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User Guide

Selenio™ VMG

Element Manager

Release 3.7

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Contact Information
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SelenioTM VMG Element Manager User Guide document history

Part Number	Software Release	Release Date	Changes
250-0343-01 Rev A	3.7	04/16/2015	• Updated release number references • Included additional EBP explanations
250-0334-01 Rev A	3.6.3	03/23/2015	• Updated release number references • Reformatted title page and color for new branding
250-0333-01 Rev A	3.6.2	Dec 2014	• Support for software upgrade from HTTP URL.
250-0281-01 Rev A	3.6.1	7/24/14	• **NOTE: Release 3.6.1 provides support for both TCMs and VPMs. However, the VMG chassis may only contain TCMs or VPMs; these cards cannot be combined in the same chassis.** • Support for upgrade and restore DB from local file, from GUI (for both system and AMP). • Function to Restore DB now added to GUI. • Support for modification of input resolutions: AVTX (720p). • Support for Audio PID only tracking for MBR and PIP TSs. • Audio only MUX and language descriptor modification. • New Bulk Configuration Tool spreadsheets. • Enhanced elementary stream management
250-0265-01 Rev A	3.6.0	4/30/14	• **NOTE: Release 3.6.0 reinstates support for VPMs. TCMs are not supported in this release.** • Teletext data control for VTX/AVTX/MBR transport. • Elementary Stream access from program mapping. • Program search through Inputs or Outputs.
250-0245-01 Rev A	3.5.1	12/20/13	• Global PMT Update • India time zone added. • New GOP configuration for VTX, AVTX, VTX+PIP, AVTX+PIP. • Option to force output vertical resolution to 1080i. • **NOTE: Release 3.5.1 does not support VPMs.**
250-0225-01 Rev A	3.5.0	8/19/13	• MBR Config for 50-frame IDR, white line masking. • **NOTE: Release 3.5.0 does not support VPMs.**

250-0208-01 Rev A	3.3.0	5/15/13	• ESAM support, including:
			  • In-band splice immediate CUE handling.
			  • Insertion of asynchronous blackout events.
			  • GUI selection to drop or process CUE if POIS server times out.
			  • NOOP POIS notification handling.
			• UTC time zone added.
			• Ability to set identical S, G, UDP port on 'mirrored' output ports.
			• **NOTE: Release 3.3.0 does not support VPMs.**

250-0189-01 Rev A	3.2.0	4/1/13	• ESAM support for MBR streams: selectable SCTE-35 cues. • Support for assignment of unique UDP port on the TS output through mirrored ports. • Support for lower Dolby Digital Plus bitrates. • Updated screen captures, to show new guide text for associated configuration screens. • SCTE-20 ingest support. • CEA-708 pass-through support. • **NOTE: Release 3.2.0 does not support VPMs.**

Selenio^{TM} VMG Element Manager User Guide document history (Continued)

Part Number	Software Release	Release Date	Changes
250-0175-01 Rev A	3.1.3	11/17/12	• Updates compliant with VMG-14+ hardware modifications, and minor screen display modifications. • Decimal mark updates for TS bitrate entries and Dolby advanced decode parameters. • **NOTE: Release 3.1.3 does not support VPMs.**
250-0165-01 Rev A	3.1.2	8/31/12	• EBP function now available for Global Transcode configuration. • **NOTE: Release 3.1.2 does not support VPMs.**
250-0161-01 Rev A	3.1.1	7/20/12	• MBR Grooming: updated resolution options. • Software upgrade enhancements. • Global quality of service controls for transcoding. • New displays: hardware, software, driver information in chassis view. • New audio worksheet in Bulk Configuration Tool. • **NOTE: Release 3.1.1 does not support VPMs.**
250-0153-01 Rev A	3.1.0	5/11/12	• New SNMP traps (including service-impacting). • 2-audio|2-data, and 4-audio|4-data configurations. • Support for E-AC-3. • New ES Performance Monitoring. • Redundant Output Option for VTX, AVTX, PIP, and VTRv transport streams. • **NOTE: Release 3.1.0 does not support VPMs.**
250-0148-01 Rev A	3.0.3	2/27/11	• New SDT pass-through for MBR transport streams. • GigE Addressing: One-IP and Three-IP modes.
250-0141-01 Rev A	3.0.1	11/30/11	• Reset grooming output. • Regroom output. • 32-character support for outbound TS name and MBR group name, input and output TSs, input and audio profile IDs.
250-0131-01 Rev A	3.0.0	10/15/11	• AC-3 Transcoder. • AMP enhancement: audio pass-through, transcoding updates. • MBR bitrate updates • Async data bitrate for AVTX+PIP, VTX+PIP, AVTX, and VTX. • Small resolution support (control for closed captioning). • Virtual MAC removed; new physical IP address fields for GigE port configurations.
250-0130-01 Rev A	2.5.2	09/16/11	• Additional resolutions for SD MBR transport streams. • Information about IP address configuration for management interface.
250-0112-01 Rev A	2.5.1	08/19/11	• New MBR-TS grooming settings, HD and SD. • Audio Codec tables inserted. • Terminology: from MBR-PIP, to transcoded+PIP. • New Bulk Configuration option from Configuration menu.
250-0102-01 Rev A	2.5.0	07/11/11	• VMG-8 Support • Enhanced audio transcoding • Audio transcoding support for non-MBR TSs • AMP upgrade through GUI
250-0071-01 Rev A	2.2.1	10/18/2010	• GUI enhancements: removed *PIP Required* option from SD and HD in new program creation.

Selenio^{TM} VMG Element Manager User Guide document history (Continued)

Part Number	Software Release	Release Date	Changes
250-0044-01 Rev E	2.2.0	09/24/2010	• Added video ES bitrate hunting feature • HD horizontal resolution enhancements • On-the-fly output TS modification support • PIP Support • MCTF support
250-0095-01 Rev A	2.4.0	04/21/11	• Added MBR transport streams with audio transcoding • Output port mirroring support • AFD support • Inter-chassis IDR support
250-0044-01 Rev B	1.1.1	04/15/2009	Production Release
250-0044-01 Rev D	2.1.0	03/10/2010	• Rebranded product name • Initialization procedure enhancement • Upgrade enhancements • Input and Output PID management enhancements • NPM fast failover reduction • Bypass transrater enhancements • PIP support • MMC support • DVB SI support • Program redundancy functionality • SNMP support • Transcoding functionality and support
250-0071-01 Rev B	2.2.2	02/02/2011	• User-defined video scaling in HD to SD down-conversion. • SCTE 20 support. • Removed IDR from H.264 PIP streams. • Support for full resolution transcoding with no IDR. • Added MBR-PIP transport streams.

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CHAPTER 1

Introduction

The Selenio^TM Video Multiprocessing Gateway (Selenio^TM VMG) from Imagine Communications delivers the industry's highest density digital video solution for multi-screen audio/video transcoding, grooming, statistical multiplexing, and transrating. Based on a flexible, scalable, and modular platform, the Selenio VMG expedites deployments of advanced video services and simplifies operation and management, while reducing operational and capital costs.

Receiving input through its Gigabit Ethernet (GigE) interfaces, this advanced product can simultaneously support standard definition (SD) and high definition (HD) program services. One chassis can simultaneously perform switching, and grooming, in addition to real time transcoding.

The Selenio VMG is fully MPEG-2 and H.264 compliant and interoperable with leading cable and telecom industry equipment.

The Selenio VMG makes configuration more intuitive and simple by providing the *Selenio VMG Element Manager,* an easy-to-use Java-based graphical user interface (GUI) accessible through a standard Web browser

Document Organization

The chapters in this document are arranged to provide the reader with a logical progression of the tasks involved in configuration and usage of the Selenio VMG.

This guide is organized as follows:

- Chapter 1, *Introduction* **–** (this chapter) describes the contents and conventions used in the Selenio VMG Software User Guide.
- Chapter 2, *Overview* **–** provides information about the features and capabilities of the Selenio VMG.
- Chapter 3, *Selenio VMG Element Manager* **–** provides an overview of the Java-based *Selenio VMG Element Manager.*
- Chapter 4, *System Configuration* **–** describes Selenio VMG setup and configuration.
- Chapter 5, *Video Processing Overview* **–** describes interfaces, transport streams, programs and grooming, transrating, transcoding, and program redundancy.
- Chapter 6, *Input Transport Streams* **–** describes input transport stream configuration and management.
- Chapter 7, *Single Video Transport Streams* **–** describes standard output transport stream configuration and management.
- Chapter 8, *Transcoded+PIP Transport Streams* **–** describes transcoded+PIP output transport stream configuration and management.
- Chapter 9, *Multi-Bitrate Grooms* **–** describes MBR output transport stream configuration and management.
- Chapter 10, *Bulk Configuration* **–** contains information about how to access and use the Bulk Configuration Tool from the *Selenio VMG Element Manager.*

- Chapter 11, *Event Signaling and Management* **–** describes Selenio VMG implementation of ESAM. Use this chapter to find out how to set ESAM parameters from the *Selenio VMG Element Manager* and apply your settings to an MBR transport stream.
- Chapter 12, *Advanced Grooming Applications* **–** describes program redundancy and elementary stream management/PID management.
- Chapter 13, *Module Redundancy* **–** provides details of the Network Processor Module (NPM), Video Processor Module (VPM), and Transcoding Module (TCM) software related redundancy features.
- Chapter 14, *Monitoring* **–** describes how to use the Selenio VMG performance monitoring tools at the Selenio VMG *Element Manager.*
- Chapter 15, *System Maintenance* **–** describes Selenio VMG system maintenance.
- Chapter 16, *System Alarms and Events* **–** discusses the methods used to monitor the health of the Selenio VMG.
- Chapter 17, *Troubleshooting* **–** describes Selenio VMG troubleshooting procedures and Customer Support contact information.
- Appendix A, *Configuration Reference* **–** provides lists of bitrates and resolutions, to reference for configuration purposes.
- Appendix B, *Selenio VMG Alarms and Events* **–** provides a list of Selenio VMG alarms and events, their categories, and severity levels.
- The glossary and index are available, for quick reference.

Document Audience

This guide is intended for system administrators and operators who are responsible for configuration and maintenance of the Selenio VMG and for processing network broadcasts. Users of this guide should be familiar with general video and networking terminology, and should be accustomed to basic network software configuration.

Most importantly, the user must be familiar with the basics and principles of broadcast network processing.

Related Documentation

- *Video Multiprocessing Gateway, Element Manager User Guide.*
- *Video Multiprocessing Gateway, Selenio VMG-8: Hardware Setup Guide.*
- *Video Multiprocessing Gateway,* Selenio VMG-*14: Hardware Setup Guide.*
- *Video Multiprocessing Gateway, VMG-14+ Hardware Setup Guide.*
- *Video Multiprocessing Gateway Software Release Notes.*

Document Conventions

Table 1 provides an easy way to recognize information of particular importance in this manual.

Table 1.   Document Conventions

When you see:	It means:
	Note: This points out information that may not be part of the text but provide tips and other helpful advice.
	Caution: This provides an alert to an action that may have undesirable consequences if the instructions are not followed correctly. Cautions also indicate that failure to follow guidelines could cause damage to equipment or loss of data.
	Warning! This shows that failure to take the necessary precautions or to follow guidelines could cause harm to equipment and personnel.
	Navigation tip: follow the path alongside the pointer to navigate to a specific option. Because many functions can be accessed via various methods, this section provides navigation information associated with the GUI menus and, as applicable, quick keys and toolbar icons.
Clicking any blue link takes you to the item to which the link refers.	

Graphics

In some cases the images shown in this manual may differ slightly from what appears on screen and on the actual product.

All efforts have been made to ensure that the latest images are used. In all cases, the functionality described is current at the time of writing.

CHAPTER 2

Overview

The Video Multiprocessing Gateway (Selenio VMG) from Imagine Communications is the industry's first high density, carrier class platform that delivers advanced standard definition (SD) and high definition (HD) MPEG-2 and H.264 video processing, including advanced ad insertion and transcoding solutions. The Selenio VMG platform enables video service operators to deploy the next generation of video services.

In This Chapter:

- "Selenio VMG Architecture," next.
- "High-Availability and Redundancy" on page 23.
- "Software Features and Capabilities" on page 24.

Figure 1.   Selenio Video Multiprocessing Gateway Systems

VMG 14+   **VMG 14**   **VMG 8**

Selenio VMG Architecture

The Selenio VMG architecture combines the Selenio VMG hardware and *Element Manager* software described in this section.

Hardware Architecture

The Selenio VMG product line delivers advanced video and audio processing solutions on a modular carrier-class platform that is designed to scale to the telco and cable service provider video processing and ad insertion requirements. The Selenio VMG product line consists of the Selenio VMG-14+, VMG-14, VMG-8, and VMG-6 products that offer cable and telco operators more flexibility in deploying the

next generation of video processing applications in terms of size and density requirements. Selenio VMG systems offer identical functionality by virtue of running the same software and sharing the same hardware modules:

Selenio VMG System Software:

• Selenio VMG *Element Manager*

Hardware Modules:

• Network Processing Module: NPM
• Application Modules:
  – Video Processing Module: VPM
  – Transcoding Module: TCM
  – Application Media Processor: AMP

Key differences between the system platforms are as follows:

• The VMG-14+ or VMG-14 can accommodate up to twelve application slots
• The VMG-8 can accommodate up to six application slots.
• The Selenio VMG-6 can accommodate up to four application slots.

For more information on the Selenio VMG hardware platform, please refer to "Related Documentation" on page 19.

Additionally, the simplified architecture of the Selenio VMG provides full processing scalability designed to grow with your environment. Just as the high density of the Selenio VMG is an ideal solution in a centralized environment, its scalability also offers an equally compelling solution for distributed video processing environments where density requirements vary. Figure 2 shows how the Selenio VMG fits within the network architecture.

Figure 2.   Centralized and Distributed Network Architecture
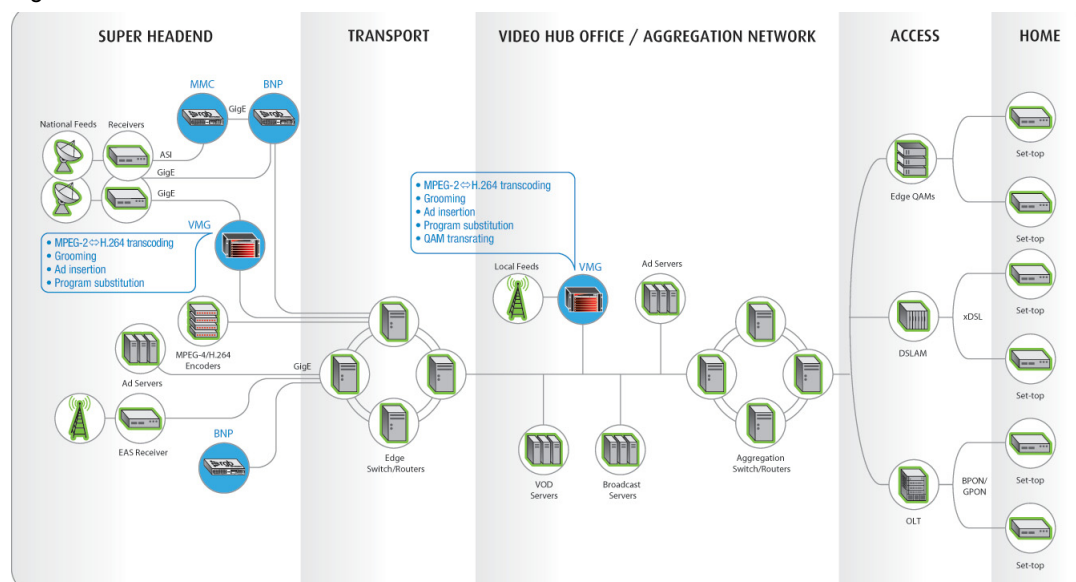
Software Architecture

The *Selenio VMG Element Manage*r is a Java Web Start-based user interface that supports Microsoft Windows™, Unix, and Apple™ operating systems. The *Selenio VMG Element Manager* communicates with the Selenio VMG using the XML-RPC protocol and provides automatic chassis status updates, such as the current chassis view, and chassis alarms and events. Multiple *Element Manage*r user interfaces are supported for managing a single Selenio VMG.

The *Selenio VMG Element Manager* user interface is divided into three layers:

- XML-RPC Client: handles communication with the XML-RPC server running on the Selenio VMG.
- User Interface Model: defines the Application Programming Interface (API) used to access the Selenio VMG data objects and configuration logic.
- User Interface Screens (or Widgets): provides the windows that are displayed to operators using the *Element Manage*r GUI.

Figure 3 shows the *Selenio VMG Element Manager* interface architecture model.

Figure 3.   *Element Manager* Interface Architecture
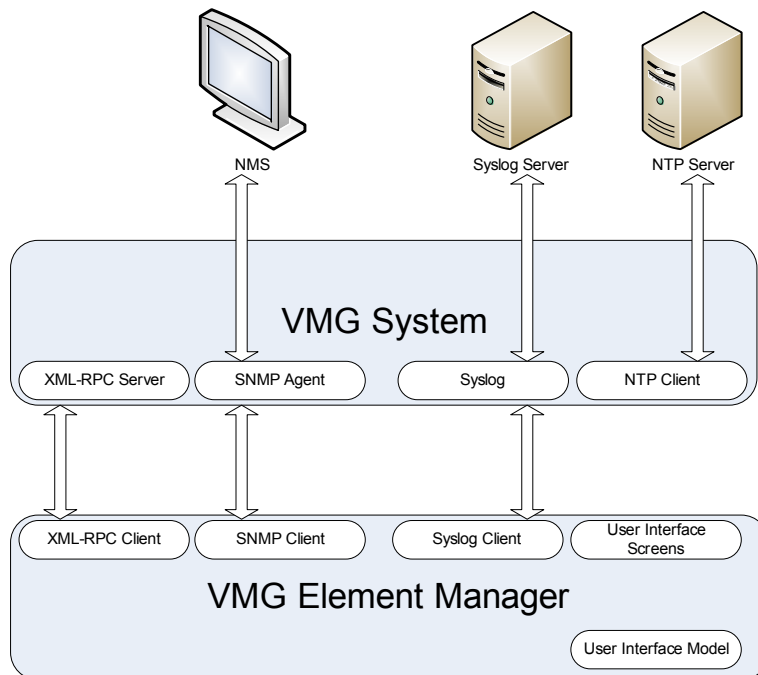
High-Availability and Redundancy

High availability and redundancy refer to the duplication of critical components within a system in order to prevent downtime in the event a primary component fails.

The Selenio VMG redundancy implementation guarantees high availability of services provided by the Selenio VMG platform. It is designed with the goal of a high availability of carrier-class service through both hardware and software implementations, including chassis redundancy, NPM and AMP 1:1 redundancy, and N+M redundancy for the VPM and TCM cards. Refer to Chapter 13, "Module Redundancy" for more information.

Software Features and Capabilities

Key Selenio VMG system software features and capabilities are listed in Table 2.

Table 2.   System Software Features and Capabilities

General	MPEG-2 and H.264 video program distribution through MPEG-2TS / UDP / IP / GigE, or through MPEG-2TS / RTP / UDP / IP / GigE with or without Pro-MPEG COP3r2 FEC coding.

Input/Output	• MPEG-2 input and output transport stream (TS) unicast and multicast.
	• DVB SI input and output transport stream support.
	• Support for:
	  - H.264 SD / HD or MPEG-2 SD / HD video programs.
	  - Mixed Mode: Multiple programs types (MPEG-2 or H.264) to be carried by one output transport stream.
	  - Up to eight GigE interfaces and one of two 10 GigE interfaces per NPM.
	  - Mirroring all output on one GigE interface (port) to another GigE interface.

Stream Processing	• Support for input transport stream network de-jittering. • Program grooming with different combinations of input programs. • MPEG-2: TS statistical multiplexing for MPEG-2 and H.264 video content, and video program digital ad insertion based on SCTE 30 and SCTE 35. • H.264: Video program digital ad insertion with constraints per SCTE 128 and DVS714r3. Picture in Picture (PIP) support. • Input and Output PID management. • Bandwidth utilization monitoring and analysis. • PSI generation, PSIP and DVB-SI data parsing, re-construction, and pass-through. • FEC decoding and encoding on input and output streams.

Video Processing	• MPEG-2 video stream transrating with manageable video quality and best bandwidth efficiency.
	• Support on each VPM for:
	  - Grooming and statistical multiplexing for SD or HD video program streams (MPEG-2 and H.264).
	  - Simultaneous transrating for MPEG-2 SD or HD video program streams.
	• Support on each TCM for:
	  - Transcoding of input programs from MPEG-2 to output of H.264 Single Program Transport Stream (SPTS).
	  - Transcoding of input programs from H.264 to output of MPEG-2 Single Program Transport Stream (SPTS).
	  - CBR rate conversion of MPEG-2 to MPEG-2 and H.264 to H.264 output TSs.
	• Input and output support for:
	  - MPEG-2 single program transport streams (SPTSs) and multiprogram transport streams (MPTSs).
	  - Constant bitrate (CBR) or variable bitrate (VBR) of MPEG-2 and H.264 video streams.
	• Support for Active Format Description (AFD)-based aspect ratio conversion and forwarding.
	• Support for high density transcoding: SD to SD and SD to PIP.

Audio Processing	Audio transcoding support for the following codecs: HE-AACv1, HE-AACv2, AAC-LC, MPEG-1 LII, MPEG-2 LII, AC-3 (Dolby Digital), and E-AC-3 (Dolby Digital Plus).

Table 2.   System Software Features and Capabilities (Continued)

Control Interface	• Web browser-based GUI for system configuration, control, and management. Also, software upgrade options—via FTP, Local System File, or HTTP URL—via the GUI, and database backup and FTP- or locally-based restoration via the GUI.
	• Support for:
	   - Drag-and-drop grooming using the Element Manager.
	   - Remote Authentication Dial In User Service (RADIUS) and Terminal Access
	   - License keys for all Selenio VMG features, with options to add licenses.
	   - SNMP v1: MIBs available for download from the Element Manager home page.
	• Controller Access Control System Plus (TACACS+) for administrative access control.
	• Management of local accounts and interaction with one or more AAA servers.
	• Multi-tiers of password protection within the Element Manager interface for different user access levels.

Redundancy	• Design for high availability of carrier-class service, service level and card redundancy. • Support for four (in the VMG-6), six (in the VMG-8), or 12 (in the VMG-14) application modules (TCM, VPM, AMP) with in-chassis module redundancy support. • Up to two Network Processor Modules (NPMs) configured in 1:1 redundancy for video over IP network routing, switching, and filtering. • Up to two Application Media Processors (AMPs), each mated to an NPM and configured in 1:1 redundancy, for audio transcoding. • Support for input-level program redundancy. • Support for output GigE interface redundancy.

Multi-Bitrate Video and Audio Transcoding for Adaptive Streaming Applications

Adaptive streaming and "over the top" video delivery technologies now represent a key option available to video service providers to leverage IP networks to the home and to make content available on PC and mobile devices such as Apple's iPad.

The Selenio VMG represents a key component in an adaptive streaming architecture in that it allows for real-time audio transcoding (through the AMP module) and video transcoding (through the TCM module). The TCM allows a multi-profile transcode operation where an HD or SD input received over MPTS or SPTS can be configured to an H.264 output complying with PC/mobile device video requirements. Requirements include the definition of a "group" of output profiles, all of which are synchronized with aligned IDR frames.

Selenio VMG input and output protocol format is typically MPEG-2 transport stream, and the output is typically received by a downstream "fragmenter" device, such as Imagine Communications' Telurio^TM Packager, for protocol conversion and possible encryption for secure content to be made available to the appropriate receiving device.

Key Selenio VMG features for multi-bitrate transcoding
• Video transcoding from HD or SD inputs and up to 48 H.264 all-progressive outputs per TCM module with varying resolutions and encoding parameters.
• Audio transcoding from MPEG-1 LII, MPEG-2 LII, AAC-LC, HE-AACv1, HE-AACv2, or AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus), to MPEG-1 LII, MPEG-2 LII, AAC-LC, HE-AACv1, HE-AACv2, or AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus).

MPEG-2 and H.264 Grooming and PSIP

Grooming refers to the process of grouping specific programs and services into different levels for end-users (e.g., creating customized channel lineups based on the available input programs). Grooming must be done to prevent potential conflicts with any current packet identifiers (PIDs) and Program and System Information Protocol (PSIP) data. PSIP data is comprised of a set of descriptive tables, associated with digital television (DTV) transport streams, that provide program guide information about the broadcasters services and programming. The Selenio VMG preserves incoming PSIP data and only reads the information to check for conflicts. If conflicts are found, the user is alerted.

Selenio VMG Grooming and PSIP features

- Allows selection of any GigE input SPTS or MPTS program to combine with one or more programs from any other input to create an MPTS multiplex on any output port.
- Supports Main and High profile H.264 encoded video for grooming and statistical multiplexing.
- Allows drag-and-drop grooming through the *Selenio VMG Element Manager.*
- Dynamic service grooming supported, with scheduling of start time, end time, and day of the week.
- Synchronization of input and output program names.
- PSIP based on the ATSC A/65 standard supported.

Refer to Chapter 7, "Single Video Transport Streams" and Chapter 8, "Transcoded+PIP Transport Streams" for more information.

MPEG-2 and H.264 Multiplexing

Multiplexing is used to combine multiple data sources such as video, audio, and data, into a single source. This is normally done to transmit multiple video programs over a single bandwidth-limited carrier medium, such as fiber or coax, to end-users. Multiplexing several variable bitrate streams together into a fixed sized transport stream bandwidth is called statistical multiplexing and helps to increase the overall efficiency of a multi-channel digital transmission.

Selenio VMG multiplexing features

- Support for transport stream-level multiplexing CBR or VBR programs from SPTS and MPTS input transport streams to an MPTS output stream.
- Support for de-multiplexing multiple MPTSs into smaller SPTSs or MPTSs.
- PID re-mapping/PID-aliasing to prevent PID conflicts in the MPEG-2 output transport stream.
- Allows program stream creation with up to thirty-two PIDs: only one can be video, the rest a mix of audio and data.
- MPEG-2 transport stream timing accuracy: PCR correction with tolerance within ±500ns.
- Generation and insertion of new PSI tables (PAT and PMT).
- PSI insertion repetition rate is MPEG-2 system specification compliant: the VPM default is 67ms and not programmable.

Refer to Chapter 5, "Video Processing Overview" through Chapter 12, "Advanced Grooming Applications" for more information.

MPEG-2 Transrating

Transrating, or rate shaping, is the process of changing the bitrate of a video stream for the purposes of improving bandwidth and system efficiency. This includes converting variable bitrate (VBR) to constant bitrate streams (CBR), as well as transrating the streams. The use of transrating removes the need for additional decoders and encoders in order to change the bitrate of a video stream.

This function is processed by the VPM to provide VTR services.

Selenio VMG Transrating features

• Supports processing of any MPEG-2 SPTS or MPTS inputs over IP (Unicast/Multicast).
• Supports NTSC and PAL video inputs:
  – Supports MP@ML and MP@HL MPEG-2 profiles.
  – SD resolutions: 720x480/576, 704x480/576, 544x480/576, 528x480/576, 352x480/576.
  – HD resolutions: 1080ix1920, 1080ix1440, 1080ix1280, 720px1280.
  – Frame rates: 23.976 or 24Hz, 25 or 29.97 or 30Hz, 50 or 59.94 or 60Hz.
  – Aspect ratios: 4:3 and 16:9.
  – 3:2 reverse pull down.
• Dynamic bitrate conversion and adaptation of MPEG-2 video streams:
  – CBR to VBR.
  – VBR rate clamped output.
  – VBR to VBR.
• Provides multiple QoS setting levels for each output program that is to be rate shaped:
  – Rate shaping QoS levels range from -8 to +8 with step sizes of 1.
  – +8 is for minimum relative rate reduction.
  – -8 is for maximum relative rate reduction.
• Configuration of transrating output video bitrates through GUI.
• Ability to disable transrating on any output program through GUI.
• VPM required.

Refer to Chapter 7, "Single Video Transport Streams" for more information.

Transcoding

The Selenio VMG's high capacity transcoding capabilities enable operators to deliver MPEG-2 or MPEG-4/H.264 SD or HD content from various sources to suit the type of "last mile" distribution network to the home, targeting broadcast-quality delivery to set top boxes or integrated digital tuner TV's. Typical applications include transcoding H.264 signals into MPEG-2 for existing MPEG-2 set top boxes, or transcoding MPEG-2 feeds into H.264 for IPTV or next-generation QAM delivery networks. IPTV applications also require a picture in picture (PIP) version of the full resolution (SD or HD) video stream. That stream is typically used for electronic program guides, multi-screen mosaic, and related set top box applications. The Selenio VMG is capable of generating a PIP stream alongside a full screen transcode, compliant with such popular middleware systems as Microsoft's Mediaroom.

This function is processed by the TCM to provide PIP, VTX, and VTX+PIP services.

TCM transcoding features

- Transcoding of MPEG-2 to H.264 SPTS, in HD or SD.
- Transcoding of H.264 to MPEG-2 SPTS, in HD or SD.
- Transcoding of MPEG-2 to MPEG-2, in HD or SD.
- Transcoding of H.264 to H.264, in HD or SD.
- Integrated HD to SD downconversion.
- H.264 PIP generation, with SD or HD inputs in either MPEG-2 or H.264 formats.
- TCM required.

Refer to Chapter 7, "Single Video Transport Streams" and Chapter 8, "Transcoded+PIP Transport Streams" for more information.

Forward Error Correction (FEC) Coding

Due to video's inherent low tolerance for transmission errors, delivering high quality IPTV video services over IP transport networks to digital set-top box decoders can be challenging, the access portion of the transport network being the main source for transmission related errors. These errors result in packet loss and perceptible degradation of video quality such as macro blocking, artifacts, and frame freezes from decoder under flows, the results even less desirable when viewing video in High Definition, where anything less than pristine quality is unacceptable from a subscriber perspective.

The Selenio VMG provides a simple, standards-based solution to video degradation seen as a result of transmission error packet loss. By implementing Real Time Protocol (RTP) in conjunction with Pro-MPEG CoP#3 FEC, the Selenio VMG can recover from packet errors on processed incoming broadcast video streams as well as supporting packet recovery to downstream devices.

FEC coding features and parameters

- Supports FEC generation and error correction on RTP encapsulated video packets.
  – Decodes and corrects FEC packets on input transport streams.
  – Generates FEC packets on output streams.
- Based on the Pro-MPEG CoP#3 standard.
- Supports RTP packet recovery on detection of packet loss on input video streams.
  – Uses two dimensional computed checksum received from the low bit rate channel.
  – Addition of four net filters and four UDP ports assigned for each FEC-enabled input transport stream.
- Supports RTP encapsulated video delivery in output video streams.
  – Generates two dimensional checksum on a set of RTP packets and sent over a separate out of band low bit rate UDP connection.
  – Addition of three netfilters and four UDP ports assigned for each FEC-encoded output transport stream.
  – Matrix dimension where L = width and range is between 1 and 20.
  – Matrix dimension where D = height and range is between 4 and 20.
  – L x D is less than or equal to 100.
- VPM required.

Refer to Chapter 6, "Input Transport Streams" and Chapter 7, "Single Video Transport Streams" for more information.

Program Redundancy

The Selenio VMG supports input-level program redundancy. At the detection of a missing program, the Selenio VMG automatically switches to a redundant or backup program.

In a program redundancy configuration, a switch to backup occurs when:

- Missing MPTS/SPTS streams are identified by checking the PAT.
- Missing program streams are identified by checking the PMT.

You can assign a backup program for every input program, and any input program can be assigned to back up a running primary program. The backup program can be another program on the same GigE port or it can be on a different GigE port in the same chassis.

Refer to Chapter 12, "Advanced Grooming Applications" for more information.

Port Mirroring

The Selenio VMG supports replicating (mirroring) all traffic sent out on one odd-numbered GigE port (the source port) to the next higher even-numbered GigE port (the mirrored-to port). The port mirroring functionality can serve one of two purposes:

- Capturing traffic sent out on a port for analysis by mirroring the traffic to another port.
- Support for downstream device redundancy where the outputs from a Selenio VMG are replicated across two different paths, thus allowing for greater network resiliency in the event that a downstream device goes out of service.

The source port can carry both input and output traffic; however, only the output traffic is mirrored. The output transport streams can be sent to a different IP address (for redundant output) on the mirrored-to port.

Software Serviceability

Software serviceability refers to the ability to perform software maintenance, such as upgrades, on the Selenio VMG with the least amount of hassle and down time.

Selenio VMG software serviceability features

- Remote upgrade of software using FTP, Local System File, or HTTP URL.
- Support for graceful shutdown of Selenio VMG.
- Full IP interface support on management IP address.

Refer to Chapter 15, "System Maintenance" for more information.

Database Backup and Restore

The *Selenio VMG Element Manager* provides the ability to backup all configurations stored in the Selenio VMG database and the ability to restore a backup up configuration to a current system.

Backup / Restore functionality includes:

- Remote HTTP backup using the Selenio VMG *Element Manager*.
- Remote restore of current system configuration using FTP.

- Forward configuration database compatibility for software upgrade.

Refer to Chapter 15, "System Maintenance" for more information.

Monitoring and Management

The Selenio VMG provides multiple monitoring and management tools accessible through the *Selenio VMG Element Manager*. The features listed below encompass security, asset management, system configuration, system management, system monitoring, and system diagnostics. Alarms and events allow operators to monitor the health of the Selenio VMG system and to be notified when their assistance is required. Alarms monitor and notify operators when any hardware, software, MPEG stream anomalies, or defects are caused by the Selenio VMG. Events are used to log issues that occur within the Selenio VMG system, and may be used to provide historical event information. Operator assistance may or may not be necessary depending on the severity of the alarm or event.

Selenio VMG monitoring and management features

- RADIUS and TACACS+ support for user authentication and access control.
- Three login profile levels for user accounts: Administrator, Operator, and User.
- Embedded GUI application for configuration and management supported via XML/RPC over HTTP.
- Allows configuration of an International Time Zone through the Selenio VMG *Element Manager* client interface.
- Display of audio language code during grooming.
- Basic event reporting using the *Selenio VMG Element Manager*.
- Popup window display for accessing configuration or activity details.
- Display of input and output bandwidth for each service.
- Display of input and output error statistics for each groomed elementary stream.
- Support for International variations of Daylight Savings Time (DST).
- Initialization of system software upgrade from the *Selenio VMG Element Manager*.
- Platform asset management information: software version, hardware serial numbers, and card characteristics and capabilities.
- Monitoring of port link faults and bitrate via the *Selenio VMG Element Manager*.
- Four severity levels for generated alarms: Critical, Major, Minor, and Info.
- Maintains a log for alarm triggered events.
- User sortable event log.
- Uses standard Syslog for logging service and system events.
- Full management capability via SNMP.

Refer to Chapter 4, "System Configuration" and Chapter 16, "System Alarms and Events" for more information.

Licensing

Licensing is used to enable certain-value added aspects of the Selenio VMG. The Selenio VMG supports the licensing options listed and described in "License Management" on page 306.

CHAPTER 3

Selenio VMG Element Manager

This chapter provides information about the *Selenio VMG Element Manager* which is used to configure and monitor the Selenio VMG system.

In This Chapter:

- "Selenio VMG Element Manager Overview," next.
- "Obtaining Java Runtime Environment" on page 32.
- "Launching the Selenio VMG Element Manager" on page 32.
- "Selenio VMG Element Manager GUI" on page 36.
- "Chassis Tab" on page 39.
- "Grooming tab" on page 48.
- "Monitor tab" on page 48.
- "Alarms & Events tab" on page 48.
- "Selenio VMG Version Information" on page 48.
- "Quick Keys" on page 50

Selenio VMG *Element Manager* Overview

The Selenio VMG *Element Manager* is a Java-based GUI available using a standard web browser. This easy-to-use interface offers a variety of features that simplify the setup and operation of the Selenio VMG. These features include:

- An embedded GUI application for configuration and management via XML/RPC over HTTP.
- Program level drag-and-drop grooming.
- PID Management.
- Input program redundancy.
- Output port mirroring.
- Simultaneous bitrate analysis of input and output transport streams and programs.
- Viewing of alarm and event logs.
- Module redundancy configurations.
- Full configuration of system functions and Gigabit Ethernet ports.

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About the Selenio VMG IP Address

There are two IP address types employed by the Selenio VMG:

- **Physical** (used by each NPM installed in the Selenio VMG).
- **Virtual** (used by the system as a whole, also referred to as the Management Interface).

The active NPM's physical IP address must be used to access the Selenio VMG until a virtual IP address has been configured.

To find out how to perform initial Selenio VMG configuration, refer to the Hardware Setup Guide particular to your Selenio VMG system. Once the virtual IP address is configured on the Selenio VMG, this address will be used for subsequent access to the Selenio VMG at its management interface.

Obtaining Java Runtime Environment

The *Selenio VMG Element Manager* requires that the PC on which it is running have Java™ Runtime Environment (JRE) v1.6 Update 39 or higher, or version 1.7 Update 12 or higher. If your PC does not have the correct JRE installed, it is available free from the RGB Customer Portal (see below). It would be beneficial, also, to visit the Oracle® website—at the Java Technologies pages—for additional information about secure versions.

Obtaining JRE from the RGB Customer Portal

To obtain installation instructions and the latest version of JRE that is compatible with the *Selenio VMG Element Manager,* log in to RGB's Customer Portal and search for *Download Java Runtime Environment*.

Launching the Selenio VMG *Element Manager*

The *Selenio VMG Element Manager* is pre-installed on the Selenio VMG at the factory. This section describes how to set up a session with the Selenio VMG and the *Selenio VMG Element Manager,* then log in to the *Element Manager* for management of the Selenio VMG.

Selenio VMG Home Page

The *Selenio VMG Element Manager* software is pre-installed on the Selenio VMG at the factory and is presented as a home page (Figure 4) following entry of a Selenio VMG's network address from a web browser. In addition to providing access to the *Selenio VMG Element Manger,* several other tools are accessible from the home page (Figure 4 and Table 3).

Figure 4.   Selenio VMG Home Page

Table 3.   Selenio VMG Home Page Options

Option	Use
Launch Selenio VMG Element Manager	Click to start the launch, which will present the login dialog prior to revealing the *Selenio VMG Element Manager* screen. See also "Accessing the Selenio VMG Element Manager," in next section.
Download Java	Enables quick-access to the Oracle website if you need to download the recommended version of the Java SDK to your desktop.
Show System Log	View events and error messages recorded by the Selenio VMG.
Show Build Info	View the current software version number and build number.
Download SNMP MIB Files	Not supported.
Collect Diagnostic Info for Tech Support	Generate the short system diagnostic file set.
Full Diagnostic Info for Customer Support.	Generate complete diagnostic files that can be provided to RGB Customer Support about your Selenio VMG system.
Save Running Configuration	Save the current running configuration of the Selenio VMG as a .cfg file.

Accessing the *Selenio VMG Element Manager*

1. Open a web browser from the management workstation and enter the IP address of the Selenio VMG in the browser's address field to display the *Selenio VMG Element Manager* home page (Figure 4).

2. At the *Element Manager* home page, click **Launch** Selenio VMG **Element Manager**. The Java Warning Security screen is now presented.

3. At the Java **Warning Security** screen:

    a. Click in the check box to indicate that you prefer not to see this screen again.

    b. Click **Run** to start the *Element Manager* and to access the **Log In** dialog.
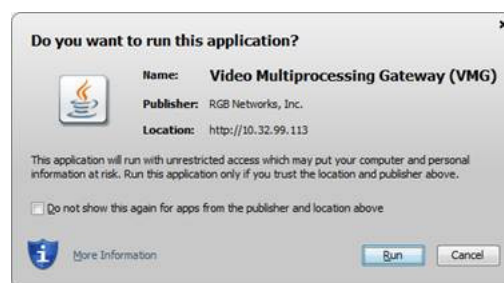
Logging in to the *Selenio VMG Element Manager*

As dependent on the type of login required—as either local login, or login via AAA server—you can either type or enter the user ID and password (Figure 5) after launching the Selenio VMG *Element Manager*.

1. At the **IP Address or Host Name***: field*, enter the **IP address** of the Selenio VMG to manage, or use that already provided in this field.

Note: *If required, you can change the Selenio VMG target to be managed, by specifying the Selenio VMG IP address or Host Name during log in. When doing this, you can avoid inconsistent Selenio VMG behavior if you ensure that the Selenio VMGs are running the same software versions. For example, if you launch Element Manager with (Selenio VMG) 10.32.96.215 at the web browser, then change the IP address to (Selenio VMG) 192.168.1.12 at the Log In dialog, these Selenio VMGs must be running identical software versions.*

Figure 5.　　Log in Screens

Local login　　　　　　　　　　　　　　　　**AAA server login**

Note: *Prior to initial configuration of the Selenio VMG, the default IP address of the NPM is set to 10.1.1.1 with a subnet mask of 255.255.255.0. However, prior to launching the Selenio VMG Element Manager, the IP address should have already been changed to an appropriate address for your specific network. For detailed information on initial configuration of the Selenio VMG, please see the Selenio VMG-6, Selenio VMG-8, or Selenio VMG-14 Hardware Setup Guides.*

2. At the **User:** field, select the user account from the drop-down list, or type the user name if using a AAA server for authentication.

3. At the **Password:** field, type the password (Table 4).

Table 4.　　*Selenio VMG Element Manage*r Default Login Reference

User	Password
Administrator	Admin
Operator	Operator
User	User

Note: *Passwords are case sensitive.*
To change a local user account password, refer to "Local Tab" on page 70. To change an AAA server password, refer to the AAA server documentation.

4. Click **Log in**.

The Selenio VMG *Element Manager* opens to reveal the graphical representation of the Selenio VMG chassis and current slot assignments, a tabular display of associated system information, and various status indicators (Figure 6). This display is dynamically updated when cards are inserted or removed. The **Refresh** option, which is always displayed in the GUI, allows you to sync the display at your convenience.

Figure 6.   Chassis tab (VMG-14+)
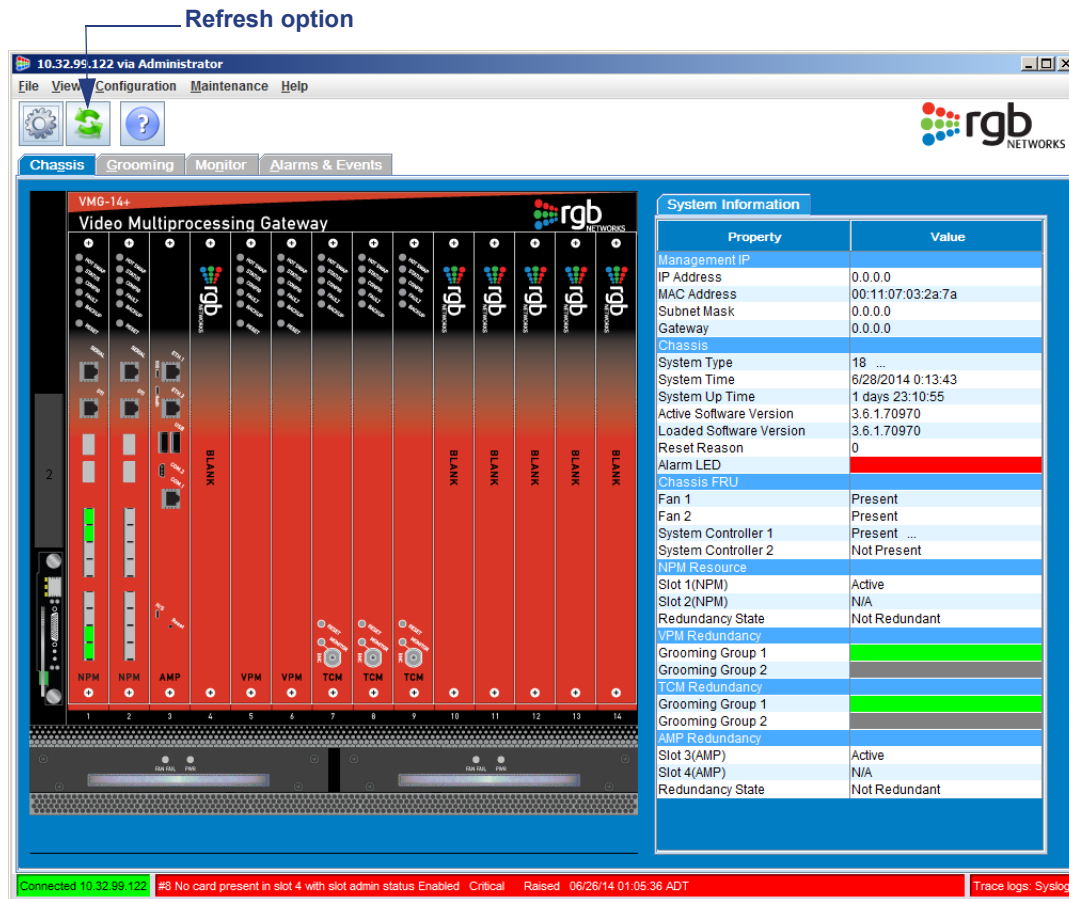
Additionally, management and control options are provided in the *Element Manager* menu, tab pages, and pop up menus throughout the *Element Manager* GUI, as described in "Selenio VMG Element Manager GUI" on page 36.

A

Selenio VMG *Element Manager* GUI

The Selenio VMG *Element Manager* provides a convenient, intuitive method for management of a Selenio VMG. In addition to numerous tools built into the interface for configuration of services, status of the Selenio VMG system is always evident via various reporting functions.

The Selenio VMG *Element Manager* GUI hierarchy consists of two main branches: tabs and menus (Figure 7). The menus and tabs reside in the GUI screen with various other functions, as described in the following topics:

- "Selenio VMG Element Manager Window" on page 37.
- "Selenio VMG Element Manager Menu" on page 37.
- "Selenio VMG Element Manager Tabs" on page 38.
- "Selenio VMG Element Manager Toolbar Icons" on page 38.
- "Selenio VMG Element Manager Status Bar" on page 39.

- "Chassis Tab" on page 39.
- "Grooming tab" on page 48.
- "Monitor tab" on page 48.
- "Alarms & Events tab" on page 48.

Figure 7.   Menus and Tabs
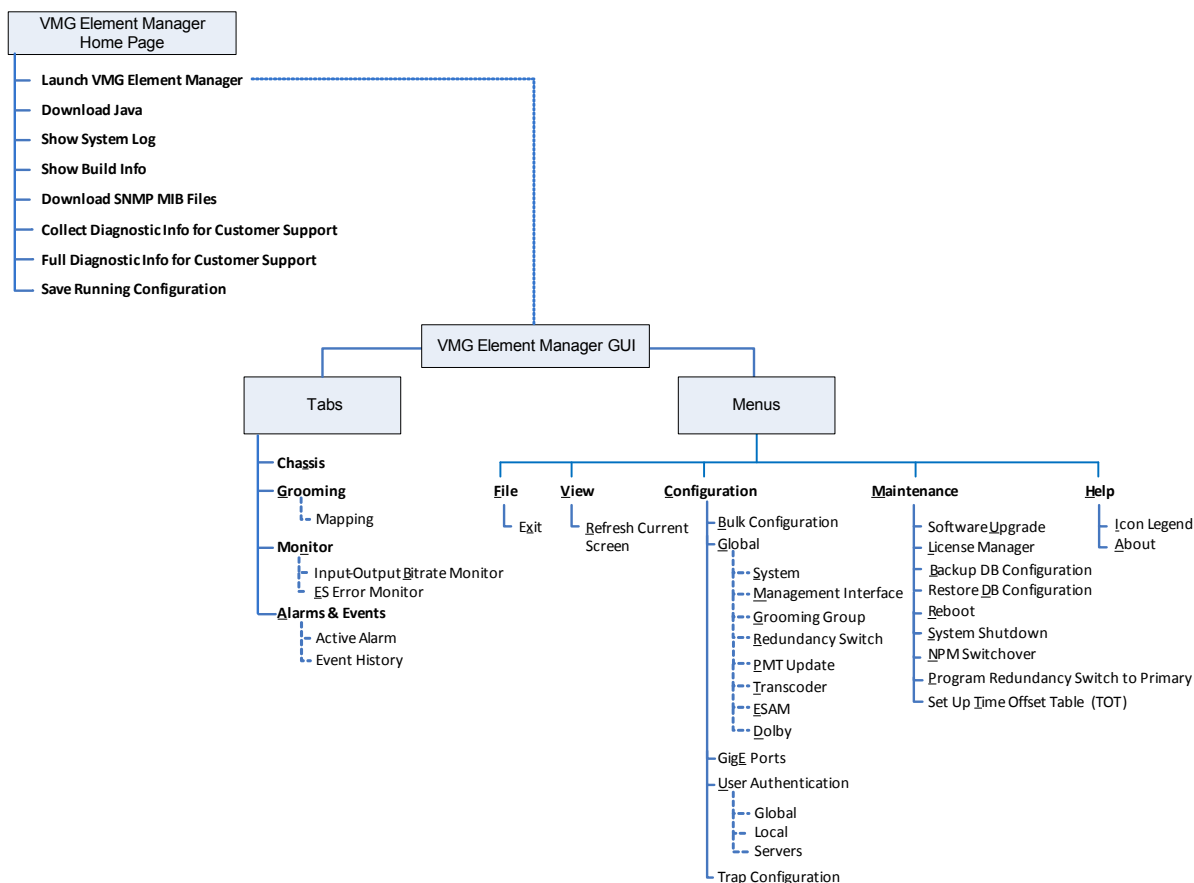
Selenio VMG Element Manager Window

The *Selenio VMG Element Manager* provides the GUI components shown in Figure 8. The menus, icons, tabs, and colors built into the GUI assist in locating the configuration functions and determining status of the Selenio VMG.

Figure 8.   *Element Manager* Window Components
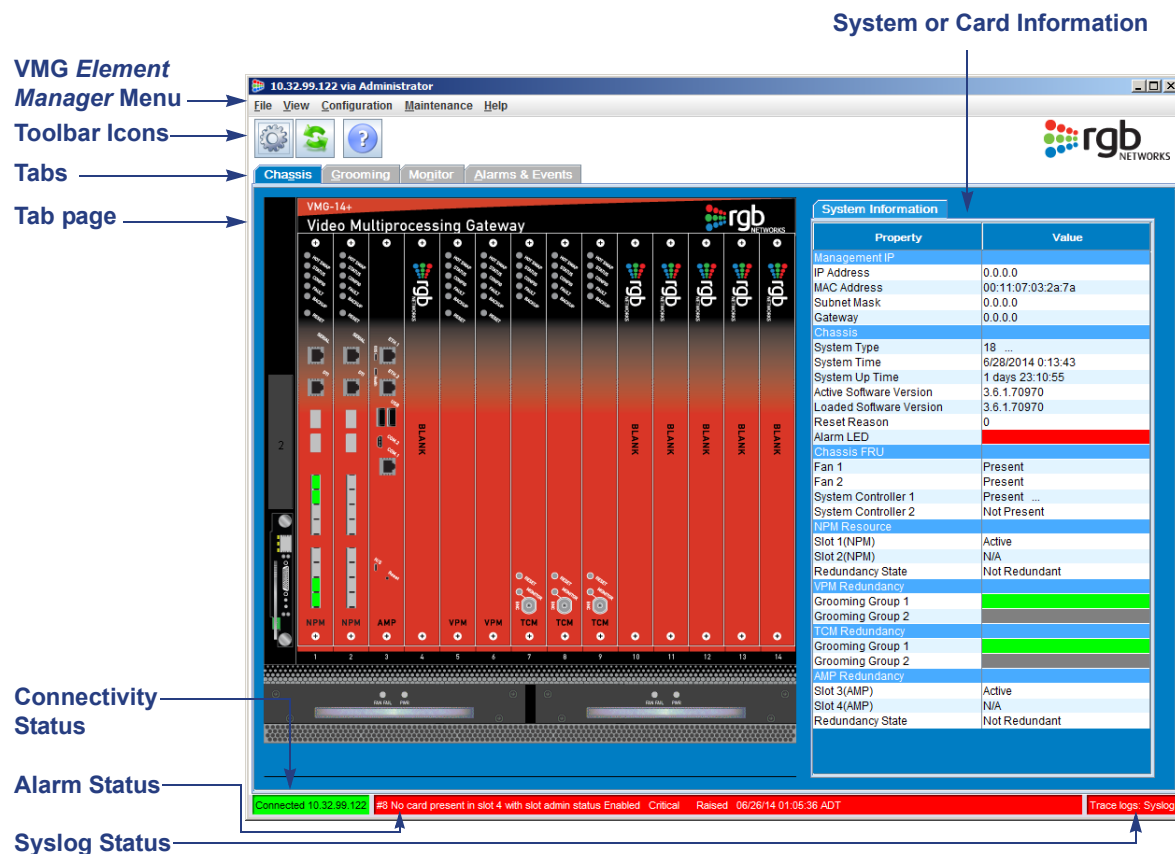
Note that the identity of the Selenio VMG and the currently logged in user is always in view at the top bar of the window. Status of the connection between the Selenio VMG and the *Element Manager* is always on display at the bottom bar, alongside the overall status of the Selenio VMG system.

Selenio VMG *Element Manager* Menu

Use the Selenio VMG *Element Manager* menu to perform configuration and maintenance tasks (Table 5).

Table 5.   *Element Manager* Menus

Menu	Use
File	Exit the Selenio VMG *Element Manager*.
View	Refresh the currently active window.
Configuration	Configure global options, Gigabit Ethernet ports, PMT Update, and user authentication. Access bulk configuration components.

Table 5.   *Element Manager* Menus (Continued)

Menu	Use
Maintenance	Upgrade software, manage licenses, backup the database, restore database information, reboot the system, shutdown the system, and perform NPM redundancy switching.
Help	Display the *Element Manager* **Icon Legend** or the **About** dialog.

Selenio VMG *Element Manager* Tabs

Use the Selenio VMG *Element Manager* tabs to perform monitoring and grooming (Table 6).

Table 6.   *Element Manager* Window Tabs

Tab	Use
Chassis	Provides a quick overview of the Selenio VMG system state. Clicking a card or port provides specific information for that item. Clicking any other part of the Selenio VMG displays system information about the Selenio VMG.
Grooming	Create and map programming.
Monitor	Monitor bitrates in real-time.
Alarms & Events	View alarms and events.

Selenio VMG *Element Manager* Toolbar Icons

Use theSelenio VMG *Element Manager* toolbar icons (Table 7) for quick access to commonly used functions.

Table 7.   *Element Manager* Toolbar Icons

Icon	Name	Use
	Global Configuration	Opens the global configuration dialog. Equivalent to **Configuration -> Global**; or Alt **c**, Alt **g** (See also "Global Configuration" on page 52).
	Refresh Current Window	Refreshes the current view. Equivalent to **View -> Refresh**; or Alt **v**, Alt **r.**
	About	Opens the Selenio VMG **About** dialog. Equivalent to **Help -> About**; or Alt **h**, Alt **a**.

Selenio VMG *Element Manager* Status Bar

The status bar at the bottom of the Selenio VMG *Element Manager* always remains in view to report status information about the Selenio VMG. Color coding (Table 7) indicates the current, highest-level severity of the situation reported for connectivity, events, or the syslog portion of the bar.

Connectivity

Status of connectivity to the Selenio VMG is reported at the left portion of the status bar, where you can view the currently connected IP address of the Selenio VMG, and current status of connectivity between the Selenio VMG and the *Element Manager* as either green (good) or red (error).

Events

Status of most critical event reported by the Selenio VMG is displayed as a text string and color code (Table 8) in the middle section of the status bar. Refer to Appendix B, *Selenio VMG Alarms and Events* – for information about messages you may see in the status bar.

Table 8.   *Element Manager* System Status

Color		Meaning
Green		Informational alert or event.
Yellow		Minor alert or event may require operator action.
Pink		Major alert or event requires operator action.
Red		Critical error has occurred and operator intervention is needed.

Syslog

Status of trace logging from the Selenio VMG is reported at the right portion of the status bar. Current status is color-coded as either green or red (Table 9).

Table 9.   *Element Manager* Syslog Status

Color		Meaning
Green		The trace logs reported to syslog are enabled at normal logging levels.
Red		The trace logs reported to syslog are enabled at increased logging levels, and may result in Selenio VMG performance issues.

Chassis Tab

The Selenio VMG *Element Manager* automatically detects the chassis hardware and provides a graphical display of the product components, current status, and general system information (Figure 6).

Except for setting the administrative state of a card, information on the **Chassis** tab screen is displayed for informational purposes only.

- When moving the cursor over a port on the screen, the name of the port is displayed, indicating that details about that port are viewable.

- Clicking with the left mouse button displays the information about the selected Gigabit Ethernet port.
- All active ports appear green on the screen.

Chassis Tab Menus

At the **Chassis** tab page, you can access popup menu options from the components displayed in the Selenio VMG chassis (Figure 9 and Table 10). These popup menus allow access to module details, administrative settings, and reset functions.

👉	**Menu Path**	Right-click on a card or the system to access its popup menu.
	Quick Keys	Not applicable

Figure 9.   Accessing Slot Information
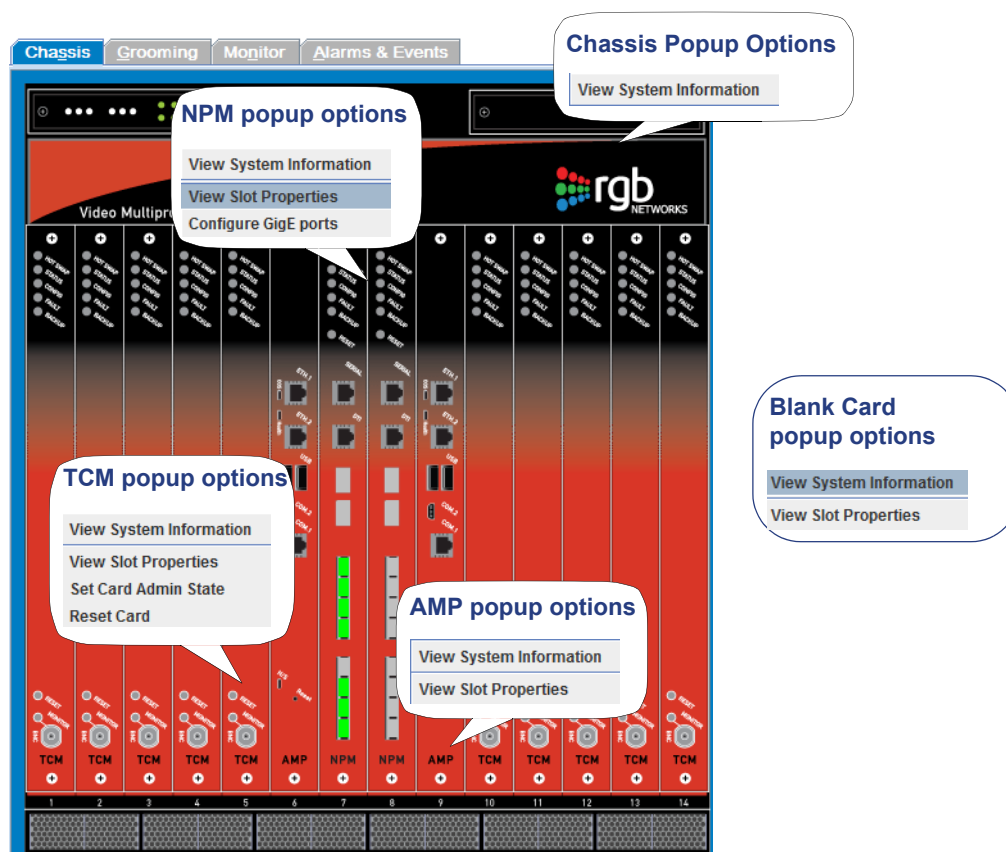
Table 10.   Selenio VMG Chassis Popup Menus

Component	Options
Chassis	View System Information (see also "Selenio VMG System Information" on page 41).
NPM	View System Information, View Slot Properties, Configure GigE Ports.
AMP	View System Information, View Slot Properties.
TCM	View System Information, View Slot Properties, Set Card Admin State, Reset Card (see also "Card Information" on page 45).
VPM	

Table 10.   Selenio VMG Chassis Popup Menus (Continued)

Component	Options
Blank Card	View System Information, View Slot Properties.
GigE port	View System Information, View Slot Properties, Configure GigE Ports (see also "Port Information" on page 46).

Selenio VMG System Information

To access the comprehensive Selenio VMG chassis **System Information** table, make sure the **Chassis** tab page (Figure 10) is in view.

	Menu Path	Right-click on the system or a card --> select **View System Information** from the popup menu.
	Quick Keys	Not applicable.

Figure 10.   System Information Tab
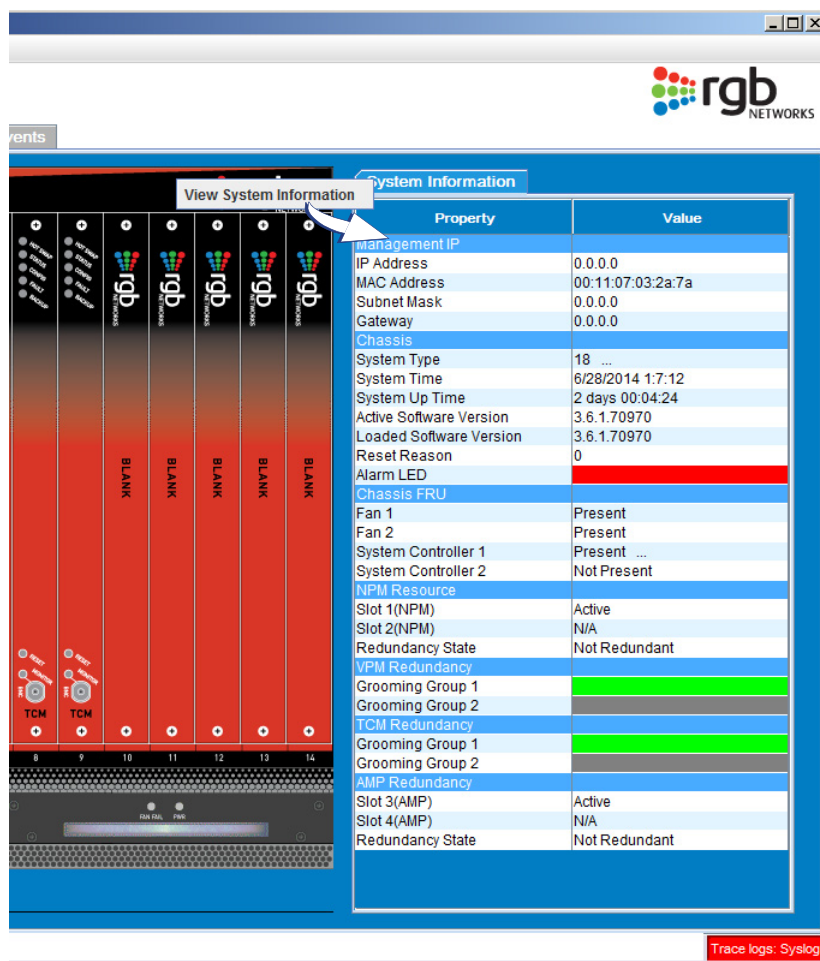
The chassis system information is displayed in the table alongside the chassis graphic, and described in the following topics:

• "Management IP," next.

• "Chassis" on page 42.

Management IP

The Management IP information for the managed Selenio VMG consists of properties listed in (Table 11).

Table 11.   Chassis: System Information: Management IP

Property	Value
IP Address	Virtual IP address of the system. • If this hasn't been configured in the *Global Configuration -> Management Interface* tab, this field will be empty.
MAC Address	MAC address of the system.
Subnet Mask	Subnet mask of the system. • If this hasn't been configured in the *Global Configuration -> Management Interface* tab, this field will be: empty.
Gateway	The IP address of the gateway. • If this hasn't been configured in the *Global Configuration -> Management Interface* tab, this field will be: 0.0.0.0

Chassis

The chassis information for the managed Selenio VMG consists of properties listed in (Table 12).

Table 12.   Chassis: System Information: Chassis

Property	Value
System Type	The chassis type (e.g., 14-slot). Note: Double click the ellipses (...) to retrieve the serial number of the chassis.
System Time	The current system time.
System Up Time	Amount of time that the chassis has been powered on.
Active Software Version	Version of the software currently running on the system.
Loaded Software Version	Specifies the latest downloaded version of the software currently residing on the system disk. This version will become the active version at the next system reboot.
Reset Reason	The reason for the last system reset. Used for troubleshooting purposes when reporting to customer support.
Alarm LED	Displays the color of the highest alarm currently active in the system.

Chassis FRU

The chassis FRUs for the managed Selenio VMG consists of properties listed in (Table 13).

Table 13.   Chassis: System Information: Chassis FRU

Property	Value
Fan *n*	Indicates if fan is present in the system.
Power *n*	Indicates if power module is present in the system.
System Controller *n*	Indicates if system controller is present in the system.
SAP	Indicates if shelf alarm panel is present in the system. SAP is displayed only for VMG-6 and VMG-14 systems; not applicable for VMG-8.

NPM Resource

Current NPM installation information (Table 14).

Table 14.   Chassis: System Information: NPM Resource

Property	Value
Slot 1(NPM) Slot 2(NPM)	Shows if there is an NPM installed. This pertains to the current redundancy state of the VMG system, as applicable for the NPM slots: • VMG-14+: slots 1 and/or 2. • VMG-14: slots 7 and/or 8. • VMG-8: slots 1 and/or 2. **If one NPM,** choice are: *Not Redundant* or *N/A* (empty slot)*.* **If two NPMs,** choices are: *Active*, *Standby*, or *Disabled.*
Redundancy State	Shows Redundancy state: • **If one NPM,** or the standby NPM has failed, value is: *Not Redundant*. • **If two NPMs** are fully operational, choices are: *Fully Redundant* or *Not Redundant.*

NPM Redundancy

Current NPM redundancy configuration and state information for the managed Selenio VMG consists of properties listed in (Table 15).

Table 15.   Chassis: System Information: NPM Redundancy

Property	Value
Grooming Group 1	Provides color coded and text redundancy status information on available bandwidth for all cards in grooming group 1 (the 8x1 GigE ports). Color codes are: • **Green**: Less than 70% capacity utilized. • **Yellow**: Greater than 70% capacity utilized. • **Orange**: Greater than 90% capacity utilized. • **Red**: Card is at 100% capacity; no more streams will be allocated to this card. Hover over a color block to view percent of utilization.
Grooming Group 2	Provides color coded and text redundancy status information on available bandwidth for all cards in grooming group 2 (either 10 GigE1 or 10 GigE2). Color codes are: • **Green** – Less than 70% capacity utilized. • **Yellow** – Greater than 70% capacity utilized. • **Orange** – Greater than 90% capacity utilized. • **Red** – Greater than 100% capacity utilized; some output TSs are currently unassigned. Hover over a color block to view percent of utilization.

See also Chapter 13, "Module Redundancy," for more information about NPM redundancy.

VPM Redundancy

Current VPM redundancy configuration and state information for the managed Selenio VMG consists of properties listed in (Table 16):

Table 16.   Chassis: System Information: VPM Redundancy

Property	Value
Grooming Group 1	Provides color coded and text redundancy status information on available bandwidth for all cards in grooming group 1 (the 8x1 GigE ports). Color codes are: • **Green**: Less than 70% capacity utilized. • **Yellow**: Greater than 70% capacity utilized. • **Orange**: Greater than 90% capacity utilized. • **Red**: Card is at 100% capacity; no more streams will be allocated to this card. Hover over a color block to view percent of utilization.
Grooming Group 2	Provides color coded and text redundancy status information on available bandwidth for all cards in grooming group 2 (either 10 GigE1 or 10 GigE2). Color codes are: • **Green** – Less than 70% capacity utilized. • **Yellow** – Greater than 70% capacity utilized. • **Orange** – Greater than 90% capacity utilized. • **Red** – Greater than 100% capacity utilized; some output TSs are currently unassigned. Hover over a color block to view percent of utilization.

See also Chapter 13, "Module Redundancy," for more information about VPM redundancy.

TCM Redundancy

Current TCM redundancy configuration and state information for the managed Selenio VMG consists of properties listed in (Table 17)

Table 17.   Chassis: System Information

Property	Value
Grooming Group 1	Provides color coded and text redundancy status information on available bandwidth for all cards in grooming group 1 (the 8x1 GigE ports). Color codes are: • **Green**: Less than 70% capacity utilized. • **Yellow**: Greater than 70% capacity utilized. • **Orange**: Greater than 90% capacity utilized. • **Red**: Card is at 100% capacity; no more streams will be allocated to this card. Hover over a color block to view percent of utilization.
Grooming Group 2	Provides color coded and text redundancy status information on available bandwidth for all cards in grooming group 2 (either 10 GigE1 or 10 GigE2). Color codes are: • **Green** – Less than 70% capacity utilized. • **Yellow** – Greater than 70% capacity utilized. • **Orange** – Greater than 90% capacity utilized. • **Red** – Greater than 100% capacity utilized; some output TSs are currently unassigned. Hover over a color block to view percent of utilization.

See also Chapter 13, "Module Redundancy," for more information about TCM redundancy.

AMP Redundancy

Current AMP redundancy configuration and state information for the managed Selenio VMG consists of properties listed in (Table 18)

Table 18.   Chassis: System Information: AMP Redundancy

Property	Value
Slot *n* (AMP)	Shows if there is an AMP installed in slot 6 or 9 of the Selenio VMG-14 chassis or slot 3 or 4 of the Selenio VMG-6 or Selenio VMG-8 chassis, and its current redundancy state. • Choices are: *Active*, *Standby*, *Disabled,* or *N/A* (empty slot)*.
Redundancy State	Shows Redundancy state: • **If one AMP,** or the standby AMP has failed, value is: *Not Redundant*. • **If two AMPs** are fully operational, choices are: *Fully Redundant* or *Not Redundant.*

See also Chapter 13, "Module Redundancy," for more information about AMP redundancy.

Card Information

To access information about a specific module in the Selenio VMG chassis, bring up its **Card Information** tab in the **Chassis** tab page.

	Menu Path	Right-click on a card --> select the **View Slot Properties** popup option --> **Card Information** tab associated with the selected card.
	Quick Keys	Not applicable.

Information displayed is categorized as Slot Information, Status, Redundancy (for TCM and AMP), LEDs (for NPMs), and Version (Table 19).

Table 19.   Chassis Tab: Card Information

Section	Field	Description
Slot Information	Slot Number	The Selenio VMG slot location where the selected card is installed.
	Card Type	The card type (NPM, AMP, VPM, or TCM) or *Blank* if no card present.
	Present	Indicates if a card is present in the slot. *Yes* or *No*. Note: See also "Additional Information (...)" on page 47.
	Failure Reason	The reason for card failure, if a failure has occurred. Used for troubleshooting purposes when reporting to customer support.
Status	Operational State	Up or Down. Specifies if the card is functioning (Up) or not (Down).
	Admin State	Up or Down. Indicates the administrative state of the card.
Version	For NPM	NPM Software version, hardware version, and driver version.
	For AMP	AMP Software version, hardware version, and driver version.
	For TCM	TCM Hardware version, and driver version.
	For VPM	VPM Hardware version, and driver version.
LEDs (NPM only)	Fault LED	Displays the current color/state of the Fault LED for the selected card: • **White** - Card operation state is down. • **Gray** - Card operation admin state is down. • **Green** – Normal operation. • **Red** – A fault has occurred.
	Backup LED	Displays the current color/state of the Backup LED for the selected card: • **White** - Card operation state is down. • **Gray** - Card operation admin state is down. • **Green** – Card is currently active (in operation). • **Red** – Card is currently in standby mode.
Redundancy (VPM & TCM only)	Redundancy Status (Grooming Group1)	Indicates the color-coded redundancy capability of the grooming group for selected card. Color codes are: • **Green** – Grooming group is available for redundancy failover. • **Red** – Grooming group is not available for redundancy failover.
	Redundancy Status (Grooming Group2)	Indicates the color-coded redundancy capability of the grooming group for selected card. Color codes are: • **Green** – Grooming group is available for redundancy failover. • **Red** – Grooming group is not available for redundancy failover.

Port Information

To access information about a specific NPM GigE port, go to the **Port Information** tab (Table 20).

	Menu Path	Right-click on a GigE port of an NPM --> select the **View Port Properties** popup option.
	Quick Keys	Not applicable.

Table 20.   Chassis Tab: Port Information

Section	Field	Description
Port	Slot Number	The Selenio VMG slot location of the NPM card where the selected port is located.
	Port Number	The selected GigE port number on the NPM card. The port numbers are as follows: • **GigE 1 to GigE 8** – The 1 GigE interfaces. • **10 GigE 1** – The 10 GigE 1 interface. • **10 GigE 2** – The 10 GigE 2 interface.
	Port	The name of the selected Gigabit Ethernet port.
	IP Address	IP address assigned to the port.
	MAC Address	MAC address of the port.
	Subnet Mask	Subnet mask of the port.
	Gateway	The IP address of the gateway.
Status	Admin State	Up or Down. Indicates the administrative state of the port.
	Operational State	Up or Down. Specifies if the port is functioning (Up) or not (Down).

Additional Information (...)

At the **System Information** tab screen, you can obtain additional information from any topic listed alongside an ellipsis. This tab screen provides the option to view tabular details about System Type, the fans, the system controller, and SAP in a dialog associated with your selection. For any selection, the dialog presents the manufacturer name, part name, part number, manufacturer date, hardware revision number, and serial number.

Menu Path	Double click ellipsis (...) --> detail screen associated with the selected element. or Right-click on ellipsis --> select **Detail** from popup menu --> detail screen associated with the selected element
Quick Keys	Not applicable.

Figure 11.   Additional Information (...)
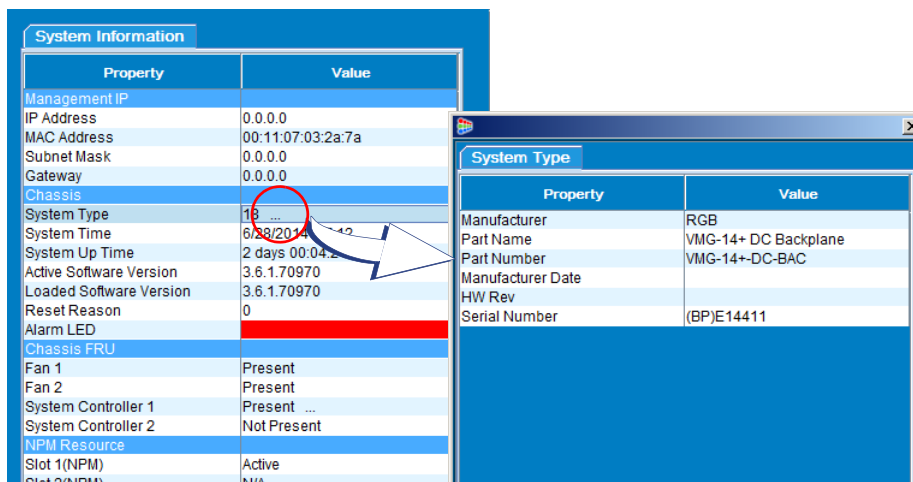
Grooming tab

The **Grooming** tab page provides access to tools for managing transport streams and programs. Refer to Chapter 5, "Video Processing Overview" for more details about how to use the Grooming pages.

Monitor tab

The **Monitor** tab allows real-time bitrate monitoring and display of error statistics on input-output audio and video elementary streams. Refer to Chapter 14, "Monitoring" for more information.

Alarms & Events tab

The **Alarms & Events** tab provides information about the current state of the system and is viewable at any time. Refer to Chapter 16, "System Alarms and Events" for more information.

Selenio VMG Version Information

Selenio VMG software version information is located from the *Element Manager* **Home** page, the **Help** menu and the **Chassis** tab screen.

To view the current version of the *Element Manager* from the **Home** screen, click **Show Build Info** to present results similar to Figure 12.

Figure 12.   Version: from Home Screen
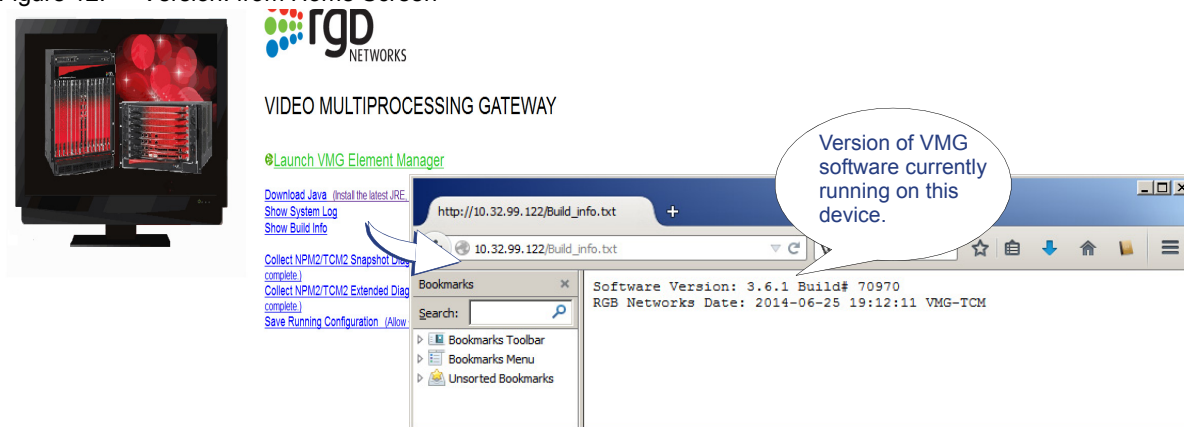
To view the current version of the *Element Manager* from the main menu, go to the **About** dialog (Figure 13).

	Menu Path	VMG *Element Manager* main menu --> **Help** --> **About**
	Toolbar	
	Quick Keys	Alt **h**, Alt **a**

Figure 13.   Version: from About Dialog
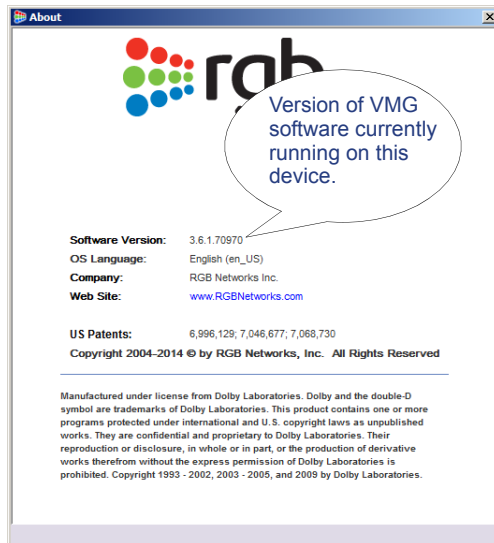
To view the current version of the Selenio VMG *Element Manager* from the chassis tab page, look at the **Chassis** section of the **System Information** panel (Figure 14):

Figure 14.   View Version: from Chassis Panel

Quick Keys

The Selenio VMG *Element Manager* contains numerous shortcuts—in the form of quick keys (Table 21)—you can use for fast navigation and various other functions.

Table 21.   *Element Manager* Quick Keys

Primary Key(s)	Key Combinations and Actions
Alt **a**	In dialogs and screens in which the **Apply** button is provided, use to apply settings currently displayed.
	Elsewhere in the GUI, access the **Alarms & Events** tab pages.
Alt **c**	In dialogs and screens in which the **Cancel** button is provided, use to dismiss the dialog without saving the settings.

	Elsewhere in the GUI, access **Configuration** menu options:
	• Alt **c**, Alt **b** = Go to the **Bulk Configuration** dialog.
	• Alt **c**, Alt **g** = Go to the **Global Configuration** tab panel.
	    - Alt **c**, Alt **g**, Alt **s** = Go to **Configuration**, **Global System** tab.
	    - Alt **c**, Alt **g**, Alt **m** = Go to **Configuration**, **Global Management Interface** tab.
	    - Alt **c**, Alt **g**, Alt **g** = Go to **Configuration**, **Global Grooming Group** tab.
	    - Alt **c**, Alt **g**, Alt **p** = Go to **Configuration**, **Global PMT Update** tab.
	    - Alt **c**, Alt **g**, Alt **r** = Go to **Configuration**, **Global Redundancy Switch** tab.
	    - Alt **c**, Alt **g**, Alt **t** = Go to **Configuration**, **Global Transcoder** tab.
	    - Alt **c**, Alt **g**, Alt **e** = Go to **Configuration**, **Global ESAM** tab.
	    - Alt **c**, Alt **g**, Alt **d** = Go to **Configuration**, **Global Dolby** tab.
	• Alt **c**, Alt **p** = Go to the **Configure GigE Ports** screen.
	• Alt **c**, Alt **u** = Go to the **User Authentication** tab panel.
	• Alt **c**, Alt **t** = Go to the **Trap Configuration** dialog.

Alt **f**	Display the **File** option from the *Element Manager* main menu. • Alt **f**, Alt **x**= Log off the current user session and dismiss the *Element Manager* screen.
Alt **g**	Display the **Grooming** tabs
Alt **h**	Display the **Help** option from the *Element Manager* main menu. • Alt **h**, Alt **a** = Go to the *Element Manager* **About** dialog.
Alt **v**	Display the **View** options from the *Element Manager* main menu. • Alt **v**, Alt **r** = Refresh the current view of the Element Manager screen.
Alt **m**	Display the **Maintenance** options from the *Element Manager* main menu. • Alt **m**, Alt **u** = Go to the **Upgrade Software** dialog. • Alt **m**, Alt **l** = Go to the **License Manager** dialog. • Alt **m**, Alt **d** = Go to the **Restore DB Configuration** dialog. • Alt **m**, Alt **r** = Go to the **Reboot** dialog. • Alt **m**, Alt **s** = Go to the **System Shutdown** confirmation query. • Alt **m**, Alt **n** = Go to the **NPM Switchover** confirmation query. • Alt **m**, Alt **p** = Go to the **Regroom** confirmation query. • Alt **m**, Alt **t** = Go to the **Set Up Time Offset Table (TOT)** dialog.
Alt **n**	Display the **Monitor** tab options

Table 21.   *Element Manager* Quick Keys (Continued)

Primary Key(s)	Key Combinations and Actions
Alt **s**	Display the VMG **Cha_s_sis** tab
Alt **v**	Display the **V**iew options from the VMG *Element Manager* main menu.

Other Shortcuts

Key	Result
Esc	Close a dialog window that is open.
F5	Refresh the current view of the VMG *Element Manager* screen.
Shift-Tab	In dialogs, navigate to previous editable field.
Tab	In dialogs, navigate to next editable field.

CHAPTER 4

System Configuration

This chapter describes the tools that are available from the configuration menu of the *VMG Element Manager*. Configuration of global settings, user authentication, and Gigabit Ethernet ports can be performed here.

> **Note:** *Release 2.5.1 introduced the new Bulk Configuration function from the VMG Element Manager main menu. Currently, only MBR-TS configuration is supported via use of the bulk configuration tools.*

In This Chapter:

- "Bulk Configuration," next.
- "Global Configuration" on page 52.
- "User Authentication Configuration" on page 68.
- "SNMP Traps and Trap Configuration" on page 74.
- "Gigabit Ethernet Port Configuration" on page 77.

Bulk Configuration

The bulk configuration function allows the *Element Manager* Administrator to set up a complete set of MBR-TS parameters into a convenient spreadsheet format. Following entry of the settings, the spreadsheet can be applied to a VMG to either replace or append the current MBR-TS configuration. You can also use the **Bulk Configuration** screen to clear the current MBR-TS configuration on the VMG.

> **Note:** *The Bulk Configuration function is available only to users logged on to the VMG Element Manager as Administrator. This function is not available at Operator or User privilege levels.*

Details are provided in Chapter 10, "Bulk Configuration." beginning on page 226.

Global Configuration

Use the **Global Configuration** screen to view and configure settings that are applicable to the Selenio VMG chassis.

	Menu Path	VMG *Element Manager* main menu --> <u>**C**</u>**onfiguration** --> <u>**G**</u>**lobal Configuration** screen.
	Toolbar	
	Quick Keys	Alt **c**, Alt **g**

The tab pages available in the **Global Configuration** screen are described in the following sections:
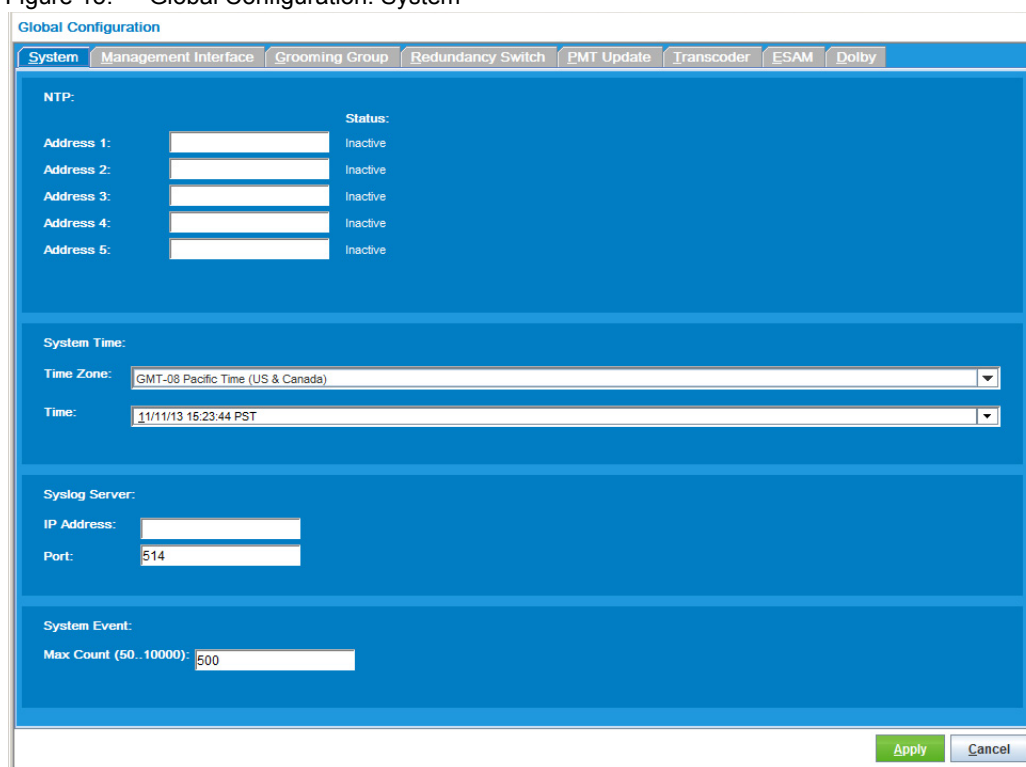
- "System Tab," next.
- "Management Interface Tab" on page 56.
- "Grooming Group tab" on page 57.
- "Redundancy Switch Tab" on page 60.
- "PMT Update Tab" on page 61.
- "Transcoder Tab" on page 62.
- "ESAM Tab" on page 65.
- "Dolby Tab" on page 66.

System Tab

Use the **System** tab (Figure 15 and Table 22) to set and configure network timing protocol (NTP) servers, system time, and syslog settings.

	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen **-->** click **System** tab
	Toolbar	--> click **System** tab
	Quick Keys	Alt **c**, Alt **g,** Alt **s**

Figure 15.   Global Configuration: System

Table 22.   Global Configuration: System Settings

Category/ Section	Field	Description	Default
NTP	NTP Address 1 ... NTP Address 5	Type the IP address(es) of the NTP server(s) to use for time synchronization. Up to five NTP servers can be specified.	Blank
	Status	View current status of NTP server, as either Active or Inactive.	Read-only
System Time	Time Zone	Drop-down selector, to define the local time zone relative to UTC (GMT) time. This section also governs the server's Daylight Saving Time (DST) interpretations. Currently supported time zones are listed in Appendix A, "Time Zone Settings"on page 335.	From NTP
	System Time	Drop-down panel, to define the system time (see also Figure 17).	From NTP
Syslog Server	Syslog IP Address	Type the IP address of the syslog server.	Blank
	Syslog Port	Type the port number to be used at the syslog server.	514
System Event	Max Count (50...10000)	Type the maximum number of events, in the range 50-10,000, to be displayed in the *Element Manager > Alarms & Events > Event History* screen.	500

About NTP

NTP provides the mechanisms to synchronize and coordinate time distribution over a computer network using a reference clock. NTP uses a hierarchical configuration of synchronized time servers, in a distributed subnet, to deliver reference time to requesting clients using local routing algorithms. NTP is used to provide accurate timestamps for system log messages and program splicing.

Note: *NTP server connectivity must be tested to ensure proper system time synchronization and system operation.*

When configuring NTP, up to five systems on the network can be specified as authoritative time sources/servers. It is important to select reliable and reachable local NTP servers in order to maintain clock accuracy and synchronization.

Figure 16.   System Time Zone Configuration

- If not using NTP, the **Time Zone** (Figure 15) and **System Time** (Figure 17) fields must be manually set, using the drop down options from the **System** tab page.
- The Time field is sensitive to current status of the NTP server(s):
  – When using NTP and server status is *Active* (as displayed in the Status column), the **Time** field is not configurable.
  – If NTP server(s) Status is displayed as *Inactive*, the **Time** field is configurable.

Figure 17.   System Time Configuration

About VMG Syslogs

The Selenio VMG generates system log messages (syslog messages) that record alarms and events occurring in the system. Each syslog message contains a time stamp of when the event occurred, a description of the event, and the severity of the event. Refer to Chapter 16, "System Alarms and Events" and Appendix B, "Selenio VMG Alarms and Events" for more information on alarms and events.

Note: *The syslog also contains debug messages intended for internal Imagine Communications use that are not documented in this user guide.*

Management Interface Tab

The Selenio VMG chassis allows for the installation of two separately addressed NPMs, to provide network connection redundancy. Configuring a virtual IP address for the Selenio VMG system means that IP connectivity to the Selenio VMG remains unchanged regardless of which NPM is active.

When configuring the Selenio VMG for the first time, the physical IP address of the NPM must first be set through Telnet access or GUI to the Selenio VMG or serial console access (see Chapter 4, *"Initial Configuration,"* of the Selenio VMG *Hardware Setup Guide* for more information). Once the physical IP addresses have been set for both NPMs (the active NPM and the backup NPM if you are configuring NPM redundancy for your system), you can then point your browser to the physical IP address configured for the active NPM in order to configure theSelenio VMG's Virtual IP address.

Use the **Management Interface** tab (Figure 18 and Table 23) to configure a single global Virtual IP address for the Selenio VMG system and to edit the physical IP address of the active NPM card.

	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen --> click **Management Interface** tab
	Toolbar	--> click **Management Interface** tab
	Quick Keys	Alt **c**, Alt **g,** Alt **m**

Figure 18.   Global Configuration: Management Interface

Table 23.   Global Configuration: Management Interface Settings

Section	Field	Description	Default
	Mac Address	View the MAC address of the active NPM.	Read-only
Virtual IP Address	IP Address	Type the virtual IP address of the Selenio VMG that the installed NPM(s) will use for management traffic.	Blank
	Subnet Mask	Type the subnet mask of the Selenio VMG's virtual IP address.	Blank
Gateway for Active NPM Physical and Virtual	Gateway	Type the IP address of the default router for the system.	Blank
Active NPM Physical IP Address	IP Address	View the physical IP address of the active NPM card.	Auto-populated based on config
	Subnet Mask	View the subnet mask of the active NPM card.	Auto-populated based on config

Management IP Address Configuration Guidelines

The following guidelines must be considered when configuring or editing the **Virtual IP Address** or the **NPM Physical IP Address** sections.

Note: The 10.0.1x and 10.0.2x subnets are reserved for VMG internal use only and cannot be used for the management interface.

- To edit the **Active NPM Physical IP Address** section, there can be no **Virtual IP Address** information configured. If a virtual IP Address has already been configured, you will need to delete the address, apply the changes, and re-login to the *VMG Element Manager* before being able to modify the **Active NPM Physical Address** section.
- When changes to either the **Virtual IP Address** or **Subnet Mask** have been applied, the *VMG Element Manager* will close and you will have to re-login using the new IP configuration.
- When changes to either the **Active NPM Physical IP Address** or **Subnet Mask** have been applied, the *VMG Element Manager* will close and you will have to re-login using the new IP configuration.
- The **Active NPM Physical Address** and **Subnet Mask** fields cannot be blank.
- The **Virtual IP Address** configuration cannot be changed at the same time as the **Active NPM Physical IP Address** configuration, and vice versa.

Grooming Group tab

Use the **Grooming Group** tab (Figure 19 and Table 24) to enable GigE grooming groups, which is necessary to retain connectivity with certain ad servers after an NPM switchover.

You can enable or disable one of the grouping categories displayed in the **Grooming Group** tab page, using the following considerations:

- The VMG must be rebooted whenever a group is enabled or disabled.
- Only one group may be selected: the groups cannot be enabled / disabled at once.

> **Note:**   *You must set up and enable all desired grooming groups before configuring and grooming any program. Disabling of the 10 GigE 1 or 10 GigE 2 grooming group will remove all grooming for the port.*

	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen --> click **Grooming Group** tab
	Toolbar	--> click **Grooming Group** tab
	Quick Keys	Alt **c**, Alt **g,** Alt **g**

Figure 19.   Global Configuration: Grooming Group tab.
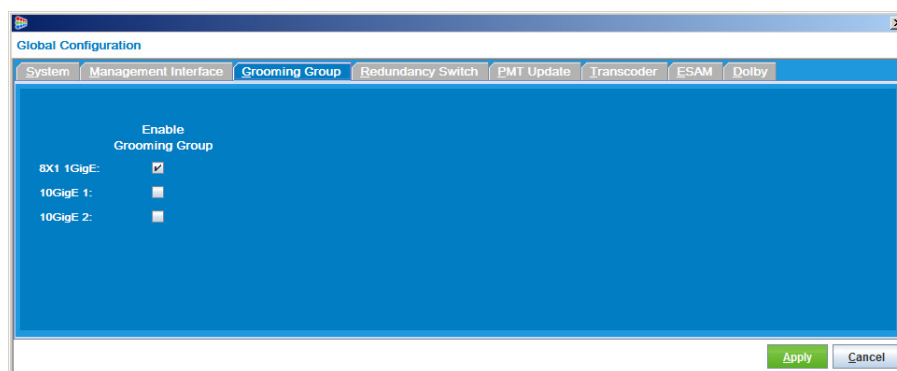
Table 24.   Global Configuration: Grooming Group Settings

Field	Description	Default
Grooming Group Enable	Enable (check) or disable (un-check) one of the following groups: • 8X1 1GigE • 10GigE 1 • 10GigE 2	8X1 1GigE = checked 10GigE 1 = un-checked 10GigE 2 = un-checked

Configuration Guidelines for Grooming Groups

The Selenio VMG recognizes three groupings for the NPM Gigabit Ethernet ports (Figure 20), which can be combined as shown in Table 25:

> **Note:**   *For conceptual purposes only, the groupings are identified in this section as Group A, Group B, and Group C.*

- Group A — the eight 1GigE ports (labeled SFP 01 to SFP 08)
- Group B — the 10GigE 1 port (labeled XFP2)
- Group C — the 10GigE 2 port (labeled XFP1)

Your groupings will be displayed at the highest level of the trees contained within the input and output columns of the **Grooming** tab page. Groups displayed in the **Grooming** tab page are ready for service configurations.

Figure 20.   NPM Port Grouping
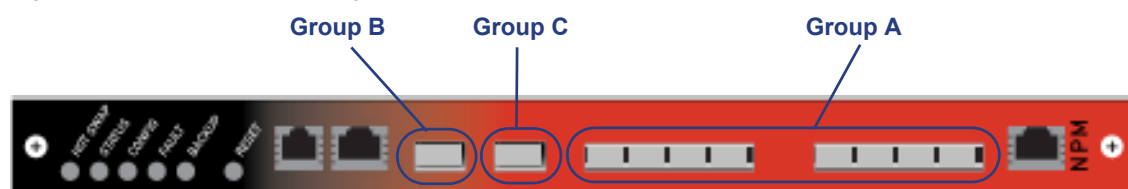
Table 25.   Valid Grooming Group Combinations

Enabled Grooming Groups	Validity
Group A + Group B	Valid
Group A + Group C	Valid
Group A alone	Valid
Group B alone	Valid
Group C alone	Valid
Group A + B + C	Invalid
Group B + C	Invalid

Video processing considerations. The NPM provides video processing capabilities based on the groups configured. Video processing for grooming input and output transport streams cannot span across the two groups. For example, an input transport stream from Group A must be associated with an output transport stream in Group A; it cannot use an output transport stream in Group B or Group C.

General considerations about grooming groups.

- When a grooming group is enabled or disabled, the Selenio VMG must be rebooted.
- 10GigE 1 and 10GigE 2 cannot be enabled together at any time.
- Only two grooming groups can exist on the Selenio VMG at any time.
- A grooming group cannot be disabled if settings are in place at the **Configure GigE Ports** screen (Figure 37) for any port in that group.
- If only one grooming group is being used on the Selenio VMG (e.g., Ports 1-8 in Group A, or only the 10GigE 2 group), consider disabling all *unused* groups to maximize bandwidth allocation for the used groups.

Note: *The VMG supports transcoding only on the Group A grooming group.*

Redundancy Switch Tab

For operations as a redundant system, up to two NPMs can be installed in the VMG. During operations as a redundant system, one of the NPMs processes requests in active mode, and the other NPM resides in standby mode. If the active NPM encounters a failure condition, the standby NPM automatically 'switches over' to become the active NPM. This is the default and recommended behavior and setting. This setting is controlled at the **Redundancy Switch** tab page (Figure 21), from which NPM redundancy can be further managed by applying one of the predefined link state determinants.

Note: *The Redundancy Switch setting should only be enabled when performing system maintenance, such as for a system upgrades. It is not recommended for use during normal operations because it forces the system into a non-redundant configuration.*

Use the **Redundancy Switch** tab page (Figure 21) to modify switchover of the NPMs in the VMG.

	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen --> click **Redundancy Switch** tab
	Toolbar	--> click **Redundancy Switch** tab
	Quick Keys	Alt **c**, Alt **g,** Alt **r**

Figure 21.   Global Configuration: Redundancy Switch
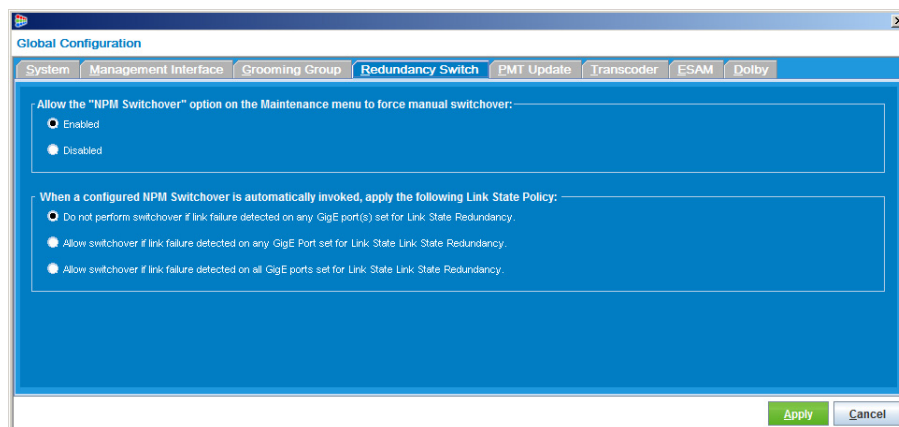
1.   At the **Redundancy Switch** tab page, define the NPM switchover behavior:

   –   To allow NPM redundancy, click *Enabled*: to inhibit NPM redundancy, click *Disabled*.

   –   Select one of the *link state determinant* options for the switchover.

2.   Click **Apply** (or use Alt **a**) to commit the settings.

Note: *This setting has no effect on a system that deploys only one NPM.*

PMT Update Tab

Use the **PMT Update** tab (Figure 22, and Table 26) to set global conditions for the handling of streams during updates to the Program Management Tables.

	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen --> click **PMT Update** tab
	Toolbar	--> click **PMT Update** tab
	Quick Keys	Alt **c**, Alt **g**, Alt **p**

Figure 22.   Global Configuration: PMT Update
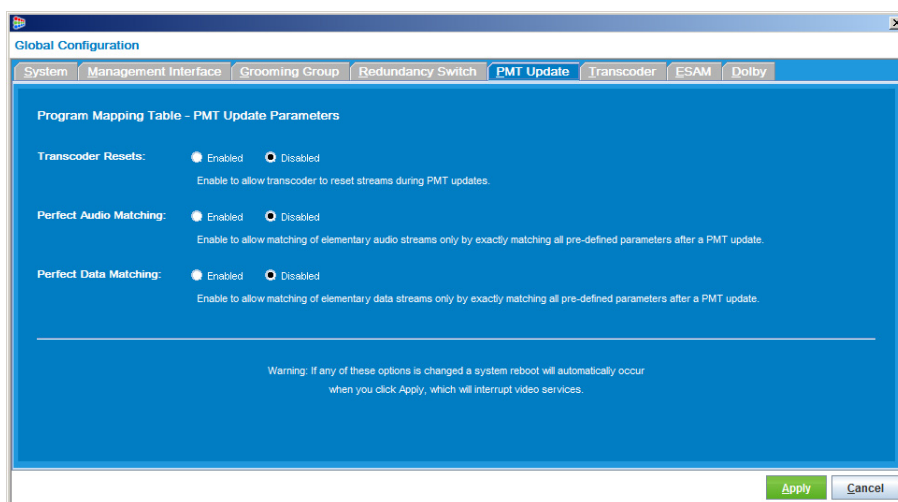
Table 26.   Global Configuration: PMT Update Settings

Field	Description	Default
Transcoder Resets	Enable or disable the transcoder to reset streams during PMT updates.	Disabled
Perfect Audio Matching	Enable or disable matching of elementary audio streams by matching all pre-defined parameters after a PMT update.	Enabled
Perfect Data Matching	Enable or disable matching of elementary data streams by matching all pre-defined parameters after a PMT update.	Enabled

Transcoder Tab

Use the **Transcoder** tab page (Figure 23 and Table 27) to globally adjust quality of video elementary stream output. This is done by enabling or disabling **Smooth Video Bitrate** and/or **Hypothetical Reference Decoding**. The **Transcoder** tab page also provides the option to define global implementation of an Encoder Boundary Point (EBP) for elementary streams.

An EBP refers to metadata (data about data) that is inserted—at segment and/or fragment boundaries— to audio or video elementary streams intended for use in adaptive streaming applications.

- EBPs may be used by downstream equipment, such as packagers (if they support EBP) to assist in the creation of discrete sections of de-codable content from the continuous streams.
- EBPs may also be added at cue-induced boundaries to facilitate the insertion of ads or other alternate content.
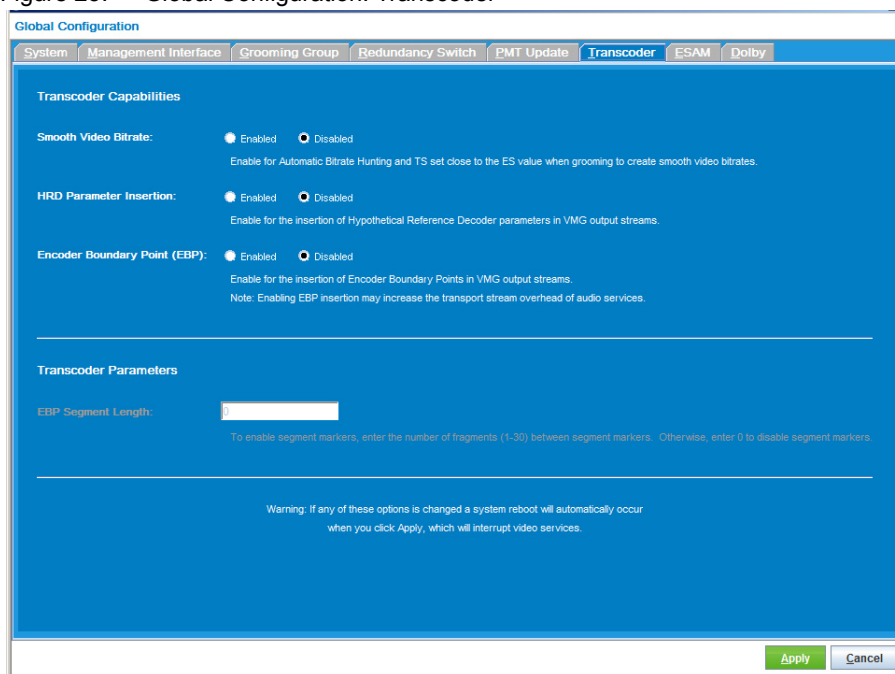
	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen --> click **Transcoder** tab
	Toolbar	--> click **Transcoder** tab
	Quick Keys	Alt **c**, Alt **g,** Alt **t**

Figure 23.   Global Configuration: Transcoder

1. At the **Global Configuration Transcoder** tab page, select enable or disable, as required.
2. Click **Apply** (or use Alt **a**) to save your settings.

Note: *Changes that are applied to the VMG's* **Global Transcode** *configuration result in automatic reboot of the VMG and interruption to services*.

Table 27.   Transcode—Transcoder Configuration Options

Field	Description	Default
Smooth Video Bitrate	Enable or disable smoothing on all output video elementary streams. When enabled, neutral packets are inserted into the video layer when the encoder buffer model overflows. The insertion of the zero bytes forces the video output to use up allocated video bandwidth. In most cases, this option will smooth the output. However, if there is a large gap between video ES bitrate and transport stream bitrate, the video output may still be bursty.	Disabled
HRD Parameter Insertion	Enable or disable inclusion of Hypothetical Reference Decoder (HRD) parameters in the video elementary stream. See also "About HRD Parameter Insertion," immediately following this table.	Disabled
Encoder Boundary Point (EBP)	Enable or disable employment of Encoder Boundary Points in MBR output streams. When enabled: • An EBP fragment marker will be inserted in every IDR. • An EBP fragment and segment marker will be inserted at every cue-induced boundary. *Note:* When EBP is configured, roughly 20 bytes of EBP info data is added to the transport adaptation header field belonging to the video PID for every IDR interval.	Disabled
EBP Segment Length	Value, in the range 0 to 30, to define the number of segments allowed between Instantaneous Decoding Refresh (IDR) fragment markers. At the specified interval, there will be a marker that indicates that the boundary is both a fragment marker and a segment marker. For example: Assume GOP = 1 second and IDR = 2 seconds. This means there will be a closed GOP every 2 seconds (approximately). Setting an EBP Segment Length of 5 will set a segment marker every 5 fragments (1 fragment = 1 IDR). In this case, setting the EBP length to 5 will render a segment marker every 10 seconds (or 5 fragments/IDRs). (GOP x IDR) x EBP Segment Length = Segment Marker location. Click **Enabled** at **Encoder Boundary Point** to activate this **EBP Segment Length** field.	0 (none)

About HRD Parameter Insertion

A Hypothetical Reference Decoder (HRD) contains coding information about the bitrate and coded picture buffer size that is provided as optional header information in video elementary streams. This header information enables certain packager devices to provide the following functions:

• Detect bitrate information.

• Assist in decoding (due to the included Coded Picture Buffer (CPB) delay, and Decoded Picture Buffer (DPB) delay.

HRD is a global parameter that is disabled by default for two reasons:

• Many end user decoders do not require this parameter.

- There may be discrepancies between actual product operation and signaled data (bitrate and buffer size).

The VMG *Element Manage*r allows you to enable or disable HRD, and the VMG must be rebooted whenever this global parameter is modified. Enabling this parameter forces cbp_delay to be included in each video access unit.

ESAM Tab

Use the **ESAM** tab page (Figure 24 and Table 28) to globally enable or disable Event Signaling and Management, and/or to define the POIS and ESAM timing parameters to be used by all MBR output streams that are enabled for ESAM.

See also Chapter 11, "Event Signaling and Management" for general information about the ESAM on the VMG.

	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen --> click **ESAM** tab
	Toolbar	⚙ --> click **ESAM** tab
	Quick Keys	Alt **c**, Alt **g,** Alt **e**

Figure 24.   Global Configuration: ESAM
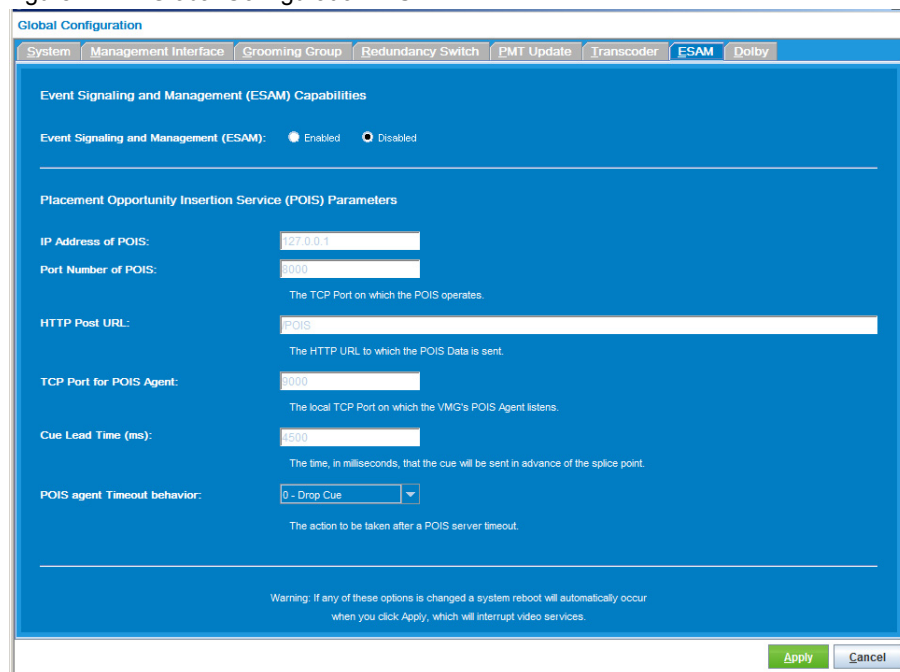
Table 28.   ESAM: Point of Insertion System Parameters

Field	Description	Default
Event Signaling and Management	Globally enable or disable ESAM for this system. When disabled, this setting overrides settings to enable individual MBR streams.	Disabled.
IP Address of POIS	IPv4 address of the POIS server.	127.0.0.1
Port Number of POIS	Value to identify the port number to be used on the POIS server.	8080
HTTP Post URL	The HTTP post URL to which POIS data is to be sent. NOTE: The current release supports only Method Post, which is a synchronized event.	/POIS
TCP Port for POIS Agent	Value to identify the local TCP port on which the VMG's POIS agent listens.	9000

Table 28.   ESAM: Point of Insertion System Parameters (Continued)

Field	Description	Default
Cue Lead Time (ms)	Number of milliseconds, in the range 1000-10000, that the cue will be sent in advance of the splice point.	4500
POIS agent Timeout behavior	Set the action to be taken after timeout of the POIS server as one of the following: 0 - Drop Cue 1 - Forward Cue As Is	0 - Drop Cue

Note: *Changes that are applied to the VMG's* **Global ESAM** *configuration result in automatic reboot of the VMG and interruption to services.*

Dolby Tab

Use the **Dolby Advanced Decoder Parameters** tab page (Figure 25 and Table 29)**.**to set global AC-3 (Dolby Digital) and E-AC-3 (Dolby Digital Plus) decode parameters, which will be applicable to the entire VMG system where input streams are AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus) types. The settings can be modified at any time but will take effect only on new sessions subsequent to your entries in the tab page.

Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Global Configuration** screen --> click **Dolby** tab	
Toolbar	--> click **Dolby** tab	
Quick Keys	Alt **c**, Alt **g,** Alt **d**	

Note: *Changes that are applied to the VMG's* **Global Dolby** *configuration result in automatic reboot of the VMG and interruption to services.*

Figure 25.   Global Configuration: Dolby

1. At the **Global Configuration Dolby** tab page, set parameters to control compression, input validations, and stereo output.

2. Click **Apply** (or use Alt **a**) to save your settings.

3. At the **Reboot Confirmation** dialog, click **Yes** (or use Alt **y**) to complete this operation.

   – Any entry errors detected for dynamic ranges will result in yellow fills at those fields.

   To continue, you will need to re-enter values—following advice in the guide text beneath the field(s)—and click **Apply** (or use Alt **a**) again.

   – Upon successful data entry, an **Information** screen is presented.
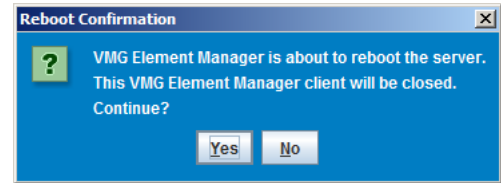
Table 29.   Dolby: Capabilities and Advanced Decoder Parameters

Field	Description	Default
E-AC-3 (Dolby Digital Plus) decode capability	Enable (ON) or disable (OFF) E-AC-3 (Dolby Digital Plus) decoding. When enabled, AMP resource allocation for E-AC-3 (Dolby Digital Plus) input is expanded.	OFF
Compression mode	Compression mode to be applied globally, as one of the following: 0 - Custom mode (no digital dialog normalization). 1 - Custom mode (digital dialog normalization). 2 - Line out mode. 3 - RF mode.	0
Dynamic range scale low	Value, in the range 0 to 1.0, to define low range scale by which to validate input. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry.	1
Dynamic range scale high	Value, in the range 0 to 1.0, to define high range scale by which to validate input. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Dolby Dynamic Range Scale Entry Guidelines" on page 333).	0
Stereo output downmix mode	Stereo output downmix mode to be applied globally, as one of the following: 0 - Automatically detect stereo mode. 1 - 2/0 Dolby Surround compatible (Lt, Rt). 2 - 2/0 Stereo (Lo, Ro).	1 - 2/20

User Authentication Configuration

Use the VMG user authentication functions to view and configure settings that control user access to the Selenio VMG chassis. The Selenio VMG allows both local and remote user authentication. Remote user authentication is performed using an authentication, authorization, and accounting (AAA) server that supports RADIUS or TACACS+.

An AAA server handles requests for access to system resources. It provides a central location for policies to be configured, allowing maintenance of user profiles to be performed once for any number of clients. When a client wants to access a system resource, it must first gain permission from the AAA server. The Selenio VMG provides a local user fallback authentication method enabling users to log in when an AAA server is not available. However, for security and account management reasons, it is recommended to use AAA. All passwords configured for AAA—both remote and local— are encrypted.

The following workflow (Figure 26) describes the behavior of the authentication process when a user attempts to login in to the Selenio VMG.

Figure 26.   Selenio VMG User Authentication Workflow
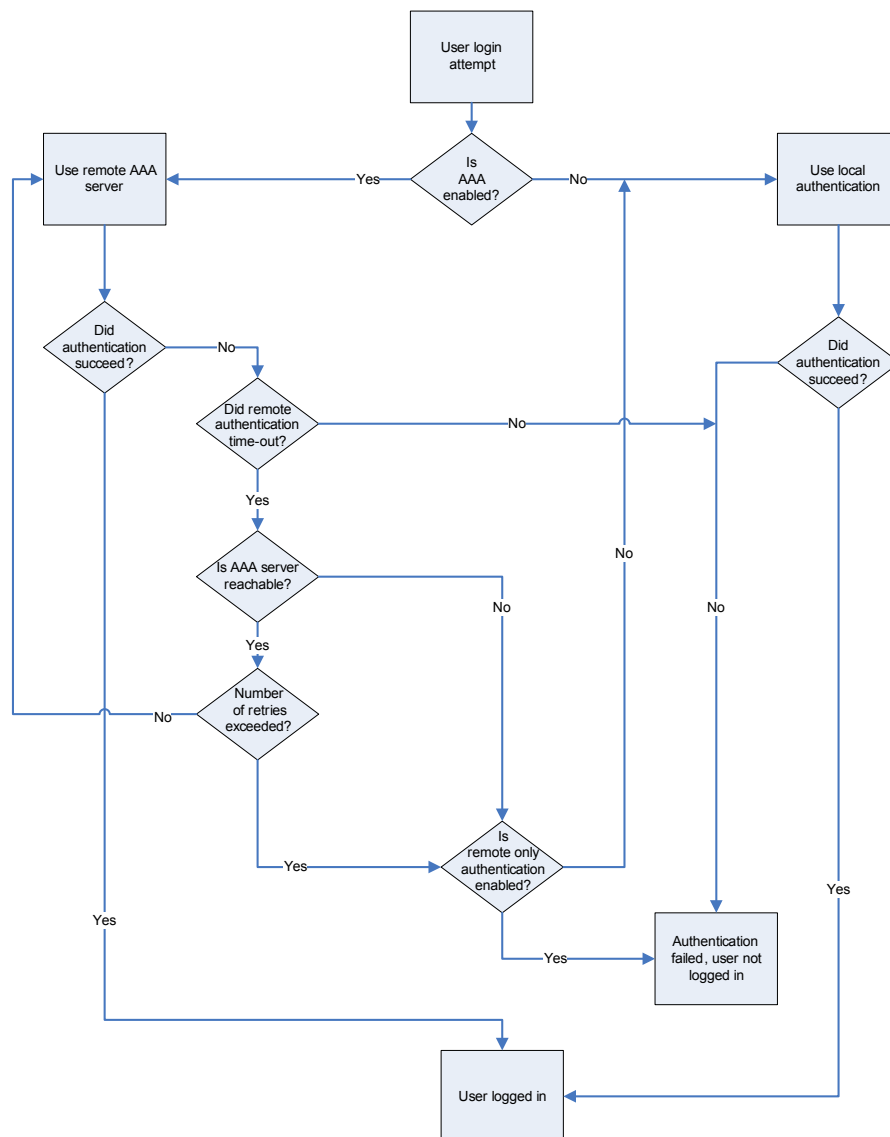
Accessing User Authentication Tools

Use the **User Authentication** dialog to set global or local parameters for access to the VMG Element Manager, as described in the following topics:

- "Global Tab," next.
- "Local Tab" on page 70.
- "Servers Tab" on page 71.

Global Tab

Use the **Global** tab (Figure 27 and Table 30) to configure global AAA options for the Selenio VMG system.

Menu Path	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> <u>U</u>ser Authentication --> click **Global** tab
Quick Keys	Alt **c**, Alt **u,** click **Global** tab.

Figure 27.   User Authentication: Global
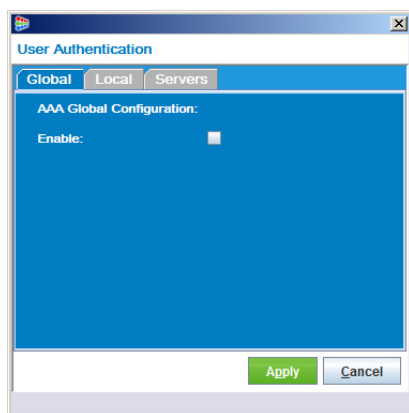
Disabled   **Enabled**
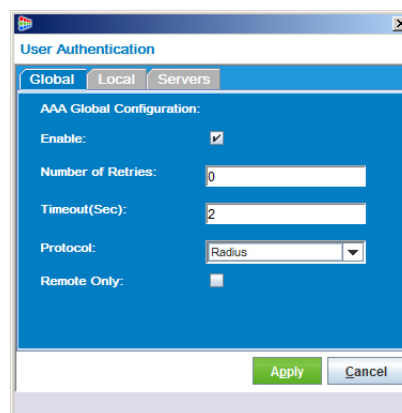
Table 30.   User Authentication: AAA Global Configuration

Field	Description	Default
Enable	Check to enable authentication using a specified AAA server. When checked, configuration fields are displayed in the **User Authentication** screen. Un-check to use local user authentication.	Un-checked
Number of Retries	Value, in the range 0 to 2, to define the number of times the system will try connecting to a remote server before trying another server in the list.	0
Timeout (Sec)	Value, in the range 1 to 4, to define the amount of time (in seconds) to wait for a response from the remote server.	2

Table 30.   User Authentication: AAA Global Configuration (Continued)

Field	Description	Default
Protocol	Protocol to be used for server selection, as one of the following: • **No Preference** – No protocol preference. • **Radius** – Try all RADIUS servers before trying TACACS+ servers. • **TACACS+** – Try all TACACS+ servers before trying RADIUS servers.	Radius
Remote Only	Requires the Selenio VMG to use only remote authentication. If enabled and remote authentication fails or a connection to the AAA server is not established, local authentication is not performed and the user is not logged in.	Un-checked

Local Tab

The **User Authentication Local** tab (Figure 28) permits the VMG *Element Manager* Administrator to configure local user account passwords, for access to the Selenio VMG.
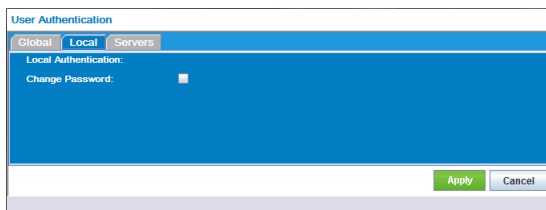
Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **User Authentication** --> click **Local** tab
Quick Keys	Alt **c**, Alt **u,** click **Local** tab.
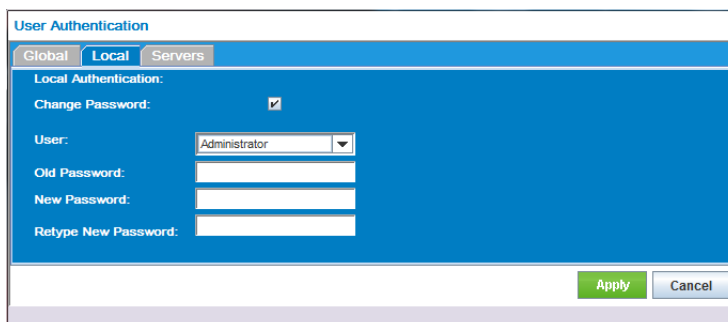
Figure 28.   User Authentication: Local

Setting the User Role and Password

At the **User Authentication** screen, click **Change Password** to reveal the password configuration fields (Figure 29 and Table 31).

Figure 29.   User Authentication: Role/Password Configuration

> **Note:** *Local settings apply only if AAA is disabled, or if the AAA server is unreachable and **Remote Only** in the **Global** tab is not enabled.*

Table 31.   User Authentication: Local Settings

Field	Description	Default
User	User account name for which to change the password, as either Administrator, Operator, or User.	*Administrator*
Old Password	The old password for the specified local user account.	Blank
New Password	The new password for the specified local user account. Local passwords are saved as encrypted data in the VMG configuration database.	Blank
Retype New Password	Confirmation of the new password for the specified local user account.	Blank

Local User Accounts

The Selenio VMG provides three local user accounts (Table 32) with different levels of access to the Selenio VMG system. Each local user account has specific permissions. At the VMG *Element Manager* screens, the features not available to a specific account type are grayed-out and cannot be selected or modified.

Table 32.   Local User Accounts

User	Description	Default Password
User	Read-only access account. No changes to the configuration are allowed.	User
Operator	Read and write access are allowed for all configuration operations except changing passwords. This is the normal login user account.	Operator
Administrator	Full access to the Selenio VMG system configuration is allowed. This is the only user account that is authorized to change passwords.	Admin

Servers Tab

Use the **Servers** tab (Figure 30).to set up and configure the AAA servers to be used by the Selenio VMG system.

Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **User Authentication** --> click **Servers** tab
Quick Keys	Alt **c**, Alt **u,** click **Servers** tab.

Figure 30.   User Authentication: Servers

The **Servers** tab lists the currently configured AAA servers that are to be used by the Selenio VMG system for user authentication. From here AAA servers can be provisioned, as described in the following sections:

- *"Adding or Editing AAA servers,"* next.
- *"Reordering Server List" on page 73*.
- *"Deleting Servers" on page 74*.

Adding or Editing AAA servers

Use the **Add / Edit AAA Server** dialog (Figure 31 and Table 33) to add new AAA servers or to edit existing AAA servers. The system allows up to eight AAA servers.

Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **User Authentication** --> click **Servers** tab, **Add** button.
Quick Keys	Alt **c**, Alt **u,** click **Servers** tab, Alt **a**

Figure 31.   Add/Edit AAA Server
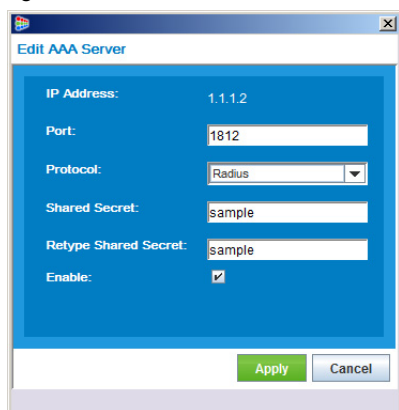
Table 33.   User Authentication: Edit AAA Servers

Field	Description	Default
IP Address	The IP address of the AAA server.	Blank
Port	Value, in the range 0 - 65536, to define the port to use on the AAA server. Radius uses UDP ports. Tacacs+ uses TCP ports	Radius: 1812
Protocol	The authentication protocol to use when communicating with the AAA server, as either Radius or Tacacs+.	Radius
Shared Secret	Type the password, or passphrase to be used to authenticate with the AAA server.	Blank
Retype Shared Secret	Retype shared secret string, exactly as for previous field.	Blank
Enable	Enable (check) or disable (un-check) associated AAA server. If a server is not enabled, it is not available to be selected by the Selenio VMG.	Un-checked

Reordering Server List

Use the **Edit AAA Server Order** dialog (Figure 32 and Table 34) to modify the sequence to be used by the VMG when searching for AAA servers.

👉	**Menu Path**	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> <u>U</u>ser Authentication --> click **Servers** tab --> **Set Order** button.
	Quick Keys	Alt **c**, Alt **u,** click **Servers** tab, **Set Order**

Figure 32.   Edit AAA Server Order
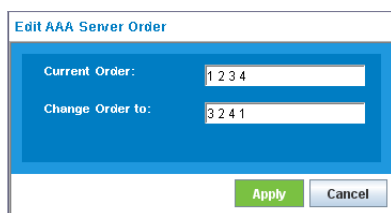
Table 34.   User Authentication: Edit AAA Server Order

Field	Description
Current Order	Displays the current server order. The default server order is the order in which the AAA servers were added to the list. This field is read-only.
Change Order to	The new server order to use. Separate each number with one space.

ℹ️ **Note:**   *The numbers used in these fields refer to the index numbers shown in the first column of the* ***Configuration -> User Authentication -> Server****s tab of the Selenio VMG Element Manager menu. See* Figure 30 on page 71.

The order in which the system attempts to connect to an AAA server is based on the following conditions:

- The preferred authentication protocol specified in the ***Protocol*** field of the ***User Authentication -> Global*** tab.
- The current server order as shown in the ***Order*** column of the ***User Authentication -> Servers*** tab.
    - If the preferred authentication protocol is set to ***Radius***, all RADIUS servers will be tried first, followed by TACACS+ servers.
    - If set to ***TACACS***+, all TACACS+ servers will be tried first, followed by RADIUS servers.
    - If no protocol preference was specified (the default), the servers will be tried based on the current server order.

For example, if four AAA servers have been added to the AAA server list (Table 35) and the specified protocol preference is *Radius*, the order in which the servers are tried is: A, D, B, C.

Table 35.   AAA Server List Example

AAA Server	Current Server Order	Protocol
A	1	RADIUS
B	2	TACACS+

Table 35.   AAA Server List Example (Continued)

AAA Server	Current Server Order	Protocol
C	3	TACACS+
D	4	RADIUS

Deleting Servers

Use the **Servers** tab screen to display the list of servers currently configured. You can delete any of the servers from the servers table in this screen.

	Menu Path	VMG *Element Manager* main menu --> <u>**Configuration**</u> --> <u>**User Authentication**</u> --> click **Servers** tab, **Set Order** button.
	Quick Keys	Alt **c**, Alt **u,** click **Servers** tab, **Set Order** button.

1. In the **Servers** tab screen, select the last AAA server to delete from the list.
2. Click the **Delete** (or use Alt **d**)

The **Servers** screen will only allow deletion of a server in last-to-first order. For example, if there are four servers in the order of 1, 2, 3, 4, the order in which the servers must be deleted is: 4, 3, 2, 1.

Note: *To delete a server whose order is not last, reorder the servers to change the desired deletion to the last number in that order.*

Note: *The index number is not relevant to the order of server deletion; it is the order in which the servers are configured to prioritize which is relevant to deletion.*

SNMP Traps and Trap Configuration

The VMG reports both alarms and events to the VMG *Element Manager.*

- Each event is reported once and logged to the event history.
- Each alarm can be reported twice—once when raised, and once when acknowledged. These occurrences are also reported in the event log.
- Alarms are sent to the designated trap server(s) when they are raised and acknowledged.
- Service impacting error events are sent to the designated trap server(s) when they are reported.

The VMG reports alarms upon detection of various hardware and service-impacting errors. Service-impacting errors may result in alarms associated with problems on the input stream (such as transport stream missing) or problems on the output stream (such as where grooming errors are detected). To reference the full list of alarms and associated criticalities, see Appendix B, *Selenio VMG Alarms and Events* **–** beginning on page 336.

Traps and Error Counters

Input errors that are detected on the output elementary stream—DTS jump, PCR error, video underflow, and PCR reset—are reported to the trap server, and associated error counters are recorded on both the output and the input elementary streams.

Traps are cleared when reporting no longer occurs about the error(s). And, if any error is repeated within the 60-second window, no new trap is generated.

Input errors that must be detected by the output video ES—CC error, Decoder error, packet loss, frame loss, packet drop, and TEI error—are the actual accumulated error occurrences detected on the output ES, and cannot be reset.

- The output ES counters are the actual accumulated error occurrences, as detected on the output ES, and cannot be reset.
- The counters on the input ES reveal the number of times that outputs reported each error.

You can set up, generate, and view dynamic reports of error counts by using the VMG Element Manager monitoring tools, as described in "Viewing Elementary Stream Traffic Details" on page 282.

Note: *It is helpful to use the VMG Element Manager monitoring tools to examine causes of stream alarms, to set up various types of counters for generation of performance statistics. See also Chapter 14, "Monitoring," beginning on page page 281, for more information.*

The VMG Element Manager provides trap configuration tools that you can use to set up SNMPv1 or SNMPv2c trap client destinations. This section describes how to add or remove IP addresses use for VMG trap configurations, in the following topics:

- "Adding IP Addresses for Trap Configuration," next.
- "Deleting Trap Servers" on page 76.

Adding IP Addresses for Trap Configuration

You may enter several trap servers for the VMG. Each trap server is defined at the VMG *Element Manager* by an IP address, an SNMP version, and a community string entry.

Use the **Trap Configuration** screen (Figure 33) to set trap parameters.

	Menu Path	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> <u>T</u>rap Configuration
	Quick Keys	Alt **c**, Alt **t**

1. In the **Trap Configuration** screen, click <u>**Add**</u> (or use Alt **a**) to present the **Configure Trap** dialog (Figure 33 and Table 36).
2. At the **Configure Trap** dialog, enter an IP address for a VMG, and the SNMP version and password (community string) to be used, then click <u>**Apply**</u> (or use Alt **a**)**.**

   Your configuration will now be displayed in the **Trap Configuration** screen (Figure 34).

Figure 33.   Trap Configuration: IP Address
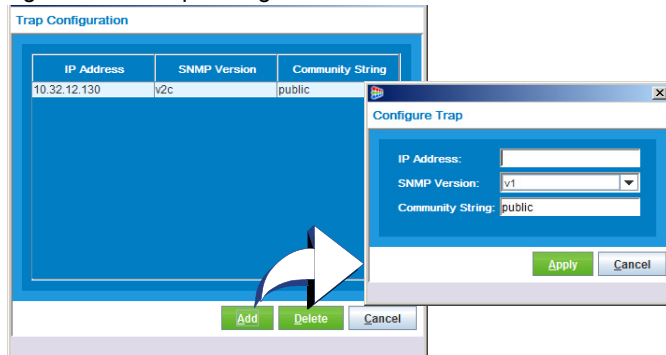
Table 36.   Configure Trap Parameters

Field	Description	Default
IP Address	Type the IP address (IPv4) of the trap server, in dotted decimal format.	Blank
SNMP Version	Set SNMP version as either v1, or v2.	v1
Community String	Set the password string to be exchanged (as cleartext) between the VMG and the designated trap server.	public

Figure 34.   Trap Configuration: View Trap Servers.
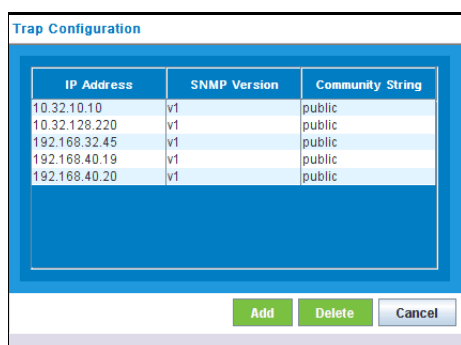
Deleting Trap Servers

Use steps in this section to remove a specified trap server from the **Trap Configuration** screen.

1. In the **Trap Configuration** screen select the trap server to be deleted, then click <u>**Delete**</u> (or use Alt **d**).

2. At the **Delete Confirmation** popup screen (Figure 35), click <u>**Yes**</u> (or use Alt **y**).

Figure 35.   Delete IP Confirmation Popup
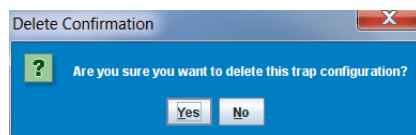
Gigabit Ethernet Port Configuration

Use the **Configure GigE Ports** screen, for either **One-IP** address mode or **Three-IP** address mode, to view and configure settings that control the NPM Gigabit Ethernet ports.

> **Note:** *You can adjust the IP Address mode at any time. The system will prompt for confirmation of an adjustment between the IP address modes, and the change will result in momentary service interruption.*
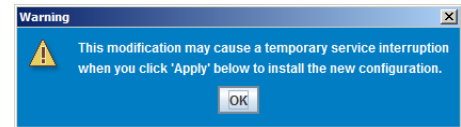
To enable operations for GigE port pairs, use the **Configure GigE Ports** screen to assign either one address (when using One-IP address mode) or three addresses (when using Three-IP address mode). Using the Three-IP address mode is beneficial if you need to ensure the fastest NPM switchover possible on the VMG.

> **Note:** *Beginning with VMG Release 3.0.3, GigE options for both One-IP and Three-IP address modes are supported. Refer to Table 37 for information about previous releases.*

Table 37.   IP Address Options and VMG Releases

VMG Release	GigE Address Modes	
	One-IP	**Three-IP**
2.5.x (and previous)	Yes	No
3.0.0, 3.0.1, 3.0.2, 3.0.2p1	No	Yes
3.0.3	Yes	Yes
3.1.x		
3.2.x		
3.3.x		
3.5.x		
3.6.x		

Duplication and conflicts with IP addressing are not allowed and the system prevents these errors (during configuration) by issuing an error message upon detection of an attempt to apply faulty address settings. Rules for assignment of subnets that are applicable to any IP address mode are listed in Table 38:

Table 38.   Rules for Subnet Assignments

Rule	Example/Description
All virtual and physical IP addresses of a GigE port must be in the same subnet.	Virtual IP address of 1.2.3.1, physical IP addresses of 1.2.3.11 and 1.2.3.21 and a subnet mask of 255.255.255.0 (Figure 37).
Each GigE port must have a unique subnetwork.	The addresses of GigE 1 might begin with 1.2.3, while the addresses of GigE 2 might begin with 1.2.4 (Figure 37).
Each GigE port's subnet must contain at least four IP addresses.	The subnet mask must *not* be 255.255.255.255 or 255.255.255.254.
10.0.1.x and 10.0.2.x subnets are reserved.	These subnets are reserved for internal VMG use only. Do not use these subnets for the management Interface or on other Ethernet ports.

One-IP Address Mode for GigE Ports

For One-IP address mode, each enabled port pair must be assigned a valid and unique IP address. Ports not enabled need not be assigned addresses.
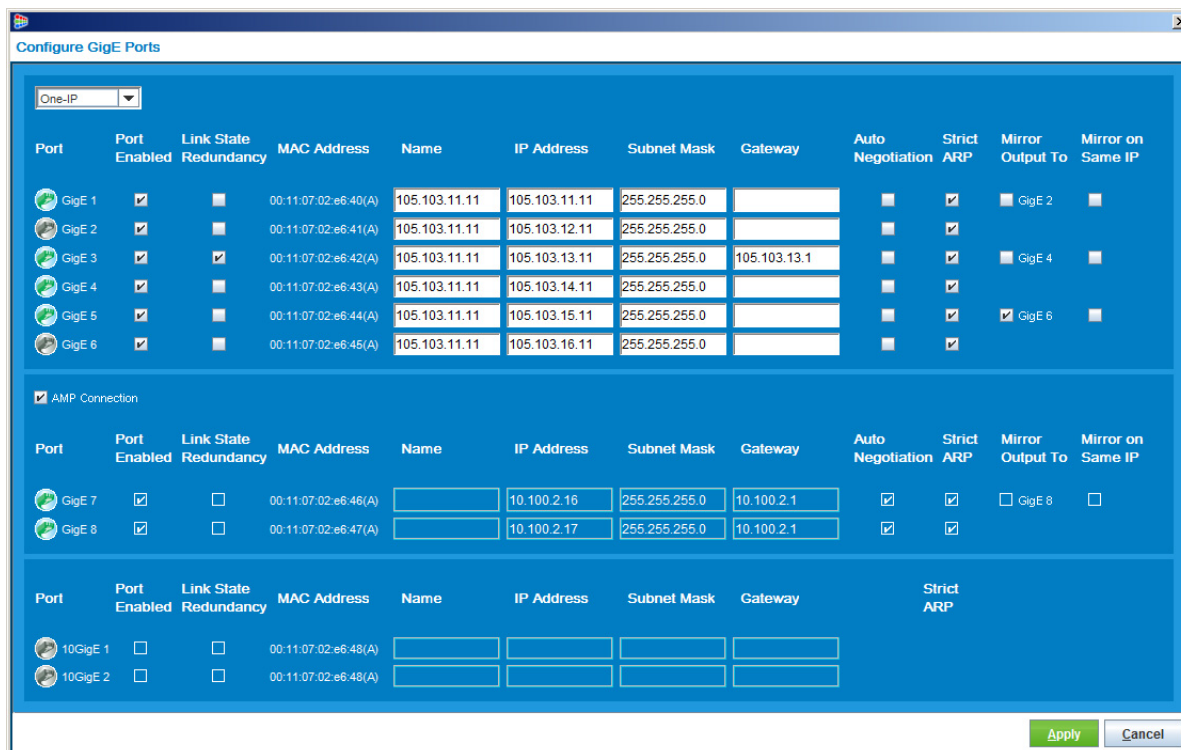
Each GigE port pairing on redundant NPMs is allocated a single IP address. This address floats with the active redundancy mode of both NPMs, and is assigned (in the **Configure GigE Ports** screen for One-IP address mode) to the GigE port of the active card only. Upon switchover, the VMG tears down this IP address from the previous active NPM GigE port then sets it up on the newly active NPM port.

Use the **Configure GigE Ports** screen (Figure 37 and Table 39) in One-IP address mode, to assign IP addresses to NPM GigE ports.

Menu Path	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> GigE <u>P</u>orts	
Popup Menu	**Chassis** tab page --> right-click on NPM -->select **Configure GigE Ports** popup option.	
Quick Keys	Alt **c**, Alt **p**	

1. At the **Configure GigE Ports** screen:
    – Ensure the drop-down selector is set for **One IP.**
    – Set **IP Address** and **Subnet Mask** for GigE ports on the active NPM.
2. Use guidelines from Table 39 to enter other GigE port information for the active NPM.
3. Click <u>A</u>pply (or use Alt **a**) to save and use your GigE port configuration.

Figure 36.   Configure GigE Ports—One-IP

Three-IP Address Mode for GigE Ports

For Three-IP address mode, each enabled port pair must be configured with three valid and unique IP addresses: one virtual IP address, and two physical IP addresses:

- **Virtual IP Address**
  This address floats with the active mode of the GigE port pair.
- **Physical IP Address** (for the lower-numbered NPM slot).
  - VMG-14: slot 7
  - VMG -6 or VMG-8: slot 1
  This address does not float with the active mode of the GigE port pair.
- **Physical IP Address** (for the high-numbered NPM slot).
  - VMG-14: slot 8
  - VMG-6 or VMG-8: slot 2
  This address does not float with the active mode of the GigE port pair.
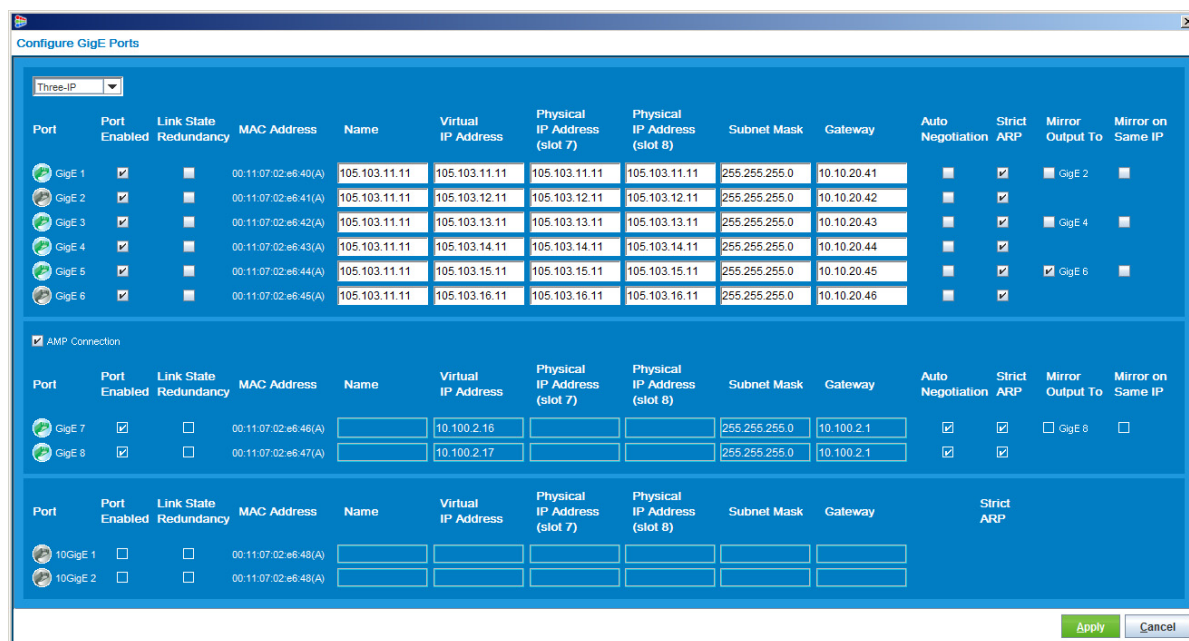
Use the **Configure GigE Ports** screen (Figure 37 and Table 39)., in Three-IP mode, to assign both virtual and physical network addresses to the NPM's GigE ports.

👉	**Menu Path**	VMG *Element Manager* main menu --> **C**onfiguration --> GigE **P**orts
	Popup Menu	**Chassis** tab page --> right-click on NPM -->select **Configure GigE Ports** popup option.
	Quick Keys	Alt **c**, Alt **p**

1. At the **Configure GigE Ports** screen:
   - Ensure the drop-down selector is set for **Three-IP**.
   - Set **Virtual IP Address**, **Physical IP Address**es for both NPM slots, and **Subnet Mask** for the administratively enabled GigE ports on the active NPM.
2. Use guidelines from Table 39 to enter other GigE port information for the active NPM.
3. Click **Apply** (or use Alt **a**) to save and use your GigE port configuration.

Figure 37.   Configure GigE Ports—Three-IP

GigE IP Address Parameters

Use information from Table 39 for entries in the **Configure GigE Ports** screen.

Table 39.   Gigabit Ethernet Port Configuration Fields

Field	Description	Default
Mode	Drop-down selector from which to define the IP Addressing mode to be used with the NPM(s), as either **One-IP** or **Three-IP**. You can toggle between these modes at any time. The system will prompt for confirmation to proceed with a mode change, and momentary service interruption will occur with the change.	Three-IP
Port	The Gigabit Ethernet port numbers on the NPM. If the port is administratively enabled and operationally Up, the icon is green.	Read-only
Port Enabled	Enable (check) or disable (un-check) a specified GigE port.	Un-checked
Input Link State Redundancy	Click to enable (check) or disable (un-check) input link state based redundancy for the GigE port.	Un-checked
MAC Address	View the physical MAC address of the port. An "(A)" next to the MAC address indicates the NPM's physical MAC is the active MAC for the system.	Read-only
Name	Type and alphanumeric string to define name for the GigE interface. The configured name will be displayed in the Grooming --> Mapping tab page.	Blank
IP Address	For One-IP mode: the valid, unique IP address for the port.	Blank
Virtual IP Address	For Three-IP mode: Type a network address for use as the virtual IP address for the GigE port. Each enabled GigE port must be configured with one virtual IP address, and two physical IP addresses.	Blank
Physical IP Address (slot 1)	for Three-IP mode: Type the IP address of the GigE port associated with the NPM in VMG in the lowest-numbered slot. • For VMG-6 and VMG-8: Slot 1 in this screen is equivalent to slot 1 at the system. • For VMG-14: Slot 1 in this screen is equivalent to slot 7 at the system	Blank
Physical IP Address (slot 2)	For Three-IP mode: Type the IP address of the GigE port associated with the NPM in VMG in the higher-numbered slot. • For VMG-6 and VMG-8: Slot 2 in this screen is equivalent to slot 2 at the system. • For VMG-14: Slot 2 in this screen is equivalent to slot 8 at the system	Blank
Subnet Mask	The subnet mask for the interface.	Blank
Gateway	The default router IP address for the port, if applicable.	Blank
Auto Negotiation	Enable (check) or disable (un-check) auto negotiation on the GigE port. This option is applicable only for GigE 1-8. It is not applicable for 10GigE 1 or 10GigE 2.	Un-checked

Table 39.   Gigabit Ethernet Port Configuration Fields (Continued)

Field	Description	Default
Strict ARP	Specifies whether or not an ARP response will be sent if the IP address in the request matches the IP address of the GigE port on which the request is received. Values are: • Checked (enabled) – an ARP response will only be sent if ARP request IP matches the GigE port IP. (recommended) • Un-checked (disabled) – an ARP response will be sent to any ARP request on any GigE port. Note: To set Strict ARP, an IP address must first be configured for the GigE port.	Checked
Mirror Output To	Check this box to mirror the port's output to the designated port. See also "Output Port Mirroring" on page 81 for details.	Un-checked
Mirror on Same IP	Check this box to allow the IP configuration to be mirrored on the output port. See also "Using Mirror On Same IP" on page 83 for additional details. This option is available when the **Mirror Output To** box is first checked.	Un-checked
AMP Connection	Check this box to connect ports 7 and 8 to the paired AMP card. This connection is necessary to use MBR transport streams. See also "AMP Connection" on page 84 for details.	Un-checked

Output Port Mirroring

The VMG supports replication (mirroring) of all traffic sent out on one GigE port (the source port) to another GigE port (the mirrored-to port). The port mirroring functionality can serve one of two purposes:

• Capture traffic sent out on a port for analysis, by mirroring the traffic to another port.

• Support for downstream device redundancy where the outputs from a VMG are replicated across two different paths, thus allowing for greater network resiliency in the event that a downstream device goes out of service.

Rules for Port Mirroring

The source port can carry both input and output traffic; however, only the output traffic is mirrored. Port mirroring can only be configured between the following port pairs:

• GigE 1 output can be mirrored to GigE 2.
• GigE 3 output can be mirrored to GigE 4.
• GigE 5 output can be mirrored to GigE 6.
• GigE 7 output can be mirrored to GigE 8 (unless the AMP Connection is enabled).

Configuring Output Port Mirroring

Use the **Configure GigE Ports** screen (Figure 38) to set parameters for the output interfaces subject to port mirroring.

Menu Path	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> GigE <u>P</u>orts	
Popup Menu	**Chassis** tab page --> right-click on NPM -->select <u>C</u>onfigure GigE <u>P</u>orts popup option.	
Quick Keys	Alt **c**, Alt **p**	

1. Click the checkbox for the port you want to mirror output traffic to. The example in Figure 38 demonstrates mirroring of output from *GigE 5* to *GigE 6*.

   Figure 38.   Configure GigE Ports: Output Port Mirroring

2. Click **Apply** (or use Alt **a**) to dismiss the screen and use your settings.

   Note: *The Element Manager checks whether there are any input or output Transport Streams configured on the mirrored-to port. If there are, an error message appears directing you to first delete all transport streams from the mirrored-to port.*

3. Verify your settings.

   Go to the **Grooming** -**Mapping** page (Figure 39). The *Output mirrored to n* message should be displayed alongside the source port.

   Note: *You will not be able to configure any input or output transport streams on the mirrored-to port.*

   Figure 39.   Grooming: Output Port Mirroring

Using Mirror On Same IP

Once a port is selected for mirrored output, you can then mirror the IP configuration by clicking on a checkbox in the **Mirror on Same IP** column of the **Configure GigE Ports**. Checking **Mirror on Same IP** sets the mirror target GigE port identically—for IP, UDP, Subnet Mask, Gateway address—and these fields become un-editable (as shown in Figure 40). The target is also enabled, which is also not modifiable. Other parameters may be changed individually. This function is supported for both One-IP and Three-IP configurations.

Note: *Note that the **Mirror on Same IP** option is also available for GigE 7 to 8 if the **AMP Connection** checkbox is not enabled.*

	Menu Path	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> GigE <u>P</u>orts
	Popup Menu	**Chassis** tab page --> right-click on NPM -->select <u>C</u>onfigure GigE <u>P</u>orts popup option.
	Quick Keys	Alt **c**, Alt **p**

Figure 40.   Mirror on Same IP

1. At the **Mirror Output To** column, click to select a GigE output port pair.

2. At the **Mirror On Same IP** column, click to select the checkbox alongside the selection from step 1.

3. Click **<u>A</u>pply** (or use Alt **a**) to dismiss the screen and use your settings.

AMP Connection

To support audio transcoding, ports 7 and 8 are used to interconnect the NPM with its paired AMP for transporting data between them.

- In the VMG-14, the NPM in slot 7 pairs with the AMP in slot 6, and the NPM in slot 8 pairs with the AMP in slot 9.
- In the VMG-6 and VMG-8, the NPM in slot 1 pairs with the AMP in slot 3, and the NPM in slot 2 pairs with the AMP in slot 4.)

To interconnect an NMP to its paired AMP, you must first physically connect the NPM to the AMP. See any of the following documents for details: *VMG-14 Hardware Setup Guide*, *VMG-8 Hardware Setup Guide,* or *VMG-6 Hardware Setup Guide*, or the *Application Media Processor (AMP) Installation Guide for VMG Systems.*

Following physical setup, you must then configure the AMP connection at the *VMG Element Manager* as described in this section.

Configuring the AMP Connection

Use the **Configure GigE Ports** screen (Figure 41) to set AMP connectivity for specific interfaces.

Note: *If you have Port Mirroring or any transport streams configured on ports 7 and 8, you must first disable Port Mirroring and/or delete these transport streams.*

Menu Path	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> GigE <u>P</u>orts	
Popup Menu	**Chassis** tab page --> right-click on NPM -->select <u>C</u>onfigure GigE <u>P</u>orts popup option.	
Quick Keys	Alt **c**, Alt **p**	

1. Enable (check) the **AMP Connection** field, located above ports 7 and 8 (Figure 41).

   Clicking AMP Connection results in display of a popup warning advising that the following events occur when enabling AMP connectivity:
   - Port mirroring is disabled.
   - IP address, subnet mask, and gateway are reset to the AMP factory defaults.
   - Input and output transport streams cannot be configured at GigE 7 and GigE 8.

Figure 41.   Configure GigE Ports: AMP Connection

2. Click **Apply** (or use Alt **a**) to dismiss this screen and use your settings.

3. Verify your settings.

    Look at the **Grooming > Mapping** tab: GigE 7 and GigE 8 should now displayed as having an *AMP Connection* (Figure 42).

Note: *You will not be able to configure transport streams on these ports while the AMP connection is enabled.*

Figure 42.   Grooming: AMP Connection
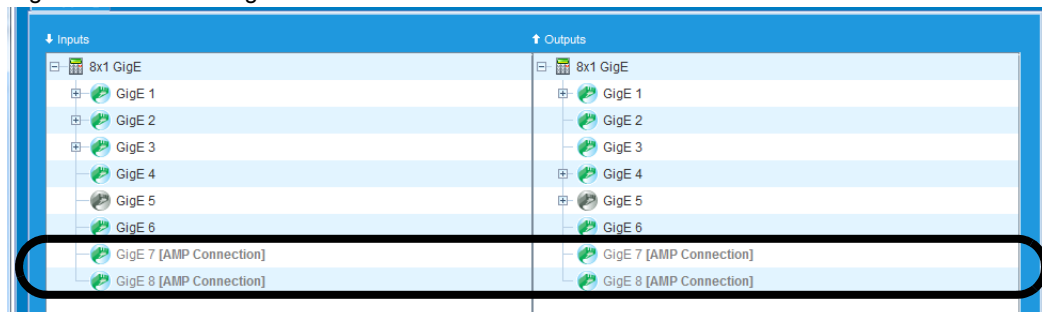
Viewing GigE Ports

When logged into a VMG, you can view the current disposition of all available GigE ports by using the following methods.

Table 40.   Viewing Port Information

Location	Description
Configure GigE Ports screen.	Lists all Gige ports for the device, including all configuration parameters.
Inputs and **Outputs** panels of the **Grooming-->Mapping** page	Lists all GigE ports for inputs and outputs.
Chassis page	View physical representation of the GigE ports for the device, alarm status, and view text summary for specific port.

Video Processing Overview

The Selenio VMG provides the capability to transmit and receive MPEG-2 and H.264 video program streams in either single- or multi-program MPEG-2 transport streams encapsulated with UDP / IP or RTP / UDP / IP using the IP transport network. The Selenio VMG provides advanced digital video services, such as transcoding, transrating, grooming, and statistical multiplexing, which are essential for video processing.

Note: *System configuration must be completed before performing grooming tasks. Refer to Table 48, "Grooming Task Sequence Reference," on page 98 and/or Chapter 4, "System Configuration" for more information.*

This chapter introduces how to associate the VMG GigE interfaces to the transport streams and perform grooming operations at the *VMG Element Manager.*

In This Chapter:

- "Interfaces," next.
- "Transport Streams" on page 89.
- "Programs" on page 92.
- "Table Processing" on page 92.
- "Grooming" on page 94.
- "Program Redundancy" on page 99.
- "Transrating" on page 99.
- "Transcoding" on page 100.
- "Bitrate Monitoring" on page 100.
- "Statistical Multiplexing" on page 101.
- "Forward Error Correction (FEC)" on page 101.
- "Grooming-Mapping Reference" on page 102.
- "Search Mappings" on page 110.

Interfaces

Interfaces refer to the Gigabit Ethernet (GigE) ports of the NPMs installed at the VMG. Each NPM provides eight bidirectional GigE ports that support small form-factor pluggable (SFP) optical or copper modules, and two 10GigE ports that support 10 Gigabit small form-factor pluggable (XFP) optical modules. The NPM also provides one RJ-45 10/100 Ethernet port for configuration and management, one RJ11 serial console port, and one RJ-45 DOCSIS Timing Interface (DTI).

Note: *For updates on the latest SFPs and XFPs approved for use with Imagine Communications' products, log in to RGB's Customer Portal and search for either* `SFP,` *or* `XFP .`

The VMG GigE interfaces comply with the following standards:

- IEEE 802.3z, IEEE 802.3ab, IEEE 802.3ae.
- ITU-T G.692 - Optical interfaces for multichannel systems with optical amplifiers.
- RFC-768, RFC-791, RFC-792, RFC-793, RFC-826, RFC-1889.

After you configure the GigE interfaces, they are displayed at the **Inputs** and **Outputs** panels of the **Grooming** -> **Mapping** page as GigE icons (Figure 43).

Figure 43.   GigE Interfaces in Grooming Mapping Tab

GigE interfaces: collapsed view

This view displays the Ethernet grooming groups at the Inputs and Outputs panels.
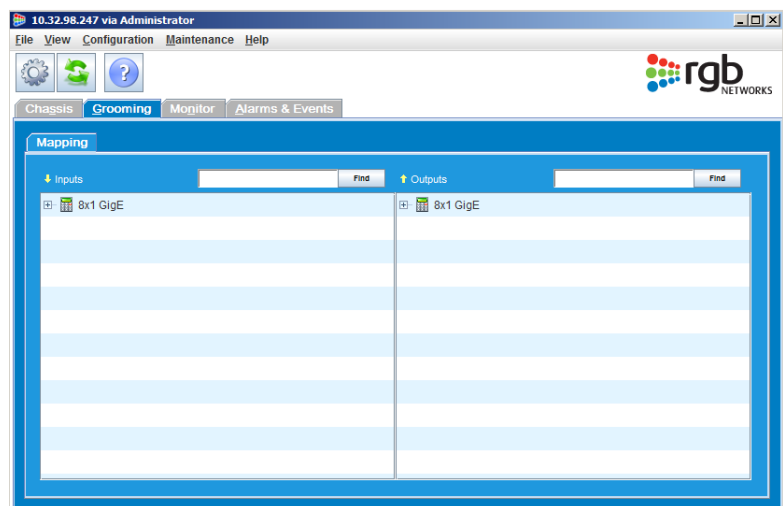
GigE interfaces: expanded view

This view provides the means by which you can manage operations on the individual GigE ports.

However, before you can use a GigE interface, it must first be configured, using the Configure GigE Ports screen.

You can view and select options from any GigE interface on the Grooming Mapping tab page by right-clicking on the interface and selecting an option from the popup menu (Table 41).
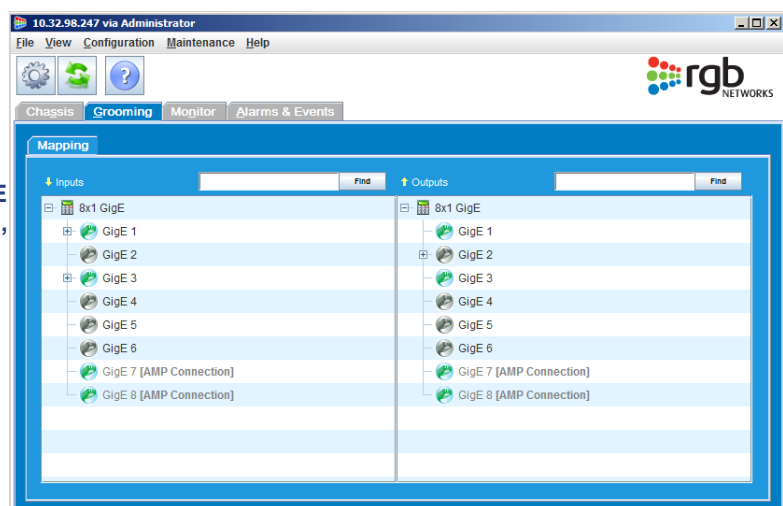
Right-click on an input or output GigE icon to view and select options from the popup menu (Table 41).

Table 41.   GigE Menu Options for Input and Output Ports

Input Options	Output Options
Create Transport Stream	Create MBR Transport Stream
Delete All Transport Streams	Create AVTX + PIP Transport Stream
	Create VTX + PIP Transport Stream
	Create AVTX Transport Stream
	Create VTX Transport Stream
	Create PIP Transport Stream
	Create VTR Transport Stream
	Delete All Transport Streams

Transport Streams

A transport stream consists of a group of programs and the elementary streams (audio, video, data, etc.) associated with each program. The Selenio VMG carries MPEG-2 transport streams using UDP / IP (or, optionally, RTP / UDP / IP for real-time content). An MPEG-2 transport stream is split in groups of packets and mapped to the data portion of a UDP frame. The UDP header contains the 16-bit source UDP port number, 16-bit destination UDP port number, and UDP frame length and checksum. The UDP port is used to identify the source and destination applications for the message. In readiness for delivery, the UDP frame is encapsulated in an IP frame, which contains the IP addresses of the source and destination.

Transport stream creation is dependent on the type of licenses installed at the VMG. Refer also to "License Management" on page 306 for details.

Using the menus from the GigE interfaces on the **Grooming** --> **Mapping** tab page, you create the transport streams for both input and output, as introduced in the following topics:

* "Input Transport Streams and the VMG," next.
* "Output Transport Streams and the VMG" on page 90.

Input Transport Streams and the VMG

Input transport streams contain the source content that the Selenio VMG uses for video processing tasks. The type of content loaded into an input transport stream is the result of your configuration at the **Create GigE Input Transport Stream** dialog for a specific GigE interface. This configuration allows you to create single or multiple input transport streams, set table processing (for DVB, ATSC, or SDT), and define network parameters.

After you set up the input streams, you can perform the following tasks:

* View input transport stream content at the **Inputs** panel of the **Grooming Mapping** page (Figure 44), displayed beneath the interface when it is received by the interface.
* Choose programs from the input stream to map with output transport streams.
* Use menu options directly from a TS popup menu (Table 42 on page 91, Inputs column).

Figure 44.   Input Transport Streams

Input Transport Streams

This view displays the various transport streams assigned to specific GigE interfaces. Each TS is identified by information as was configured with the Create GigE Input Transport Stream dialog.
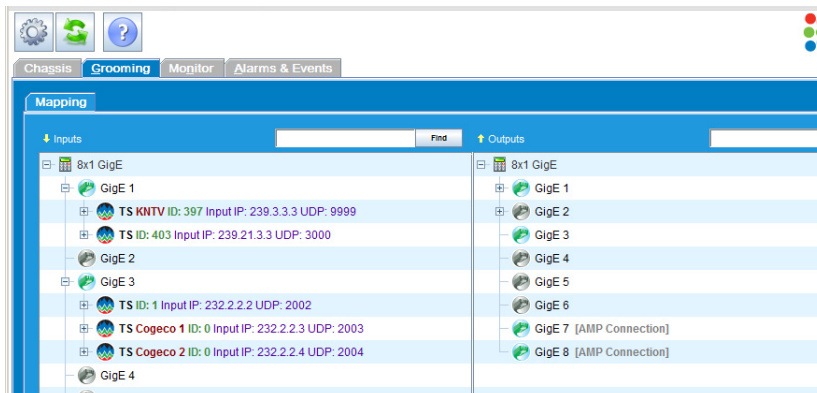
For details about managing input transport streams, refer to Chapter 6, "Input Transport Streams".

Output Transport Streams and the VMG

Output transport streams contain the content being sent out from the Selenio VMG. For any GigE output interface, you can use the *VMG Element Manager* to create standard, transcoded+PIP, and/or MBR transport streams.

After you set up the output streams, you can perform the following tasks:

- View output transport stream content at the **Outputs** panel of the **Grooming Mapping** page (Figure 45), displayed beneath the interface when you groom to the transport stream.
- Use menu options directly from a output TS popup menu (Table 42 on page 91, Outputs columns) to manage the transport stream as well as the grooming.

Figure 45.   Output Transport Streams
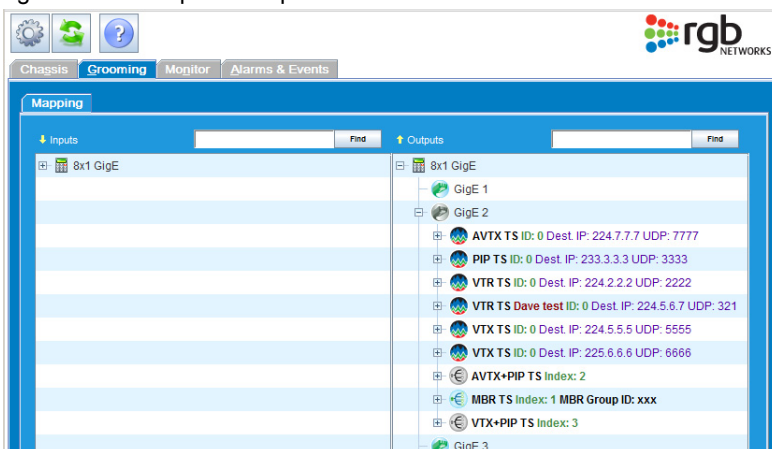
Output Transport Streams

These transport streams are associated with specific GigE interfaces as a result of your selection for TS type. Content for each TS is the result of assigning an input program to the output TS.

Standard Output Transport Streams

Standard output transport streams are MPEG-2, ATSC, SCTE, or DVB streams that can contain transcoded or non-transcoded output programs. Single video transport streams are **VTX** (video transcoding), **AVTX** (audio and video transcoding), **PIP** (picture-in-picture), and **VTR** (video transrating). Transcoded output programs can contain output video types of MPEG-2 (HD or SD) or H.264 (HD, SD, or PIP).

For information on creating standard output transport streams and associated program grooming, refer to Chapter 7, "Single Video Transport Streams".

Transcoded+PIP Output Transport Streams

In contrast to standard output transport streams, a Transcoded+PIP transport stream enables transcoding of a single input stream (HD or SD in either MPEG-2 or H.264 format) into two H.264 output streams: a full frame rate, broadcast-resolution main stream and a corresponding PIP stream. All programs groomed to Transcoded+PIP transport streams are transcoded to H.264 video.

Transcoded+PIP TSs use the VMG's resources more efficiently than standard OTSs and simplify the creation of programming that requires PIP output.

You can create two types of Transcoded+PIP transport streams:

- **AVTX+PIP** for audio transcoding and picture-in-picture.
- **VTX+PIP** for video transcoding and picture-in-picture.

For information on creating Transcoded+PIP transport streams and associated program grooming, refer to Chapter 8, "Transcoded+PIP Transport Streams".

MBR Output Transport Streams

An **MBR** (multi-bitrate) transport stream enables transcoding of a single input stream (HD or SD in either MPEG-2 or H.264 format) into as many as four H.264 SPTSs per grooming operation. More than four profiles (outputs) can be configured by performing multiple groom operations reference the same group ID. All programs groomed to MBR TSs are transcoded to H.264 video. For each SPTS in an MBR TS, you can independently control the video bitrate, resolution, aspect ratio, profile, and GOP structure for a groomed program.

MBR TSs also perform transcoding on the input audio streams, enabling you to control the number of audio channels, sampling rate, and audio bitrate for the output programs. You can set up as many as 108 video/audio MBR groups for programs groomed to MBR TSs with up to 8 profiles (outputs) each.

For information on creating MBR transport streams and associated program grooming, refer to Chapter 9, "Multi-Bitrate Grooms".

Right-click on an input or output transport stream to view and select options from the popup menu (Table 42).

Table 42.   Transport Stream Menu Options for Input and Output

INPUTS	OUTPUTS	
Transport Stream Options	Standard Transport Stream Options	MBR, and Transcoded + PIP Stream Options
Modify Transport Stream	Modify <TS type> Transport Stream	Modify <TS type> Transport Stream
Delete Transport Stream	Delete <TS type> Transport Stream	Delete <TS type> Transport Stream

Table 42.   Transport Stream Menu Options for Input and Output (Continued)

INPUTS	OUTPUTS	
Transport Stream Options	**Standard Transport Stream Options**	**MBR, and Transcoded + PIP Stream Options**
Create Ghost Program	Create Program	Modify <TS type> Grooming
	Delete All Programs	Delete <TS type> Grooming
	Display Grooming	Reset <TS type> Grooming
	Bitrate Monitor	View <TS type> Grooming Source
	Reset Grooming	

Programs

Programs processed by the VMG are represented by Program icons at both the input and output sections of the grooming platform.

Input Programs

Input programs are displayed at the *VMG Element Manager* as a result of being received in a particular transport stream via its GigE input interface. An input program consists of a group of individual elementary streams (audio, video, data, etc.), which are compliant with the table processing instructions you define in your configuration for the GigE Input Transport Stream.

Once a program icon is in view at the input panel, you can use options directly from its popup menu for management of the input program and to add elementary streams. Right-click on an input program to access the popup menu. See "Grooming-Mapping Reference" on page 102 to view the input program menus.

Output Programs

An output program consists of a group of individual elementary streams (audio, video, data, etc.) intended for transmission from the Selenio VMG. You set up and configure the output programs at the **Outputs** section of the grooming platform either by creating a new program directly from an output TS (AVTX, VTX, VTR, PIP), or by dragging an input program to a specific output TS.

Once a program icon is in view at the output panel, you can use options directly from its popup menu for management of the output program, streams, and grooming. Right-click on an output program to access the popup menu. See "Grooming-Mapping Reference" on page 102 to view the output program menus.

Table Processing

The VMG processes Service Definition Tables (SDTs) on non-DVB input transport streams (on the basis of your configuration for table processing on specific GigE interfaces), and enables generation of SDTs on MBR output transport streams (on the basis of your settings when creating or modifying the output transport streams).

Table processing on an input TS is supported at the VMG for both DVB and non-DVB input. The stream content is managed by means of your configurations for table processing—for specific input transport streams on GigE interfaces—whereby you can opt for no table processing, or choose DVB, ATSC, or SDT (Table 43). More information about this configuration is provided in .

Following your configuration of an input transport stream, the associated table types are displayed in the *VMG Element Manager* grooming platform upon receipt of the incoming traffic. The tables, themselves, cannot be modified.

Table 43.   Table Processing—Input Transport Streams

Table Processing Option	Input TS
None	Streams classified as DVB, ATSC, or SDT will be ignored but only basic tables (PAT and PMT) will be processed on the input TS at the GigE interface.
DVB (Digital Video Broadcast)	The GigE interface will classify the input TS as DVB, and will process only DVB tables in conjunction with PAT and PMT from the input transport stream.
	This setting cannot be combined with any other table processing option.
ATSC (Advanced Television Systems Committee)	The GigE interface will classify the input TS as ATSC, and will process only ATSC tables in conjunction with PAT and PMT from the input transport stream.
	This setting cannot be combined with any other table processing option.
SDT (Service Descriptor Table)	Allows processing SDT tables on non-DVB input TS. When enabled, input stream types 0x80 are interpreted as SCTE-video; other DVB-SI tables (EIT, NIT, TDT, TOT) cannot be received on the input interface.
	This setting cannot be combined with any other table processing option.

Grooming

Grooming refers to the process of grouping (mapping) specific input programs and services from multiple sources into different packages, such as customized channel lineups for subscribers. The Selenio VMG allows selecting an elementary stream (e.g., video, audio, or data), a single-program transport stream (SPTS), or multi-program transport stream (MPTS) from one input, and grooming it with one or more streams from other inputs to create an MPTS multiplex.

Note: *The VMG must be equipped with appropriate modules to enable service for particular transport streams. See Table 47 for more information.*

You can perform grooming tasks from a single window—the **Grooming**--> **Mapping** page—on the *VMG Element Manager*, to manage both input and output interfaces, programs, and a variety of transport streams.

Drag-and-drop Grooming

The *VMG Element Manager* GUI provides drag-and-drop grooming capability for programs and elementary streams on an input program, to become part of an output program.

Drag-and-drop grooming can be applied to create new program mappings, or you can replace an existing, already-groomed output transport stream (which is referred to as regrooming). Regrooming recreates the grooming configuration but associates it with a different input (source) program. A basic rule for regrooming is that the input program being used must contain an identical number of streams, stream types, and PMT order as does the targeted output program.

As based on the output transport stream type, the *VMG Element Manager* supports two types of regrooming (Table 44):

Table 44.   Regrooming

Output Transport Streams	Description
VTX, VTX+PIP, PIP, VTR	Regrooming rebuilds the grooming at the selected output TS, with the new input program, using the identical configuration on the output program, output elementary streams.
	See also "Regrooming—VTX, VTX+PIP, PIP" on page 177.
	The same implementation is true for VTR.
AVTX, AVTX+PIP, MBR	Regrooming rebuilds all grooms for the output transport stream that shared the same audio profile ID, MBR group ID, to use the identical video configuration and audio configuration, and the identical MBR group ID or audio profile ID name.
	See also "Regroom—AVTX, AVTX+PIP" on page 201.

Resetting Grooming

The *VMG Element Manager* allows you to reset grooming of output transport streams. This function interrupts service while tearing down the current grooming to rebuild it with the identical configured parameters. For more information about the **Reset Grooming** function, see:

How to Groom

At the VMG *Element Manager*, click the **Grooming** tab to present the **Mapping** tab page.

Figure 46.   Mapping Components
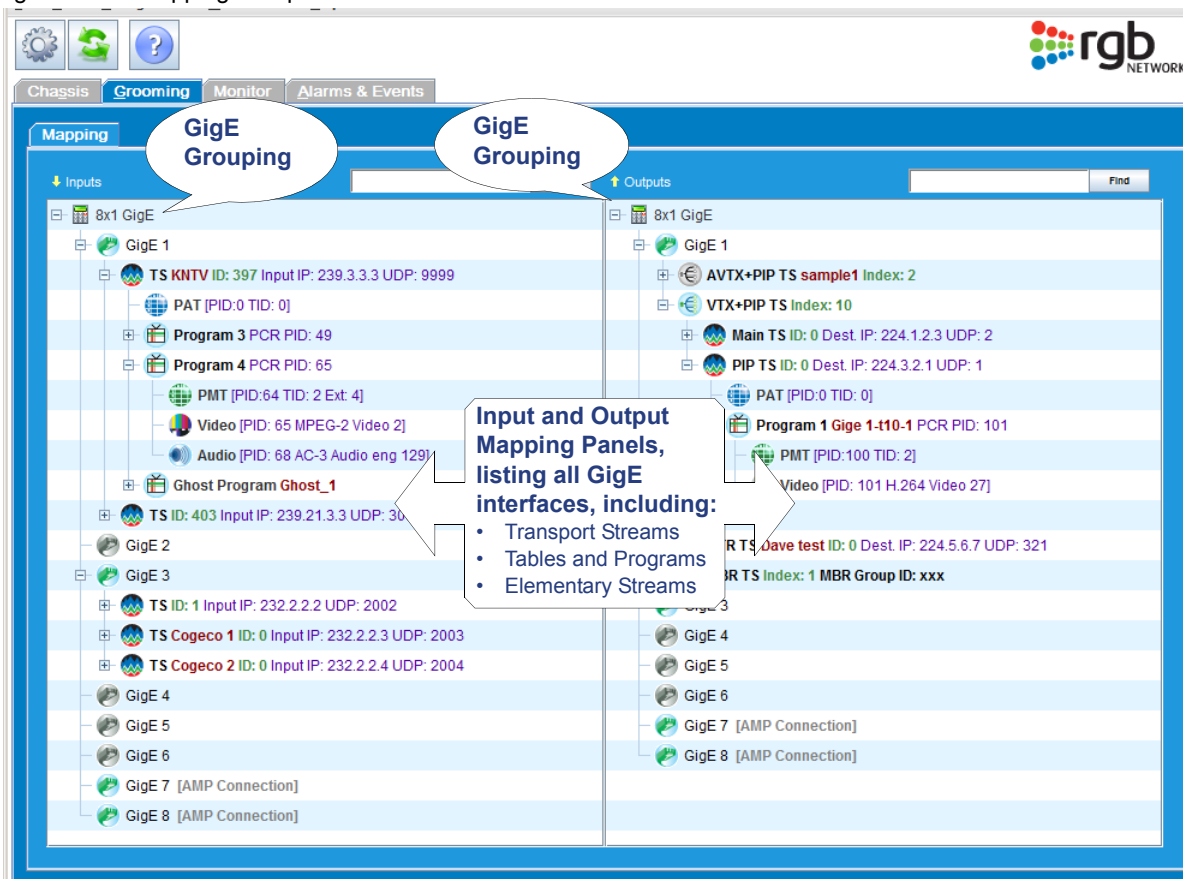
The **Mapping** page displays all the input and output components currently associated with each GigE interface at the VMG. The components are hierarchically organized (Table 45), and identifiable by icons and labels (Table 46).

The **Find** fields at the upper edges of the **Inputs** and **Outputs** panels allow you to search for specific streams and programs. See "Search Mappings" on page 110 for more information.

Table 45.   Mapping Hierarchy for Grooming

Object	Description
GigE group	Displayed at top of the input and output panels. The type of group displayed is the result of your configuration for the GigE grooming group (see "Grooming Group tab" on page 57).
GigE1 through GigE 8	Individual GigE ports, as numbered on the installed NPM. The same GigE port is configured for both input streams and output streams at the **Mapping** page.

TS	Transport stream.
	• Input TS: After you create these, they will contain source content: a set of programs and PSIP/SI tables and programs, which are displayed under their associated transport stream. To find out how to create an input TS, see "Creating Input Transport Streams" on page 111.
	• Output TS: After you create these, they will contain the content to be delivered from the VMG. Each output TS is associated with a specific transcoding and/or transrating method. To find out how to create an output TS, see the section appropriate for the type of stream:
	  - "Creating Output Transport Streams" on page 121
	  - "Creating Transcoded+PIP Transport Streams" on page 183.
	  - "Creating MBR Transport Streams" on page 207.

Programs and Tables	• Each program consists of audio, video, and PSIP/SI information.
Elementary Streams	• Elementary streams appear under the program.

You can also use the **Display Grooming** option from a populated input program, to view and refresh program information in the **Current Program Mapping** screen.

Grooming Icons

All configured interface ports are displayed in the **Mapping** tab page, which contains the inputs in the left panel, and the outputs in the right panel. If a port is enabled and functioning, it is displayed with a green icon. Each component type listed in the **Mapping** tab page is identifiable by its icon (Table 46) as well as its logical name. Icon colors provide a quick method of determining status of the GigE ports, certain transport streams, and the programs.

Note: *You can access descriptions of all grooming icons from the Help menu—Icon Legend—of the VMG Element Manager.*

Table 46.   Grooming -> Mapping Icons

Icon	Description
	1 GigE or 10 GigE Interface. To start drilling down into the contents, either double-click on the icon or click the + box alongside the label.
	1 GigE or 10 GigE Port. • Status Green and blue = port is administratively up. • Status Black and white = port is enabled but not administratively up.

Table 46. Grooming -> Mapping Icons (Continued)

Icon	Description
	Input or Standard Output Transport Stream.
	Transcoded+PIP or MBR Transport Stream. Status is indicated as follows: • Blue and dark blue = video processing is active. • Black and white = video processing is not active.
	Input or Output Program. Status is indicated as follows: • Red, green, and blue = video processing is active. • Black and white = video processing is inactive.
	Error detected in program, such as a mismatch between the configurations and the actual stream type, video codec, or resolution. To view the reason for the program error, hover over this icon to prompt for the information popup.
	PAT, SDT (or other TS-level table) presence.
	PMT, EIT, CUE (or other program-level table) presence.
	Video channel presence.
	Audio channel presence.
	Data channel presence.

Basic Grooming Requirements and Workflow

The VMG Element Manager contains numerous tools that you can use to set up a wide variety of stream configurations. The VMG can support various configurations if the correct VMG modules are installed at the system (Table 47).

Table 47. VMG Equipment and Streams

Output Streams	Description	VMG Equipment Requirement	TS Type—Options
VTR	Single video TS: Video Transrating	VPM, NPM	MPEG-2, ATSC, SCTE, DVB
PIP	Single video TS: Picture in Picture	TCM, NPM	MPEG-2, ATSC, SCTE, DVB
VTX+PIP	Transcoded+PIP TS: Video Transcode with PIP	TCM, NPM	MPEG-2, DVB
VTX	Single video TS: Video Transcode	TCM, NPM	MPEG-2, ATSC, SCTE, DVB
MBR	MBR TS: Video and Audio Transcoding	TCM, AMP, NPM	MPEG-2

Table 47.   VMG Equipment and Streams (Continued)

Output Streams	Description	VMG Equipment Requirement	TS Type—Options
AVTX	Single video TS: Video and Audio Transcoding	TCM, AMP, NPM	MPEG-2, ATSC, SCTE, DVB
AVTX+PIP	Transcoded+PIP TS: Video and Audio Transcoding with PIP	TCM, AMP, NPM	MPEG-2

Typical Task Sequence

The typical task sequence, for grooming input programs to output transport streams consists of steps listed in Table 48.

Table 48.   Grooming Task Sequence Reference

Steps and Options	VMG Element Manager Access	Location in Manual
1. Configure GigE interfaces	Main Menu, **Configuration** --> **GigE Ports** --> **Configure GigE Ports** screen.	"Gigabit Ethernet Port Configuration" on page 77.
2. Create Input Transport Stream	**Grooming** tab --> **Mapping** page, **Inputs** panel --> right click on GigE interface, select **Create Transport Stream** --> **Create GigE Input Transport Stream** screen.	"Creating Input Transport Streams" on page 111.
3. Create Output Transport Stream	**Grooming** tab --> **Mapping** page, **Outputs** panel --> right click on GigE interface, select **Create** <type> **Transport Stream** screen.	• "Creating Output Transport Streams" on page 121. • "Creating MPEG-2 Transcoded+PIP Transport Streams" on page 183. • "Creating DVB Transcoded+PIP Transport Streams" on page 187.
4. Map Input Program to Output Transport Stream.	**Grooming** tab --> **Mapping** page, **Inputs** panel --> click-select a **Program** from an **Input Transport Stream** --> drag it to the **Outputs** panel and into a <type> **TS** --> <type> **Program Mapping** screen.	• **VTR**: "Grooming Non-Transcoded Programs" on page 152. • **PIP**: "Grooming Transcoded Programs" on page 156. • **VTX+PIP:** "Grooming to VTX+PIP" on page 191. • **VTX**: "Grooming Transcoded Programs" on page 156. • **MBR**: "Grooming a Program to an MBR TS" on page 212. • **AVTX**: "Grooming Transcoded Programs" on page 156. • **AVTX+PIP:** "Grooming to AVTX+PIP" on page 190.

Typical Maintenance Tasks

Typical grooming maintenance tasks are listed in Table 49.

Table 49.   Grooming Management Tasks

Steps and Options	VMG Element Manager Access	Location in Manual
1. Manage Output TS (options: **Modify**, **Delete**, **Reset**, Integrate)	**Grooming** tab --> **Mapping** page, **Outputs** panel --> right-click a **Program** for popup menu.	• "Managing Standard Output Streams and Programs" on page 167.
2. Manage Output Programs (options: **Modify**, **Delete**, **Manage ES**s, **View Grooming Source**, **Display Grooming**)	**Grooming** tab --> **Mapping** page, **Outputs** panel --> right-click Program for popup menu.	• "Managing Transcoded+PIP Transport Streams and Programs" on page 198. • "Manage MBR Transport Streams and Programs" on page 221.
3. Manage Input Programs (options: **Modify**, **Delete**, **Rollback**, **Config Redundancy**, **Add ES**)	**Grooming** tab --> **Mapping** page, **Inputs** panel	• "Modifying and Deleting Input Transport Streams and Programs" on page 116.

Program Redundancy

The Selenio VMG supports per-input program redundancy. Program level standby is configurable using the *VMG Element Manager*. The Selenio VMG allows you to designate any input service from the same grooming group as a "standby program" with the exception of the same service. The Selenio VMG automatically returns to the primary program from the standby program when the primary program recovers from the interruption if auto-revert was initially selected; otherwise manual intervention is required for the switch back to the primary input.

The health of the standby program will be checked before failover, and the Selenio VMG will not perform the switch if the standby is degraded.

When a grooming session is created (via static configuration or SCTE 30 message) it will inherit the program redundancy configuration from the corresponding input program.

Transrating

Transrating, or rate shaping, is the process of changing the bitrate of a video stream for the purposes of improving bandwidth and system efficiency. This includes converting variable bitrate (VBR) streams to constant bitrate (CBR) streams (also known as "clamping") as well as reducing VBR streams' bitrate. The Selenio VMG supports MPEG-2 standard-definition (SD) and high-definition (HD) transrating.

Transcoding

Transcoding is the direct compressed stream-to-compressed stream conversion of one type of video or audio stream into another in order to increase bandwidth capacity for video delivery of programs, or to enable a new generation of consumer decoding devices. Historically, transcoding was achieved using stand-alone decoders that brought the signal down to the SDI un-compressed format, followed by a stand-alone real-time encoder. That architecture suffered from network complexity and high capital costs. With the TCM, the Selenio VMG can provide the following video transcoding features:

* Transcoding of MPEG-2 to H.264, in HD, SD, PIP, or multi-bitrate streams.
* Transcoding of H.264 to MPEG-2, in HD or SD.
* Transcoding of MPEG-2 to MPEG-2, in HD or SD.
* Transcoding of H.264 to H.264, in HD, SD, PIP, or multi-bitrate streams.
* Downconversion from HD to SD in any transcoding combination and aspect ratio.
* Flexibility in configuring video bit rate (in CBR).
* Ability to configure a variety of horizontal resolutions.
* Ability to configure Group of Picture (GOP) structure.
* Support for various pre-processing filters including MCTF noise reduction and Telecine.
* Closed captioning support.

With the AMP module, the VMG can provide the following audio transcoding features:

* Audio transcoding from MPEG-1 LII, MPEG-2 LII, AAC-LC, HE-AACv1, HE-AACv2, or Dolby AC-3 (Dolby Digital), to MPEG-1 LII, MPEG-2 LII, AAC-LC, HE-AACv1, HE-AACv2, or Dolby AC-3 (Dolby Digital).
* Mono, stereo, or 5.1 channel sources can be converted to mono or stereo during transcoding to MPEG-1 LII or MPEG-2 LII.
* Mono or 5.1 channel sources will be converted to stereo during transcoding to HE-AACv2.
* Mono, stereo, or 5.1 channel sources can be converted to mono, stereo, or 5.1 channel during transcoding to AAC-LC or HE-AACv1.
* Up to 300 stereo pairs can be transcoded by an AMP module.

Bitrate Monitoring

The *VMG Element Manager* provides real-time bitrate monitoring and display for both input and output streams.

* Input bitrate monitoring is performed through sampling of the inputs, and monitoring of transport streams and ports.
* Output bitrate monitoring provides output program bitrates as a percentage of total output bandwidth, which you can display as follows.
  – For single-video streams, you can access the bitrate monitor screen by clicking directly on an output —VTR, AVTX, PIP, VTR, or VTX.
  – For multi-video streams, the bitrate monitor is accessible by clicking on a TS listed beneath the transport type—VTX+PIP, MBR, or AVTX+PIP.

See Chapter 14, *Monitoring* on Page 281 for more information about the VMG *Element Manager* monitoring tools.

Statistical Multiplexing

Multiplexing is used to combine multiple data sources, such as video, audio, and data into, a single source. This is normally done to transmit multiple video programs over a single bandwidth-limited carrier medium, such as fiber or coax, to end-users. Multiplexing several variable bitrate streams together into a fixed sized transport stream bandwidth is called statistical multiplexing and helps to increase the overall efficiency of a multi-channel digital transmission.

Forward Error Correction (FEC)

Forward Error Correction is a means of error control for video transmission in which redundant data, or error correction code, is added to the transmission. This allows for error detection and correction on incoming transport streams and ensures consistent delivery of high quality video on output transport streams. The Selenio VMG provides a simple, standards-based solution to video degradation seen as a result of transmission error packet loss. By using the Pro-MPEG CoP#3 standard, FEC generation and error correction is applied on RTP encapsulated video packets, thus enabling the Selenio VMG to provide high density video processing—including transrating, statistical multiplexing, and advertisement insertion—at the highest levels of video quality, which the subscriber has come to expect from IPTV services.

The Selenio VMG performs error correction and detection on RTP encapsulated input video streams and generates FEC packets using the Pro-MPEG CoP#3 standard on output video streams.

For more information about VMG and FEC, see:

- "Forward Error Correction (FEC) Coding" on page 28.
- "Creating FEC-based Input Transport Streams" on page 112.
- FEC field descriptions in Table 50, "Create Input Transport Stream Fields," on page 112 and Table 57, "Create Output TS: AVTX, VTX, VTR, or PIP," on page 127.

Grooming-Mapping Reference

This section provides diagrams you can use to locate specific functions provided from the interfaces, transport streams, programs, and other entities within the **Inputs** and **Outputs** panels of the Grooming-Mapping tab page.

Inputs and Outputs Popup Menus

Access the **Inputs** and **Outputs** panels from the **Grooming** - **Mapping** tab in the *Element Manager*.

Right click on a GigE interface to access its menu and/or right-click on entities in the expanded view to access other available menus (Figure 47).

Figure 47.   Inputs and Outputs Menus
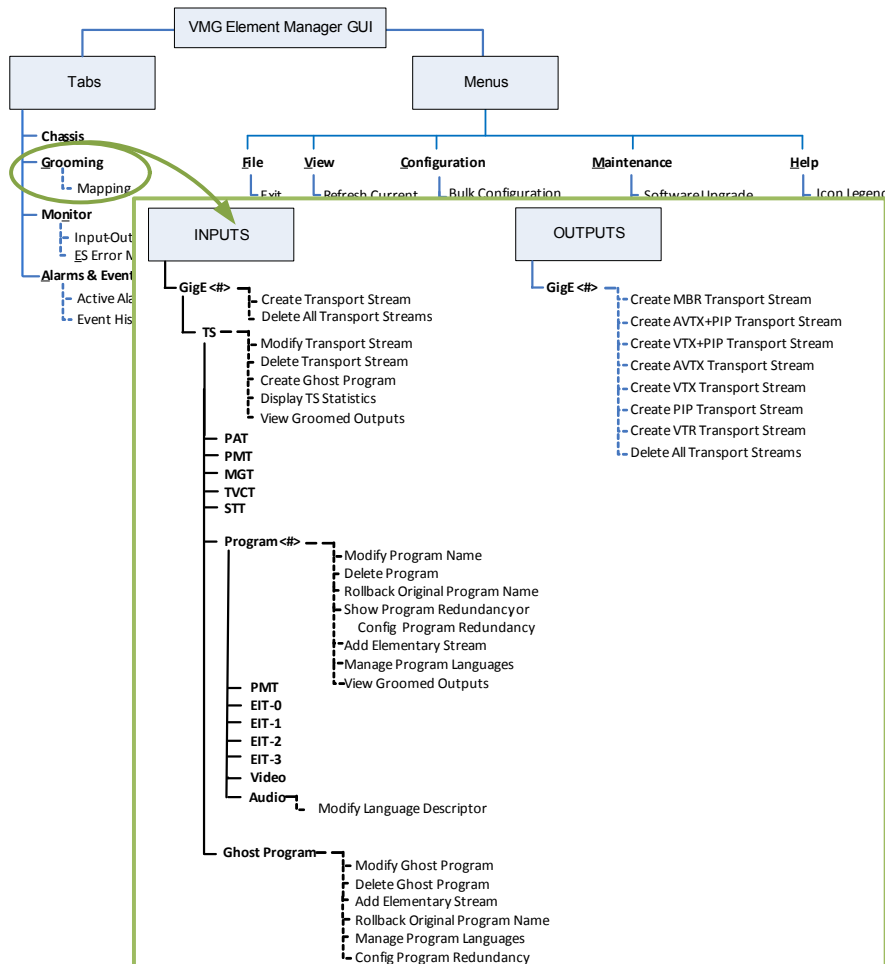
Outputs—MBR Transport Stream

The **MBR Transport Stream** menus (Figure 48) not only allow you to manage the MBR stream and grooming, but also access the associated TS bitrate monitor, program functions, and statistical functions for audio and video.

Note that certain functions are not available until the stream is groomed.

Figure 48.   MBR Output TS Menus
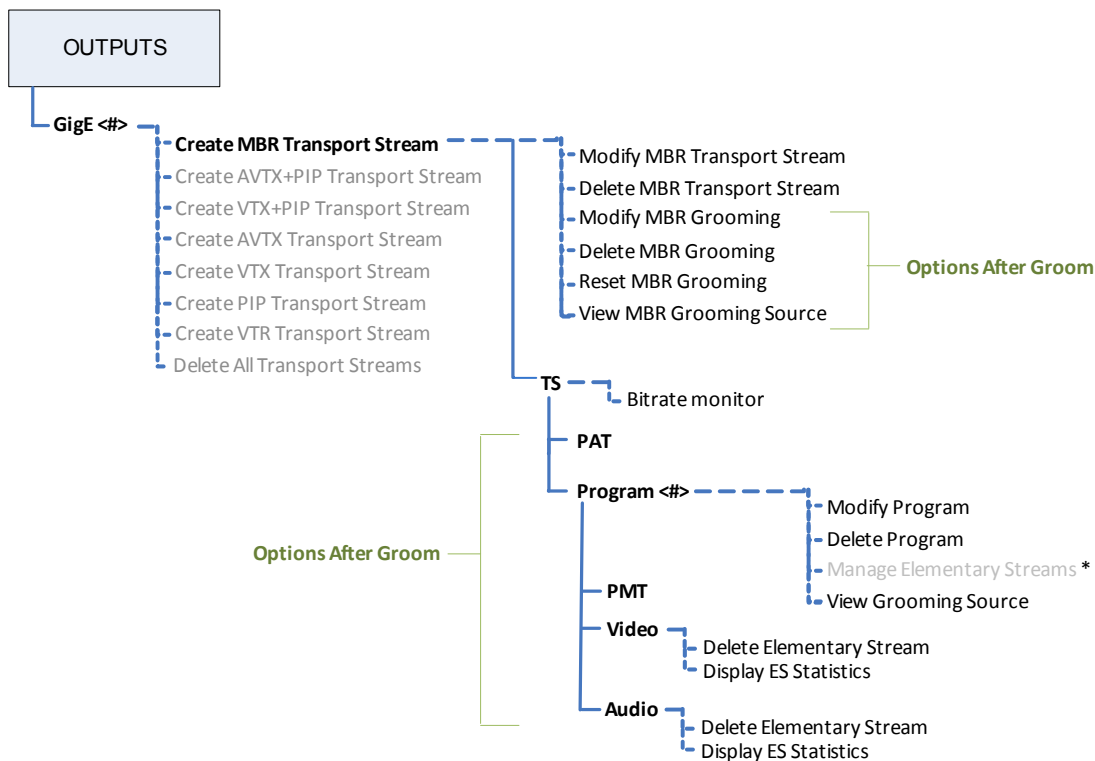
* This option is always disabled .

Outputs—AVTX+PIP Transport Stream

Use the **AVTX+PIP Transport Stream** menus (Figure 49) to manage the AVTX+PIP stream and grooming, and to access the bitrate monitor, program functions, and statistical functions for audio and video as associated with this stream's Main TS and the PIP TS.

Note that certain functions are not available until grooming is completed.

Figure 49.   AVTX+PIP Output TS Menus

```
┌──────────────────┐
│    OUTPUTS       │
└──────────────────┘
    │
    └─ GigE <#>
        ├─ Create MBR Transport Stream
        ├─ Create AVTX +PIP Transport Stream ─ ─ ┐
        │                                         ├─ Modify AVTX+PIP Transport Stream
        ├─ Create VTX+PIP Transport Stream       ├─ Delete AVTX +PIP Transport Stream
        ├─ Create AVTX Transport Stream          ├─ Modify AVTX+PIP Grooming
        ├─ Create VTX Transport Stream           ├─ Delete AVTX +PIP Grooming     Options After Groom
        ├─ Create PIP Transport Stream           ├─ Reset AVTX +PIP Grooming
        ├─ Create VTR Transport Stream           └─ View AVTX +PIP Grooming Source
        └─ Delete All Transport Streams
                                    Main TS ─── Bitrate monitor
                                       ├─ PAT
                                       ├─ Program <#> ─ ┐
                                       │                ├─ Modify Program
                                       │                ├─ Delete Program
                                       │                ├─ Manage Elementary Streams *
                 Options After Groom   │                └─ View Grooming Source
                                       ├─ PMT
                                       ├─ Video ─┬─ Delete Elementary Stream
                                       │         └─ Display ES Statistics
                                       └─ Audio ─┬─ Delete Elementary Stream
                                                 └─ Display ES Statistics

                                    PIP TS ─── Bitrate monitor
                                       ├─ PAT
                                       ├─ Program <#> ─ ┐
                                       │                ├─ Modify Program
                                       │                ├─ Delete Program
                                       │                ├─ Manage Elementary Streams *
                 Options After Groom   │                └─ View Grooming Source
                                       ├─ PMT
                                       └─ Video ─┬─ Delete Elementary Stream
                                                 └─ Display ES Statistics
```

* This option is always disabled .

Outputs—VTX+PIP Transport Stream

Use the **VTX+PIP Transport Stream** menus (Figure 50) to manage the VTX+PIP stream and grooming, and to access the bitrate monitor, program functions, and statistical functions for audio and video as associated with the Main TS and the PIP TS.

Note that certain functions are not available until grooming is completed.

Figure 50.   VTX+PIP Output TS Menus
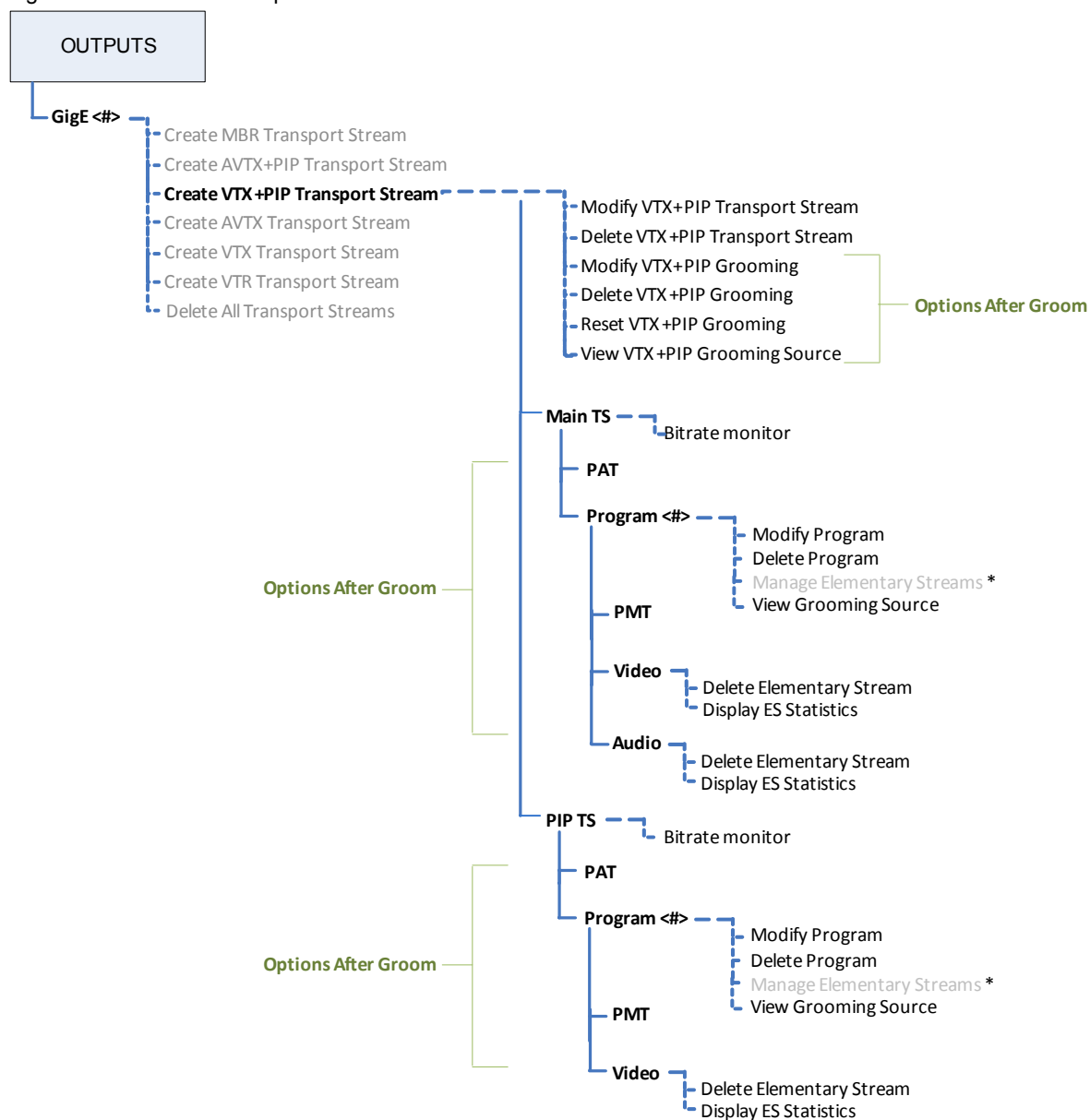
* This option is always disabled .

Outputs—AVTX Transport Stream

Use the **AVTX Transport Stream** menus (Figure 51) to manage the AVTX stream and grooming, and to access the program and statistical functions for audio and video as associated with the originating AVTX TS.

Note that certain functions are not available until grooming is completed.

Figure 51. AVTX Output TS Menus
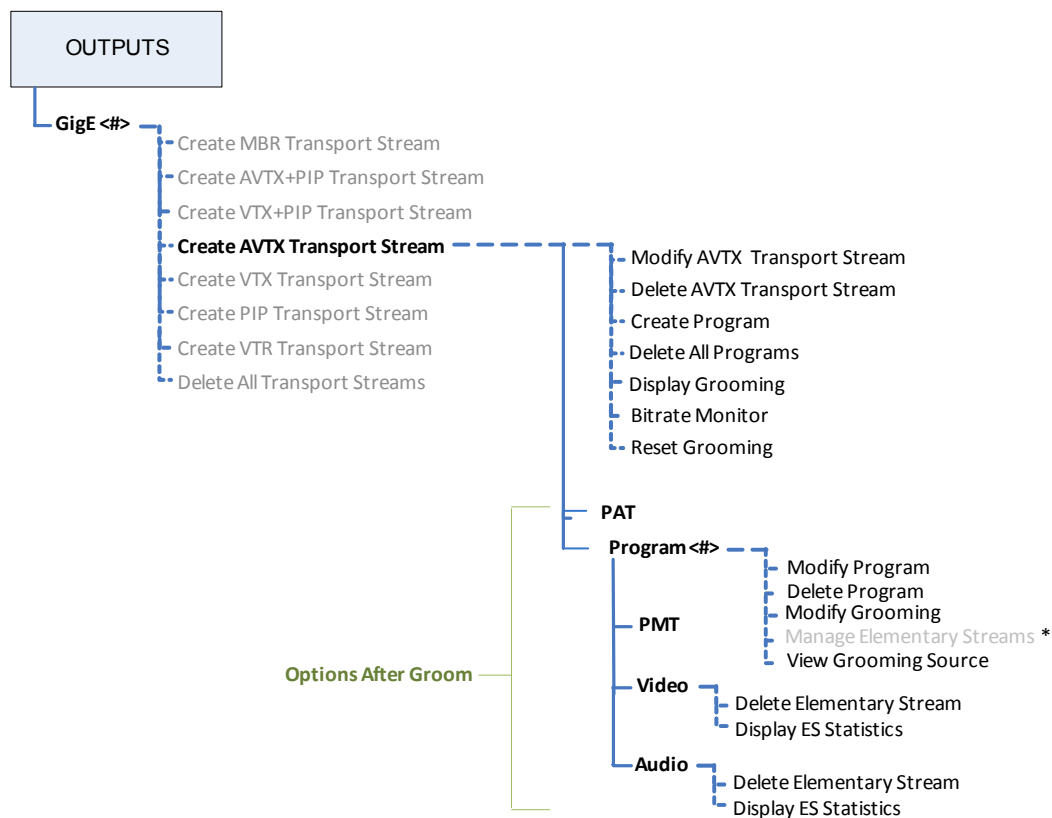
* This option is always disabled .

Outputs—VTX Transport Stream

Use the **VTX Transport Stream** menus (Figure 51) to manage the VTX stream and grooming, and to access the program and statistical functions for audio and video as associated with the originating VTX TS.

Note that certain functions are not available until grooming is completed.

Figure 52.   VTX Output TS Menus
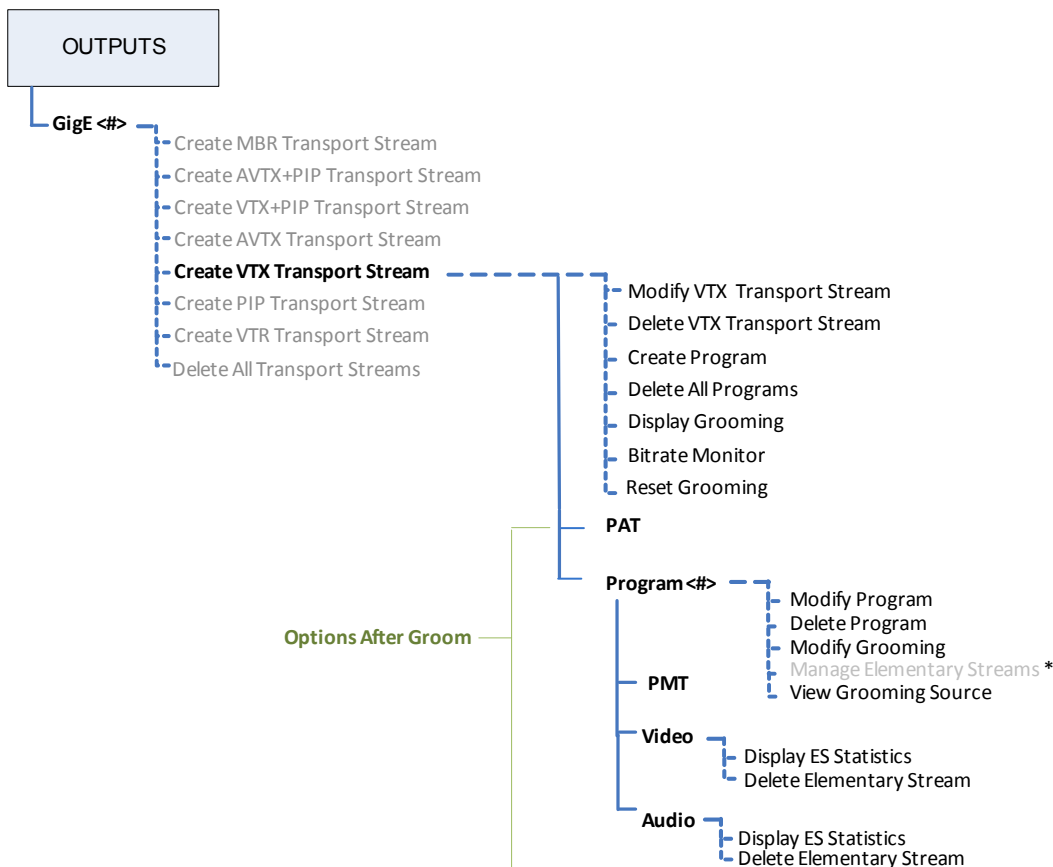
* This option is always disabled.

Outputs—PIP Transport Stream

Use the **PIP Transport Stream** menus (Figure 53) to manage the PIP stream and grooming, and to access the program and statistical functions for video as associated with the originating PIP TS.

Note that certain functions are not available until grooming is completed.

Figure 53.   PIP Output TS Menus
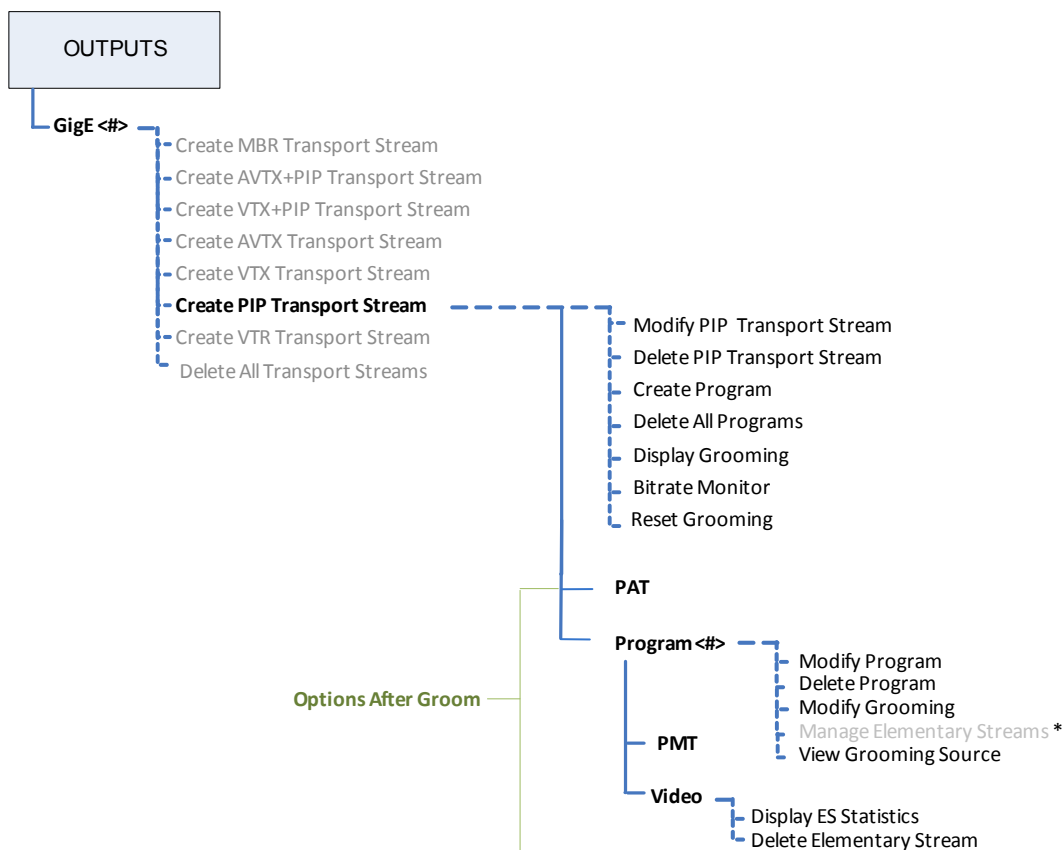
* This option is always disabled .

Outputs—VTR Transport Stream

Use the **VTR Transport Stream** menus (Figure 54) to manage the VTR stream and grooming, and to access the program functions as associated with the originating VTR TS.

Note that certain functions are not available until grooming is completed.

Figure 54.   VTR Output TS Menus
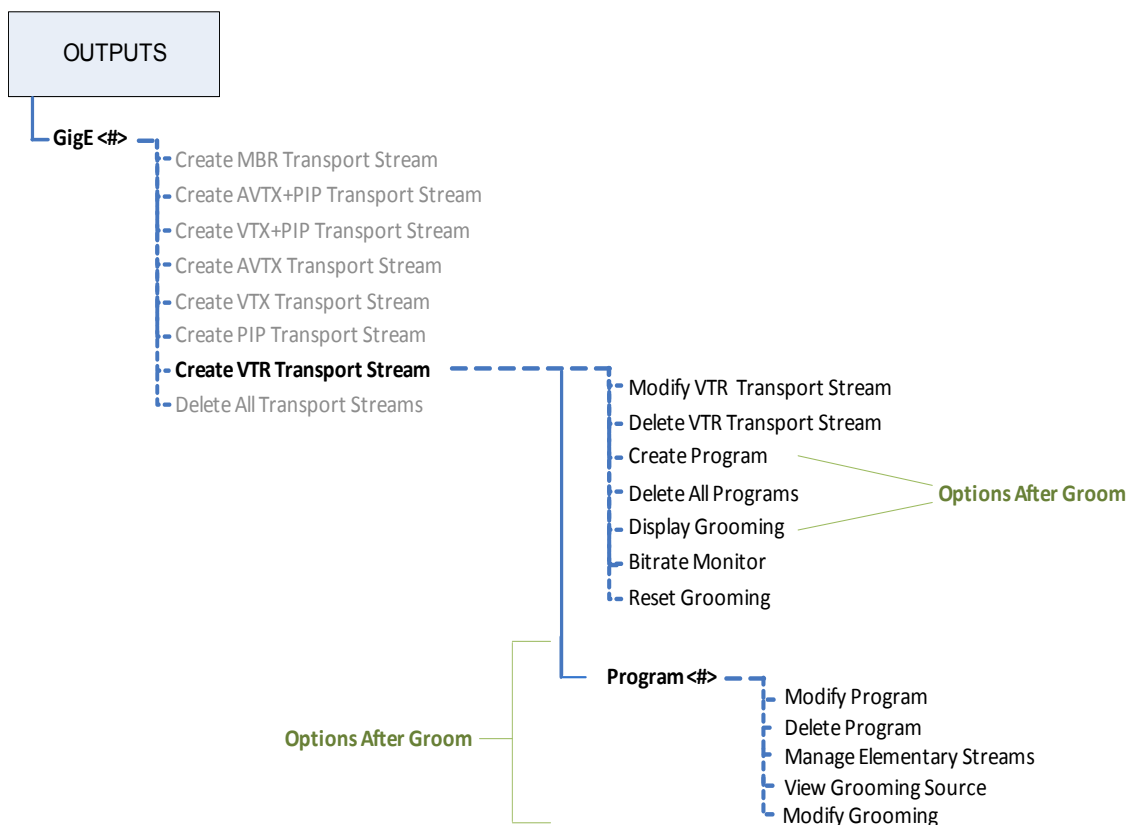
Search Mappings

Use the **Find** fields at the upper edges of the **Inputs** and **Outputs** panels of the **Grooming Mapping** page to quickly locate specific streams and programs.

1. With the **Grooming Mapping** page in view, type a string into the **Find** field to identify the TS or program you want to locate, then click **Find**.

   The **Search Mappings for** *<yourstring>* screen is now presented, which will either let you know that no matches were found, or will list each transport stream or program that matches your entry. Note that the display in the **Grooming Mapping** page remains intact after issuing search results.

2. To view the location of the matched TS or program in the associated **Inputs** or **Outputs** panel, click on the table row. The tree will then be revealed and a flashing green bar will guide you directly to the searched TS or program.

The following example demonstrates results of a search through the **Inputs** trees for all instances of the term *Cogeco*.

Figure 55.   Grooming-Mapping Find
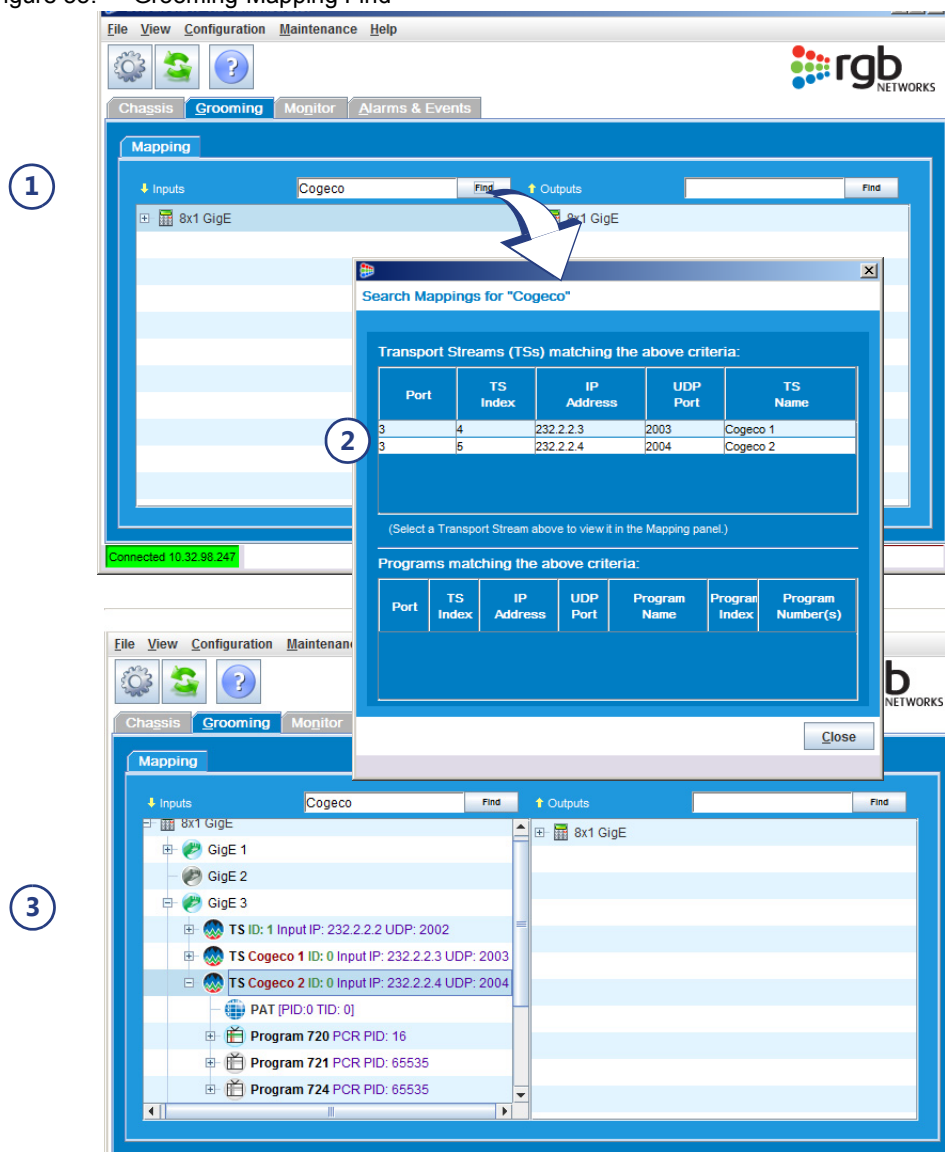
Input Transport Streams

This chapter provides an overview about use of the *VMG Element Manager* to perform video processing, using settings you provide for input transport streams.

> ℹ️ **Note:** *System configuration must be completed before performing grooming tasks.*
> *Refer to Chapter 4, "System Configuration" for more information.*

> ℹ️ **Note:** *The VMG supports program redundancy and elementary stream/PID management. If you plan to implement any of these advanced applications, please review associated sections in Chapter 12, "Advanced Grooming Applications" before attempting the input transport stream tasks described in this chapter.*

In This Chapter:

- *"Creating Input Transport Streams,"* next.
- *"Creating Ghost Programs" on page 114.*
- *"Modifying and Deleting Input Transport Streams and Programs" on page 116.*
- *"Configuring Program Languages" on page 119.*

Creating Input Transport Streams

Use the **Create GigE Input Transport Stream** screen to set parameters (Table 50) for specific input transport streams. You can also use this screen to access parameters for setup of multiple transport streams (see also *"Creating Multiple Transport Streams" on page 113*).

Menu Path	Grooming-Mapping page, **Inputs** panel --> right-click input GigE interface --> select **Create Transport Stream** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

The following steps insert a new transport stream (and table processing specification) into the **Inputs** panel, beneath a selected GigE interface.

1. At the **GigE Input Transport Stream** screen, use guidelines from Table 50 to set parameters for the GigE input transport stream.

2. Click **Apply** (or use Alt **a**).

3. Check the **Mapping** page display to ensure that the transport stream name is displayed under its GigE at the Input panel.

Table 50.   Create Input Transport Stream Fields

Field	Description	Default
GigE Port	View the selected port on which the input transport stream will be created.	Read-only
TS Name	Type an alphanumeric string to set a name for the input transport stream. Maximum length = 32 characters.	Blank
Table Processing	Enable (check) or disable (un-check) a specific table processing method for input transport streams on the GigE interface: • *DVB:* check to process SI tables, in addition to PAT and PMT. • *ATSC:* check to process PSIP tables, in addition to PAT and PMT. • *SDT*: check to process SDT, in addition to PAT and PMT. Only one option can be selected. If no option is checked, only PAT and PMT streams will be processed on the interface.	Un-checked
Multicast IP Address	Enable (check) or disable (un-check) multicasting on this interface. • If enabled, type a valid multicast address (in the range 224.0.0.0 through 239.255.255.255) to define the address carrying the service. • If disabled, type a valid unicast address. For each multicast input transport stream defined, the Selenio VMG issues an Internet Group Management Protocol (IGMP) join to the IP address specified in its configuration. A multicast group must be successfully joined before video can be routed to the interface.	Multicast: Blank Unicast: *Defaults to IP Address of GigE port*
Source IP	*(Optional, and only for multicast IGMPv3 streams)* Type the IP address of the source where the port receives data.	Blank
UDP Port	The UDP port on which the input stream transports.	Blank
FEC	Enable (check) or disable (un-check) FEC decoding on the input transport stream. When enabled, an additional four UDP ports will be used when the stream is created, totalling five UDP ports per FEC enabled stream. Refer also to "Creating FEC-based Input Transport Streams" on page 112 for more information.	Un-checked
Multiple TS	Access the **Select Multiple IP and UDP** screen to set parameters for multiple transport streams. Refer also to "Creating Multiple Transport Streams" on page 113 for more information.	See Table 51 on page 113

Creating FEC-based Input Transport Streams

The following guidelines should be considered when creating FEC-based input transport streams:

- Each FEC-based input transport stream will use an additional four (4) UDP ports, totalling five (5) UDP ports per FEC enabled stream. For example, if creating an FEC input transport stream with a multicast IP address of 239.1.1.1, which uses UDP port number 500, port numbers 500-504 will be used for the FEC based stream.
- For the reason mentioned above, creating multiple transport streams using incrementing UDPs for an FEC-based stream is not allowed.

Creating Multiple Transport Streams

You can create both input and output multiple transport streams. To create an input stream, use steps in this section.

1. At the **Create GigE Input Transport Stream** screen, enter the TS name, IP address, and UDP port number. Click **Multiple TS** to display the **Multiple IP and UDP** screen (Figure 56).

2. At the **Multiple IP and UDP** screen, select one of the incremental options, enter values to define the multiple and excluded UDP ports, then click **Apply** (or use Alt **a**).

Figure 56.   Select Multiple IP and UDP
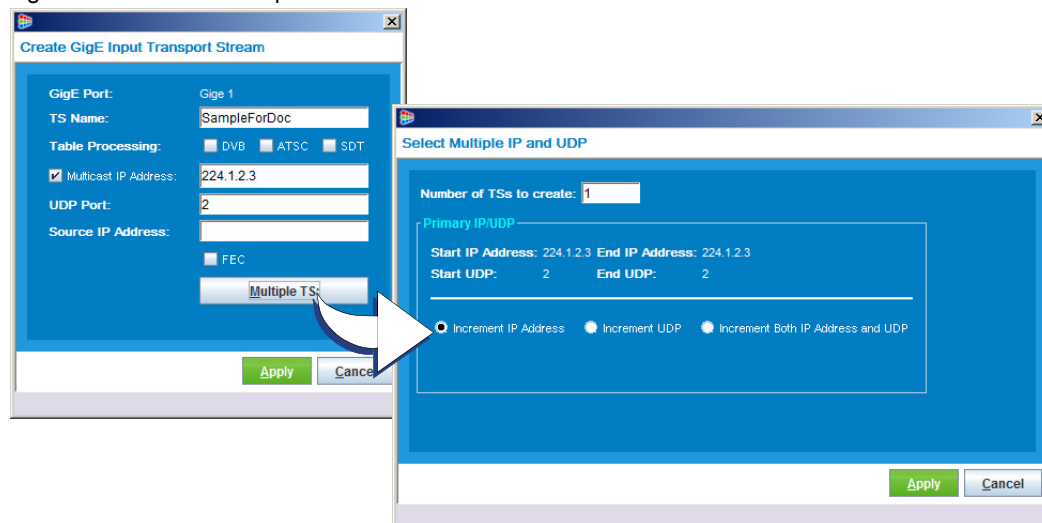
Table 51.   Create Multiple Transport Streams (IP and UDP)

Field	Description	Default
Number of TSs to create	Value to define the number of transport streams to be included in this GIgE TS.	Blank
Start IP Address	View the starting IP address. This field is read-only.	Based on IP address from stream creation dialog
End IP Address	View the ending IP address. This field is read-only and is updated to reflect the value entered in the *Multiple Number* and *Multiple TS Type* fields.	Incremented by the Multiple Number if applicable.

Table 51.   Create Multiple Transport Streams (IP and UDP)

Field	Description	Default
Primary IP/UDP	**Start UDP**—View the starting UDP port. This field is read-only.	Based on UDP port number from stream creation dialog.
	End UDP—View the ending UDP port. This field is read-only and is updated to reflect the value entered in the *Multiple Number* and *Multiple TS Type* fields.	Incremented by the Multiple Number if applicable.
	Incrementation—Set sequential increment method, as one of the following: • **Increment IP Address** – Increment only the IP addresses. • **Increment UDP** – Increment only the UDP ports. • **Increment Both IP Address and UDP** – Increment both the IP addresses and UDP ports.[a]	Increment IP Address
Excluded UDP Ports	Type values to define the UDP ports to be excluded from the sequential increments. This field is available only when *Increment UDP* is selected for the increment type. Use comma delimiters to separate port numbers in your entry.	Hidden

a.   When *Increment Both IP Address and UDP* option is selected, the *Excluded UDP Ports* option is not available.

Creating Ghost Programs

Ghost programs are used to add one or more unreferenced packet identifiers (PIDs) to an input transport stream. Unreferenced PIDs are input elementary streams that are not referenced by PAT/PMT tables. Such streams are not detected by the VMG system and require manual configuration for input routing. This manual operation is referred to as "ghost program" configuration.

Use the **Create Ghost Program** screen (Figure 57 and Table 52) to set identifiers for a ghost program.

	Menu Path	**Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> right-click on the transport stream --> select **Create Ghost Program** from popup.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. In the **Create Ghost Program** screen, set program name and number.
2. Click **Apply** (or use Alt **a**) to dismiss the screen and commit your settings.
3. Check the **Inputs** panel of the **Mapping** tab (Figure 57) page to ensure your ghost program is listed.

Figure 57.   Create Ghost Program.
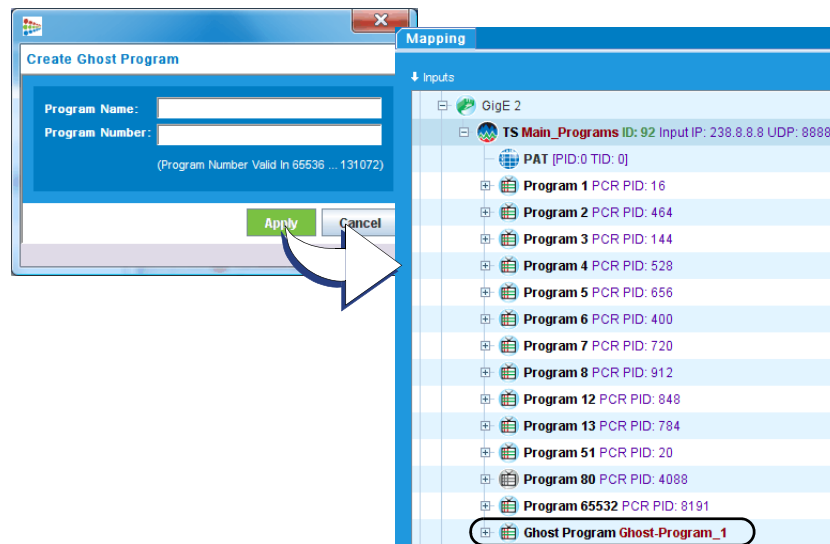
> **i** **Note:**   *To use the ghost program to add an unreferenced PID as an elementary stream,*
> *refer to "Adding an Unreferenced PID as an Elementary Stream" on page 266.*

Table 52.   Create Ghost Program Fields

Field	Description	Default
Program Name	Type alphanumeric string to set name of the ghost program. Maximum length = 32 characters.	Blank
Program Number	Type numeric string, in the range 65535 to 131072, to set number of the ghost program.	Blank

Modifying and Deleting Input Transport Streams and Programs

Use menu options from transport streams and programs in the **Grooming** tab of the *VMG Element Manager* screen to modify parameters for the selected TSs and programs.

☞	**Menu Path**	• For input transport stream modification: **Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> right-click on a transport stream --> select **Modify Transport Stream** from the popup menu. • For input program modification: **Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> expand selected TS--> right-click on a program --> select **Modify Program Name** from the popup menu. • For ghost program modifications: **Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> expand selected TS--> right-click on a ghost program --> select **Modify Ghost Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 58.   Inputs Popup Menus
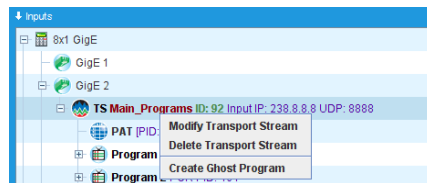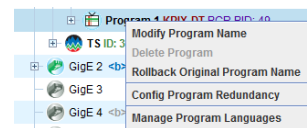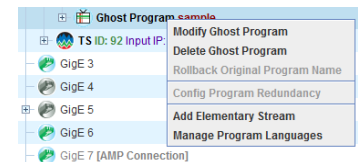
The availability of options from a popup menu differs as based on the status of the selected item. For example, if an item can be deleted, the **Delete** option becomes available.

- Table 53 describes options from the **Inputs** transport stream popup menu.
- Table 54 describes options from the **Inputs** program popup menu.

Table 53.   Inputs TS Menu Options

Menu Item	Description
Modify Transport Stream	Access the transport stream modification screen.
Delete Transport Stream	Remove a selected transport stream.
Create Ghost Program	Access the **Create Ghost Program** screen.

Table 54.   Inputs Program: Menu Options

Menu Item	Description
Modify Program/Ghost Program Name	Goes to the **Modify Input Program** dialog for the input program.
Delete Program/Delete Ghost Program	Applicable for Ghost Program only: deletes the ghost program.
Rollback Original Program Name	When selectable, allows you to return to the original name of the input program as received on the input port.
Config Program Redundancy	Applicable for Non-Ghost Programs only: opens the **Input Program Redundancy Configuration** screen.

Table 54.   Inputs Program: Menu Options (Continued)

Menu Item	Description
Add Elementary Stream	Applicable for Ghost Program only: opens the **Add Elementary Stream** screen.
Manage Program Languages	Goes to the **Audio Stream Languages** dialog if any ES in the program is configured for a language.
	If the ES language has not been modified, an **Info** dialog states that no language modifications were found.

Modify Input Program

Use the **Modify Input Program** dialog to change the name of the selected input program.

Note: *To find out how to modify output program parameters, see "Modify Output Program" on page 179.*

Menu Path	**Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> expand selected TS --> right-click a program and select **Modify Program Name** from popup.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. At the **Program Name:** field, type an alphanumeric string (maximum 32 characters) to set a name for the selected program.
2. Click **Apply** (or use Alt **a**).
3. Check the **Inputs** panel to ensure that the program name is now displayed alongside the program number.
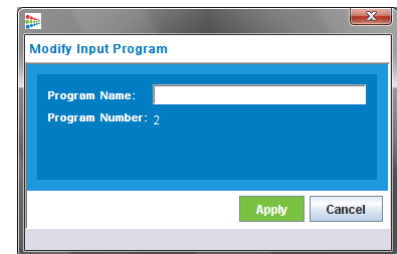
Delete All Input Transport Streams

Use steps in this section to delete all input transport streams configured for an interface.

1. Go to the **Delete All Transport Streams** option:

Menu Path	**Grooming-Mapping** page, **Inputs** panel --> right-click on a GigE interface and select **Delete Transport Stream** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

2. Click **Yes** (or use Alt **y**) when prompted by the **Delete Confirmation** screen. All transport streams associated with the selected GigE interface are immediately removed from the display.

Delete Single Input Transport Stream

Use steps in this section to delete a single transport stream and all its associated programs from an interface:

Note: *If an input transport stream contains programs that are groomed to output transport streams, you cannot delete the input stream until you first delete all of the groomed programs.*

1. Go to the **Delete Transport Stream** option:

	Menu Path	**Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> right-click on a TS and select **Delete Transport Stream** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

2. Click <u>**Yes**</u> (or use Alt **y**) when prompted by the **Delete Confirmation** screen. The selected transport stream is immediately removed from the display.

Delete Ghost Program

Use steps in this section to delete a single ghost program in an input transport stream.

Note: *Input programs learned through configuring an input transport stream cannot be deleted.*

1. Go to the **Delete Ghost Program** option:

	Menu Path	**Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> expand the TS --> right-click on the ghost program and select **Delete Ghost Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

2. Click <u>**Yes**</u> (or use Alt **y**) when prompted by the **Delete Confirmation** dialog. The selected ghost program is immediately removed from the display.,

Configuring Program Languages

The VMG *Element Manager* provides language control tools you can use to perform the following tasks:

- Modify the original language (English) for audio elementary stream(s) associated with an input Program.
- Reset the original language, either from the ES level or from the program level.
- View all languages currently configured to run within a program.

Modifying Language Descriptors

The VMG provides ISO 639-compliant configuration for language coding on individual input audio elementary streams. The language descriptor function allows you to replace the input language code with your selection.

Use the **Modify Language Descriptor** dialog to view the current language, and/or to select the language (Table 55) to be associated with a specified audio elementary stream.

	Menu Path	Grooming-Mapping page, **Inputs** panel --> expand selected GigE interface--> expand selected TS --> expand selected program --> right-click on an Audio ES and select **Modify Language Description** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.
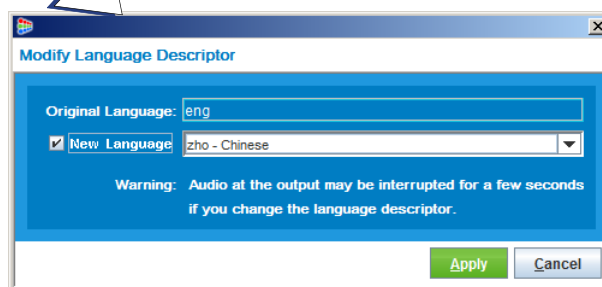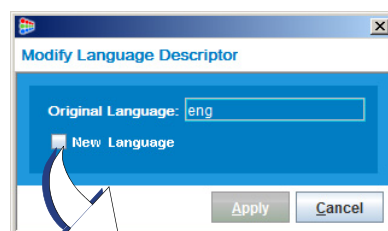
1. With the **Modify Language Descriptor** dialog in view, click to check the **New Language** box. The dialog immediately expands to provide the drop-down selector, and presents an audio-interrupt warning.

2. Use the drop-down selector to define the language to be used on the elementary stream, then click **Apply** (or use Alt **a**) to commit the setting.

Table 55.   Modify Language Descriptor

Menu Item	Description
Original Language	Three-letter country code that identifies the language descriptor originally provided in the VMG *Element Manager* software.
New Language	Click to check-mark and reveal the entry field for New Language. Languages you can choose are listed in Table 150 on page 334.

The setting will remain until it is either reset at the **Modify Language Descriptor** dialog or removed at the program level (as described in "Managing Program Languages" on page 120).

Managing Program Languages

All language descriptors modified for a program can be viewed or removed by means of the **Manage Audio Stream Languages** dialog (Figure 59).

👉	**Menu Path**	**Grooming-Mapping** page, **Inputs** panel --> expand selected GigE interface--> expand selected TS --> right-click on a program and select **Manage Program Languages** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 59.   Manage Program Languages
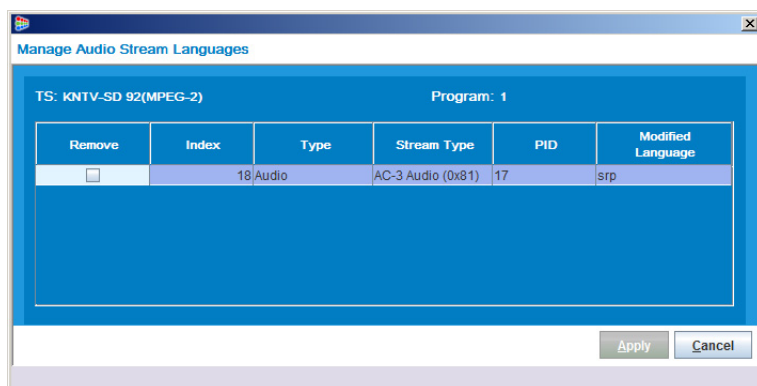
Removing a Program Language

1. At the **Manage Audio Stream Languages** dialog, click the checkbox alongside the row containing the program language details to be removed.
2. Click **Apply** (or use Alt **a**) to complete this operation and to dismiss the dialog.

Configuration Prerequisite for Language Management

If a language has not been set for an audio ES within the selected program, an error message is presented.

Refer to "Modifying Language Descriptors" on page 119 to configure language associations for input audio elementary streams.
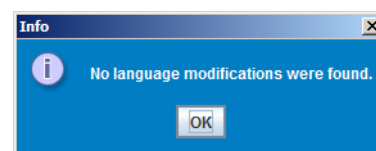
Removing a Language Descriptor at the Program Level

1. Go to the **Manage Audio Stream Languages** dialog for a specific program.
2. At the dialog, click one or more check boxes at the **Remove** column.

    There are no other editable fields in this dialog.
3. Click **Apply** (or use Alt **a**) to complete this operation and to dismiss the dialog.

    All applicable audio elementary streams are returned to the Original Language setting(s).

Single Video Transport Streams

This chapter describes the use of the *VMG Element Manager* **Grooming** -> **Mapping** tab page to manage the creation and grooming of standard single bitrate transport streams—AVTX, VTX, PIP, and VTR.

> **Note:** *System configuration must be completed before performing grooming tasks. Refer to Chapter 4, "System Configuration" for more information.*

> **Note:** *The VMG supports program redundancy and elementary stream/PID management. If you plan to implement any of these advanced applications, please familiarize yourself with their respective sections in Chapter 12, "Advanced Grooming Applications" before performing the procedures in this chapter.*

In This Chapter:

- "Creating Output Transport Streams," next.
- "Output Programs and Grooming" on page 138.
- "Managing Standard Output Streams and Programs" on page 167.

Creating Output Transport Streams

The Selenio VMG supports four types of single bitrate output streams: MPEG-2 and SCTE; ATSC and DVB, for which the Selenio VMG supports PSIP/SI table generation.

- Processes for creating either an MPEG-2 or SCTE output stream are identical.
  See "Creating Single Video Output Transport Streams" on page 122.
- Processes for creating ATSC and DVB output streams and for generating PSIP tables are similar.
  See "Creating ATSC and DVB Output Transport Streams" on page 133.

Creating Single Video Output Transport Streams

Use steps in this section to create an MPEG-2 or SCTE output transport stream.

1. Access the output transport stream menu.

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface --> select a single-video option—AVTX, VTX, PIP, or VTR—from the popup menu (Figure 60).
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 60.   Create Output Single Bitrate TS
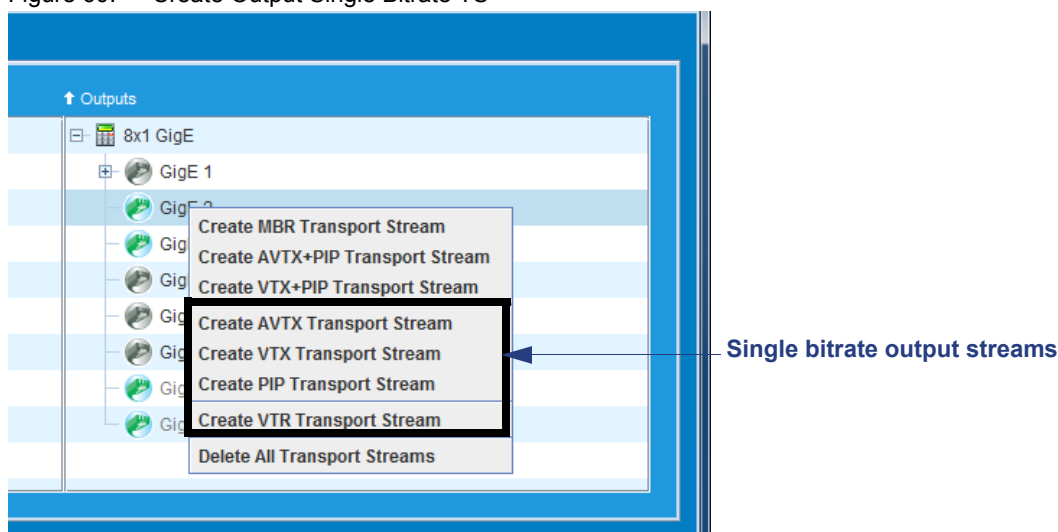
2. Set parameters into the **Create Output Transport Stream** screen associated with your selection (Table 56).

Table 56.   Create Output Single Bitrate TS

Menu Selection	Description
Create AVTX Transport Stream	Access the **Create Output AVTX Transport Stream** screen (Figure 61) to set parameters for a standard output transport stream that enables both audio and video transcoding. See also "Create Output AVTX Transport Stream" on page 123.
Create VTX Transport Stream	Access the **Create VTX Transport Stream** screen (Figure 62) to set parameters for standard output transport stream that enables video transcoding only. See also "Create Output VTX Transport Stream" on page 124.
Create PIP Transport Stream	Access the **Create PIP Transport Stream** screen (Figure 63) to set parameters for standard transcoded PIP program output transport stream. See also "Create Output PIP Transport Stream" on page 125.
Create VTR Transport Stream	Access the **Create VTR Transport Stream** screen (Figure 64) to set parameters for non-transcoding transrating output transport stream. See also "Create Output VTR Transport Stream" on page 126.

Video transcoding parameters for use with these screens are described in Table 57 on page 127, and Table 58 on page 129.

Create Output AVTX Transport Stream

Use the **Create Output AVTX Transport Stream** dialog (Figure 61) to set parameters for an AVTX TS at a selected GigE output port.
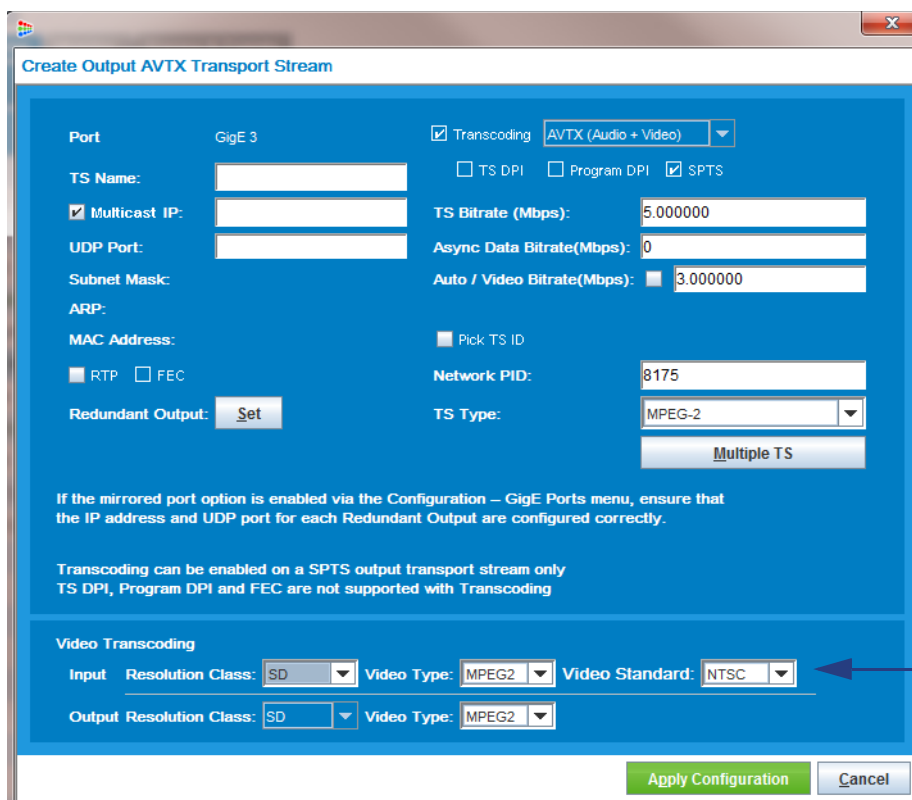
	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface --> select **Create AVTX Transport Stream** from the popup menu.
☞	**Quick Keys**	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 61.   Create Output AVTX TS

1. At the **Create Output AVTX Transport Stream** dialog, enter information to define the AVTX TS. Use guidelines from Table 57 for your entries.

2. Click **Apply Configuration** (or use Alt **a**) to save and use the configuration.

   The new AVTX TS is now displayed at the **Outputs** panel of the **Mapping** tab page.

   This transport stream is now ready to accept program setup and/or mapping.

Create Output VTX Transport Stream

Use the **Create Output VTX Transport Stream** dialog (Figure 62) to set parameters for a VTX TS at a selected GigE output port.
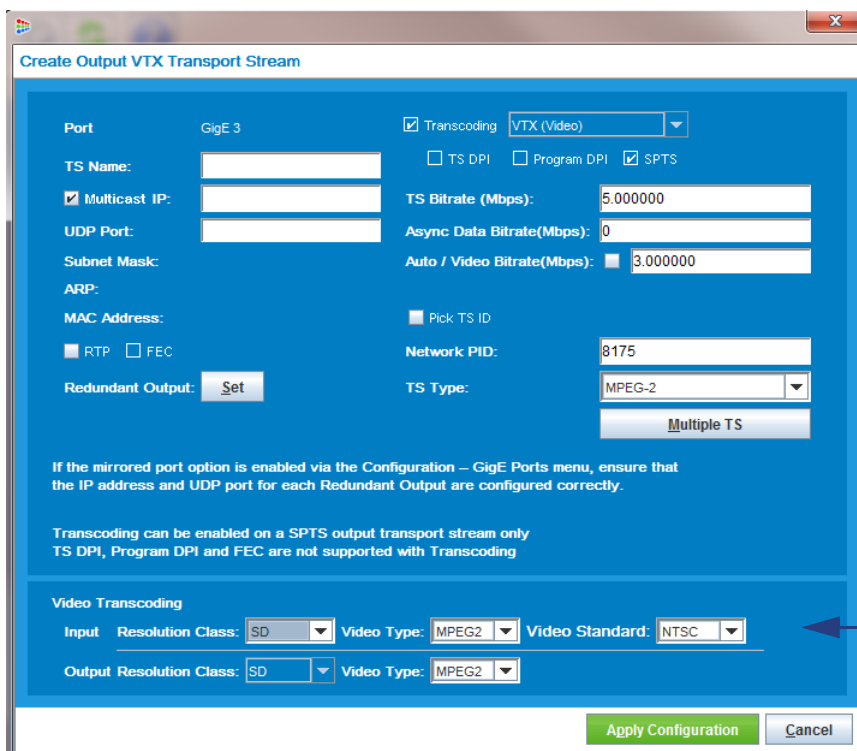
🖒	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface --> select **Create VTX Transport Stream** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 62.   Create Output VTX TS

1. At the **Create Output VTX Transport Stream** dialog, enter information to define the VTX TS. Use guidelines from Table 57 for your entries.

2. Click **Apply Configuration** (or use Alt **a**) to save and use the configuration.

    The new VTX TS is now displayed at the **Outputs** panel of the **Mapping** tab page.

    This transport stream is now ready to accept program setup and/or mapping.

Create Output PIP Transport Stream

Use the **Create Output PIP Transport Stream** dialog (Figure 63) to set parameters for an PIP TS at a selected GigE output port.
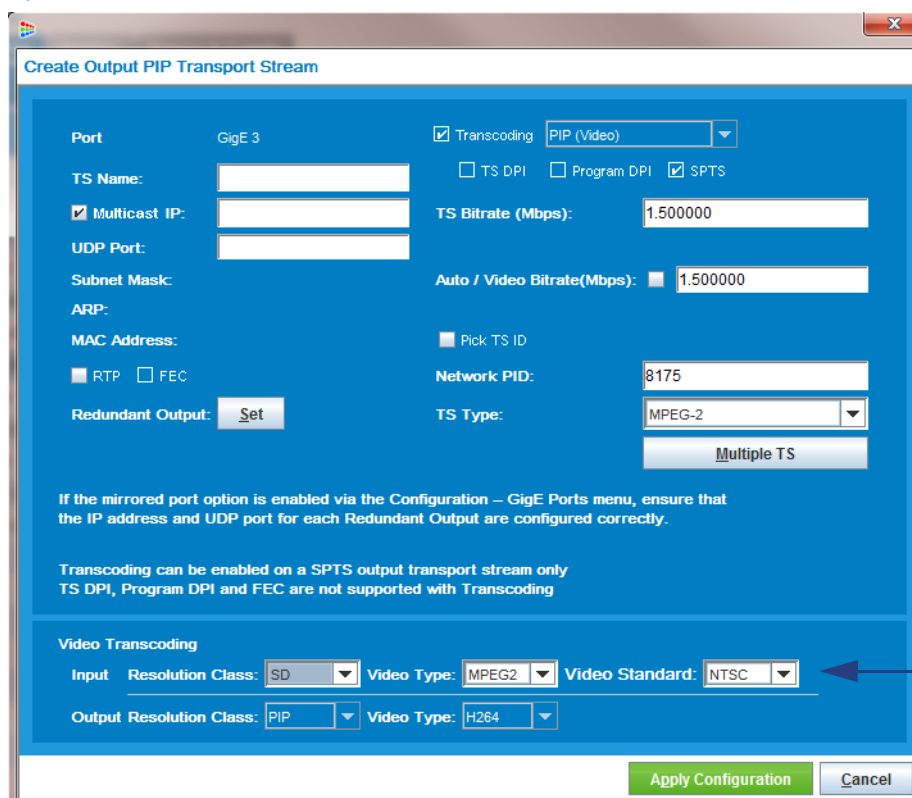
👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface --> select **Create PIP Transport Stream** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 63.   Create Output PIP TS

1. At the **Create Output PIP Transport Stream** dialog, enter information to define the PIP TS. Use guidelines from Table 57 for your entries.

2. Click **Apply Configuration** (or Alt **a**) to save and use the configuration.

    The new PIP TS is now displayed at the **Outputs** panel of the **Mapping** tab page.

    This transport stream is now ready to accept program setup and/or mapping.

Create Output VTR Transport Stream

Use the **Create Output VTR Transport Stream** dialog (Figure 64) to set parameters for an VTR TS at a selected GigE output port.
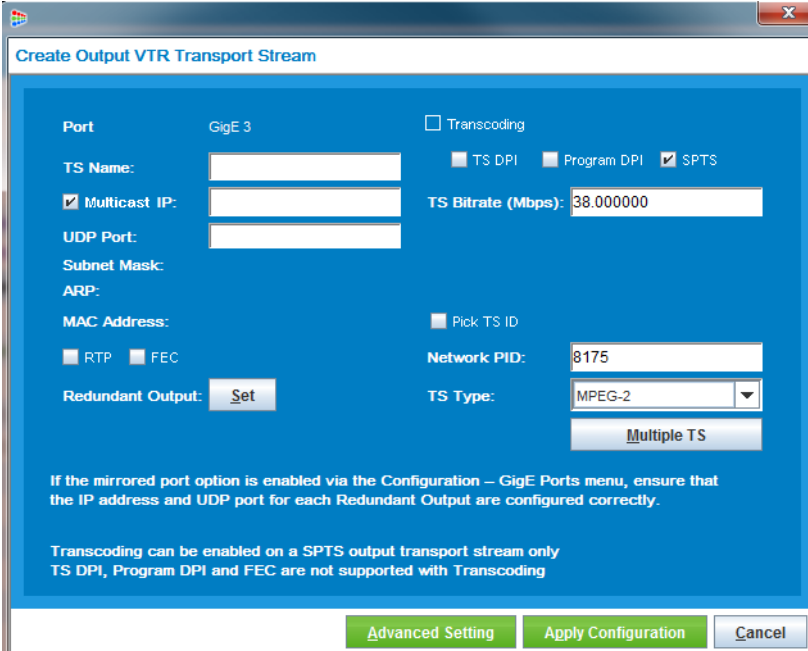
☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface --> select **Create VTR Transport Stream** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 64.   Create Output VTR TS

1. At the **Create Output VTR Transport Stream** dialog, enter information to define the VTR TS. Use guidelines from Table 57 for your entries.

2. Click **Apply Configuration** (or use Alt **a**) to save and use the configuration.

   The new VTR TS is now displayed at the **Outputs** panel of the **Mapping** tab page.

   This transport stream is now ready to accept program setup and/or mapping.

Parameters listed and described in Table 57 are provided in the **Create Outputs Stream** screens for configuration of single-video transcoded and non-transcoded streams.

Table 57.   Create Output TS: AVTX, VTX, VTR, or PIP

Field	Description	Default
Port	Displays the selected port on which the output transport stream is being created.	Read-only
Transcoding	Note that a valid MPEG-2 or H264 SD or HD license is required to enable transcoding. The following transcoding transport streams are available: • AVTX (Audio + Video) • VTX (Video) • PIP (Video) When displayed as checked, transport-level transcoding is enabled for an SPTS program in the TS. This field is un-checked for VTR transport streams.	Read-only
TS Name	*(Optional)* Alphanumeric string to set name for the output transport stream. Maximum length = 32 characters.	Blank
SPTS	Check if the output is a single program transport stream (SPTS). If you are creating a transcoding (AVTX, VTX, PIP) transport stream, *SPTS* is checked and read-only	Checked
Multicast IP Unicast IP	Set stream as either multicast (check) or unicast (un-check). • For multicast, type a valid multicast IP address. • For unicast, type a unicast IP address, and provide subnet mask and ARP settings.	Checked (multicast)
Bitrate (Mbps)	Value to set bitrate of the output stream. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331). See "Locales and Decimal Entries" on page 330 for guidelines.	AVTX= 20 VTX = 20 PIP = 1.2 VTR = 38
Async Data Bitrate (Mbps)	For AVTX, VTX, and PIP transport streams, value in Mbps to set maximum bitrate for asynchronous data in this stream. The async data bitrate cannot exceed the TS bitrate. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331). See "Locales and Decimal Entries" on page 330 for guidelines.	PIP: 0 (no maximum limit; equivalent to the transport stream bitrate)
Automatic Video Bitrate *(In Mbps)*	Enable (check) or (disable) auto video bitrate assignment. • If enabled (checked) the system assigns the video bitrate, with the latency marked by a "*Perfecting video*" message until the bitrate is assigned. • If disabled (un-checked) enter a value to define video bitrate (See "Locales and Decimal Entries" on page 330, for acceptable values). As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331).	AVTX=15.0 VTX=15.0 PIP = 0.3
UDP Port	Identifier of the UDP port to use for transmitting data.	Blank

Table 57.   Create Output TS: AVTX, VTX, VTR, or PIP (Continued)

Field	Description	Default
Pick TS ID	Enables the system to choose a unique number for identification of the output transport stream. When checked, the entry field is displayed. Enter a value, in decimal format, in the range 0 to 65535. Display of this field is demonstrated in Figure 65, "Output TS: Unicast Configuration," on page 130.	Un-checked When checked: *0*
Subnet Mask	For unicast configuration only—set the subnet mask of the output transport stream. Display of this field is demonstrated in Figure 65, "Output TS: Unicast Configuration," on page 130.	*255.255.255.0*
Network PID	Value, in the range 16 to 8175, to define the program ID of transport stream packets that contain the network information table.	8175 When creating a DVB output transport stream, this field defaults to 16 and is read only.
ARP	For unicast configuration only—Enable (check) or disable (un-check) ARP for this stream: • If creating a unicast transport stream on GigE's 1-8, check this box if ARP is to be used for broadcasting the Selenio VMG MAC address. • If creating a unicast transport stream on 10GigE 1 or 10GigE 2, un-check this box and enter the MAC address • Display of this field is demonstrated in Figure 65, "Output TS: Unicast Configuration," on page 130	enable (checked)
TS Type	For AVTX, VTX, or PIP, select type of output transport stream to create, as either MPEG-2, ATSC, SCTE, or DVB. This setting is not applicable to VTR transport streams. For TS types *ATSC* or *DVB*, refer to "Creating ATSC and DVB Output Transport Streams" on page 133 for additional configuration parameters.	MPEG-2
MAC Address	Where ARP is not enabled, type the physical MAC address of the active NPM. Display of this field is demonstrated in Figure 65, "Output TS: Unicast Configuration," on page 130	Hidden if ARP enabled. When ARP is un-checked: 00:00:00:00:00:00
Multiple TS	Click to access the **Select Multiple IP and UDP** screen, to create multiple transport streams. Refer to "Creating Multiple Transport Streams" on page 113 for more information.	
RTP	Enable (check) or disable (un-check) Real Time Protocol (RTP) on the output transport stream.	Un-checked

Table 57.   Create Output TS: AVTX, VTX, VTR, or PIP (Continued)

Field	Description	Default
FEC	For transrating transport streams only: Enable (check) or disable (un-check) Forward Error Correction (FEC) on the output transport stream. Checking the FEC option reveals the following fields in which to set the height and width of the FEC matrix:	Un-checked
	D: value to define FEC height, in the range 4 to 20.	D = 4
	L: value to define FEC width, in the range 1 to 20	L = 1
	When checked, an additional four UDP ports will be used when the stream is created, to total five UDP ports per FEC-enabled stream.	
	Display of REC port configuration fields is demonstrated in Figure 65, "Output TS: Unicast Configuration," on page 130. Additional guidelines for FEC configuration are provided in "Creating FEC-based Output Transport Streams" on page 132.	
Redundant Output Button	Access the **Set Redundant IP Address** dialog to set a multicast or unicast IP address for supplemental port mirroring.	n/a
	See also "Redundant Output" on page 130.	
Advanced Setting Button	For VTR transport stream only: Access advanced settings for the selected transport stream.	n/a
	See also "Advanced Transport Stream Setting" on page 132.	

Parameters listed and described in Table 58 are provided in the **Create Outputs Stream** screens for configuration of single-video transcoded and non-transcoded streams.

Table 58.   Video Transcoding Parameters - Standard Output Streams

Field	Description	Default
Input Resolution Class	Select HD or SD. • For SD, additional fields are displayed in which to set video type (as either MPEG-2 or H264) and video standard (as either NTSC or PAL). • HD does not require video type and video standard settings.	• AVTX and VTX: HD input, HD output, and MPEG-2 video • PIP: HD input, PIP output, and H264 video
Output Resolution Class	Select HD or SD. • For SD: set video type as either MPEG-2 or H264. • For HD: set video type as either MPEG-2 or H264.	• VTR (not applicable)

Unicast Addressing for Output Transport Streams

If the output transport stream configuration dialog is set to disable (un-check) multicast, the unicast IP address field is then revealed to enable entry of the IP address to be associated with this stream. Correspondingly, the subnet mask, ARP and MAC address fields are also revealed (Figure 65).

Figure 65.   Output TS: Unicast Configuration

Redundant Output

The redundant output function supplements the port mirroring established via GigE port configuration (see also, and allows you to configure secondary destination IP and destination MAC (if destination IP is unicast) for a specific output transport stream. This allows the destination IP of the redundant output transport stream to differ from the source.

With the **Set Redundant IP Address** dialog for either unicast or multicast, you can set up the secondary destination IP for use with a specific output transport stream.

- **Multicast**: the destination MAC is well-known and derived directly from the destination IP. Therefore, when an output ts is enabled (assigned to a TCM or VPM on the VMG), its network settings are enacted without additional dependencies.
- **Unicast**. In this case, wait is necessary during ARP resolution for both primary (if primary is unicast) and secondary destination IPs before the network settings can be enacted.

  If ARP for the secondary destination IP is not resolved, the primary output transport stream will not be transmitted (even if ARP for the primary destination IP is resolved), and vice versa.

  You can statically configure both the primary and secondary destination MAC addresses (if unicast) to avoid ARP dependencies during programming of the output transport stream.

Use the **Set IP Address of Redundant Output** dialog (Figure 66) to set redundant addresses parameters for a transport stream:

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a TS and select **Modify** <TS type> **Transport Stream** from the popup menu --> click **Set**.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 66.   Redundant IP Address: Multicast
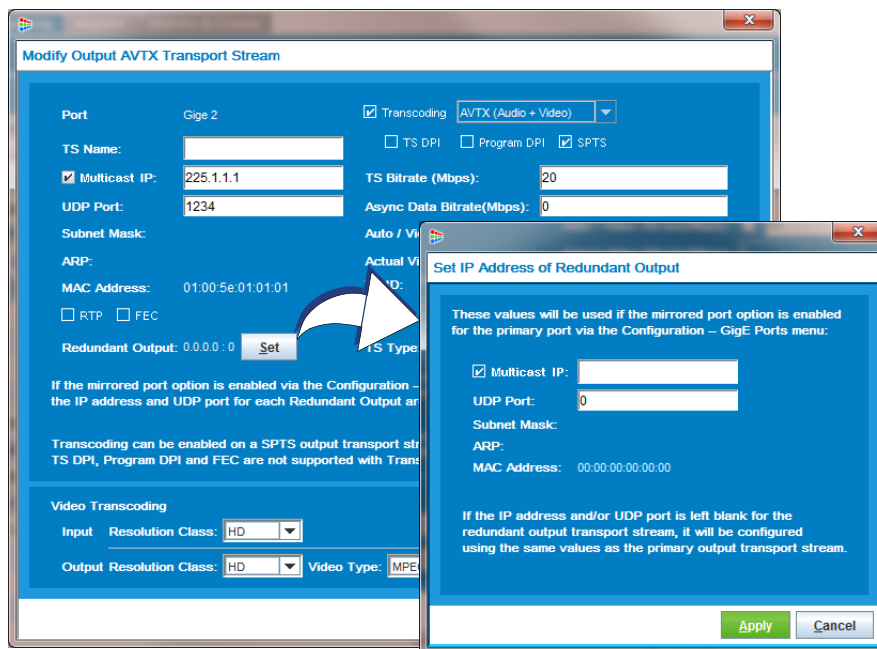
Fields provided in the **Set IP Address of Redundant Output** dialog are associated with your multicast or unicast specification for the transport stream.

Figure 67.   Redundant IP Address: Unicast
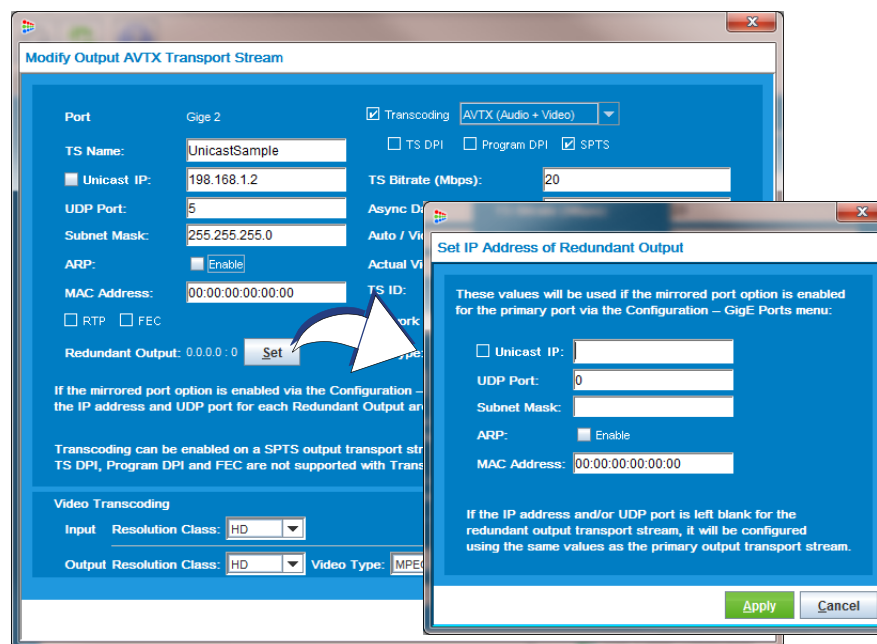
Advanced Transport Stream Setting

This option applies only to VTR transport streams, and provides access to configuration of the MPTS H.264 alarm bitrate level. This setting can assist in maintaining video quality for MPEG-2 video content in the presence of other content, such as H.264, which bypasses the Selenio VMG's transrater. If the H.264 program bandwidth exceeds the configured percentage, an alarm is generated.

Go to the Create **Advanced Transport Stream Setting** dialog (Figure 68 and Table 59) to set the H.264 Alarm Bitrate.

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> right-click on an output GigE interface and select **Create Output VTR** from the popup menu --> **Create Output VTR Transport** stream dialog: un-check **SPTS**, click **Advanced Setting**.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 68.   Advanced TS Setting: MPTS
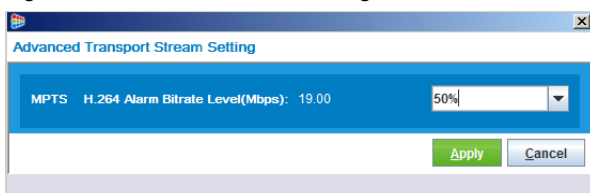
1. At the **Advanced Transport Stream Setting** dialog, select a value to define a percentage of transport stream bandwidth.

2. Click **Apply** (or use Alt **a**) to dismiss this dialog and to return to the **Output Transport Stream** dialog.

3. At the **Output Transport Stream** dialog, click **Apply Configuration** (or use Alt **a**) to save and use this setting.

Table 59.   Advanced TS Setting: MPTS

Field	Description	Default
MPTS H.264 Alarm Bitrate Level (Mbps): 19.00	Value to define percentage of aggregated transport stream bandwidth allowable before generating alarm, as one of the following: 0%, 25%, 50%, 75%, 100%	50%

Creating FEC-based Output Transport Streams

The following guidelines should be considered when creating FEC-based output transport streams:

- Because FEC coding is used on top of the RTP, when the FEC field is checked, RTP must also be checked.
- The valid height (D) range of the FEC matrix is from 4 to 20.
- The valid width (L) range of the FEC matrix is from 1 to 20.
- Each FEC-based output transport stream will use an additional four (4) UDP ports, totalling five (5) UDP ports per FEC enabled stream.

   For example, if creating an FEC output transport stream with a multicast IP address of 239.1.1.1, which uses UDP port number 500, port numbers 500-504 will be used for the FEC-based stream.
- For the reason mentioned above, creating multiple transport streams using incrementing UDPs for an FEC-based stream is not allowed.

Creating ATSC and DVB Output Transport Streams

PSIP (Program and System Information Protocol) is a collection of tables operating within the terrestrial broadcast Transport Stream (TS) of every digital (and sometimes analog) television. PSIP settings are configured as part of the transport stream. PSIP tables are defined as part of the ATSC standards. DVB defines Service Information (SI) tables to achieve similar functions.

These tables contain system information and program data:

- System information allows navigation and access of the channels within the DTV transport stream.
- Program data provides necessary information for efficient browsing and event selection.
- Some PSIP tables contain the information to locate digital streams.

Note: *If you are not sure of the PSIP guidelines, there are many good references on the Internet, including the ATSC Recommended Practice: Program and System Information Protocol Implementation Guidelines for Broadcasters at* http://www.atsc.org/standards/.

For DVB reference, see DVB-SI reference, see http://www.home.agilent.com/upload/cmc_upload/All/6C06MPEGPAPER1.pdf

Creating ATSC Output Transport Streams

Use steps in this section to create a new ATSC output transport stream.

1. From the **Outputs** panel of the **Grooming** -> **Mapping** tab page, right-click the output port on which to create the stream and select one of the following options from the popup menu (Figure 60):

    • **Create AVTX Transport Stream**

    • **Create VTX Transport Stream**

    • **Create PIP Transport Stream**

    • **Create VTR Transport Stream**

    The **Create Transport Stream** configuration dialog associated with your selection is now displayed.

2. At the output stream configuration dialog, in the **TS Type** field, select **ATSC.**

    The lower portion of the screen expands to reveal the ATSC configuration fields shown in Figure 69.

    Figure 69.   ATSC Output TS

3. Use guidelines from Table 60 to define ATSC parameters for the output transport stream.

4. Click **Apply Configuration** (or use Alt **a**) to save and use your settings.

Table 60.   Create ATSC Output Transport Stream Fields

Field	Description	Default
EIT PID EIT [0-3]	Event Information Table packet identifier (PID) numbers. These can be manually set, overriding the PID in the Master Guide Table (MGT). • Valid range is from 48 to 8175 • EIT 1 - 3 automatically increments by 1, as based on the base value entered in EIT 0.	Blank
EIT Interval EIT [0-3]	Event Information Table intervals. These can be manually set, overriding the intervals in the Master Guide Table (MGT). EIT 0: Valid range from 10 to 500 EIT 1: Valid range from 1000 to 3000 EIT 2: Valid range from 30000 to 60000 EIT 3: Valid range from 30000 to 60000	EIT 0: *500* EIT 1: *3000* EIT 2: *60000* EIT 3: *60000*
MGT Interval	The Master Guide Table intervals. The MGT is the highest table in the ATSC transport stream table hierarchy. It contains the PIDs of other tables so receivers can locate them. Valid range is from 10 to 150	150
CVCT Interval	Cable Virtual Channel Table intervals. The CVCT provides information about channels, such as channel name, navigation identifier, and stream components. Valid range is from 10 to 400	400
STT Source	System Time Table source. The STT serves as a reference for time-of-day functions. Used for setting daylight-savings time indicators on the consumer's set-top box, and synchronizing the concept of "now" between the set-top box and the broadcaster. • Click the **Select STT** button to select a source. If a groomed input transport stream is using an STT, valid options will appear in this menu. • There must be a valid STT source to be ATSC compliant.	Blank
RRT Source	Rating Region Table source. The RRT transmits the program rating information. • Click the **Select RRT** button to select a source. If a groomed input transport stream is using an RRT, valid options will appear in this menu. • There must be a valid RRT source to be ATSC compliant.	Blank
Modulation Mode	Valid modes are: Analog, SCTE 64 QAM, SCTE 256 QAM, ATSC 8 VSB, and ATSC 16 VSB.	SCTE 256 QAM

Creating DVB Output Transport Streams

Use steps in this section to create a new DVB output transport stream.

1. From the **Outputs** panel of the **Grooming** -> **Mapping** tab page, right-click the output port on which to create the stream, and select one of the following options from the popup menu (Figure 60):

- • **Create AVTX Transport Stream**
- • **Create VTX Transport Stream**
- • **Create PIP Transport Stream**
- • **Create VTR Transport Stream**

2. At the output stream configuration dialog, in the **TS Type** field, select **DVB.**

The lower portion of the screen expands to reveal the fields shown in Figure 70.

Figure 70.   DVB Output TS

3. Use guidelines from Table 61 to define DVB parameters for the output transport stream.

4. Click **Apply Configuration** (or use Alt **a**) to save and use these settings.

Table 61.   DVB Output TS

Field	Description	Default
Network ID	Value, in the range 0 to 65535, to set Network ID of the current transport stream.	160
Modulation Mode	Modulation mode to be used for the TS, as either *SCTE 64 QAM* or *SCTE 256 QAM*.	SCTE 256 QAM

Table 61.   DVB Output TS (Continued)
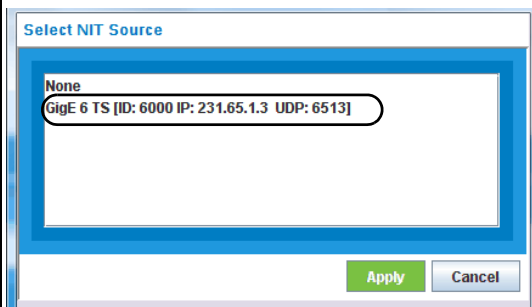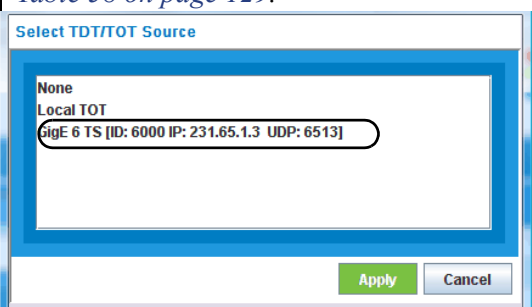
Field	Description	Default
Original Network ID	Value, in the range 0 to 65535, to set the Network ID from which this stream has originated.	160
NIT Source	Specifies whether or not a DVB network information table is to be included in the output TS. To place a value for NIT Source, click **Select NIT**, then select an option from the **Select NIT Source** dialog: • *None* - No NIT will be generated on the output TS • *[Input GigE TS ID]* - Specified source NIT will be included in the output TS. **NOTE**: If a NIT is to be included in the output TS, a valid DVB stream must be feeding the input, and DVB table processing must be enabled on the input TS. Refer also to *Table Processing* in *Table 58 on page 129*. Source selection that includes the input TS (GigE 6 TS), which is a DVB stream for which DVB table processing has been enabled.	Blank
TDT/TOT Source	Specifies whether or not DVB time and date, and time offset tables will be generated for the output TS. To place a value for TDT/TOT Source, click **Select TDT/TOT**, then select a value from the Select **TDT/TOT Source** dialog: • *None* - No DVB time tables will be generated on the output TS. • *Local TOT* - The output TS will use the locally configured TOT. • *[Input GigE TS ID]* - Specified source TDT/TOT will be included in the output TS. **NOTE**: If a TDT/TOT is to be included in the output TS, a valid DVB stream must be feeding the input, and DVB table processing must be enabled on the input TS. Refer also to *Table Processing* in *Table 58 on page 129*. Example of TDT/TOT Source selection that includes the input TS (GigE 6 TS), which is a DVB stream for which DVB table processing has been enabled.	Blank

Table 61.   DVB Output TS (Continued)

Field	Description	Default
SDT Source	Specifies whether or not a service description table will be generated for this transport stream, as one of the following: • *N/A* - No SDT will be generated for this output TS • *LocalSDT* - Local SDT will be generated for this output TS. NOTE: if an SDT is to be included in the output TS, a valid DVB stream must be feeding the input, and DVB table processing must be enabled on the input TS. Refer also to Table Processing in Table 50, "Create Input Transport Stream Fields," on page 112.	LocalSDT
EIT Source	Specifies how an Event Information Table (EIT) is generated by the Selenio VMG, as one of the following: • *Groomed Input* is selected, an Event Information Table (EIT) is generated based on that which is received from the groomed input program of the DVB TS. • *N/A* - No EIT will be generated for this output TS.	Groomed Input

Output Programs and Grooming

The Selenio VMG supports program-level grooming. The *VMG Element Manager* provides two methods you can use to create new output programs in standard output transport streams, as described in the following topics:

• "Manual Program Creation," next.
• "Using Drag-and-Drop to Create Output Programs" on page 151.

The manual program creation method walks you through the Output Program creation process, whereas drag-and-drop program creation automatically sets up an output program on the transport stream to which the program was dragged.

Note: *The target output transport stream must already exist before performing program level grooming. Refer to "Creating Single Video Output Transport Streams" on page 122 and "Creating ATSC Output Transport Streams" on page 134 for more information.*

Note: *Output program creation depends on the type of licenses installed. Refer to "License Management" on page 306 for details.*

Manual Program Creation

This section contains guidelines for the following manual configurations:

• "Manual configuration for non-transcoded program," next.
• "Manual Setup for Transcoded Program" on page 140

Manual configuration for non-transcoded program

Use the **Create Output Program** screen for manual setup of a non-transcoded program.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a non-transcoded TS and select **Create Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. At the **Create Output Program** dialog, use guidelines from Table 62 to define the output program.

2. Click **Apply** (or use Alt **a**) to save and use your settings.

   After creating the program, an existing input program can be dragged and dropped over it, which will open the **Configure Program Mapping** dialog (see example in Figure 76 on page 152).
   For more information, see "Managing Standard Output Streams and Programs" on page 167.
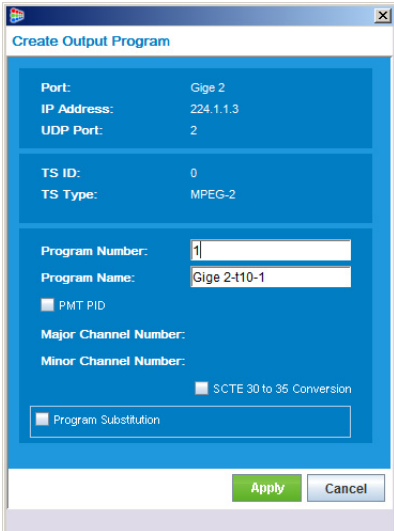
Table 62. Manual Program Setup: Non transcoded Stream

Field	Description	Default
Port	View the GigE or 10 GigE interface on which the program is being created.	Read-only
IP Address	The destination IP address of the transport stream.	Read-only
UDP Port	UDP port the program uses, based on UDP port of the transport stream.	Read-only
TS ID	The program's transport stream id (name), based on TS ID of the transport stream.	Read-only
TS Type	Type of transport stream, based on TS type specified in the creation of the transport stream.	Read-only
Program Number	Number assigned to the program. Valid range is from 1 to 131072	*1*
Program Name	Type alphanumeric string to set program name. Maximum length = 32 characters. Default format: GigE #-t[unique id]-[Program Number]	e.g: GigE 7-t47221504-1
PMT PID	ID of the program map table (PMT). Check this box to input a valid range from 48-8175.	Un-checked
Major Channel Number	Operator-defined channel number that groups all channels to be identified to a particular broadcast corporation. When the program's TS Type is set to ATSC, the value in this field may be set from 1 to 999.	Read-only
Minor Channel Number	Operator-defined channel number that identifies a particular channel within the Major Channel Number group. When the program's TS Type is set to ATSC, the value in this field may be set from 0 to 999.	Read-only
SCTE 30 to 35 Conversion	Used to enable SCTE 30 to SCTE 35 conversion.	Un-checked

Manual Setup for Transcoded Program

Use the **Create Transcoding Output Program** dialog to manually establish a transcoded program type. This setup is available for VTX or PIP transport streams: it does not apply to AVTX transport streams.

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a VTX or PIP TS and select **Create Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

The entry fields provided in the **Create Transcoding Output Program** screen will be pertinent to the type of video transcoding already configured for the output GigE port, as one of the following:

- MPEG-2 HD Encoded Video—Transcoded Output Program Configuration (see page 141).
- MPEG-2 SD Encoded Video—Transcoded Output Program Configuration (see page 142).
- HD Encoded H.264 Video—Transcoded Output Program Configuration (see page 143)
- SD Encoded H.264 Video—Transcoded Output Program Configuration (see page 144).
- PIP Encoded H.264 Video—Transcoded Output Program Configuration (see page 145).

MPEG-2 HD Encoded Video—Transcoded Output Program Configuration.

For this setup, you should first check to ensure that the VTX TS is configured for MPEG-2 HD encoded video.

1. At the **Create or Modify Output Transport Stream** dialog, ensure that the **Video Transcoding** section is set for HD resolution class at both the Input and Output: Video Type is MPEG-2.
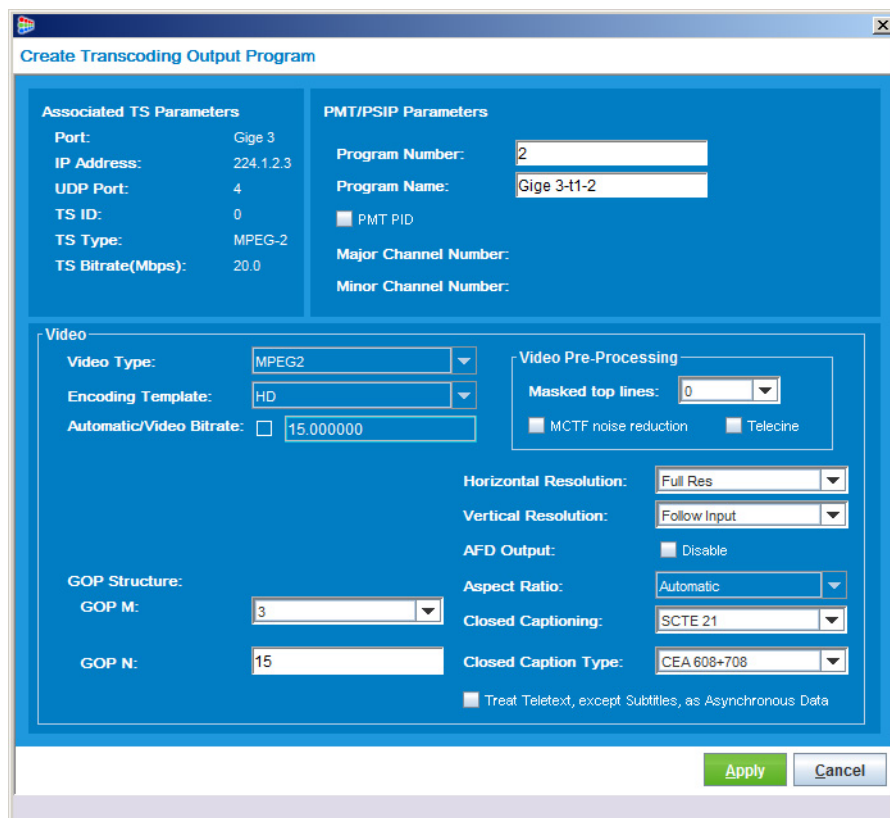
2. Get the **Transcoding Output Program** screen for a selected VTX transport stream:

	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand output GigE interface --> right-click on the VTX transport stream and select **Create Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

3. Use the **Create Transcoded Output Program** screen (Figure 71) to set parameters for an HD Encoded MPEG-2 video program.

Figure 71.   Transcoding Output Program: MPEG-2, HD Encoder

4. At the **Create Transcoding Output Program** dialog, use guidelines from the following tables to define this output program:

   –
   –
   –

5. Click **Apply** (or use Alt **a**) to save and use these settings.

MPEG-2 SD Encoded Video—Transcoded Output Program Configuration.

For this setup, you should first check to ensure that the VTX TS is configured for MPEG-2 SD encoded video.

1. At the **Create or Modify Output Transport Stream** dialog, ensure that the **Video Transcoding** section set for HD resolution class at the Input, and SD at the Output: Video Type is MPEG-2.

2. Get the **Transcoding Output Program** screen for a selected VTX transport stream:

Menu Path	Grooming-Mapping page, **Outputs** panel --> expand output GigE interface --> right-click on the VTX transport stream and select **Create Program** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

3. Use the **Create Transcoded Output Program** screen (Figure 72) to set parameters for an SD Encoded MPEG-2 video program.

Figure 72.　　Transcoding Output Program: MPEG-2, SD Encoder

4. At the **Create Transcoding Output Program** dialog, use guidelines from the following tables to define this output program:

   – "Create Transcoding Output Program—Associated TS Parameters" on page 146.
   – "Create Transcoding Output Program—PMT/PSIP Parameters" on page 146.
   – "Create Transcoding Output Program—Video Parameters" on page 147.

5. Click **Apply** (or use Alt **a**) to save and use these settings.

HD Encoded H.264 Video—Transcoded Output Program Configuration.

For this setup, you should first check to ensure that the PIP or VTX TS is configured for H.264 HD encoded video.

1. At the **Create or Modify Output Transport Stream** dialog (for VTX or PIP), ensure that the **Video Transcoding** section is set for HD resolution class at both the Input and Output, and SD: Video Type is H.264.

2. Get the **Transcoding Output Program** screen for a selected VTX transport stream:

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand output GigE interface --> right-click on the VTX transport stream and select **Create Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

3. Use the **Create Transcoded Output Program** screen (Figure 73) to set parameters for an HD Encoded H.264 video program.

Figure 73. Transcoding Output Program: H.264, HD Encoder

4. At the **Create Transcoded Output Program** dialog, use guidelines from the following tables to define this output program:

   – "Create Transcoding Output Program—Associated TS Parameters" on page 146.
   – "Create Transcoding Output Program—PMT/PSIP Parameters" on page 146.
   – "Create Transcoding Output Program—Video Parameters" on page 147.

5. Click **Apply** (or use Alt **a**) to save and use these settings.

SD Encoded H.264 Video—Transcoded Output Program Configuration.

For this setup, you should first check to ensure that the PIP or VTX TS is configured for H.264 SD encoded video.

1. At the **Create or Modify Output Transport Stream** dialog (for VTX or PIP), ensure that the **Video Transcoding** Input is set for SD resolution class, Video Type H.264, and Video Standard NTSC: Set Output Video Type as H.264.

2. Get the **Transcoding Output Program** screen for a selected VTX transport stream:

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand output GigE interface --> right-click on the VTX transport stream and select **Create Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

3. Use the **Create Transcoded Output Program** screen from an output PIP or VTX TS (Figure 74) to set parameters for an SD Encoded H.264 video program.

Figure 74.   Transcoding Output Program: H.264, SD Encoder

4. At the **Create Transcoded Output Program** dialog, use guidelines from the following tables to define this output program:

    – "Create Transcoding Output Program—Associated TS Parameters" on page 146.
    – "Create Transcoding Output Program—PMT/PSIP Parameters" on page 146.
    – "Create Transcoding Output Program—Video Parameters" on page 147.

5. Click **Apply** (or use Alt **a**) to save and use these settings.

PIP Encoded H.264 Video—Transcoded Output Program Configuration.

Use the **Create Transcoded Output Program** screen (Figure 75) to set parameters for a PIP Encoded H.264 video program.

1. Get the **Transcoding Output Program** screen for a selected PIP transport stream:
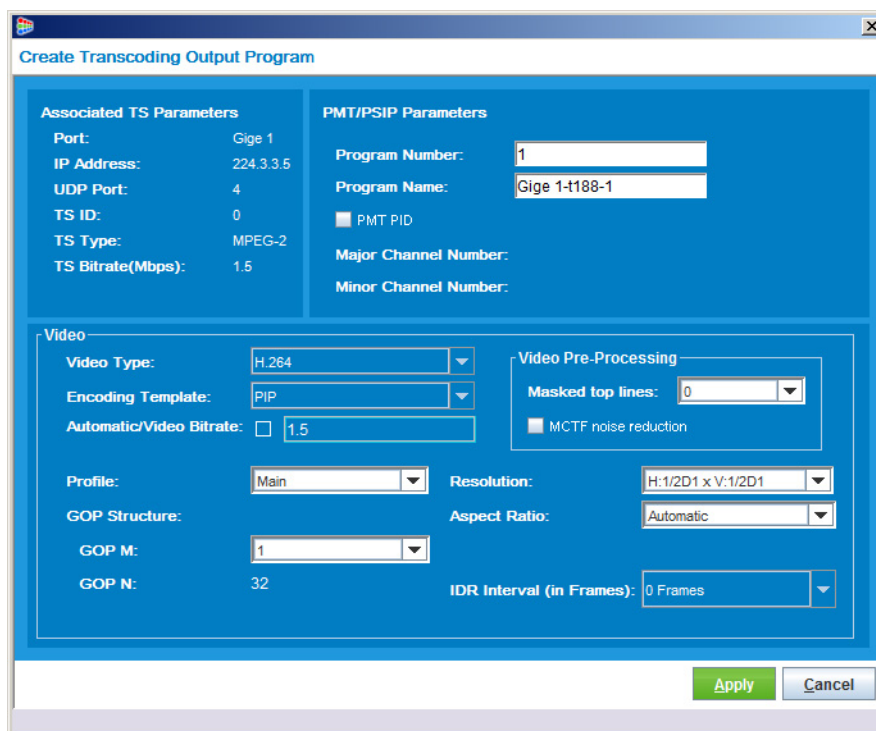
Menu Path	Grooming-Mapping page, **Outputs** panel --> expand output GigE interface --> right-click on the PIP transport stream and select **Create Program** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 75.   Transcoding Output Program: H.264, PIP Encoder

2. At the **Create Transcoded Output Program** dialog, use guidelines from the following tables to define this output program:

   – "Create Transcoding Output Program—Associated TS Parameters" on page 146.
   – "Create Transcoding Output Program—PMT/PSIP Parameters" on page 146.
   – "Create Transcoding Output Program—Video Parameters" on page 147.

3. Click **Apply** (or use Alt **a**) to save and use these settings.

Create Transcoding Output Program—Associated TS Parameters

The parameters listed and described in Table 63 are provided in the **Create Transcoding Program** dialog.

Table 63.   Transcoding Output Program: TS Parameters

Field	Description	Default
Port	The GigE or 10 GigE interface on which the program is being created.	Read-only
IP Address	The destination IP address of the transport stream.	Read-only
UDP Port	UDP port the program uses, based on UDP port of the transport stream.	Read-only
TS ID	The program's transport stream id (name), based on TS ID of the transport stream.	Read-only
TS Type	Type of transport stream, based on TS type specified in the creation of the transport stream.	Read-only
TS Bitrate(Mbps)	Bitrate for the transport stream, based on TS bitrate specified in the creation of the transport stream.	Read-only

Create Transcoding Output Program—PMT/PSIP Parameters

The parameters listed and described in Table 64 are provided in the **Create Transcoding Program** dialog.

Table 64.   Transcoding Output Program: PMT/PSIP Parameters

Field	Description	Default
Program Number	Number assigned to the program. Valid range is from 1 to 131072	*1*
Program Name	Type an alphanumeric string to set program name. Maximum length = 32 characters. Default format: GigE #-t[unique id]-[Program Number]	e.g: GigE 7-t47221504-1
PMT PID	ID of the program map table (PMT). Check this box to input a valid range from 48-8175.	Un-checked
Major Channel Number	Operator-defined channel number. Used to group all channels that are to be identified to a particular broadcast corporation. When the program's TS Type is set to ATSC, the value in this field may be set from 1 to 999.	Read-only
Minor Channel Number	Operator-defined channel number. Used to identify a particular channel within the Major Channel Number group. When the program's TS Type is set to ATSC, the value in this field may be set from 0 to 999.	Read-only

Create Transcoding Output Program—Video Parameters

The parameters listed and described in Table 63 are provided in the **Create Transcoding Program** dialog.

Table 65.   Transcoding Output Program: Video Parameters

Field	Description	Default
Video Type	Specifies the type of video the program is to be transcoded to. The available options are *MPEG-2* and *H.264* for VTX transport streams and *H.264* only for PIP transport streams.	MPEG-2
Encoding Template	Choose between HD (high definition), SD (standard definition), or PIP (picture in picture). If HD, SD, or PIP is selected, the Video Bit Rate defaults and range will change as described below. *PIP* is only available if creating a program for a PIP transport stream.	HD PIP
Automatic Video Bitrate *(In Mbps)*	Allows automatic bitrate assignment, to maximize bitrate available for video streams within the range configured in the output transport stream. If this box is checked, the system assigns the video bitrate, with the latency marked by a *"Perfecting video"* message until the bitrate is assigned. Leaving this box un-checked will allow manual video bitrate entry according to supported values for Video Type parameters MPEG-2 HD, MPEG-2 SD, H.264 HD, H.264 SD, and PIP. Refer to "Locales and Decimal Entries" on page 330 for ranges and default values.	Un-checked
Profile *(Video Type = H.264 only)*	Select either high, main, or baseline to set the video standard to be used. Refer to "Video Profile Configuration Reference" on page 334 for guidelines. Note: *Profile is available only when Video Type is set to H.264. High is not available for PIP transport streams.*	For HD or SD: *High* For PIP: *Main*
GOP Structure	Specifies how the Group of Pictures (GOP) structure is determined, as either GOPM or GOPN. **GOP M**—Specifies the spacing of the P frames in the output. The higher the value, the lower the data rate. • MPEG-2 HD or SD, select 1, 2, or 3. • For H.264 HD or SC, select 1, 2, 3, 4, or 8. - Note that GOP M 8 is not available if input is 1080i HD. • For H.264 PIP, select 1 or 4. **GOP N** — Specifies the number of frames in each GOP. The higher the value, the lower the data rate. • MPEG-2 HD or SD, set value between 1 and 60 and a multiple of the GOP M value, else the nearest lower multiple is used. • H.264 HD or SC, set value between 1 and 240 and a multiple of the GOP M value. When the GOP M value is set to 4 or 8, the GOP N value is set to 32 and is read-only. • H.264 PIP, the value is set to 32 and read-only	 3 4 4 15 32

Table 65.   Transcoding Output Program: Video Parameters (Continued)

Field	Description	Default
Video Pre-Processing	One, both, or none of the following pre-processing filters may be selected:	
	• *MCTF noise reduction* — when checked, enables motion compensated temporal filtering (MCTF).	Un-checked
	• *Masked Top Lines*—Value to define the number of WSS white lines to be hidden on video, as either 0, 1, 2, or 3. • 0 = no WSS lines are hidden.	0
Horizontal Resolution	Specifies the type of Horizontal (H) resolution to use for the transcoded program.	
	• For HD transcoded programs, the following options are available: *Full Res, 1920, 1440, 1280, 960*	HD: H: Full Res
	• For SD programs, the following options are available: *Full D-1, VGA, 3/4 D-1, 2/3 D-1, or 1/2 D-1*	H: Full D-1
	• For PIP programs, the following horizontal and vertical options are available: H:1/2D1 X V:1/2D1 (352 x 240 for NTSC; 352 x 288 for PAL) 192 X192, 128 X 96, 96 X 96	192 x 192
Vertical Resolution	Specifies the type of vertical resolution to use for the transcoded program, as either Follow input, or Force 1080i.	
AFD Output	By default, Active Format Descriptions on the input streams are forwarded in the output streams. Check the box to disable the forwarding of AFDs.	Un-checked
	The *AFD Output* parameter does not appear when the Encoding Template is set to PIP.	
	For information on AFD, refer to "Active Format Description (AFD)" on page 149.	
Active Format *(Hidden unless SD selected)*	Specifies the type of output for HD content transcoded to SD, as one of the following options:	Force 16:9 letterbox
	• *Force 16:9 letterbox* — an AFD code of *10* is included in the output (16:9 Image: Letterbox in 4:3 frame, Full Frame in 16:9 frame).	
	• *Force 4:3 centercut* — an AFD code of *9* is included in the output (4:3 Image: Full Frame in 4:3 frame, Pillarbox in 16:9 frame).	
	• *Use AFD; 16:9 fallback* — the frame format will be determined by the Active Format Description in the input program. If the AFD is not present, the frame will be forced to 16:9 Letterbox.	
	• *Use AFD; 4:3 fallback* — the frame format will be determined by the Active Format Description in the input program. If the AFD is not present, the frame will be forced to 4:3 Centercut.	
	The *Active Format* field only appears when the Encoding Template is set to *SD*.	
Aspect Ratio	Specifies the ratio of the program's width to the height.	HD and SD: Automatic
	• For an HD program, the field is read-only and set to *Automatic*.	
	• For an SD program, choose from one of the following options: *Automatic, 4:3, 16:9*.	PIP: 4:3
	• For a PIP program, choose from one of the following options: *Automatic, 4:3, 16:9*.	

Table 65.   Transcoding Output Program: Video Parameters (Continued)

Field	Description	Default
Closed Captioning	Specifies the format used for encoding closed captioning on an MPEG-2 transcoded program. The options are: • SCTE 21 • SCTE 20 and SCTE 21 When selecting SCTE 20 and SCTE 21, be sure to reserve sufficient bandwidth for both closed captioning streams. *Automatic Video Bitrate Assignment* accounts for the additional bandwidth needed for SCTE 20. The VMG discards user data format as per SCTE 20 in the input. It re-formats user data for the input as per SCTE21 to SCTE, and as per SCTE 20 when requested. The *Closed Captioning* field is displayed if the **Video Type** is set to *MPEG-2*.	SCTE 21
IDR Interval (in Frames)	Specifies the interval between instantaneous decoder refresh (IDR) frames. • For GOP M—1-3 with HD or SD encoding, the IDR interval can be input by the user and must be a multiple of the GOP N value. Enter *0* if no IDR frames are to be inserted. • For GOP M—4, the IDR interval can be set to *96* (the default) or *0* (no IDR). • For GOP M—8, the IDR interval is set to *96* and is read-only. • If PIP is selected for the Encoding Template, no IDR frames are inserted and the field does not display. The *IDR Interval* field is displayed if the **Video Type** is set to *H.264*.	96
Treat Teletext, except Subtitles, as Asynchronous Data	Enable (check) or disable (un-check) Teletext stream to be processed as asynchronous data. • When enabled (checked), Teletext streams are handled as asynchronous data for the grooming. • When disabled (un-checked), Teletext streams are handled as synchronous data.	Un-checked

Active Format Description (AFD)

MPEG-2 standards define a 4:3 aspect ratio for SD content, 16:9 for HD content. When transcoding from HD content to SD size, in general, we must fit 16:9 HD frames inside a 4:3 frame. This can be accomplished using two different approaches: 16:9 letter box, where the full 16:9 frame is visible with black bars at the top and the bottom of the 4:3 screen, and 4:3 center cut, where the right and left portions of the 16:9 frame are cut off and the remainder fills the 4:3 frame.

To aid HD to SD down-scaling, incoming MPEG-2 or H264 video can contain active format description (AFD) code that describes the active video region inside the 16:9 display frame. The down-scaling process then uses this code to downscale only the active region to the SD display region, thus maximizing the displayed video area inside the 4:3 display.

With the VMG, you can choose whether to forward the incoming AFD in transcoded output streams. You can also determine how to process incoming AFDs:

• Follow the AFD while selecting either 16:9 letterbox or 4:3 centercut as fallback if no AFD is present

OR

- Ignore any AFD and force the output to either 16:9 letterbox or 4:3 centercut

Table 66 describes how the VMG processes incoming video depending on the incoming AFD and the GUI option you select.

Table 66.   AFD Codes and GUI Selection

AFD code in input HD video in decimal (binary)	Aspect ratio of the "area of interest" in input HD video	Output Based on Active Format GUI Selection			
		Force 16:9 letterbox	**Force 4:3 centercut**	**Use AFD; 16:9 fallback**	**Use AFD; 4:3 fallback**
0 (0000)	Reserved	16:9 letterbox vertically centered	4:3 centercut	16:9 letterbox vertically centered	16:9 letterbox vertically centered
1 (0001)	Reserved: treat as full screen 16:9	16:9 letterbox vertically centered	4:3 centercut	16:9 letterbox vertically centered	16:9 letterbox vertically centered
2 (0010)	Full screen box 16:9 (top)	16:9 letterbox vertically centered	4:3 centercut	16:9 letterbox vertically centered	16:9 letterbox vertically centered
3 (0011)	Pillar box 14:9 (top)	16:9 letterbox vertically centered	4:3 centercut	14:9 letterbox vertically centered	14:9 letterbox vertically centered
4 (0100)	Box > 16:9 (center). Treat as full screen.	16:9 letterbox vertically centered	4:3 centercut	16:9 letterbox vertically centered	16:9 letterbox vertically centered
5 (0101)	Reserved: treat as full screen 16:9	16:9 letterbox vertically centered	4:3 centercut	Anamorphic	16:9 letterbox vertically centered
6 (0110)	Reserved: treat as full screen 16:9	16:9 letterbox vertically centered	4:3 centercut	Anamorphic	16:9 letterbox vertically centered
7 (0111)	Reserved: treat as full screen 16:9	16:9 letterbox vertically centered	4:3 centercut	Anamorphic	16:9 letterbox vertically centered
8 (1000)	Active format is the same as the coded frame. Full screen 16:9	16:9 letterbox vertically centered	4:3 centercut	16:9 letterbox vertically centered	16:9 letterbox vertically centered
9 (1001)	Pillar box 4:3 center cut	16:9 letterbox vertically centered (postage stamp)	4:3 centercut	Full frame 4:3 image	Full frame 4:3 image
10 (1010)	Full screen 16:9 (center)	16:9 letterbox vertically centered	4:3 centercut	16:9 letterbox vertically centered	16:9 letterbox vertically centered
11 (1011)	Pillar box 14:9 (center)	16:9 letterbox vertically centered	4:3 centercut	14:9 pillar box	14:9 pillar box

Table 66.   AFD Codes and GUI Selection (Continued)

AFD code in input HD video in decimal (binary)	Aspect ratio of the "area of interest" in input HD video	Output Based on Active Format GUI Selection			
		Force 16:9 letterbox	**Force 4:3 centercut**	**Use AFD; 16:9 fallback**	**Use AFD; 4:3 fallback**
12 (1100)	Reserved: treat as full screen 16:9	16:9 letterbox vertically centered	4:3 centercut	Anamorphic	Anamorphic
13 (1101)	Pillar box 4:3 center cut (with shoot and protect 14:9 center)	16:9 letterbox vertically centered (postage stamp)	4:3 centercut	Full frame 4:3 image	Full frame 4:3 image
14 (1110)	Full screen 16:9 (with shoot and protect 14:9 center)	16:9 letterbox vertically centered	4:3 centercut	Full screen 16:9 (14)	Full screen 16:9 (14)
15 (1111)	Full screen 16:9 (with shoot and protect 4:3 center)	16:9 letterbox vertically centered	4:3 centercut	Full frame 4:3 image	Full frame 4:3 image
No AFD	Treat as full screen 16:9	16:9 letterbox vertically centered	4:3 centercut	16:9 letterbox vertically centered	4:3 centercut

Using Drag-and-Drop to Create Output Programs

The *VMG Element Manager* supports drag-and-drop grooming at the program level and transport stream level. Drag-and-drop grooming is performed on the **Grooming -> Mapping** tab page of the *VMG Element Manager* screen.

Program grooming performs different tasks depending on whether there are any existing programs currently associated with the output transport stream (Table 67).

Table 67.   Drag-and-Drop Results

When you drag:	The grooming behavior:
Program to Transport Stream	The program is created in the Transport Stream; the *Configure Program Mapping* screen appears, allowing you to modify the program mapping information.
Program to non-transcoded Program	Deletes the existing program and replaces it with the dragged program.
Program to the TS carrying the transcoded Program	Regrooms the program to the new program.

Grooming Non-Transcoded Programs

Use the **Configure Program Mapping** dialog (Figure 76) to set grooming parameters for a selected program in a non-transcoded transport stream.
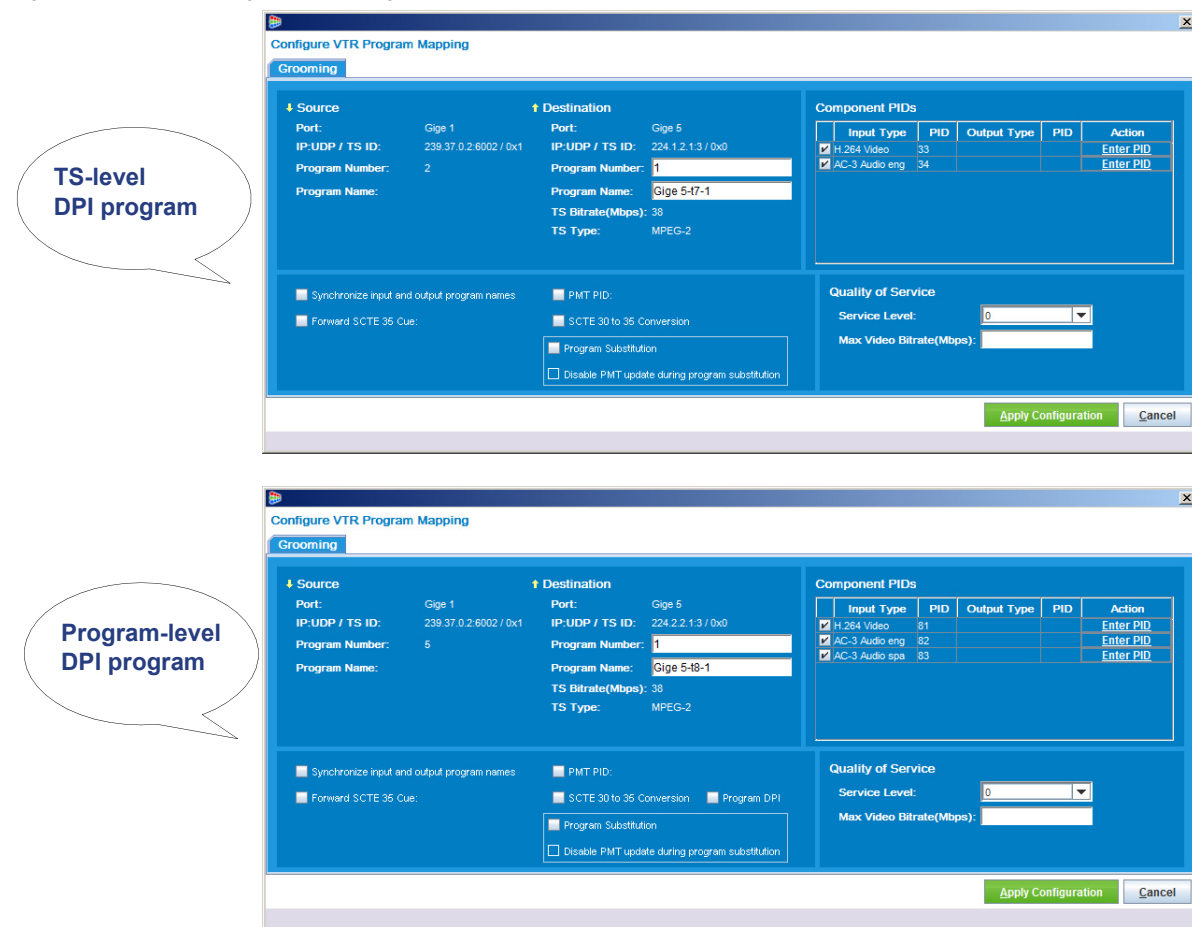
Menu Path	**Grooming-Mapping** page, **Inputs** panel --> drag-and-drop selected program to non-transcoded VTR TS in **Outputs** panel
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 76.   VTR Program Mapping

1. At the **Configure VTR Program Mapping** dialog, use guidelines from the following tables:

    –   Table 68, "VTR Program Mapping: Source," on page 153.
    –   Table 69, "VTR Program Mapping: Destination," on page 153.
    –   Table 70, "VTR Program Mapping: Component PIDs," on page 154.
    –   Table 71, "VTR Program Mapping: Quality of Service," on page 155.

2. Click **Apply Configuration** to save and use the settings. After clicking the **Apply Configuration** button the input program is copied to the output transport stream, replacing any existing programs if their schedules conflict.

Configure VTR Program Mapping—Source

The parameters listed in Table 68 are provided in the **Configure VTR Program Mapping** dialog (Figure 76).

Table 68.   VTR Program Mapping: Source

Field	Description	Default
Port	The input program's source GigE or 10 GigE interface.	Read-only
TS ID	The input program's transport stream id (name).	Read-only
Program Number	Program number assigned to the input program.	Read-only
Program Name	Program name assigned to the input program.	Read-only

Configure VTR Program Mapping—Destination

The parameters listed in Table 69 are provided in the **Configure VTR Program Mapping** dialog (Figure 76).

Table 69.   VTR Program Mapping: Destination

Field	Description	Default
Port	The output program's destination GigE interface port.	Read-only
TS ID	The program's transport stream id (name), based on TS ID of the transport stream.	Read-only
Program Number	Number, in the range 1 to 131072, assigned to the output program.	Number of the GigE port
Program Name	Type an alphanumeric string to set the program name. Maximum length = 32 characters. Default format: GigE #-t[unique id]-[Program Number]	e.g: GigE 7-t47221504-1
TS Bitrate(Mbps)	Displays the bitrate defined for the transport stream.	Read-only
TS Type	Displays the transport stream type, as either MPEG-2, ATSC, DVB, & SCTE	Read-only
Major Channel Number (appears only when *TS Type* is set to ATSC)	Operator-defined channel number, for grouping of all channels to be identified to a particular broadcast corporation. When the program's TS Type is set to ATSC, the value in this field may be set from 1 to 999.	Blank
Minor Channel Number (appears only when *TS Type* is set to ATSC)	Operator-defined channel number that identifies a particular channel within the Major Channel Number group. When the program's TS Type is set to ATSC, the value in this field may be set from 0 to 999.	Blank

Configure VTR Program Mapping—Component PIDs

The parameters listed in Table 70 are provided in the **Configure VTR Program Mapping** dialog (Figure 76).

Table 70.   VTR Program Mapping: Component PIDs

Field	Description	Default
Input Type	Displays the input program types and associated PIDs. To allow stream grooming, un-check the desired input PID Types.	Checked
PID	Displays the PID of the associated Input Type.	Read-only
Output Type	Displays the output program types if a referenced or unreferenced PID has been defined. Click this field or click *Enter PID* under **Action** to create a referenced or unreferenced PID.	Blank
PID	Displays the output program type's PID if one has been defined as described above. Click this field to open the same screen as described above for defining a PID.	Blank
Stay Unreferenced (Field displays only if the input program is a Ghost Program)	If the input program is a *Ghost Program*, the *Stay Unreferenced* option displays in this section. • Checked = no PAT / PMT generation. Use this option if the PIDs in this stream are to remain unreferenced in PSI tables. See also "Adding an Unreferenced PID as an Elementary Stream" on page 266 for more information. • Un-checked = the program will become referenced.	Checked
Synchronize input and output program names	Enable (check) or disable (un-check) synchronization of the output program names to the input program names.	Un-checked
Forward SCTE 35 Cue	Enable (check) or disable (un-check) forwarding of SCTE 35 information at input streams.	Un-checked
PMT PID	ID of the program map table (PMT). Check to input a valid range from 48-8175.	Un-checked
SCTE 30 to 35 Conversion	Enable (check) or disable (un-check) SCTE 30 to SCTE 35 conversion at output streams.	Un-checked

Configure VTR Program Mapping—Quality of Service

The parameters listed in Table 71 are provided in the **Configure VTR Program Mapping** dialog (Figure 76).

Table 71.   VTR Program Mapping: Quality of Service

Field	Description	Default
Service Level	Select bit rate adaptation techniques to be applied to MPEG-2 encoded streams to enhance bandwidth efficiency as one of the following: • Any integer from -8 to +8 • 0 for average or mid-scale quality • Bypass Transrater • Handle as Data • No Rate-shaping See also Table 72, "Service Level Configuration Details," on page 155.	0
Max Video Bitrate (Mbps)	Value to define maximum bitrate (in Mbps) for this program. Choosing a specific max rate will bypass automatic transrating based on priorities.	Blank

> **Note:**   Statistical multiplexing with rate shaping: With an MPTS, the instantaneous transrating factor for each video stream is determined by ensuring that no overflow or underflow occurs at the receiver when the video programs contained in that MPTS are sent at the transport stream bitrate.

QoS Settings for Program Mapping

This section contains information about the quality of service selections (Table 72) for service level configuration, which are provided in the **VTR Program Mapping** screen. This **Service Level** field allows the assignment of transrating priorities and conditions for each program.

Table 72.   Service Level Configuration Details

QoS Service Level Configuration	Video Processing	Effect on Video Output Bandwidth
Transrating Service Level Values	Video elementary stream (ES) is processed through the transrater. • -8: highest transrating, lowest quality. • +8: lowest transrating, highest quality.	Transrated output video ES requires less bandwidth than input video ES.
No Rate-shaping	Video ES processing is limited through the transrater with null packet removal. • Video quantization level is unchanged	Output video ES bandwidth will vary depending on level of ES null packet removal.

Table 72.   Service Level Configuration Details (Continued)

QoS Service Level Configuration	Video Processing	Effect on Video Output Bandwidth
Bypass Transrater	Video ES is not processed through the transrater. • Video can be displayed.	Output video ES uses the same bandwidth as input video ES. • Cannot use more than the bandwidth of output TS.
Handle As Data	Video ES is not processed through the transrater. • Video cannot be displayed.	Output data ES is treated as data and will therefore use the same bandwidth as input video ES. • Cannot use more than the bandwidth of output TS. • Total bandwidth should not exceed 4Mbps per TS.

Grooming Transcoded Programs

Use the **Configuration Program Mapping** dialog for AVTX, VTX, or PIP to set grooming parameters for a transcoded program.

☞	**Menu Path**	**Grooming-Mapping** page, **Inputs** panel --> drag-and-drop selected program to transcode-enabled TS in **Outputs** panel.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

This section describes how to perform the following grooms:

Configure AVTX Program Mapping

Use the Configure AVTX Program Mapping screen (Figure 77) to set grooming parameters for a specific AVTX transport stream.

Figure 77.   AVTX Program Mapping: Grooming

1. At the **Configure AVTX Program Mapping** screen, use guidelines from the following tables to define the grooming parameters for this AVTX stream.

   – "Configure AVTX/VTX/PIP Program Mapping—Source" on page 160.
   – "Configure AVTX/VTX/PIP Program Mapping—Destination" on page 160.
   – "Configure AVTX/VTX/PIP Program Mapping—Component PIDs" on page 160.
   – "Configure AVTX/VTX/PIP Program Mapping—Video" on page 163.
   – "Configure AVTX/VTX/PIP Program Mapping—Audio" on page 166.

2. Click **Apply Configuration** (or use Alt **a**) to save the settings. The new program is now displayed in the **Outputs** panel, in the expanded AVTX TS view.

Configure VTX Program Mapping

Use the Configure VTX Program Mapping screen (Figure 78) to set grooming parameters for a specific VTX transport stream.

Figure 78.   VTX Program Mapping: Grooming

1. At the **Configure VTX Program Mapping** screen, use guidelines from the following tables to define the grooming parameters for this VTX stream.

    – "Configure AVTX/VTX/PIP Program Mapping—Source" on page 160.
    – "Configure AVTX/VTX/PIP Program Mapping—Destination" on page 160.
    – "Configure AVTX/VTX/PIP Program Mapping—Component PIDs" on page 160.
    – "Configure AVTX/VTX/PIP Program Mapping—Video" on page 163.
    – "Configure AVTX/VTX/PIP Program Mapping—Audio" on page 166.

2. Click **Apply Configuration** (or use Alt **a**) to save the settings. The new program is now displayed in the **Outputs** panel, in the expanded VTX TS view.

Configure PIP Program Mapping

Use the Configure PIP Program Mapping screen (Figure 79) to set grooming parameters for a specific PIP transport stream.

Figure 79.   PIP Program Mapping: Grooming

1. At the **Configure PIP Program Mapping** screen, use guidelines from the following tables to define the grooming parameters for this VTX stream.

    –   "Configure AVTX/VTX/PIP Program Mapping—Source" on page 160.
    –   "Configure AVTX/VTX/PIP Program Mapping—Destination" on page 160.
    –   "Configure AVTX/VTX/PIP Program Mapping—Component PIDs" on page 160.
    –   "Configure AVTX/VTX/PIP Program Mapping—Video" on page 163.
    –   "Configure AVTX/VTX/PIP Program Mapping—Audio" on page 166.

2. Click **Apply Configuration** (or use Alt **a**) to save the settings. The new program is now displayed in the **Outputs** panel, in the expanded PIP TS view.

Configure AVTX/VTX/PIP Program Mapping—Source

The source parameters listed and described in Figure 73 are provided in the **Configure Program Mapping** dialog for AVTX, VTX, or PIP.

Table 73.   Configure AVTX/VTX/PIP Program Mapping: Source

Field	Description	Default
Port	The input program's source GigE or 10 GigE interface.	Read-only
IP:UDP / TS ID	The input program's transport IP address, UDP port, and stream id (name).	Read-only
Program Number	Program number assigned to the input program.	Read-only
Program Name	Program name assigned to the input program.	Read-only
Resolution Class	Identifies the resolution class as either HD, or SD.	Read-only

Configure AVTX/VTX/PIP Program Mapping—Destination

The destination parameters listed and described in Table 74 are provided in the **Configure Program Mapping** dialog for AVTX, VTX, or PIP.

Table 74.   Configure AVTX/VTX/PIP Program Mapping: Destination

Field	Description	Default
Port	The output program's destination GigE interface port.	Read-only
IP:UDP / TS ID	The program's transport stream IP address and UDP port and id (name), based on TS ID of the transport stream.	Read-only
Program Number	Value, in the range 1-131072, assigned to the output program.	Number of the GigE port
Program Name	Alphanumeric string to set name assigned to the program. Maximum length = 32 characters. Example: GigE 7- t47221504-1	Default format: GigE #-t[unique id]-[Program Number]
TS Bitrate (Mbps)	The maximum bitrate for the TS	Read-only
TS Type	Displays the transport stream type as either *MPEG-2, ATSC, DVB*, or *SCTE*	Read-only

Configure AVTX/VTX/PIP Program Mapping—Component PIDs

The component PIDs parameters listed and described in Table 75 are provided in the **Configure Program Mapping** dialog for AVTX, VTX, or PIP.

Table 75.   Configure AVTX/VTX/PIP Program Mapping: Component PIDs

Field	Description	Default
Pass-through	Specify whether to disallow passthrough (None), or enable AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus) passthrough on this output transport stream.	None

Table 75.   Configure AVTX/VTX/PIP Program Mapping: Component PIDs (Continued)

Field	Description	Default
Max Audio	Set value to define the maximum allowable audio elementary streams to be handled in the output. Note that this setting affects bitrate allowances on the stream.	See "Locales and Decimal Entries" on page 330 for comparative values.
Max Data	Set value to define the maximum allowable data elementary streams to be handled in the output. Note that this setting affects bitrate allowances on the stream.	
Input Type	Displays the input program types and associated PIDs. To allow stream grooming, un-check the desired input PID Types.	Checked
ES Type	Type of elementary stream, as either audio, video, or data.	Data

Stream Type	Value to identify the byte that defines the stream encoding.
	
	• For data streams, enter a value in the range 1 - 255
	• For audio streams, set one of the following options:
	  - MPEG-1 Audio (3)
	  - MPEG-2 Audio (4)
	  - AC-3 Audio (6)
	  - AC-3 Audio (0x81)
	  - AAC Audio (0x0f)
	  - HE-AAC Audio (0x11)
	  - E-AC-3 Audio (0x84)
	  - E-AC-3 (Audio (0x87)
	• For video streams, set a value to correspond with one of the following resolutions:
	  - MPEG-1 video (1)
	  - MPEG-2 video (2)
	  - H.264 video (0x1b)
	  - SCTE video (0x80)
	
	Note: *When an ES audio or video type is selected, the stream type is populated from these settings during BCT import.*	

PID	Displays the output program type's PID (if defined as described above). If blank, click in this field or click *Enter PID* under *Action* to create a referenced or unreferenced PID.	Blank
Synchronize input and output program names	Enable (check) or disable (un-check) synchronization of input and output program names.	un-checked/ disabled
Forward SCTE 35 Cue	Enable (check) or disable (un-check) forwarding of SCTE 35 Cues.	un-checked/ disabled

Table 75.   Configure AVTX/VTX/PIP Program Mapping: Component PIDs (Continued)

Field	Description	Default
PMT PID	Enable (check) and identify a PMT PID, or disable (un-check) PMT PID in this program.	un-checked/ disabled
Buttons	• **Add ES**—Add a new elementary stream row to the **Component PIDs** table • **Delete ES**—Remove a selected elementary stream row from the table. • **Up**—Reposition a selected row toward the top of the table. • **Down**—Reposition a selected row toward the bottom of the table. These buttons are also provided in the **Manage Elementary Streams** dialog (Figure 144 on page 263).	N/A

Configure AVTX/VTX/PIP Program Mapping—Video

The video parameters listed and described in Table 76 are provided in the **Configure Program Mapping** dialog for AVTX, VTX, or PIP.

Table 76.   Configure AVTX/VTX/PIP Program Mapping: Video

Field	Description	Default
Video Type	Specifies the type of video the program is to be transcoded to, as either *MPEG-2* and *H.264*.	MPEG-2
Encoding Template	Choose between HD (high definition), SD (standard definition), or PIP (picture in picture). If selecting HD, SD, or PIP the Video Bit Rate defaults and range will change as described below.	HD for AVTX and VTX TS PIP for PIP TS
Automatic Video Bitrate Assignment *(In Mbps)*	This feature allows automatic bitrate assignment in order to maximize the bitrate available for video streams within the range configured by the user in the output transport stream. Automatic bitrate assignment also takes into account other (non-video) elementary streams in the output TS. • Checked = the system assigns the video bitrate, with the latency marked by a *"Perfecting video"* message until the bitrate is assigned. • Un-checked = A low manual video bitrate entry according to the supported values for Video Type parameters MPEG-2 HD, MPEG-2 SD, H.264 HD, H.264 SD, and PIP. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331). Refer to "Locales and Decimal Entries" on page 330 for ranges and default values.	Un-checked
Actual Video Bitrate	Read-only field that reports the actual bitrate used by the MPEG2 transport stream.	
Profile *(Video Type = H.264 only)*	Select either high, main, or baseline to set the video standard to be used. Refer to "Video Profile Configuration Reference" on page 334 for guidelines. Note: *Profile is only available when Video Type is set to H.264. High is not available for PIP transport streams.*	Main

Table 76.   Configure AVTX/VTX/PIP Program Mapping: Video (Continued)

Field	Description	Default
GOP Structure	Specifies how the Group of Pictures (GOP) structure is determined. GOP M specifies the spacing of P frames in the output. The higher the value the lower the data rate. GOP N specifies the number of frames in each GOP. The higher the value the lower the data rate. For MPEG-2 HD or SD outputs: • GOP M: 1, 2, 3, 4 or 8. • GOP N: user entered value. For H.264 HD or SD outputs: • GOP M: 1, 2, 3, 4 or 8. • GOP N (if GOP M = 1, 2, or 3): user entered value • GOP N (if GOP M = 4): selectable from pull down of multiples of 4. • GOP N (if GOP M = 8): selectable from pull down of multiples of 8. For H.264 PIP outputs: • GOP M: 1 or 4. • GOP N: 32 (read only).	For MEG-2 HD or SD outputs: • GOP M: 3 • GOP N: 15 For H.264 HD, SD, or PIP outputs: • GOP M: 4 • GOP N: 32
Video Pre-Processing	One, both, or none of the following pre-processing filters may be selected:	
	• *MCTF noise reduction* — when checked, enables motion compensated temporal filtering (MCTF).	Un-checked
	• *Masked Top Lines*—Value to define the number of WSS white lines to be hidden on video, as either 0, 1, 2, or 3. • 0 = no WSS lines are hidden.	0
	• Telecine	
Horizontal Resolution	Specifies the type of Horizontal (H) resolution to use for the transcoded program. • For HD transcoded programs, the following options are available: *Full Res, 1920, 1440, 1280, 960* • For SD programs, the following options are available: *Full D-1, VGA, 3/4 D-1, 2/3 D-1, or 1/2 D-1* • For PIP programs, the following horizontal and vertical options are available: *H:1/2D1 X V:1/2D1* (352 x 240 for NTSC; 352 x 288 for PAL) *192 X192, 128 X 96, 96 X 96*	HD: H: Full Res SD: H: Full D-1 PIP: 192 X 192
Vertical Resolution	Set vertical resolution as either Follow input, or Force 1080i. • Follow input: output will have same vertical resolution as the input even when it changes between 720 and 1080i. This will cause brief video outages when the input resolution changes. • Force 1080i: output will always be 1080i and there will be no video outages when the input resolution changes between 720 and 1080i.	
Actual Resolution	Read-only field in which to view actual resolution at the time of grooming.	n/a

Table 76. Configure AVTX/VTX/PIP Program Mapping: Video (Continued)

Field	Description	Default
AFD Output	By default, Active Format Descriptions on the input streams are forwarded in the output streams. Check the box to disable the forwarding of AFDs. The *AFD Output* parameter does not appear when the Encoding Template is set to PIP. For information on AFD, refer to "Active Format Description (AFD)" on page 149.	Un-checked
Active Format (Hidden unless SD selected)	Specifies the type of output for HD content transcoded to SD, as one of the following options: • *Force 16:9 letterbox* — an AFD code of *10* is included in the output (16:9 Image: Letterbox in 4:3 frame, Full Frame in 16:9 frame). • *Force 4:3 centercut* — an AFD code of *9* is included in the output (4:3 Image: Full Frame in 4:3 frame, Pillarbox in 16:9 frame). • *Use AFD; 16:9 fallback* — the frame format will be determined by the Active Format Description in the input program. If the AFD is not present, the frame will be forced to 16:9 Letterbox. • *Use AFD; 4:3 fallback* — the frame format will be determined by the Active Format Description in the input program. If the AFD is not present, the frame will be forced to 4:3 Centercut. The *Active Format* field only appears when the Encoding Template is set to *SD*.	Force 16:9 letterbox
Aspect Ratio	Specifies the ratio of the program's width to the height. • For an HD program, the field is read-only and set to *Automatic*. • For an SD program, choose from one of the following options: *Automatic, 4:3, 16:9*. • For a PIP program, choose from one of the following options: *Automatic, 4:3, 16:9*.	HD and SD: Automatic PIP: 4:3
Closed Captioning	Specifies the format used for encoding closed captioning on an MPEG-2 transcoded program. The options are: • SCTE 21 • SCTE 20 and SCTE 21 When SCTE 20 and SCTE 21 is selected, be sure to reserve sufficient bandwidth for both closed captioning streams. *Automatic Video Bitrate Assignment* accounts for the additional bandwidth needed for SCTE 20. The VMG discards user data format as per SCTE 20 in the input. It re-formats user data for the input as per SCTE21 to SCTE, and as per SCTE 20 when requested. The *Closed Captioning* field is displayed if the **Video Type** is set to *MPEG-2*.	SCTE 21

Table 76.   Configure AVTX/VTX/PIP Program Mapping: Video (Continued)

Field	Description	Default
IDR Interval (in Frames)	Specifies the interval between instantaneous decoder refresh (IDR) frames. • For GOP M=1-3 with HD or SD encoding, the IDR interval can be input by the user and must be a multiple of the GOP N value. Enter *0* if no IDR frames are to be inserted. • For GOP M=4, the IDR interval can be set to *96* (the default) or *0* (no IDR). • For GOP M=8, the IDR interval is set to *96* and is read-only. • If PIP is selected for the Encoding Template, no IDR frames are inserted and the field does not display. The *IDR Interval* field is displayed if the **Video Type** is set to *H.264*.	96
Closed Caption Type	Select either CEA or CEA 608+708.	CEA 608+708
Treat Teletext, except Subtitles, as Asynchronous Data	Enable (check) or disable (un-check) Teletext stream to be processed as asynchronous data. • When enabled (checked), Teletext streams are handled as asynchronous data for the grooming. • When disabled (un-checked), Teletext streams are handled as synchronous data.	Un-checked

Configure AVTX/VTX/PIP Program Mapping—Audio

Table 77.   Configure AVTX/VTX/PIP Program Mapping: Audio

Field	Description	Default
Audio Profile	You can define audio profiles that you can quickly apply to a Program Mapping. If this option is checked, enter a name to create a new audio profile and then define the audio parameters below. If the option is un-checked, you can select from a list of existing audio profiles and the audio parameters will be automatically filled in and un-editable.	Blank
Audio Codec	Defines the codec for the output audio, as one of the following options: • *For non-Dolby: HE AAC, HE AAC v2, AAC-LC, MPEG1 L2, MPEG2 L2, AC-3 (Dolby Digital)* • *For Dolby (These options activate the Advanced button): E-AC-3 (Dolby Digital Plus).* **Note:** *This audio codec setting is not applicable for VTX.* **Note:** *The pre-configured Audio ES at the AVTX output will be used despite settings for the input audio type. As a workaround, use language descriptor to define the audio matching criteria for a pre-configured audio PID.*	AAC LC
Sampling Rate	Value, in kHz, to set the number of audio samples per second. The higher the number, the better the sound quality. Choose one of the following options: 8 kHz, 11.03 kHz, 12 kHz, 16 kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz, 48 kHz	44.1 kHz

Table 77.   Configure AVTX/VTX/PIP Program Mapping: Audio (Continued)

Field	Description	Default
Channels	Defines the number of output channels per audio stream, using one of the following options: mono, stereo, 5.1 surround	stereo
Audio Bitrate	Defines the bitrate for all audio streams within the MBR TS. The selectable values depend on your selection of *Audio Codec*, *Sampling Rate*, and *Channels*.	128 kbps
Audio Gain	Defines the gain on an audio stream level. *Audio Gain* is applied to all audio streams within the MBR TS. If the input program has two or more audio PIDs, all audio outputs will have the same gain. • *Audio Gain* ranges from -24 dB to +24 dB and is selectable in 1 dB increments. Note: *And Audio Gain of 0 means no gain*.	no Gain
Advanced Button	Allows access to Dolby Configuration dialogs, as appropriate for the Audio Codec specified in the Audio Codec field.	• Disabled for non-Dolby audio Codec. • Enabled for Dolby audio Codec.

Managing Standard Output Streams and Programs

You can view, change parameters, or delete output streams and programs from the Grooming Mapping tab page, as described in the following sections:

• "Displaying or Modifying Grooming Details," next.

• "Modifying, Deleting, and Regrooming Output Transport Streams and Programs" on page 172

Displaying or Modifying Grooming Details

• For non-transcoded transport streams and programs, use the **Current Program Mapping** screen to view grooming details.

• For transcoded transport streams, go to the individual programs to modify and view grooming details.

Display Grooming for all Programs in a Non-Transcoded TS

Use the **Current Program Mapping** screen (Figure 80) to view grooming details for a VTR transport stream.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> right-click on a TS and select **Display Grooming** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 80.   Current Program Mapping: Non-transcoded TS

The upper portion of the **Current Program Mapping** screen contains the table of grooming sessions for the selected transport stream (Table 78).

Table 78.   Current Program Mapping: Table Columns

Field	Description	Default
Input Port	The input program's GigE or 10 GigE interface.	Read-only
Input TS ID	The input program's transport stream ID.	Read-only
Input Program	Program number assigned to the input program.	Read-only
Output Port	The output program's transport GigE or 10 GigE interface port.	Read-only
Output TS ID	The output program's transport stream ID.	Read-only
Output Program	Program number assigned to the output program.	Read-only

Information contained in the lower section of the Current Program Mapping screen is derived from configuration described in "Grooming Non-Transcoded Programs" on page 152.

Display Grooming for a Single Program in a Non-Transcoded TS

To view grooming details for a single program in a non-transcoded transport stream, access the **Current Program Mapping** screen (Figure 81).

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> expand a TS --> right-click on a program and select **Display Grooming** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 81.   Current Program Mapping: Single Program: Non-transcoded Stream

Modify Grooming for a Transcoded Program

To modify grooming details for a transcoded program, use the **Modify Program Mapping** screen (Figure 82 and Table 79).
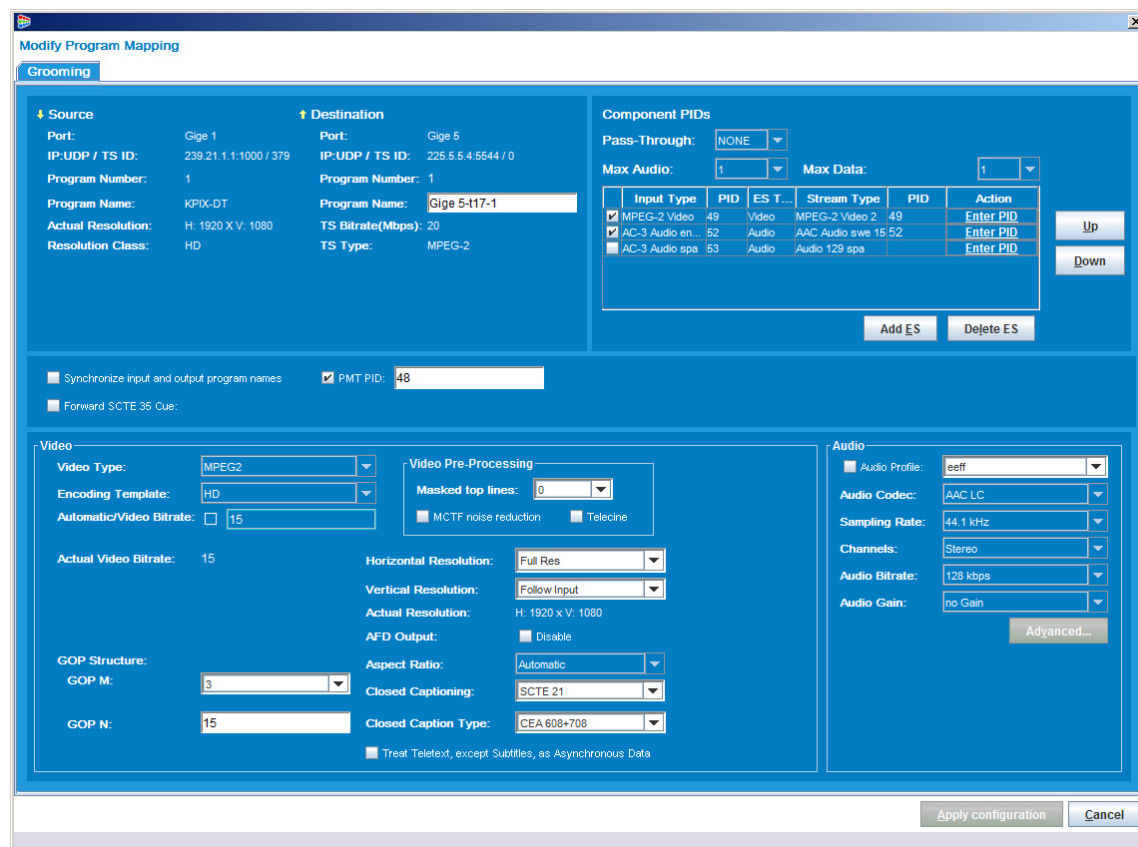
☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> expand a TS --> right-click on a transcoded program and select **Modify Grooming** from the popup menu. or Click **Grooming** from the **Modify** \<TS type\> **Transport Stream** dialog.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 82.   Modify Program Mapping: Program

1. At the **Modify Program Mapping** screen, apply changes, as necessary. Guidelines are provided in Table 79.

2. Click the green **Apply Configuration** button (or use Alt **a**) to save your changes.

> **Note:** *Once you have made valid changes, the Apply Configuration button becomes green, indicating you can save those changes.*

Table 79. Transcoded Grooming: Modify Program Mapping

Section	Field(s)	Default	Description
Source	Port, IP:UDP/TS ID, Program Number, Program Name	Read-only	For a description of these fields, see "Configure AVTX/VTX/PIP Program Mapping—Source" on page 160.
	Resolution Class	Read-only	Displays the resolution (before transcoding) of the source input program.
Destination	Port, IP:UDP/TS ID, Program Number, TS Bitrate(Mbps), TS Type, Major Channel Number (if ATSC), Minor Channel Number (if ATSC)	Read-only	For a description of these fields, see "Configure AVTX/VTX/PIP Program Mapping—Destination" on page 160.
	Program Name	Editable	
Component PIDs	Pass-Through, Max Audio, Max Data	Read-only	For a description of these fields, see "Configure AVTX/VTX/PIP Program Mapping—Component PIDs" on page 160.
	Input Type, Input PID, Output Type, Output PID	Editable	
	Synchronize input and output program names, Forward SCTE 35 Cue, PMT PID	Editable	
Quality of Service	Service Level	Bypass Transrater	For transcoded programs, transrating options are not available. This field will be displayed as read-only. For a description of this field, see Table 71, "VTR Program Mapping: Quality of Service," on page 155. Additional details are provided in Table 72, "Service Level Configuration Details," on page 155.
	Max Video Bitrate (Mbps)	Blank	For transcoded programs, transrating options are not available. For a description of this field, see Table 71, "VTR Program Mapping: Quality of Service," on page 155.
Video	Video Type, Encoding Template. Automatic Video Bitrate, Profile (H.264), Actual Video Bitrate (MPEG2), GOP Structure (GOP M, GOP N), Video Pre-Processing (Masked top lines, MCTF noise reduction, Telecine (MPEG2), Horizontal Resolution, Vertical Resolution, Actual Resolution (MPEG2), AFD Output, Aspect Ratio, IDR Interval (H.264), Closed Captioning, Close Caption Type	Editable	For a description of these fields, see "Configure AVTX/VTX/PIP Program Mapping—Video" on page 163.
Audio (if AVTX TS)	Audio Profile, Audio Codec, Sampling Rate, Channels, Audio Bitrate, Audio Gain, Dolby (via Advanced button)	Editable	For a description of these fields, see "Configure AVTX/VTX/PIP Program Mapping—Audio" on page 166.

Modifying, Deleting, and Regrooming Output Transport Streams and Programs

Use the menu provided from an individual output transport stream or program to select the Modify, Delete, and Regroom function appropriate for the stream.

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> expand a TS (VTR, AVTX, VTX, or PIP) --> right-click on a program and select an option (Table 80) from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Table 80.   Output TS: Popup Menu (

Menu Option	Description
Modify Transport Stream	Presents the transport stream modification dialog specifically for the selected transport stream type.
Delete Transport Stream	Deletes the selected transport stream. This option always presents a confirmation dialog prior to deleting the TS.
Create Program	For PIP and VTX transport streams, this option presents the **Create Transcoding Output Program** dialog. For VTR, this option presents the non-transcode **Create Output Program** dialog.
Delete All Programs	Remove all programs associated with the selected transport stream.This option always presents a confirmation dialog prior to deleting the programs currently under the transport stream.
Display Grooming	Go to the *Current Program Mapping* dialog to view current grooming session and other information about the VTR program mapping. This option is provided only for VTR transport streams, and is disabled for transcoded streams.
Bitrate Monitor	Go to the *Monitor* tab page of the Selenio VMG *Element Manger* screen.
Reset Grooming	Reset grooming for transcoded transport streams. This option is not available for VTR transport streams. The system always issues a confirmation query prior to performing the reset.

Menus and Modification dialogs for standard output streams are described in the following topics:

- "Non-transcoded Output Transport Stream—VTR," next.
- "Transcoded Output Transport Stream—PIP" on page 174.
- "Transcoded Output Transport Stream—AVTX" on page 175.
- "Transcoded Output Transport Stream—VTX" on page 176

Non-transcoded Output Transport Stream—VTR

To access management options for a VTR transport stream, use the VTR popup menu. Use the **Modify Output VTR Transport Stream** dialog (Figure 83, SPTS, and Figure 84, DPI) to change parameters for a specific VTR transport stream.
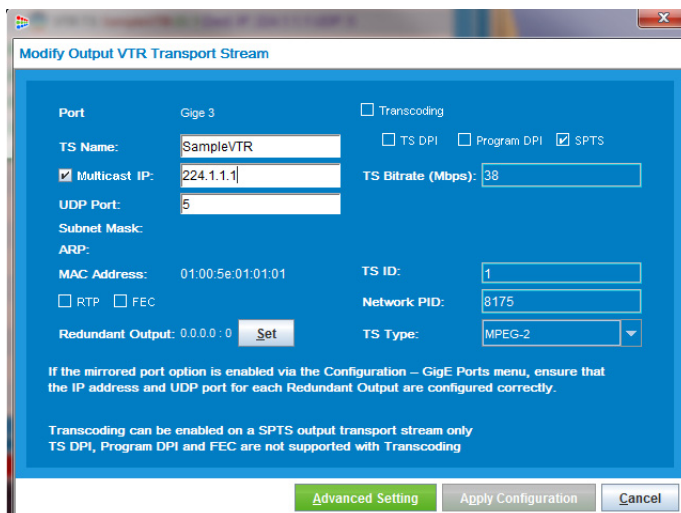
	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> right-click on the non-transcoded (VTR) TS --> select an option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 83.   Modify Output TS: VTR (SPTS)

Figure 84.   Modify Output TS: VTR (DPI)

1. At the **Modify Output VTR Transport Stream** dialog, edit any or all of the following fields: *TS Name*, *Multicast IP*, *UDP port*, and/or *TS bitrate*.

> ⚠️ **Caution:**   *Modification of any setting (other than the TS name) can result in service interruption.*

2.   Click the green **Apply Configuration** button (or use Alt **a**) to update and save these settings.

Transcoded Output Transport Stream—PIP

To access management options for a PIP transport stream, use the PIP popup menu. To modify current parameters for this stream type, go to the **Modify Output PIP Transport Stream** dialog (Figure 85).

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> right-click on a PIP TS --> select an option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 85.   Modify Output TS: PIP

1.   At the **Modify Output PIP Transport Stream** dialog, edit any or all of the following fields: *TS Name, Multicast IP, UDP port, TS bitrate, and/or Input Video Transcoding Input settings.*

> ⚠️ **Caution:**   *Modification of any setting (other than the TS name) can result in service interruption.*

2.   Click the green **Apply Configuration** button (or use Alt **a**) to update and save these settings.

Transcoded Output Transport Stream—AVTX

To access management options for an AVTX transport stream, use the AVTX popup menu. To modify current parameters for this stream type, go to the **Modify Output AVTX Transport Stream** dialog (Figure 86).
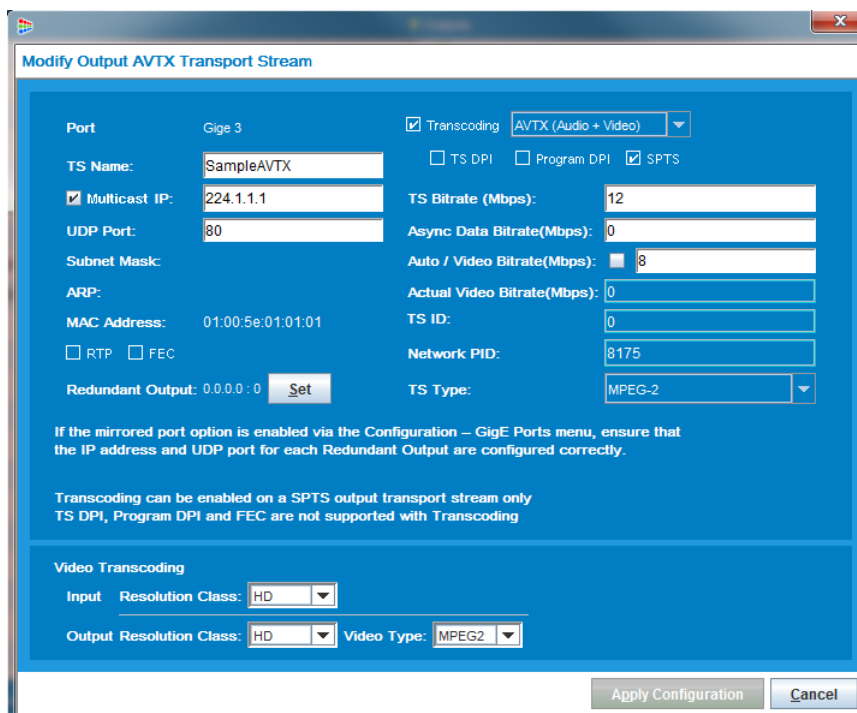
☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> right-click on an AVTX TS --> select an option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 86.   Modify Output TS: AVTX

1. At the **Modify Output AVTX Transport Stream** dialog, edit any or all of the following fields: *TS Name*, *Multicast IP, UDP Port, TS bitrate, Async Data Bitrate, Auto/Video bitrate, and/or the Video Transcoding settings.*

⚠ **Caution:**   *Modification of any setting (other than the TS name) can result in service interruption.*

2. Click the green **Apply Configuration** button (or use Alt **a**) to update and save these settings.

Transcoded Output Transport Stream—VTX

To access management options for a VTX transport stream, use the VTX popup menu. To modify current parameters for this stream type, go to the **Modify Output VTX Transport Stream** dialog ([Figure 87](#)).
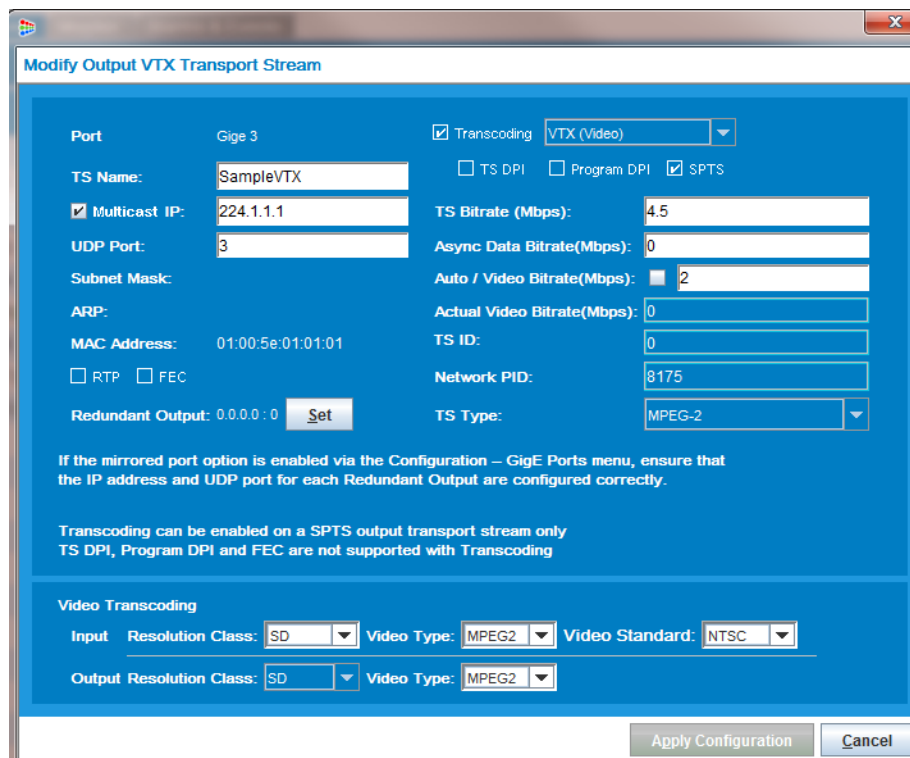
Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand a GigE interface --> right-click on a VTX TS --> select an option from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 87.   Modify Output TS: VTX: No Audio Transcoding

1. At the **Modify Output VTX Transport Stream** dialog, edit any or all of the following fields: *TS Name, Multicast IP, UDP Port, TS bitrate, Async Data Bitrate, Auto/Video bitrate, and/or the Video Transcoding settings.*

Caution: *Modification of any setting (other than the TS name) can result in service interruption.*

2. Click the green **Apply Configuration** button (or use Alt **a**) to update and save these settings.

Resetting Grooming—AVTX, VTX, PIP

Use the **Reset Grooming** option on an output transport stream currently in service to tear down a current configuration and rebuild the transport stream with the identical configuration.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel -->expand a GigE interface --> right-click on an AVTX, VTR, or PIP TS and select **Reset Grooming** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Note: *Because this option interrupts service during the tear down and rebuild process, the system queries for confirmation to proceed with the reset.*

At the **Confirmation** dialog, click <u>**Yes**</u> (or use Alt **y**) to complete this operation.
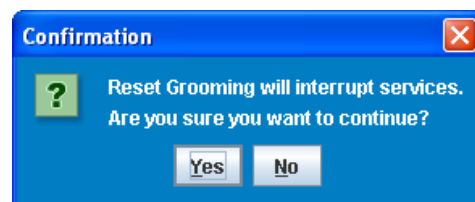
Regrooming—VTX, VTX+PIP, PIP

Regrooming is the process of changing the program mapping configuration by performing a drag-and-drop grooming operation on an output TS that has already been groomed, which results in replacement of all existing program information in the destination with the new program information. This action rebuilds the grooming at the selected output TS, with the new input program, using the identical configuration on the output program and output elementary streams.

Caution: *The new input program must be similar to the current input program that it will replace: it must contain the identical number of streams, stream types, and PMT order.*

Prior to dynamically grooming the targeted output transport stream, the *VMG Element Manager* queries for confirmation of the configuration, to ensure that the input configuration matches that of the output configuration. The **Confirmation** dialog (Figure) also reminds you that regrooming interrupts service.
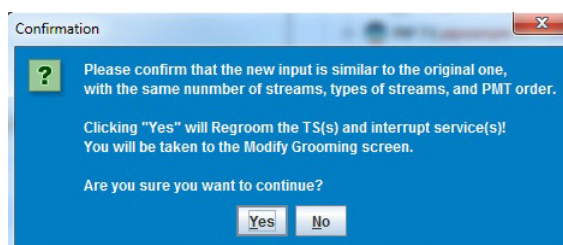
Upon completion of the regrooming process, you can view the results in a **Modify Program Mapping** screen for a particular transport stream type.

Deleting All Output Transport Streams

Use the delete function from a selected GigE output interface (Figure 88) to remove its transport streams.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel -->right-click on a GigE interface and select **Delete all Transport Streams** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 88.   Delete All Output Transport Streams
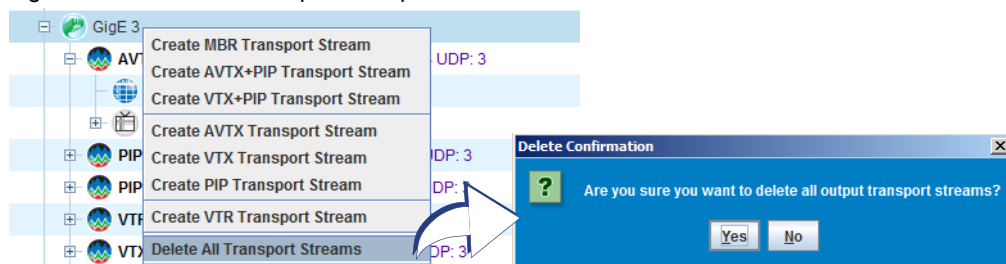
At the **Delete Confirmation** dialog, click <u>**Yes**</u> (or use Alt **y**) to complete this operation.

Deleting a Single Transport Stream

Use the delete function from an individual TS to remove it (Figure 89).

	Menu Path	**Grooming-Mapping** page, **Outputs** panel -->expand a GigE interface --> right-click on a TS and select **Delete** <TS type> **Transport Stream**.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 89.   Delete a Specific Transport Stream
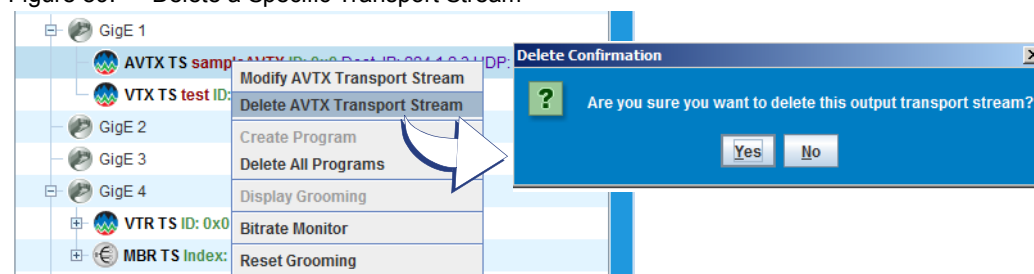
At the **Delete Confirmation** dialog, click <u>**Yes**</u> (or use Alt **y**) to complete this operation.

Deleting All Programs

Deleting all programs in a transport stream will also delete all associated grooming sessions. Use the delete function from an output TS to remove all programs from the TS.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel -->expand a GigE interface --> right-click on a TS and select **Delete All Programs**.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 90.   Delete All Programs
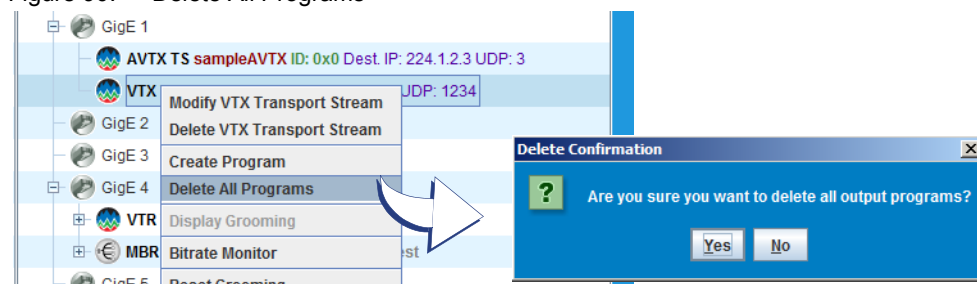
At the **Delete Confirmation** dialog, click <u>**Yes**</u> (or use Alt **y**) to complete this operation.

Deleting A Single Program

Use the delete function from an output program to remove it.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel -->expand a GigE interface --> expand a TS --> right-click on a program and select **Delete Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 91.   Delete a Program
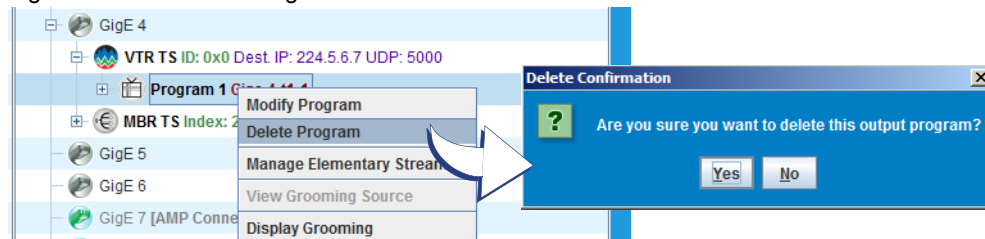
At the **Delete Confirmation** dialog, click <u>**Yes**</u> (or use Alt **y**) to complete this operation.

Modify Output Program

Use the **Modify Program** option to change parameters for program in a non-transcoding or transcoding TS. Options in the associated dialog screens differ in accordance with the associated type of TS (Figure 92).

	Menu Path	**Non Transcoded:** **Grooming-Mapping** page, **Outputs** panel -->expand a GigE interface --> expand a VTR TS --> right-click on a program and select **Modify Program** from the popup menu. **Transcoded:** **Grooming-Mapping** page, **Outputs** panel -->expand a GigE interface --> expand a VTX or AVTX TS --> right-click on a program and select **Modify Program** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Note: *To find out how to modify input program parameters, see* "Modify Input Program" on page 117.

Figure 92.   Modify Output Program Screens

Non-Transcoded Program Options

Transcoded Program Options
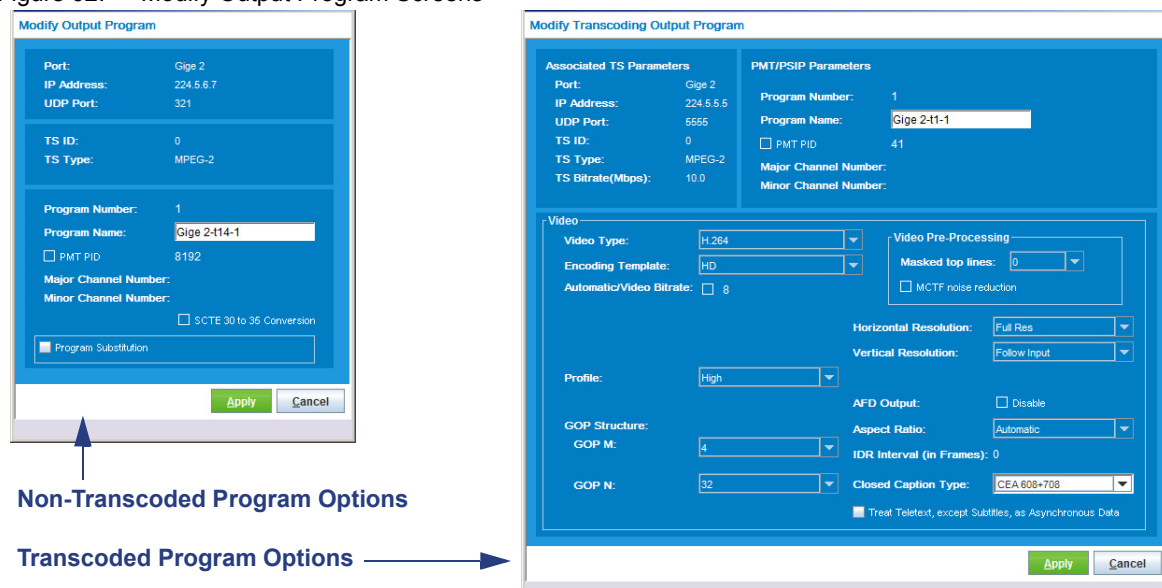
Deleting Grooming Sessions

Use the **Current Program Mapping** screen (Figure 93) to select and remove a grooming session for an AVTX, PIP, VTR, or VTX TS.

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel -->expand a GigE interface --> right-click on a program and select **Display Grooming** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. At the **Current Program Mapping** dialog, click on the grey row that identifies the grooming session you want to delete, then right-click and select **Delete** from the popup menu. The selected row is now removed from the table in this dialog.

2. Click **Refresh** (or Alt **r**) to ensure that contents of this screen are up to date.

Figure 93.   Delete Grooming Session

Viewing Grooming Source

Selecting this option from the program context menu highlights the source input program associated with the selected output program (Figure 94). In the following example, [1] Selecting **View Grooming Source** from Program 1 of the **Outputs** panel GigE 1 interface results in [2] highlighting/identifying Program 1 from the **Inputs** TS of GigE 4 as the grooming source.

Figure 94.   View Grooming Source
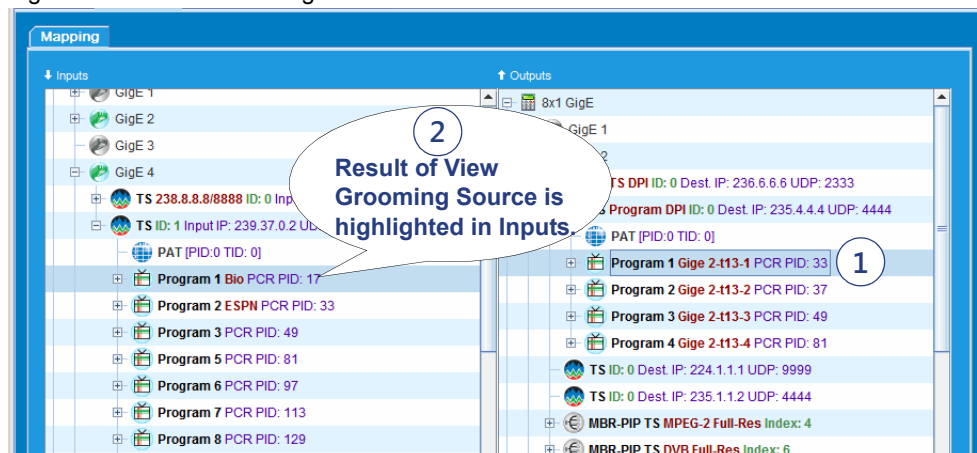
Display Grooming

Use the **Current Program Mapping** dialog, which displays the currently configured grooming sessions for the selected non-transcoded program. See "Displaying or Modifying Grooming Details" on page 167.

Transcoded+PIP Transport Streams

This chapter describes the use of the *VMG Element Manager* to manage the creation and grooming of transcoded+PIP transport streams.

> **Note:** *System configuration must be completed before performing grooming tasks. Refer to Chapter 4, "System Configuration" for more information.*

> **Note:** *The VMG supports input-level program redundancy for transcoded+PIP transport streams. If you plan to implement program redundancy, please familiarize yourself with "Program Redundancy" on page 258 before performing the procedures in this chapter.*

In This Chapter:

- "Overview," next.
- "Creating Transcoded+PIP Transport Streams" on page 183.
- "Transcoded+PIP TS Program Grooming" on page 189.
- "Managing Transcoded+PIP Transport Streams and Programs" on page 198.
- "Monitoring Bitrates for Transcoded-PIP Streams" on page 204.

Overview

In contrast to standard output transport streams, a transcoded+PIP transport stream transcodes a single input stream into two output streams:

- A full frame rate, broadcast-resolution main stream, either HD or SD.
- A corresponding PIP stream, defined as a video-only SPTS program consisting of a lower-resolution H.264 Baseline Profile stream.

Transcoded+PIP transport streams use the VMG's resources more efficiently than standard output transport streams and also simplify the creation of programming that provides PIP services. Transcoded+PIP transport streams are single-program transport streams (SPTSs) in which the broadcast-resolution and the PIP video start at the same time and share the same input time base. You can create two types of Transcoded+PIP transport streams:

- **AVTX+PIP**—enables the transcoding of both audio and video
- **VTX+PIP**—enables the transcoding of video

All programs groomed to Transcoded+PIP transport streams are transcoded to H.264 video.

Table 81 (below) highlights the differences between Transcoded+PIP Transport Streams and Standard Output Transport Streams.

Table 81.   Comparing Standard Output TS and Transcoded+PIP TS

Feature	Standard Output TS	Transcoded+PIP TS
Transcoding	Both transcoding and non-transcoding supported	Transcoding only
Transcoding output	MPEG-2 or H.264 HD, SD, or PIP stand-alone streams	H.264 only HD or SD (PIP included automatically)
TS Types	MPEG-2, SCTE, ATSC, DVB	MPEG-2, DVB
SPTS/MPTS	Both SPTS and MPTS	SPTS only
Program Creation	Manual and Drag-and-Drop Grooming	Drag-and-Drop Grooming only

Creating Transcoded+PIP Transport Streams

The Selenio VMG supports two Transcoded+PIP TS types: MPEG-2 and DVB, for which the Selenio VMG supports SI table generation. Steps are provided in the following topics:

- "Creating MPEG-2 Transcoded+PIP Transport Streams," next.
- "Creating DVB Transcoded+PIP Transport Streams" on page 187.

Color Indicators for Transcoded+PIP TS

In the **Outputs** panel, the Transcoded+PIP TS icon is gray when video processing is not active. When you groom a program to the Transcoded+PIP TS the icon become green to indicate that the TS is active. The two SPTSs appear within the Transcoded+PIP TS—one that is broadcast resolution and the other PIP resolution. The Transcoded+PIP TS automatically takes on the name of the **Main** stream.

In Transcoded+PIP TS-related screens, purple background shading identifies fields that cannot be edited. Fields that have white or light blue shading can be edited by first double-clicking on them.

Creating MPEG-2 Transcoded+PIP Transport Streams

Use the **Create** <Transcoded+ PIP> **Transport Stream** screen (Figure 96) to set parameters for one of the following stream types:

- **AVTX+PIP Transport Stream** (to transcode both audio and video).
- **VTX+PIP Transport Stream** (to transcode video only).

	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface --> select a transcoded+PIP option—AVTX+PIP, or VTX+PIP—from the popup menu (Figure 95).
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 95.   Output TS Options From GigE
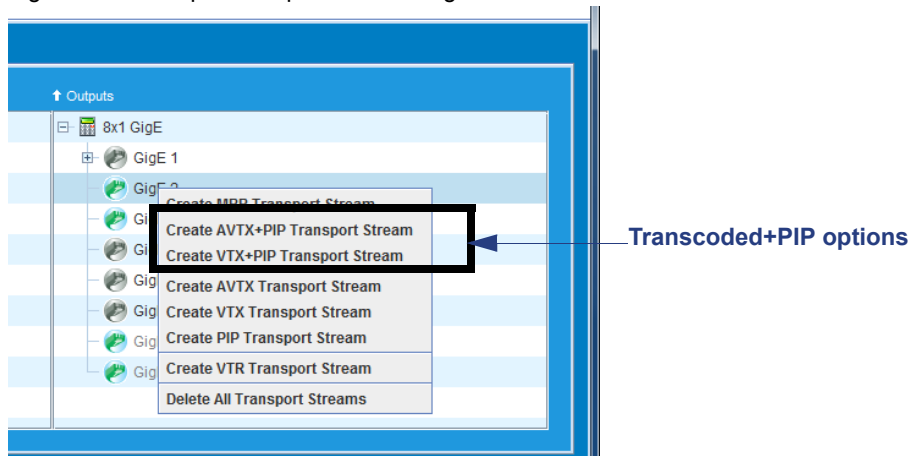
Figure 96.   MPEG-2 Transcoded+PIP TS Setup

3.   Verify **TS Type** is set to **MPEG-2**.

4. Set the parameters for both the **Main** (broadcast-resolution) and **PIP** transport streams (Table 82), then click **<u>Apply</u>** (or use Alt **a**) to complete this operation.

Table 82.   MPEG-2 Transcoded+PIP TS: Parameters

Field	Description	Default
Port	Displays the selected port on which the Transcoded+PIP output transport stream is being created.	Read-only
TS Type	Select a type of Transcoded+PIP output transport stream to create, as either *MPEG-2* or *DVB*.	MPEG-2
Index	The row entry within the Transcoded+PIP TS creation dialog.	Read-only
Type	The type of video stream, either *Main* (full resolution) or *PIP*.	Read-only
Name	(*Optional*) Type alphanumeric string to set name of the output transport stream. Note: *The name you give to the Main stream will also become the name of the Transcoded+PIP TS.*	Blank
TS ID	(*Optional*) The TS ID enables the system to choose a unique number for identification of the output transport stream. Valid range is from 0 to 65535 in decimal format.	Blank
Multicast	Enable (check) or disable (un-check) multicast for the output transport stream. If enabled, the *IP Address* must be a valid multicast IP address.	Checked
Primary IP Address	The IP address to which the output stream is routed. • If *Multicast* is checked, this must be a valid multicast IP address. Valid range is from 224.0.0.1 to 239.255.255.255. • If *Multicast* is un-checked, this must be a valid unicast IP address. Valid range is from 0.0.0.1 to 223.255.255.255. • Do not assign 10.0.0.1x or 10.0.0.2x to the VMG management interface face or Ethernet port because these are reserved for internal VMG usage.	Blank
Primary Subnet Mask	If *Multicast* is un-checked, this field is available for input.	When Multicast is un-checked: *255.255.255.0*
Primary UDP Port	Type a value, in the range 1 - 65535, to specify the UDP port to use for transmitting data.	Blank
Redundant IP Address	The alternate IP address to which the output stream can be routed. The redundant IP option can be used if port mirroring is enabled on the output port. • If *Multicast* is checked, this must be a valid multicast IP address. Valid range is from 224.0.0.1 to 239.255.255.255. • If *Multicast* is un-checked, this must be a valid unicast IP address. Valid range is from 0.0.0.1 to 223.255.255.255. • Do not assign 10.0.0.1x or 10.0.0.2x to the VMG management interface face or Ethernet port because these are reserved for internal VMG usage.	Blank
Redundant Subnet Mask	If *Multicast* is un-checked, this field is available for input.	When Multicast is un-checked: *255.255.255.0*

Table 82.   MPEG-2 Transcoded+PIP TS: Parameters

Field	Description	Default
Redundant UDP Port	Type a value, in the range 1 - 65535, to specify the UDP port to use as the alternate for transmitting data.	Blank
TS Bitrate (Mbps)	The bitrate of the output stream. • For the Main transport stream, the valid range is 0.1 to 38.8 Mbps. • For the PIP transport stream, the valid range is 0.1 to 1.0 Mbps. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331).	Main: *18.5* PIP: *1.2*
Async Data Bitrate (Mbps)	Applicable to the main configuration, value in Mbps to set maximum bitrate for asynchronous data in this stream. Async data bitrate cannot exceed the TS bitrate. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331).	Blank (no maximum limit; equivalent to transport stream bitrate)
Automatic Video Bitrate (Mbps)	Enable (check) or (disable) auto video bitrate assignment. • If enabled the system assigns the video bitrate, with the latency marked by a "*Perfecting video*" message until the bitrate is assigned. • If disabled, use a video bitrate entry according to supported values Video Type parameters H.264 HD, H.264 SD, or H.264 PIP. Refer to Table , "Locales and Decimal Entries," on page 330 for ranges and default values.	Un-checked
Video Bitrate (Mbps)	Value, in Mbps, to set maximum video bitrate for the main and the PIP in this stream.	Main: 8.0 PIP: 0.3

Table 83.   Video Transcoding Parameters: Transcoded+PIP Streams

Field	Description	Default
Input Resolution Class	Select HD or SD. • For SD, set video type (as either MPEG-2 or H264) and video standard (as either NTSC or PAL). • HD does not require video type and video standard settings.	• AVTX and VTX: HD input, HD output, and MPEG-2 video • PIP: HD input, PIP output, and H264 video • VTR (not applicable)
Output Resolution Class	Select HD or SD. • For SD: set video type as either MPEG-2 or H264. • For HD: set video type as either MPEG-2 or H264.	

The new Transcoded+PIP TS is now displayed on the **Grooming** -> **Mapping** tab page (as demonstrated in Figure 97.

Figure 97.   Ungroomed MPEG-2 Transcoded+PIP TS
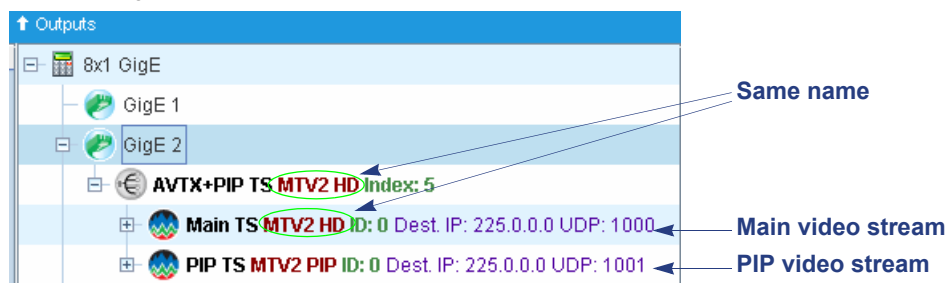
Creating DVB Transcoded+PIP Transport Streams

Use the **Create** <Transcoded+ PIP> **Transport Stream** screen (refer to Figure 96 on page 184) to set parameters for one of the following stream types:

- **AVTX+PIP Transport Stream** (to transcode both audio and video).
- **VTX+PIP Transport Stream** (to transcode video only).

Menu Path	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface --> select a transcoded+PIP option—AVTX+PIP, or VTX+PIP—from the popup menu
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. Set **TS Type** to DVB, to present the TS-specific fields in the screen (Figure 98).

Figure 98.   DVB Transcoded+PIP TS Setup

2. Set parameters for both the Main (full-resolution) and PIP transport streams as well as the DVB-specific parameters (Table 84), then click **Apply** (or use Alt **a**) to complete this operation. (See also

for details about other fields in this screen.). The new Transcoded+PIP TS displays on the **Outputs** panel of the **Grooming -> Mapping** tab page (Figure 99).

Table 84. DVB-SI Output TS: Parameters

Field	Description	Default
Network ID	Input the Network ID of the current transport stream. Valid range is from 0 to 65535.	160
Modulation Mode	Use the pull-down menu to select the modulation mode used for the TS. Choice between *SCTE 64 QAM* and *SCTE 256 QAM*.	SCTE 256 QAM
Original Network ID	Input the Network ID from which this stream has originated. Valid range is from 0 to 65535.	160
NIT Source[a]	Specifies whether or not a DVB network information table is to be included in the output TS. Click the *Select NIT* button to select a source. Choices are: *None* - No NIT will be generated on the output TS *[Input GigE TS ID]* - Specified source NIT will be included in the output TS.	Blank
TDT/TOT Source[b]	Specifies whether or not DVB time and date, and time offset tables will be generated for the output TS. Click the *Select TDT/TOT* button to select a source. Choices are: *None* - No DVB time tables will be generated on the output TS. *Local TOT* - The output TS will use the locally configured TOT. *[Input GigE TS ID]* - Specified source TDT/TOT will be included in the output TS.	Blank
SDT Source[c]	Specifies whether or not a service description table will be generated for this transport stream. Choose an option from the pulldown menu: *N/A* - No SDT will be generated for this output TS *LocalSDT* - Local SDT will be generated for this output TS.	LocalSDT
EIT Source	Specifies how an Event Information Table (EIT) is generated by the Selenio VMG. Choices are: *Groomed Input* is selected, an Event Information Table (EIT) is generated based on that which is received from the groomed input program of the DVB TS. *N/A* - No EIT will be generated for this output TS.	Groomed Input

a. If a NIT is to be included in the output TS, a valid DVB stream must be feeding the input and DVB table processing must be enabled on the input TS (Click here for more information on enabling DVB table processing).
b. If a TDT/TOT is to be included in the output TS, a valid DVB stream must be feeding the input, and DVB table processing must be enabled on the input TS (Click here for more information on enabling DVB table processing).
c. If an SDT is to be included in the output TS, a valid DVB stream must be feeding the input, and DVB table processing must be enabled on the input TS (Click here for more information on enabling DVB table processing).

Figure 99. Ungroomed DVB Transcoded+PIP TS
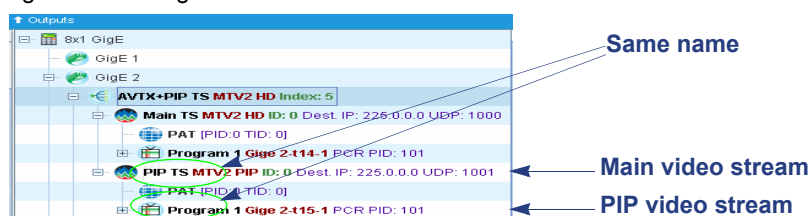
Transcoded+PIP TS Program Grooming

Unlike standard OTS creation in which a program can be created both manually and through drag-and-drop grooming, Transcoded+PIP programs are created through drag-and-drop grooming only. When dragging an input program to an Transcoded+PIP TS, the VMG automatically creates one output program on each of the main and PIP transport streams, for a maximum of two programs on the Transcoded+PIP TS.

> **Note:** *The target Transcoded+PIP TS must already exist before performing program level grooming. Refer to "Creating MPEG-2 Transcoded+PIP Transport Streams" on page 183 and "Creating DVB Transcoded+PIP Transport Streams" on page 187 for more information.*

> **Note:** *Output program creation depends on the type of licenses installed. Refer to "License Management" on page 306 for details.*

Grooming a Program to a Transcoded+PIP TS

To perform program grooming for transcoded+PIP transport streams, you can apply drag-and-drop grooming in the **Grooming -> Mapping** tab page.

1. Set up the transport stream type, in the output panel of the grooming tab page.

   After setting up an **AVTX+PIP TS** or **VTX+PIP TS** in the output panel, drag a program from the input panel to the new output stream. (Figure 100).

   Figure 100. Transcoded+PIP TS Program Grooming: Drag-Drop
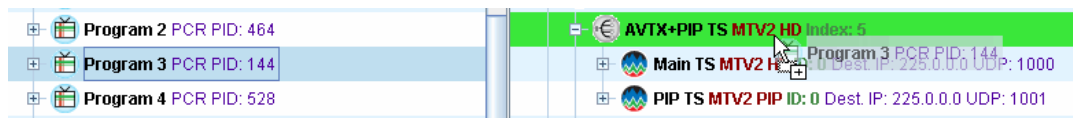
   The program mapping screen associated with AVTX+PIP or VTX+PIP will now display, as shown in the following topics:

   - "Grooming to AVTX+PIP" on page 190.
   - "Grooming to VTX+PIP" on page 191.

   Guidelines for setting parameters are provided in "Program Mapping Parameters for VTX+PIP or AVTX+PIP" on page 191.

2. Complete your entries in the configuration screen, then click **Apply** (or use Alt **a**).

   The groomed program is now displayed in the Transcoded+PIP TS on the **Grooming -> Mapping** tab page (similar to the example shown in Figure 101).

   Figure 101. Groomed Transcoded+PIP TS
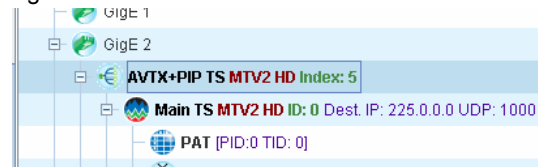
   Colorization of the Transcoded+PIP TS icon indicates that the stream is actively processing video. In addition to modifying the Transcoded+PIP TS, you can now modify the grooming parameters ("Modify Transcoded+PIP Grooming" on page 200) and view its grooming source ("View Transcoded+PIP Grooming Source" on page 203).

Grooming to AVTX+PIP

If you groom to an AVTX+PIP TS, the **Create AVTX+PIP Program Mapping** screen for an HD encoded H.264 video program is displayed (Figure 102).

Figure 102.   AVTX+PIP Program Mapping Setup

Enabled only if a Dolby Codec is selected.

Configuration guidelines AVTX_PIP program mapping are provided in "Program Mapping Parameters for VTX+PIP or AVTX+PIP" on page 191.

Grooming to VTX+PIP

If you groom to a VTX+PIP TS, the **Create VTX+PIP Program Mapping** menu for an HD encoded H.264 video program is displayed (Figure 103).

Figure 103.   VTX+PIP Program Mapping Setup

Configuration guidelines VTX_PIP program mapping are provided in "Program Mapping Parameters for VTX+PIP or AVTX+PIP" on page 191.

Program Mapping Parameters for VTX+PIP or AVTX+PIP

Parameters available in the **Create Transcoded+PIP Programming Mapping** tab page are categorized as follows:

- "Source Parameters," next.
- "Destination" on page 192
- "Video and Audio Parameters" on page 192
- "Main Components" on page 196
- "PIP Components" on page 197

Note: *Transcoded+PIP programs do not support SCTE 30 to 35 conversion, or transrating.*

Source Parameters

The source parameters listed and described in Table 85 are available from the **Create Transcoded+PIP Programming Mapping** tab page.

Table 85. Grooming: Source Parameters

Field	Description	Default
Port	The input program's source GigE or 10 GigE interface.	Read-only
TS ID	The input program's transport stream ID.	Read-only
Program Name	Program name assigned to the input program.	Read-only
Program Number	Program number assigned to the input program.	Read-only
Resolution Class	Resolution standard, as either SD or HD, assigned to the input program.	Read-only

Destination

The destination parameters listed and described in Table 86 are available from the **Create Transcoded+PIP Programming Mapping** tab page.

Table 86. Grooming: Destination Parameters

Field	Description	Default
Port	View output program's destination GigE interface port.	Read-only
TS Index	View the unique ID for each transcoded+pip transport stream.	Read-only
TS Name	View program's transport stream name.	Read-only
IP Address: UDP Port	View IP address and port to which the output stream is routed.	Read-only
TS Bitrate	View bitrate of the output stream.	Read-only
Program Number	Type a value, in the range 1 - 131072, to assign a number to the output program.	1
Program Name	Alphanumeric string to set program name. • Default format: GigE #-t[unique id]-[Program Number].	For example: GigE 7-t47221504-1

Video and Audio Parameters

The video and audio parameters listed and described in Table 87 are available from the **Create Transcoded+PIP Programming Mapping** tab page.

Table 87. Grooming: Video and Audio Parameters

Field	Description	Default
Video Type	Only H.264 is available as the video type for Transcoded+PIP output transport stream programs.	H.264
Encoding Template	Choose between HD (high definition) or SD (standard definition) • If HD is selected, the video bitrate defaults and range will change (see the *Automatic Video Bitrate (In Mbps)* field). • If SD is selected, the video bitrate defaults and range will change (see the *Automatic Video Bitrate (In Mbps)* field).	HD for Main. Read-only for PIP

Table 87.   Grooming: Video and Audio Parameters (Continued)

Field	Description	Default
Profile	Select either high, main, or baseline to set the video standard to be used. Refer to "Video Profile Configuration Options" on page 334 for guidelines. Note: *Profile is available only when Video Type is set to H.264. High is not available for PIP transport streams.*	*High* for the Main stream and *Main* for the PIP stream
Automatic Video Bitrate *(In Mbps)*	Enable (check) or (disable) auto video bitrate assignment. • If enabled the system assigns the video bitrate, with the latency marked by a "*Perfecting video*" message until the bitrate is assigned. • If disabled, use a video bitrate entry compliant with supported Video Type parameters H.264 HD, H.264 SD, or H.264 PIP. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331). • See Table , "Locales and Decimal Entries," on page 330 for ranges and default values.	Un-checked
Resolution	Specifies the type of horizontal (H) resolution to use for the transcoded program. • For HD transcoded programs, the following options are available: *Full Res, 1920, 1440, 1280, 960* • For SD programs, the following options are available: *Full D-1, VGA, 3/4 D-1, 2/3 D-1, or 1/2 D-1* • For the PIP program, the following horizontal and vertical options are available: *H:1/2D1 X V:1/2D1 (352 x 240 for NTSC; 352 x 288 for PAL), 192 X192, 128 X 96, 96 X 96*	HD: H: Full Res SD: H: Full D-1 PIP: 192 X 192
AFD Output	Disable (check) or enable (un-check) forwarding of Active Format Descriptions in output streams. This option does not apply to the PIP program. For information on AFD, refer to "Active Format Description (AFD)" on page 149.	Un-checked
Active Format (Hidden unless SD selected)	Specifies the type of output for HD content transcoded to SD. The options are: • *Force 16:9 letterbox* — an AFD code of *10* is included in the output (16:9 Image: Letterbox in 4:3 frame, Full Frame in 16:9 frame). • *Force 4:3 centercut* — an AFD code of *9* is included in the output (4:3 Image: Full Frame in 4:3 frame, Pillarbox in 16:9 frame). • *Use AFD; 16:9 fallback* — the frame format will be determined by the Active Format Description in the input program. If the AFD is not present, the frame will be forced to 16:9 Letterbox. • *Use AFD; 4:3 fallback* — the frame format will be determined by the Active Format Description in the input program. If the AFD is not present, the frame will be forced to 4:3 Centercut. The *Active Format* field is displayed when the *Encoding Template* is set to *SD*. • This option does not apply to the PIP program.	Force 16:9 letterbox

Table 87.   Grooming: Video and Audio Parameters (Continued)

Field	Description	Default
Aspect Ratio	Specifies the ratio of the program's width to the height. • For an HD program, the field is read-only and set to *Automatic*. • For an SD program, choose from one of the following options: *Automatic, 4:3, 16:9* • For the PIP program, choose from one of the following options: *Automatic, 4:3, 16:9*	HD and SD: Automatic PIP: 4:3
GOP M	Specifies the spacing of the P frames in the output. The higher the value, the lower the data rate. • For the *Main* program, choose one of the following values: *1, 2, 3, 4,* or *8*. - Note that GOP M 8 is not available if the input is 1080i HD. • For the *PIP* program, choose one of the following values: *1* or *4*	4
GOP N	Specifies the number of frames in each GOP. The higher the value, the lower the data rate. • For the *Main* program, this value must be between 1 and 240 and a multiple of the *GOP M* value. When the *GOP M* value is set to 4 or 8, the *GOP N* value is set to 32 and is read-only. • For the *PIP* program, this value is set to 32 and read-only.	32
IDR Interval (in Frames)	Specifies the interval between instantaneous decoder refresh (IDR) frames. • For GOP M=1-3 with HD or SD encoding, the IDR interval can be manually entered and must be a multiple of the GOP N value. Enter *0* if no IDR frames are to be inserted. • For GOP M=4, the IDR interval can be set to *96* (the default) or *0* (no IDR). • For GOP M=8, the IDR interval is set to *96* and is read-only. • For the PIP program, no IDR frames are inserted and this field does not display.	96
Closed Caption Type	Closed caption standard, as either CEA 608, or CEA 608+ CEA 708.	CEA 608.
Treat Teletext, except Subtitles, as Asynchronous Data	Enable (check) or disable (un-check) Teletext stream to be processed as asynchronous data. • When enabled (checked), Teletext streams are handled as asynchronous data for the grooming. • When disabled (un-checked), Teletext streams are handled as synchronous data.	Un-checked
Masked Top Lines	Value to define the number of WSS white lines to be hidden on video, as either 0, 1, 2, or 3. 0 = no WSS lines are hidden.	0
SCTE 35 Cue	Check the *Forward* box to forward SCTE 35 cues from the input program • This option does not apply to the PIP program.	Checked
Pre-Processing Filters	*MCTF noise reduction* — when checked, enables motion compensated temporal filtering (MCTF). • This option does not apply to the PIP program.	Un-checked

Table 87.   Grooming: Video and Audio Parameters (Continued)

Field	Description	Default
Audio Profile (AVTX+PIP only)	You can define audio profiles that you can quickly apply to a Program Mapping. If this option is checked, enter a name to create a new audio profile and then define the audio parameters below. If the option is un-checked, you can select from a list of existing audio profiles and the audio parameters will be automatically filled in and un-editable.	Blank
Audio Codec (AVTX+PIP only)	Defines the codec for the output audio. Choose one of the following options: • *HE AAC, HE AAC v2, AAC-LC, MPEG1 L2, MPEG2 L2, AC-3 (Dolby Digital)* **Note:** *The pre-configured Audio ES at the AVTX+PIP output will be used despite settings for the input audio type. As a workaround, use language descriptor to define the audio matching criteria for a pre-configured audio PID.*	AAC LC
Sampling Rate (AVTX+PIP only)	Defines the number of audio samples per second. The higher the number, the better the sound quality. Choose one of the following options: • *8 kHz, 11.03 kHz, 12 kHz, 16 kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz, 48 kHz*	48 kHz
Channels (AVTX+PIP only)	Defines the number of output channels per audio stream as either mono, stereo, or 5.1 surround.	stereo
Audio Bitrate (AVTX+PIP only)	Defines the bitrate for all audio streams within the MBR TS. The selectable values depend on your selection of *Audio Codec*, *Sampling Rate*, and *Channels*.	128 kbps
Audio Gain (AVTX+PIP only)	Defines the gain on an audio stream level. *Audio Gain* is applied to all audio streams within the MBR TS. If the input program has two or more audio PIDs, all audio outputs will have the same gain. • *Audio Gain* ranges from -24 dB to +24 dB and is selectable in 1 dB increments. Note: *Audio Gain of 0 = no gain.*	no Gain
Advanced Button (AVTX+PIP only)	Allows access to Dolby Configuration dialogs, as appropriate for the Audio Codec specified in the Audio Codec field.	• Disabled for non-Dolby audio Codec. • Enabled for Dolby audio Codec.

Main Components

The main components parameters listed and described in Table 88 are available from the **Create Transcoded+PIP Programming Mapping** tab page.

Table 88.   Grooming: Main Components Parameters

Field	Description	Default
Pass-through (AVTX+PIP only)	Enable or disable AC-3 (Dolby Digital) audio pass-through for the stream. If enabled, the AC-3 (Dolby Digital) stream will be passed through to the output with your setting for the PID, and transcoded to the output with your settings for audio codec.	None
Start PID (AVTX+PIP only)	This field is displayed in the Program Mapping screen when AC-3 (Dolby Digital) is selected for Pass-through. Type the PID value to be associated with AC-3 (Dolby Digital). Range: 32 - 8175.	Blank
Max Audio	Set value to define the maximum allowable audio elementary streams to be handled in the output. Note that this setting affects bitrate allowances on the stream.	See "Locales and Decimal Entries" on page 330 for comparative values.
Max Data	Set value to define the maximum allowable data elementary streams to be handled in the output. Note that this setting affects bitrate allowances on the stream.	
Groom	Check this box to include the specified elementary stream in the *Main* output program.	Checked
Input Type	Displays the input elementary stream types for the input program.	Read-only
Input PID	Displays the *Input Type*'s associated PID for the input program.	Read-only
ES Type	Type of elementary stream, as either audio, video, or data.	Data

Stream Type	Value to identify the byte that defines the stream encoding.
	• For data streams, enter a value in the range 1 - 255
	• For audio streams, set one of the following options:
	  - MPEG-1 Audio (3)
	  - MPEG-2 Audio (4)
	  - AC-3 Audio (6)
	  - AC-3 Audio (0x81)
	  - AAC Audio (0x0f)
	  - HE-AAC Audio (0x11)
	  - E-AC-3 Audio (0x84)
	  - E-AC-3 (Audio (0x87)
	• For video streams, set a value to correspond with one of the following resolutions:
	  - MPEG-1 video (1)
	  - MPEG-2 video (2)
	  - H.264 video (0x1b)
	  - SCTE video (0x80)
	Note: *When an ES audio or video type is selected, the stream type is populated from these settings during BCT import.*
		Default depends on the Max Audio and Max Data values:
		• If the number of Audio ESs present exceed the configured Max Audio, default = Data.
		• Otherwise, default = Audio

Output PID	Editable cells in which to view or modify the output PID for a groom.	

Table 88.   Grooming: Main Components Parameters (Continued)

Field	Description	Default
Output Language	Three-letter code that identifies the language currently configured for use with this audio profile. See also Table 150 on page 334 for the full list of supported languages and associated codes.	N/A
Buttons	• **Add ES**—Add a new elementary stream row to the **Component PIDs** table • **Delete ES**—Remove a selected elementary stream row from the table. • **Up**—Reposition a selected row toward the top of the table. • **Down**—Reposition a selected row toward the bottom of the table. These buttons are also provided in the **Manage Elementary Streams** dialog (Figure 144 on page 263).	N/A

PIP Components

The PIP components parameters listed and described in Table 89 are available from the **Create Transcoded+PIP Programming Mapping** tab page.

Table 89.   Grooming: PIP Components Parameters

Field	Description	Default
Groom	Indicates that the elementary stream is included in the *PIP* output program.	Read-only
Input Type	Displays the input elementary stream types for the input program.	Read-only
Input PID	Displays the *Input Type*'s associated PID for the input program.	Read-only
TS Index *X* PID	The *X* refers to the *TS Index* for the *PIP* transport stream within this Transcoded+PIP TS. Here you can set the PIDs for the *PIP* transport stream.	Output PID

About Audio Pass-Through

Pass-through configuration can be applied only to MBR, AVTX+PIP, and AVTX grooming. Only one input audio stream per groom is allowed when the pass-through option is enabled. This will result in output that contains one transcode audio and one pass-though audio. Audio pass-through applies to the entire groom; it cannot be applied to individual audio streams.

1. From the **Outputs** panel of the **Grooming** -> **Mapping** tab page, right-click on a GigE interface and choose **Create Transport Stream** for either MBR, AVTX+PIP, or AVTX to access the **Create Transport Stream** screen for your selection.

2. Provide the following entries in the **Create Transport Stream** screen:
   – Name, TS ID, multicast information, IP Address, UDP, and bitrate.
   – Resolution class = HD.
   – Click **Apply** (or use Alt **a**) to put the Transport Stream on the **Outputs** panel.

3. Drag an input stream over to the new output stream. The **Configure Program Mapping** screen for the your selection is now displayed.

Note: *At the **Main Components** section of the screen, the **Pass-Through** field defaults to None.*

4. Select either **AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus)** from the **Pass-Through** field, and set a value to define the PID at the **Start PID** field.

5. Set any other required parameters in the **Configure Program Mapping** screen, then click **Apply** (or use Alt **a**) to complete this grooming operation.

Managing Transcoded+PIP Transport Streams and Programs

Management of Transcoded+PIP transport streams and programs is performed from the **Grooming** tab of the *VMG Element Manager* screen.

Modify a Transcoded+PIP Transport Stream

Use the **Modify Transport Stream** screen for AVTX+PIP or VTX+PIP to modify parameters. As dependent on the TS type, you can modify parameters for an MPEG-2 TS and/or a DVB TS (Table 90 and Figure 104). The purple portions in the screen indicate parameters that cannot be edited.

Table 90. Editable Parameters for Transcode+PIP TS

MPEG-2 TS Type	DVB TS Type	Where to find information
• Name • Multicast • IP Address • Subnet Mask (if Multicast is un-selected) • UDP Port	• Name • Multicast • IP Address • Subnet Mask (if Multicast is un-selected) • UDP Port	• Table 82 on page 185
	• Network ID • Original Network ID • NIT Source • TDT/TOT Source • SDT Source • EIT Source	• Table 84 on page 188

⚠ **Caution:** *Modifying a Transcoded+PIP TS will disrupt program output from the VMG for a few seconds. The actual duration of the disruption at the set top box end might be several seconds.*

1. Go to the **Modify** <AVTX+PIP or VTX+PIP> **Transport Stream** screen.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select its **Modify Transcoded+PIP Transport Stream** option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 104.   Transcoded+PIP TS: Modify

2. At the **Modify** <AVTX+PIP or VTX+PIP> **Transport Stream** screen, enter changes, then click **Apply** (or use Alt **a**).

    – The **Apply** button becomes green when all required fields contain information.

    – The **Grooming** button also becomes green when all required fields contain information You can then go directly to the **Program Mapping** screen in which to apply grooming parameters for this transport stream.

Delete a Transcoded+PIP Transport Stream

Use the delete function from the Transcoded+PIP TS popup menu to remove the selected TS.

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select **Delete Transport Stream** option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 105. Delete a Transcoded+PIP TS
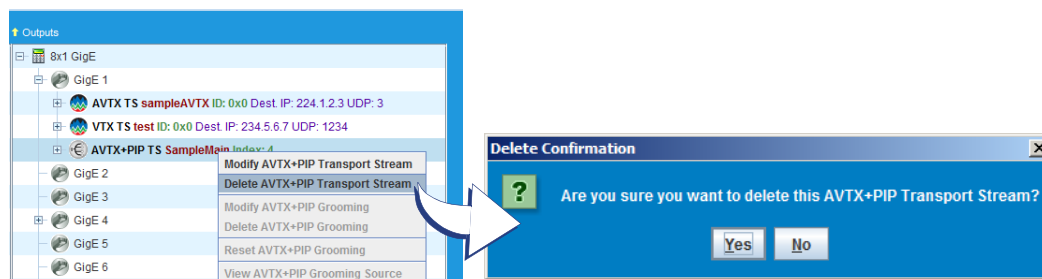
At the **Delete Confirmation** dialog, click **Yes** (or use Alt **y**) to complete this operation.

Modify Transcoded+PIP Grooming

Use the **Modify Program Mapping** screen (Figure 106) for AVTX+PIP or VTX+PIP to modify grooming for a selected Transcoded+PIP transport stream.

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select **Modify Transcoded+PIP** Grooming option from the popup menu.
		or
		Click **Grooming** from the **Modify AVTX+PIP** or **VTX+PIP Transport Stream** dialog.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 106. Transcoded+PIP Program Mapping: Modify

All parameters that can be set during initial grooming of an Transcoded+PIP program can also be modified. Refer to the following parameter descriptions for guidelines:

- Table 85, "Grooming: Source Parameters," on page 192.
- Table 86, "Grooming: Destination Parameters," on page 192.
- Table 87, "Grooming: Video and Audio Parameters," on page 192.
- Table 88, "Grooming: Main Components Parameters," on page 196.
- Table 89, "Grooming: PIP Components Parameters," on page 197.

Reset Grooming—AVTX+PIP or VTX+PIP

Use the **Reset Grooming** option (Figure 107) on an output transcoded+PIP transport stream to tear down the current configuration and rebuild the transport stream with an identical configuration.

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select its **Reset Grooming** option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 107.   Reset Grooming: AVTX+PIP. VTX+PIP

Confirmation Query for Reset Grooming at AVTX+PIP TS.
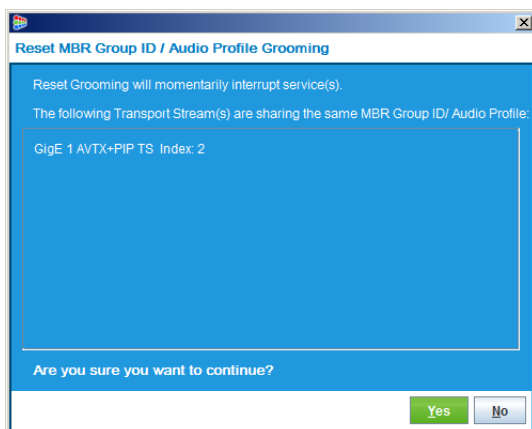
Confirmation Query for Reset Grooming at VTX+PIP TS.
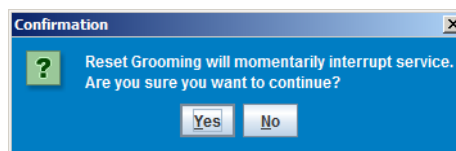
> ℹ️ **Note:** *This option interrupts service on service associated with transport streams sharing the same MBR group ID or audio profile. When selected, a confirmation query (Figure 108) will be presented prior to beginning the reset process on the selected transport stream.*

Regroom—AVTX, AVTX+PIP

Regrooming occurs when you drag an input program to an output transport stream that has already been groomed. This action rebuilds the grooming at the selected output TS, with the new input program, is both configurations are identical—on the output program and the output elementary streams.

> ℹ️ **Note:** *The Max Audio and Max Data will be persisted from the existing grooming configuration. An error message is displayed—and the re-grooming will be blocked—if the new Input Program has audio/data ESs exceeding the max audio/data values.*

Prior to regrooming the targeted output transport stream, the *VMG Element Manager* queries for confirmation of the configuration, to ensure that the input configuration matches that of the output configuration. The **Confirmation** dialog (Figure 108) also reminds you that regrooming interrupts service.

Figure 108.   Regroom Confirmation: AVTX+PIP. VTX+PIP

Confirmation Query for Regroom for AVTX+PIP TS.
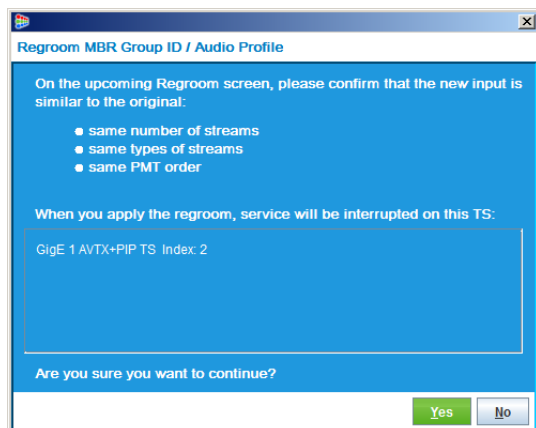
Confirmation Query for Regroom for VTX+PIP TS.
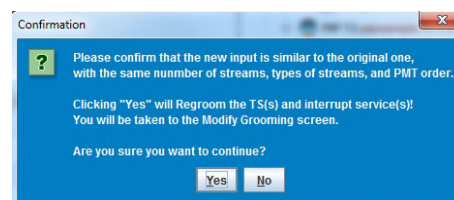
Once this grooming session is completed, you can check the **Modify** <TS type> **Program Mapping** screen to view data about the incorporated program. Fields associated with the Output ES (in Component PIDs) are editable; all others are read-only (purple). Because regroomed results are displayed in the **Modify** <TS type> **Program Mapping** screen, the display is similar to that shown in Figure 106 on page 200.

Delete Transcoded+PIP Grooming

Use the **Delete Grooming** function from the Transcoded+PIP TS popup menu to remove the selected output programs and grooming.

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select its **Delete Grooming** option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 109.   Delete a Transcoded+PIP Grooming
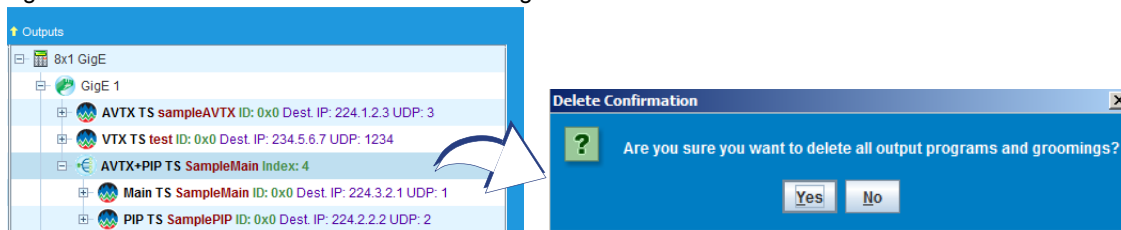
At the **Delete Confirmation** dialog, click **Yes** (or use Alt **y**) to complete this operation.

View Transcoded+PIP Grooming Source

Use the **View Grooming Source** function from a selected Transcoded+PIP TS to view the grooming source for a Transcoded+PIP program. Selecting this option highlights the source input program associated with the selected output Transcoded+PIP program (Figure 110).

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select its **View Grooming Source** option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 110.   View Transcoded+PIP Grooming Source
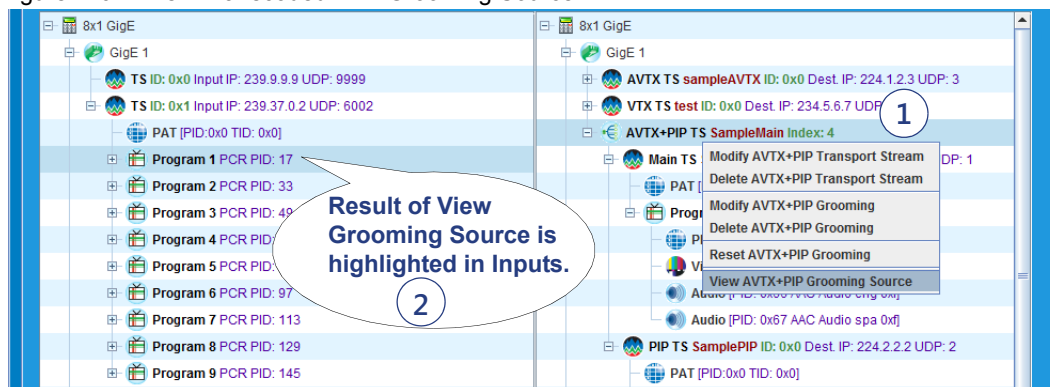
Monitoring Bitrates for Transcoded-PIP Streams

Use the **Input-Output Bitrate Monitor** screen (Figure 111) to view the bitrate graph for a selected Transcoded+PIP TS.

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select **Bitrate Monitor** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 111.   Transcoded+PIP Bitrate Monitor
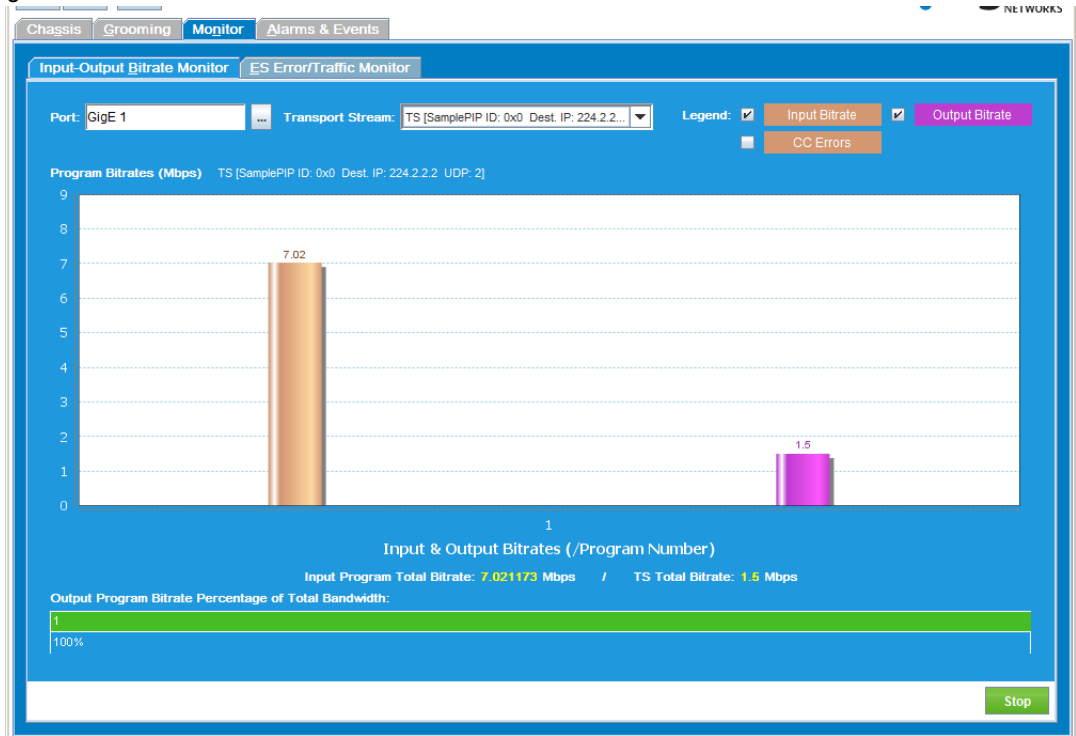
ℹ️	**Note:** *The Bitrate Monitor can only display the real-time bitrate for one transport stream and to one VMG Element Manager user at a time. Multiple transport streams cannot be monitored. simultaneously.*

Multi-Bitrate Grooms

This chapter describes the use of the Selenio VMG *Element Manager* to manage the creation and grooming of MBR (multi-bitrate) transport streams. The **Grooming** -> **Mapping** tab provides program and transport stream (TS) information.

Note: *System configuration must be completed before performing grooming tasks. Refer to Chapter 4, "System Configuration" for more information.* In addition to the hardware requirements, sufficient H.264 SD licenses must be available.

Note: *The VMG supports input-level program redundancy for MBR transport streams. If you plan to implement program redundancy, please familiarize yourself with "Program Redundancy" on page 258 before performing the procedures in this chapter.*

Hardware requirements for support of MBR Transport Stream configuration are provided in Table 91.

Table 91.   MBR TS: Hardware Requirements—GEN1

Hardware	Description
TCM	One or more must be installed and operational.
AMP	One or two must be installed and operational.
	Each AMP must be physically connected to its NPM pairing, using guidelines from the *VMG Hardware Setup Guide* for your VMG. The available VMG Hardware Setup Guides are listed in "Related Documentation" on page 19.
	Each AMP connection must be enabled through the *VMG Element Manager*. See "AMP Connection" on page 84 for instructions.

Streams associated with MBR configurations can be monitored at the bitrate level. See Chapter 14, *Monitoring* on Page 281 for more information.

In This Chapter:

- "Overview," next.
- "Creating MBR Transport Streams" on page 207.
- "MBR TS Program Grooming" on page 212.
- "Manage MBR Transport Streams and Programs" on page 221.

Overview

An MBR (multi-bitrate) transport stream enables transcoding of a single input stream (HD or SD in either MPEG-2 or H.264 format) into as many as four H.264 SPTSs per grooming operation. More than four profiles (outputs) can be configured by performing multiple groom operations reference the same group ID. All programs groomed to MBR TSs are transcoded to H.264 video. For each SPTS in an MBR TS, you can independently control the video bitrate, resolution, aspect ratio, profile, and GOP structure for a groomed program.

MBR TSs also perform transcoding on the input audio streams, enabling you to control the number of audio channels, sampling rate, and audio bitrate for the output programs. You can set up as many as 54 HD or 108 SD video/audio MBR groups for programs groomed to MBR TSs with up to eight profiles (outputs) each. Capacities for redundant and non-redundant VMG systems are listed in Table 92 and Table 93.

Table 92.   MBR Transport Stream System Capacities - Redundant System

| VMG Model | Input Resolution | Maximum Capacities | | | | |
		MBR Groups	MBR Transport Streams	MBR Profiles	Stereo Audio Transcoding streams (AAC-LC)	Qty of Audio Transcodings per MBR Group
VMG-14[a]	HD/SD	108	108	432	375 mono, or 249 stereo, or 132 surround	2
VMG-8[b]		36	36	144		
VMG-6[c]		12	12	48		

a.   System containing nine active TCMs.
b.   System containing three active TCMs.
c.   System containing one active TCM.

Table 93.   MBR Transport Stream System Capacities - Non-Redundant System

| VMG Model | Input Resolution | Maximum Capacities | | | | |
		MBR Groups	MBR Transport Streams	MBR Profiles	Stereo Audio Transcoding streams (AAC-LC)	Qty of Audio Transcodings per MBR Group
VMG-14[a]	HD/SD	132	132	528	375 mono, or 249 stereo, or 132 surround	2
VMG-8[b]		60	60	240		
VMG-6[c]		36	36	144		

a.   System containing 11 active TCMs.
b.   System containing five active TCMs.
c.   System containing three active TCMs.

Transport streams have different characteristics, as based on whether they are MBR streams or standard output streams (Table 94).

Table 94.   Comparing Standard Output TS to MBR TS

Feature	Standard Output TS	MBR TS
Video Transcoding	Both transcoding and non-transcoding supported	Transcoding only

Table 94.   Comparing Standard Output TS to MBR TS (Continued)

Feature	Standard Output TS	MBR TS
Transcoding output	MPEG-2 or H.264 HD, SD, or PIP stand-alone streams	H.264 only Up to 4 streams of varying resolutions (per groom; more supported per group ID)
TS Types	MPEG-2, SCTE, ATSC, DVB	MPEG-2
SPTS/MPTS	Both SPTS and MPTS	SPTS only
Program Creation	Manual and Drag-and-Drop Grooming	Drag-and-Drop Grooming only

Note: *See also the "Resolution Configuration Reference" on page 329 for* resolutions currently supported for HD or SD programming.

Inter-VMG IDR Alignment

The VMG enables transcoders to create IDR-aligned output profiles suitable for segmenting and adaptive delivery. It also ensures that different transcoders that ingest the same input will have all of their outputs be IDR aligned.

To enable inter-VMG IDR alignment, each VMG must be configured to use identical MBR settings and tuning parameters.

Creating MBR Transport Streams

The Selenio VMG supports only one MBR TS type: MPEG-2. You can control the HD output for the MBR transport stream by setting parameters for up to four individual streams, or use the Full HD Output option to consolidate full output into a single MBR transport stream as described in the following topics:

- "Configuring Individual MBR Transport Streams," next.
- "Configuring Full HD MBR Transport Stream" on page 209.

Note: *In MBR TS screens, purple background shading identifies fields that cannot be edited. Fields that have white or light blue shading can be edited by first double-clicking on them.*

Configuring Individual MBR Transport Streams

Use the **Create MBR Transport Stream** screen (Figure 112), to set parameters (Table 95) for individual streams for the MBR groom.

Menu Path	**Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface and select **Create MBR Transport Stream** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. At the **Create MBR Transport Stream** screen select the number of transport streams to be included, and set values for each in the configuration table.

2. Enable or disable output **SDT**, and set **Video Transcoding Input Resolution Class** as either HD or SD.
    - Select *HD* if the video input you intend to process is High Definition.
    - Select *SD* if the video input you intend to process is Standard Definition.

Figure 112.   MBR TS Setup: Multiple TSs

3. Click **Apply** (or use Alt **a**). The new MBR TS is now displayed on the **Grooming -> Mapping** tab page (Figure 114).

Configuring Full HD MBR Transport Stream

Configuration for Full HD MBR enables one profile, only, per MBR transport stream. Use the **Create MBR Transport Stream** screen (Figure 113), to set parameters (Table 95) for a full HD MBR groom.
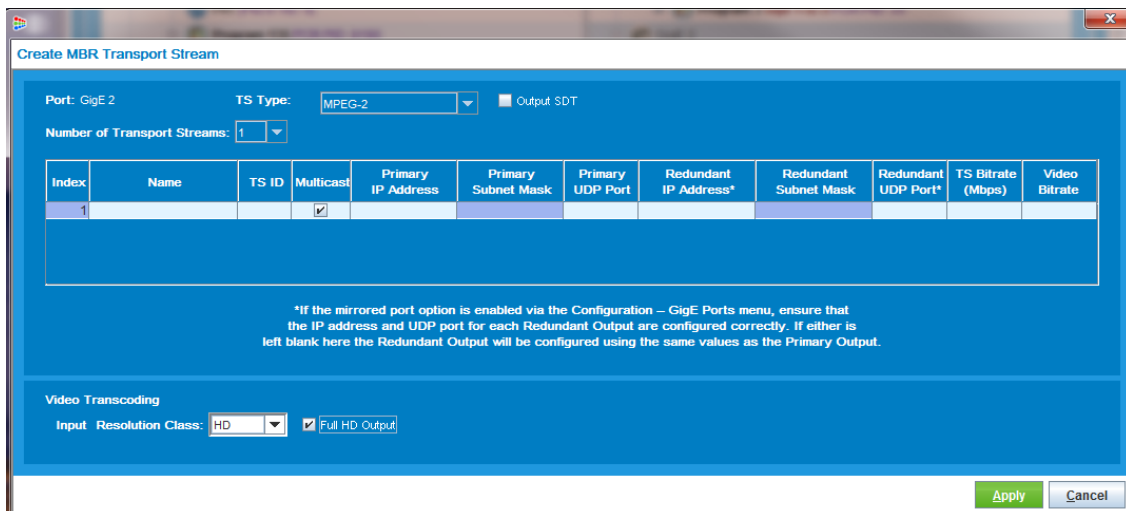
Menu Path	Grooming-Mapping page, **Outputs** panel --> right-click output GigE interface and select **Create MBR Transport Stream** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. At the **Create MBR Transport Stream** screen, click to check-mark the **Full HD Output** checkbox.

    The **Number of Transport Streams** available is now displayed as one only, and only one row is provided for entry of the MBR stream parameters.

Note: *If you de-select the **Full HD Output** box, you can replace the missing configuration rows by entering a value (maximum four) into Number of Transport Streams field.*

Figure 113.   MBR TS Setup: Full HD

2. Click **Apply** (or use Alt **a**). The new MBR TS is now displayed on the **Grooming -> Mapping** tab page (Figure 114).

Table 95.   MBR TS Setup Parameters

Field	Description	Default
Port	View the selected port on which the MBR output transport stream is being created.	Read-only
TS Type	View the type of MBR output transport stream being created. Currently, *MPEG-2* is the only option.	Read-only
Number of Transport Streams	Type a value, in the range 1 - 4, to set the number of single-program transport streams (SPTS) to be contained by the MBR TS. Note: for full HD mode, only 1 TS is allowed.	4
Output SDT	Enable (check) or disable (un-check) SDT passthrough on this MBR transport stream.	Un-checked
Index	View the individual stream number within the MBR TS.	Read-only

Table 95.   MBR TS Setup Parameters (Continued)

Field	Description	Default
Name	(*Optional*) Type an alphanumeric string—up to 32 characters—to set a name for the output transport stream. Note: *The name you give to the first stream will also become the name of the MBR TS.*	Blank
TS ID	(*Optional*) Type a numeric value, in the range 0 - 65535, to set a unique transport identifier.	Blank
Multicast	Enable (check) or disable (un-check) multicast for this output transport stream.	Checked
IP Address	The IP address to which the output stream is routed. • If *Multicast* is checked, this must be a valid multicast IP address. Valid range is from 224.0.0.1 to 239.255.255.255. • If *Multicast* is un-checked, this must be a valid unicast IP address. Valid range is from 0.0.0.1 to 223.255.255.255.	Blank
Subnet Mask	If *Multicast* is un-checked, this field is available for input.	When Multicast is un-checked: *255.255.255.0*
UDP Port	The UDP port to use for transmitting data. Valid range is from 1 to 65535.	Blank
TS Bitrate (Mbps)	Set bitrate of the output stream. The valid range is from 0.1 to 10 Mbps. The sum of all TS bitrates within the MBR group will be constrained to 12 Mbps. As appropriate for your locale, type a comma or a period symbol to designate the decimal point in your entry (see also "Bitrate Entry Guidelines" on page 331).	Blank
Input Resolution Class	Specifies the video input you intend to process, as either *HD* or *SD*.	HD
Video bitrate	Value, in Mbps, to define the maximum bitrate for the video bitrate in this transport stream. Range: 0.1 - 8 Mbps. The total for the four video streams is limited to 9 Mbps.	Blank

Table 96.   MBR TS: Video Transcoding Parameters

Field	Description	Default
Input Resolution Class	Select HD or SD. • For SD, set video type (as either MPEG-2 or H264) and video standard (as either NTSC or PAL). • HD does not require video type and video standard settings.	• AVTX and VTX: HD input, HD output, and MPEG-2 video • PIP: HD input, PIP output, and H264 video • VTR (not applicable)
Output Resolution Class	Select HD or SD. • For SD: set video type as either MPEG-2 or H264. • For HD: set video type as either MPEG-2 or H264.	

Table 96.   MBR TS: Video Transcoding Parameters (Continued)

Field	Description	Default
Full HD Output (checkbox)	Check here if the stream is to be treated as an Full-HD MBR. If so, the dialog will provide only one entry row in which to define the Full-HD MBR parameters, and the number of transport streams that can be groomed to the particular session will be limited to one only.	• Unchecked
	An Full-HD MBR transport stream video bitrate is limited to 9 Mbits/sec, and can support up to four audio and four data PIDs.	
	When unchecked, all other sessions (maximum 4) remain unaffected.	

Figure 114.   Example: New MPEG-2 MBR TS
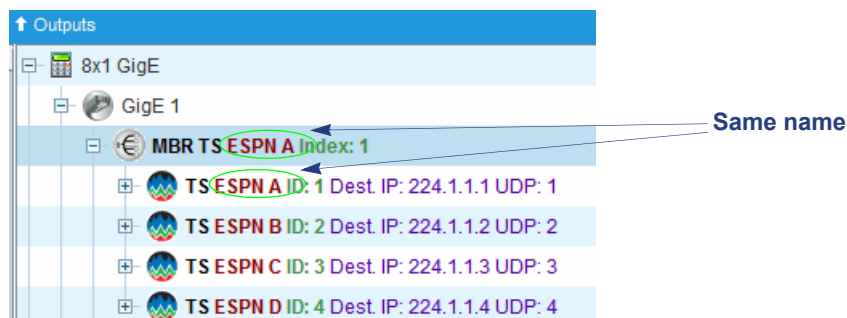
The MBR TS icon is gray unless video processing is active, that is, until you groom a program to the MBR TS. One to four SPTSs appear within the MBR TS. The MBR TS automatically takes on the name of the first SPTS.

Figure 115.   Groomed MBR TS
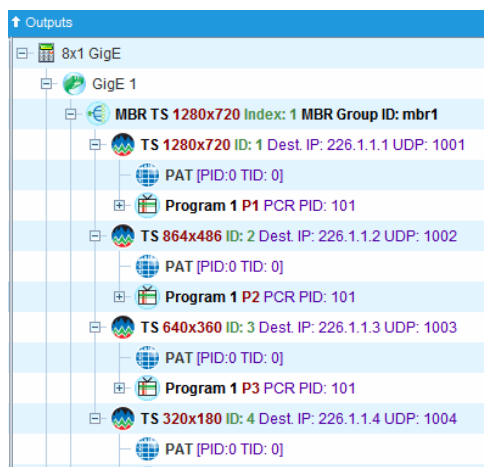
Colorization of the MBR TS icon (previously gray) indicates that the groomed stream is actively processing video.

- You can modify parameters for the MBR TS (see "Modifying an MBR Transport Stream" on page 221).

- You can also modify current grooming parameters ("Modifying MBR Grooming" on page 223) and view its grooming source ("Viewing MBR Grooming Source" on page 224).

- You can modify the MBR program name ("Modifying an MBR Program" on page 225).

MBR TS Program Grooming

Unlike standard OTS creation in which a program can be created both manually and through drag-and-drop grooming, MBR programs are created *only* through drag-and-drop grooming at the **Grooming-Mapping** tab page. When you drag an input program to an MBR TS, the VMG automatically creates one output program on each of the transport streams, for a maximum of four programs on an MBR TS.

Note: *The target MBR TS must already exist before performing program level grooming. Refer to "Creating MBR Transport Streams" on page 207 for more information.*

Note: *MBR TS programs require an H264 Transcoding License. Refer to "License Management" on page 306 for details.*

Grooming a Program to an MBR TS

After you associate a selected program to a new MBR transport stream, the **Configure MBR Program Mapping** screen is then presented, which allows you to set the grooming parameters.

1. Set up the MBR transport stream in the **Output** panel of the grooming table page.

2. Drag a program from the **Input** panel to the new to MBR TS at the **Output** panel (Figure 116).

    Figure 116.   MBR TS Program Grooming: Drag-Drop
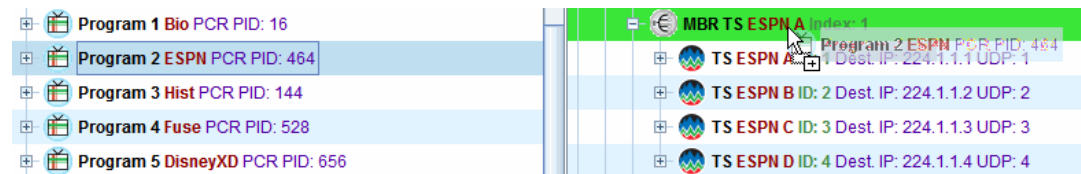
    The **MBR Program Mapping** screen will now display (Figure 117 and Figure 118).

3. At the **MBR Program Mapping** screen, set parameters, then click **Apply**. (or use Alt **a**).

    Using **Apply** results in grooming the new MBR output program, which will now be displayed in the MBR TS on the **Grooming** -> **Mapping** tab page (similar to the example shown in Figure 115). Guidelines applying settings at this screen are provided in "Program Mapping Parameters for MBR" on page 212.

4. At the **Outputs** panel, note that the MBR group ID is now appended to the MBR TS information.

Program Mapping Parameters for MBR

The Configure MBR Program Mapping screen complies with the video transcoding setting—as either SD (Figure 117), HD (Figure 118), or Full HD Output (Figure 119—defined during creation, as well as modification, of the MBR output transport stream.

The **Configure MBR Program Mapping** screen contains configuration parameters that are grouped into sections, as described in the following tables:

- Table 97, "MBR Program Mapping: Source and Destination," on page 216.
- Table 98, "MBR Program Mapping: Output Programs," on page 216.
- Table 99, "MBR Program Mapping: General," on page 217.
- Table 102, "MBR Program Mapping: Audio," on page 219.
- Table 103, "MBR Program Mapping: Component PID," on page 220.

Configure MBR Program Mapping—SD

Use the **Configure MBR Program Mapping** screen (Figure 117) to define grooming parameters for a specified MBR program using resolution class SD. Before you begin, ensure that the **Video Transcoding Input Resolution Class** is set for SD in the MBR Transport Stream.
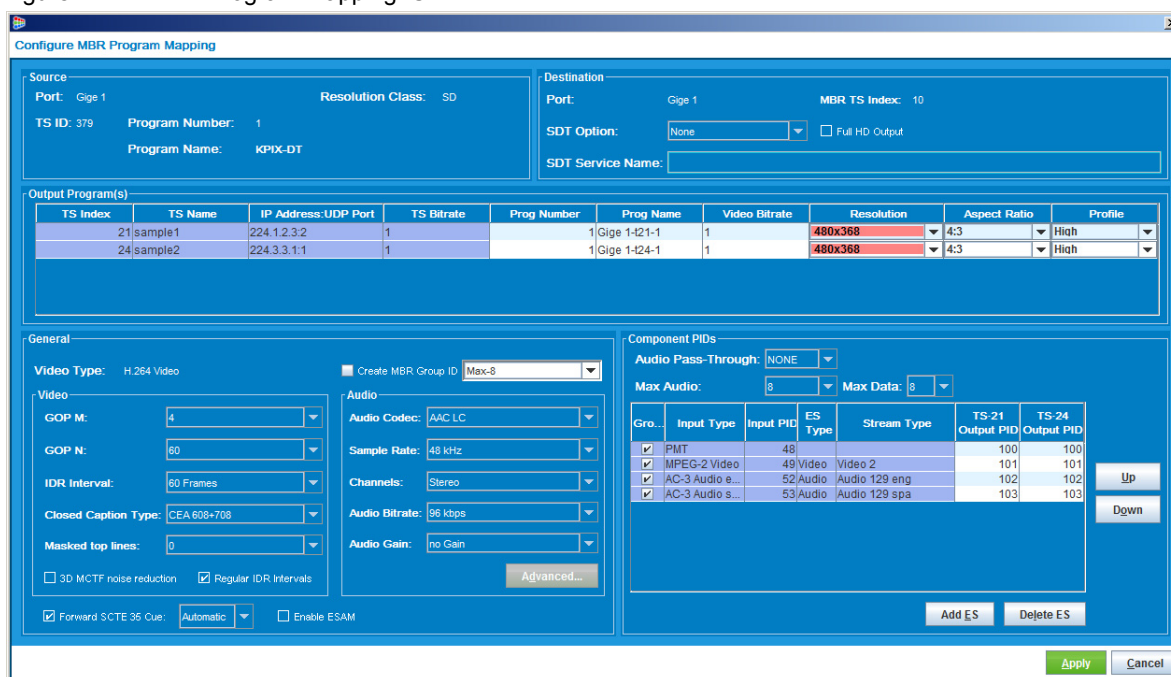
	Menu Path	1. **Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface and select an ungroomed MBR TS that has been configured for SD resolution.
		2. **Grooming-Mapping** page, **Outputs** panel --> Select an Inputs program and drag-drop it into the ungroomed MBR TS.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 117.   MBR Program Mapping: SD

1.   At the **Configure MBR Program Mapping** screen, set parameters, then click **Apply** (or use Alt **a**) to dismiss the screen.

2.   At the **Outputs** panel, note that the **MBR group ID** is now appended to the information alongside this MBR TS.)

Configure MBR Program Mapping—HD

Use the **Configure MBR Program Mapping** screen (Figure 118) to define grooming parameters for a specified MBR program using resolution class HD. Before you begin, ensure that the **Video Transcoding Input Resolution Class** is set for HD in the MBR Transport Stream.
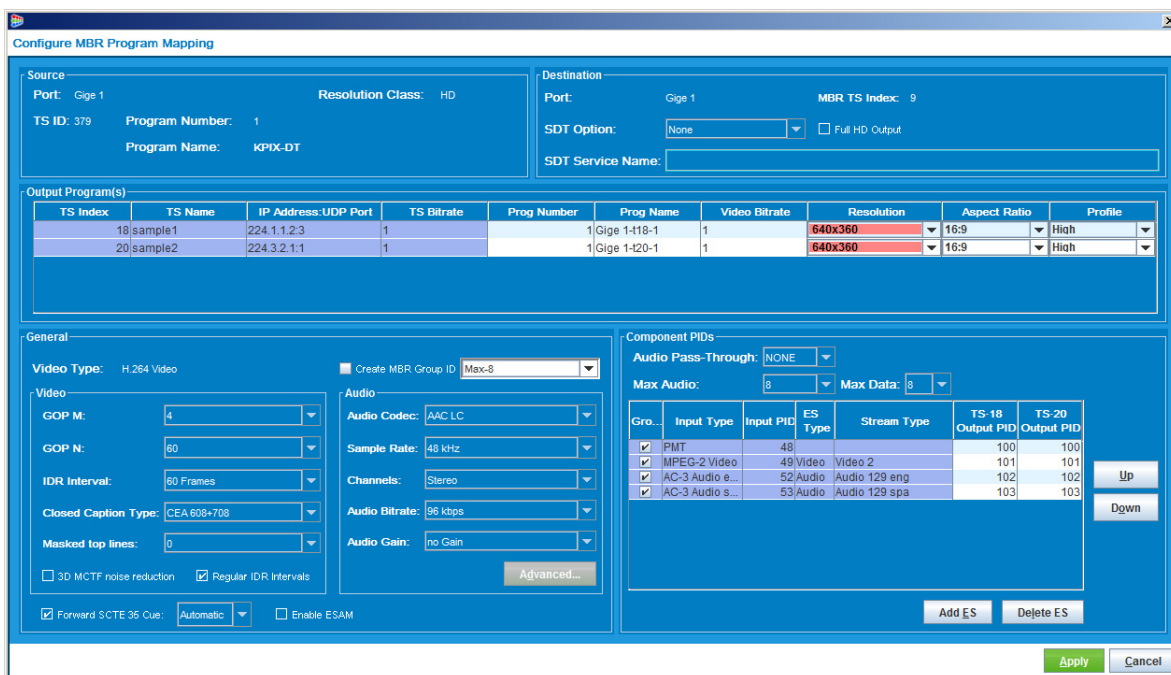
	Menu Path	1. **Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface and select an ungroomed MBR TS that has been configured for HD resolution.
		2. **Grooming-Mapping** page, **Outputs** panel --> Select an Inputs program and drag-drop it into the ungroomed MBR TS.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 118.   MBR Program Mapping: HD

1. At the **Configure MBR Program Mapping** screen, set parameters, then click **Apply** (or use Alt **a**) to dismiss the screen.

2. At the **Outputs** panel, note that the **MBR group ID** is now appended to the information alongside this MBR TS.

Configure MBR Program Mapping—Full HD Output

Use the **Configure MBR Program Mapping** screen (Figure 119) to define grooming parameters for a specified MBR program using resolution class Full HD Output. Before you begin, ensure that the **Video Transcoding Input Resolution Class** is set for **HD Full HD Output**.
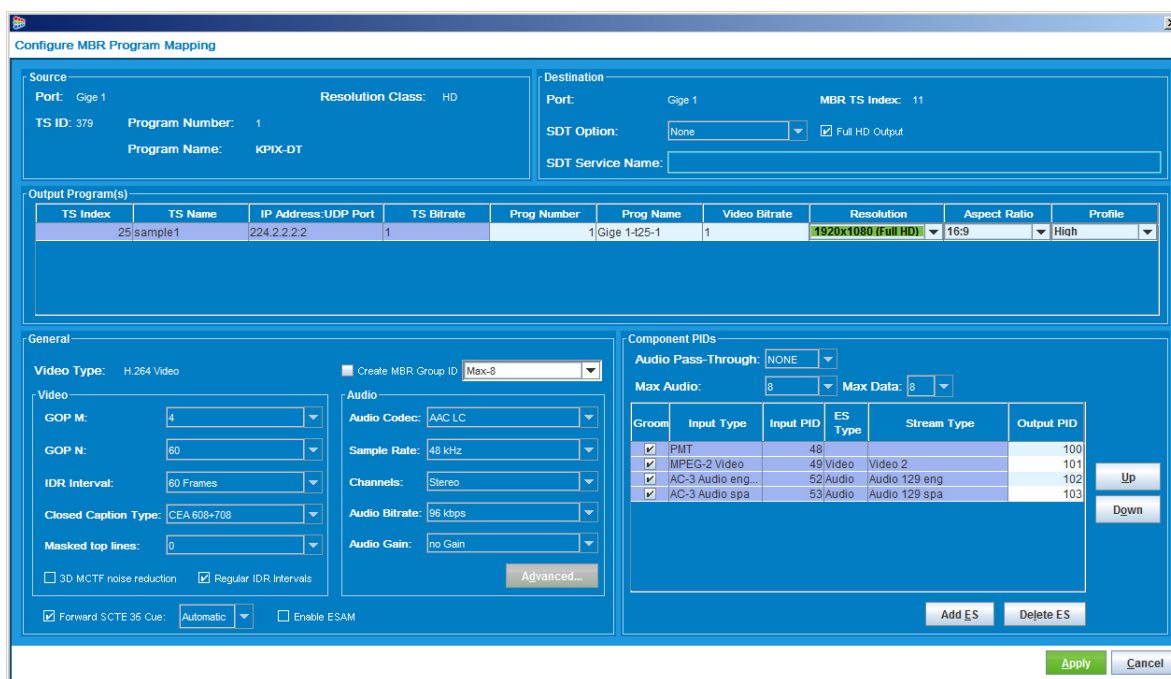
👉	Menu Path	1. **Grooming-Mapping** page, **Outputs** panel --> right-click output GigE interface and select an ungroomed MBR TS that has been configured for **Full HD Output**. 2. **Grooming-Mapping** page, **Outputs** panel --> Select an Inputs program and drag-drop it into the ungroomed MBR TS.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 119.   MBR Program Mapping: Full HD

> **Note:** *Configuration for Full HD MBR enables one profile, only, per MBR transport stream.*

1. At the **Configure MBR Program Mapping** screen, set parameters, then click **Apply** (or use Alt **a**) to dismiss the screen.

2. At the **Outputs** panel, note that the **MBR group ID** is now appended to the information alongside this MBR TS.

Note: *MBR programs do not support SCTE 30 to 35 conversion, or transrating.*

Table 97.　　MBR Program Mapping: Source and Destination

Section	Field	Description	Default
Source	Port	The input program's source GigE or 10 GigE interface.	Read-only
	TS ID	The input program's transport stream ID.	Read-only
	Program Name	Program name assigned to the input program.	Read-only
	Program Number	Program number assigned to the input program.	Read-only
	Resolution Class	This field specifies the input resolution class that is going to be detected from transport stream.	Read-only
Destination	Port	The output program's destination GigE interface.	Read-only
	MBR TS Index	A unique system-generated ID for the MBR TS.	Read-only
	SDT Option	Select **Passthrough** or **Generate**. The default setting is dependent on the input setting (as configured with Create Output TS). If Output TS is enabled (checked, at Create Output TS), and: • If the input TS has SDT, the SDT option will be **Passthrough**. • If the input does not carry SDT, the SDT option setting will be **Generate**. If SDT is not enabled for output SDT, the SDT option will be *None* and grayed-out.	See description at left.
	SDT Service Name	Alphanumeric entry, up to 64 characters, to identify the SDT service for this transport stream. Default display is dependent on SDT option: • If SDT option is **Generate**, this field is blank. • If SDT option is **Passthrough**, the field displays the SDT service name defined for the corresponding input program.	See description at left.

Table 98.　　MBR Program Mapping: Output Programs

Field	Description	Default
TS Index	A unique ID for each transport stream in the MBR TS	Read-only
TS Name	The name given to each TS when the MBR TS was created.	Read-only
IP Address: UDP Port	The IP address and port to which the output stream is routed.	Read-only
TS Bitrate	The bitrate of the output stream.	Read-only
Program Number	Number assigned to the output program. Valid range is from *1* to *131072*.	1
Program Name	Name assigned to the program. • Field is alphanumeric. • Default format: GigE #-t [unique id]-[Program Number].	For example: GigE 7-t47221504-1

Table 98.   MBR Program Mapping: Output Programs (Continued)

Field	Description	Default
Video Bitrate *(In Mbps)*	Sets the maximum bitrate for the video stream in each program. The *Video Bitrate* can range from 0.1 to 8 Mbps but cannot be set higher than the *TS Bitrate*. The sum of all video bitrates within the MBR group will be constrained to 9 Mbps.	1.5 Mbps
Resolution	Specifies the resolution for each transcoded program. The list of possible resolutions depends on the *Resolution Class*, for either HD or SD. Values and resolution combinations associated with the resolution classes are provided in "Resolution Configuration Reference" on page 329.	640x360 for HD 480x368 for SD 1920x1080 for Full HD
Aspect Ratio	Specifies the ratio of the program's width to the height. Choose from one of the following options for each TS: • Automatic, 4:3, 16:9	Automatic
Profile	Select either high, main, or baseline to set the video standard to be used. Refer to Table 149, "Video Profile Configuration Options," on page 334 for guidelines. Note: *The transcoded programs in a single MBR TS can have a mix of High and Main for the profile. However, you should not mix Baseline with High and Main profiles.*	High

Table 99.   MBR Program Mapping: General

Field	Description	Default
Video Type	Only H.264 is available as the video type for MBR output transport stream programs	Read-only
Create MBR Group ID	MBR Groups are video/audio profiles that you can quickly apply to an MBR Program Mapping. If this option is checked, enter a name to create a new MBR Group ID and then define the video and audio parameters below. If the option is un-checked, you can select from a list of existing MBR Groups and the video and audio parameters will be automatically filled in and un-editable.	Checked
GOP M	Specifies the spacing of the P frames in the output. The higher the value, the lower the data rate. Choose from one of the following options: • *1, 2,* or *4*.	4

Table 99.   MBR Program Mapping: General (Continued)

Field	Description	Default
GOP N	Specifies the number of frames in each GOP. The options displayed in this field differ in accordance with your setting for **Full HD Output** in the associated MBR transport stream. in conjunction with Actual Resolution of 720p input. For Full HD Output with 720p input, the GOP N value will be doubled (Table 100)	32

Table 100.   GOP N Options for MBR

Full HD Output Disabled Any Resolution	Full HD Output Enabled Resolution 1920x1280	Full HD Output Enabled (TS) Resolution 1280x720
• 25	• 25	• 50
• 32	• 32	• 64
• 60	• 60	• 120
• Optimized x25	• Optimized x25	• Optimized x50
• Optimized x50	• Optimized x50	• Optimized x100
• Optimized x60	• Optimized x60	• Optimized x120

Field	Description	Default
IDR Interval (in Frames)	Specifies the interval between instantaneous decoder refresh (IDR) frames. The options displayed in this field differ in accordance with your setting for **Full HD Output** in the associated MBR transport stream, in conjunction with Actual Resolution of 720p input. For Full HD Output with 720p input, the IDR interval values will be doubled (Table 101). Choose an option, as appropriate for your GOP N setting.25	160 frames

Table 101.   IDR Interval Options for MBR

Full HD Output Disabled Any Resolution	Full HD Output Enabled Resolution 1920x1280	Full HD Output Enabled (TS) Resolution 1280x720
• 32	• 32	• 64
• 64	• 64	• 238
• 96	• 96	• 192
• 128	• 128	• 256
• 160	• 160	• 320
• 192	• 192	• 384
• 224	• 224	• 448
• 256	• 256	• 512
• 288	• 288	• 576
• 320	• 320	• 640

NOTE:
• If GOP N is set to 25 or Optimized x25, acceptable settings for IDR interval are 25, 50, 75, 100, 125, 150, 175, 200, 250.
• If GOP N is set as 32 or Optimized x32, acceptable settings for IDR Interval are 32, 64, 96, 128, 160, 192, 224, 256, 288, 320.
• If GOP N is set as 60 or Optimized x60, acceptable settings for IDR Interval are 60, 120, 180, 240, or 300.

Field	Description	Default
Closed Caption Type	Closed caption standard, as either CEA 608, or CEA 608+ CEA 708.	CEA 608.

Table 99. MBR Program Mapping: General (Continued)

Field	Description	Default
Masked Top Lines	Value to define the number of WSS lines to be hidden on video, as either 0, 1, 2, or 3. 0 = no WSS lines are hidden.	0
3D MCTF Noise Reduction	When checked, enables motion compensated temporal filtering (MCTF).	Read-only
Regular IDR Intervals	Enable (check) or disable IDR frames to occur at regular intervals.	Checked
Forward SCTE 35 Cue	Check this box to forward SCTE 35 Cues from the input program. When checked, the drop-down selector is displayed alongside the option to enable or disable ESAM for this MBR program.	Checked
Enable ESAM	Enable (check) or disable (un-check) ESAM for this MBR program.	Un-checked

Table 102. MBR Program Mapping: Audio

Field	Description	Default
Audio Codec	Defines the codec for the output audio. Choose one of the following options: • *For non-Dolby: HE AAC, HE AAC v2, AAC-LC, MPEG1 L2, MPEG2 L2, AC-3 (Dolby Digital)* • *For Dolby (These options activate the Advanced button): E-AC-3 (Dolby Digital Plus).* **Note:** *The pre-configured Audio ES at the output will be used despite settings for the input audio type. As a workaround, use language descriptor to define the audio matching criteria for a pre-configured audio PID.*	AAC-LC
Sample Rate	Set value, in kHz, to define number of audio samples per second. The higher the number, the better the sound quality. Choose one of the following options: • *8 kHz, 11.03 kHz, 12 kHz, 16 kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz, 48 kHz*	See Table 134, "Audio Bitrates and Sampling Rates," on page 326.
Channels	Defines the number of output channels per audio stream. Choose one of the following options: • *mono, stereo, 5.1 surround*	stereo
Audio Bitrate	Defines the bitrate for all audio streams within the MBR TS. The selectable values depend on your selection of *Audio Codec*, *Sample Rate*, and *Channels*.	See Table 134, "Audio Bitrates and Sampling Rates," on page 326.
Audio Gain	Defines the gain on an audio stream level. *Audio Gain* is applied to all audio streams within the MBR TS. If the input program has two or more audio PIDs, all audio outputs will have the same gain. • *Audio Gain ranges from -24 dB to +24 dB and is selectable in 1 dB increments. An Audio Gain of 0 means no gain.*	no Gain

Table 102.   MBR Program Mapping: Audio (Continued)

Field	Description	Default
Advanced Button	This button is enabled only if the currently selected Audio Code is one of the Dolby codec options. When enabled, click to access encoder configuration parameters associated with the resolution and codec settings currently in place at the MBR Program Mapping screen.	See also Chapter 12, "Advanced Audio Encoder Configuration."

Table 103.   MBR Program Mapping: Component PID

Field	Description	Default
Audio Pass-Through	This is selectable only if Create MBR Group ID is checked (in the General section of this screen). Other fields associated with audio pass-through—SCTE Video and/or AC-3 (Dolby Digital) audio eng—are also selectable if pass-through is enabled. Select either None or AC-3 (Dolby Digital).	None
Max Audio	Set value to define the maximum allowable audio elementary streams to be handled in the output. Note that this setting affects bitrate allowances on the stream.	See "Locales and Decimal Entries" on page 330 for comparative values.
Max Data	Set value to define the maximum allowable data elementary streams to be handled in the output. Note that this setting affects bitrate allowances on the stream.	
Start PID	This field is displayed in the Program Mapping screen when AC-3 (Dolby Digital) is selected for Pass-through. Type the PID value to be associated with AC-3.(Dolby Digital) Range: 32 - 8175.	
Groom	Check this box to include the corresponding elementary stream in the output program.	Checked
Input Type	Displays the input elementary stream types for the input program. This information is available if an MBR group has been defined or modified.	Read-only
Input PID	Displays the *Input Type*'s associated PID for the input program.	Read-only
TS Index *X* PID	The *X* refers to the *TS Index* for the SPTS within this MBR TS. Here you can set the output PIDs for each SPTS.	Output PID
Buttons	• **Add ES**—Add a new elementary stream row to the **Component PIDs** table • **Delete ES**—Remove a selected elementary stream row from the table. • **Up**—Reposition a selected row toward the top of the table. • **Down**—Reposition a selected row toward the bottom of the table. These buttons are also provided in the Manage Elementary Streams dialog (Figure 144 on page 263).	N/A

Manage MBR Transport Streams and Programs

Use the **Grooming** tab of the *VMG Element Manager* screen for management of MBR transport streams and programs, as described in the following topics:

- "Modifying an MBR Transport Stream," next.
- "Deleting an MBR Transport Stream" on page 223.
- "Modifying MBR Grooming" on page 223.
- "Deleting MBR Grooming" on page 224.
- "Viewing MBR Grooming Source" on page 224.
- "Modifying an MBR Program" on page 225

Modifying an MBR Transport Stream

Use the **Modify MBR Transport Stream** screen (Figure 120) to change settings for a specific MBR transport stream.

> ⚠️ **Caution:** *Modifying an MBR TS will disrupt program output from the VMG for a few seconds. The actual duration of the disruption at the set top box end might be several seconds.*

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on MBR TS and select **Modify MBR Transport Stream** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 120.   MBR TS: Modify

1. At the **Modify MBR Transport Stream** screen, enter changes in the editable fields.

   For both MBR transport streams, the name, IP address, and UDP port of each SPTS can be modified (see Table 95 on page 209 for information on these parameters).

2. Click one of the buttons:

   - If the **Apply** button is green, you can click **Apply** (or use Alt **a**) to save and use changes shown in the screen.
     If the **Apply** button is grey, click **Grooming** to go to the **Modify MBR Program Mapping** screen.

> At the **Modify MBR Program Mapping** screen, check and/or modify settings on this screen, then click **Accept** to return to the **Modify MBR Transport Stream** screen (on which the **Apply** button should now be green).
>
> – Click **Cancel** to abort this MBR modification session.

Resetting Grooming—MBR

Use the **Reset Grooming** option on an output MBR groom to tear down the current configuration and rebuild the groom with the identical configuration.

Because this operation interrupts service during the tear down and rebuild process, the **Reset MBR Group ID/Audio Profile Grooming** screen is presented, to query for confirmation to proceed.

Reset MBR Group ID / Audio Profile Grooming

Reset Grooming will momentarily interrupt service(s).

The following Transport Stream(s) are sharing the same MBR Group ID/ Audio Profile:

GigE 1 MBR TS Index: 4 MBR Group ID: aaa

Are you sure you want to continue?

Yes   No

Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on MBR TS and select **Reset MBR Grooming** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.
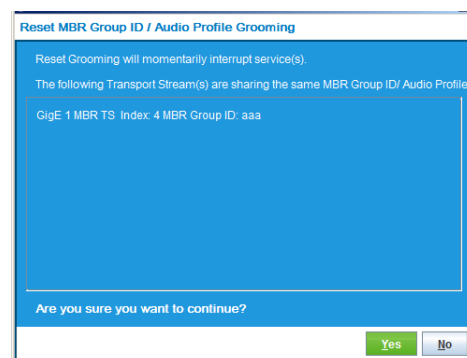
Regrooming—MBR

To regroom an MBR TS, drag an input program to an MBR output transport stream that has already been groomed. This action rebuilds the MBR grooming at the selected output TS, with the new input program, using the identical configuration on the output program and output elementary streams.

Prior to dynamically grooming the targeted output transport stream, the *VMG Element Manager* queries for confirmation of the configuration, to ensure that the input configuration matches that of the output configuration. The **Confirmation** dialog also reminds you that regrooming interrupts service.

Regroom MBR Group ID / Audio Profile

On the upcoming Regroom screen, please confirm that the new input is similar to the original:

• same number of streams
• same types of streams
• same PMT order

When you apply the regroom, service will be interrupted on this TS:

GigE 1 MBR TS Index: 4 MBR Group ID: aaa

Are you sure you want to continue?

Yes   No

Clicking **Yes** results in display of the **MBR Program Mapping** screen, where you can apply and/or verify settings for this transport stream.

- If the MBR group contains more than one MBR transport stream, you will be guided to the MBR Program Mapping screen associated with the first MBR transport stream of the MBR group.
- If you apply changes to the MBR transport stream program mapping, then (as depending on the changes you make) you may also need to make changes to the remaining MBR transport streams in the group.
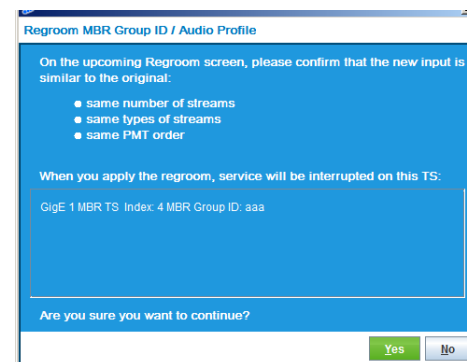
Upon completion of the regrooming process, you can view the results in a **Modify** <TS type> **Program Mapping** screen.

Deleting an MBR Transport Stream

Use the **Delete MBR Transport Stream** function to remove an MBR transport stream from a specified interface.

👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on MBR TS and select **Delete MBR Transport Stream** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

1. At the **Delete Confirmation** dialog, click **Yes** (or use Alt **y**)

2. At the **Outputs** panel, check to ensure that the deleted MBR TS is no longer displayed.
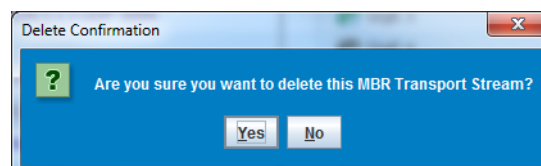
Modifying MBR Grooming

Use the **Modify MBR Program Mapping** screen (Figure 121) to adjust grooming parameters for a specified MBR program.
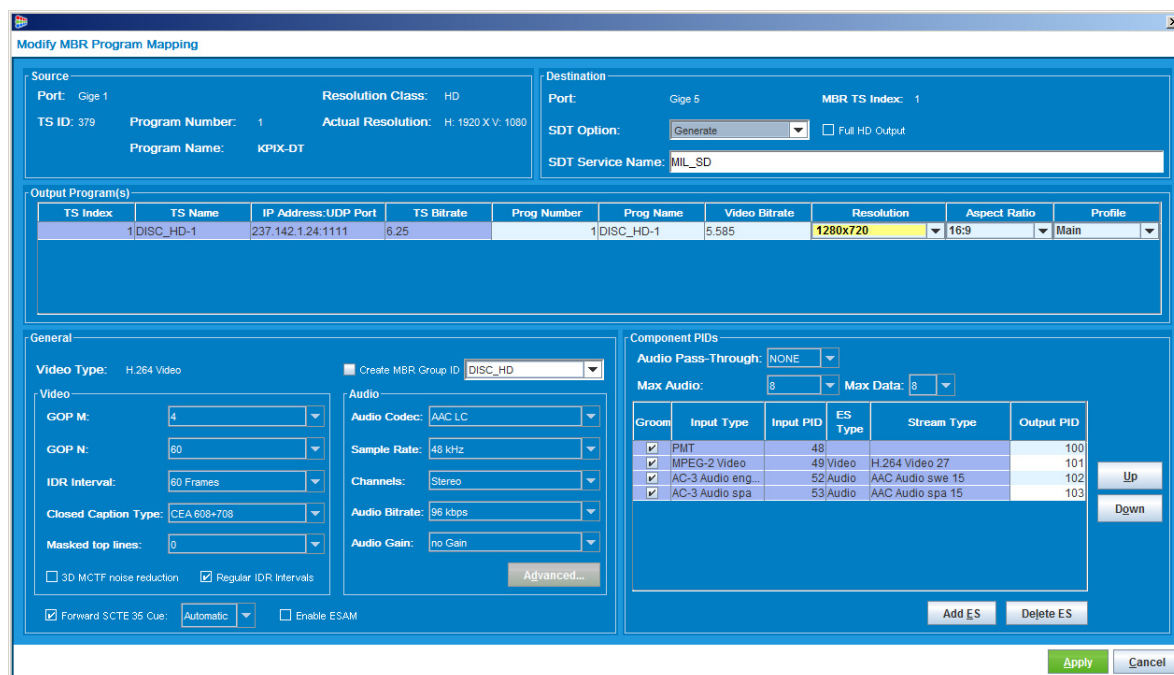
👉	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on MBR TS and select **Modify MBR Grooming** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 121.   MBR Program Mapping—Modify

The configuration fields provided in this screen are identical to those originally configured for this MBR program mapping.

- To change MBR parameters in this screen, use guidelines provided in Table 97 on page 216.

- Values and resolution combinations associated with the resolution classes are provided in "Resolution Configuration Reference" on page 329.

Deleting MBR Grooming

Use the **Delete MBR Grooming** function to remove grooming from a specified MBR TS.

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on MBR TS and select **Delete MBR Grooming** from the popup menu. See also Figure 120 on page 221)
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

At the **Delete Confirmation** dialog, click <u>**Yes**</u> (or use Alt **y**) to complete this operation.
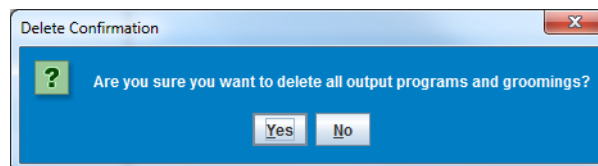
Viewing MBR Grooming Source

Use the **View MBR Grooming Source** function from a selected output MBR TS to view its input grooming source. Selecting this option highlights the source input program associated with the selected output MBR TS (Figure 122).

☞	**Menu Path**	**Grooming-Mapping** page, **Outputs** panel --> expand an output GigE interface --> right-click on a Transcoded+PIP TS and select its **View Grooming Source** option from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 122.   View Transcoded+PIP Grooming Source
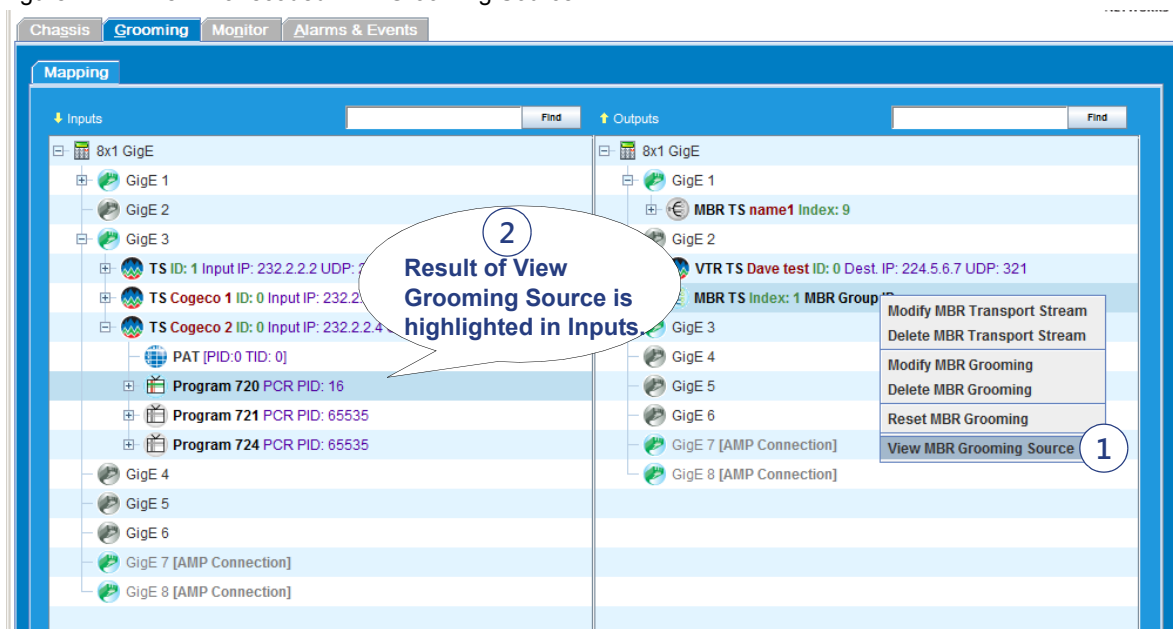
Modifying an MBR Program

Note: *For MBR programs, the **Modify Program, Delete Program**, **Manage Elementary Streams**, **View Grooming Source**, and **Display Grooming** menu options are not available. (Figure 123).*

Figure 123.   MBR Program Menu
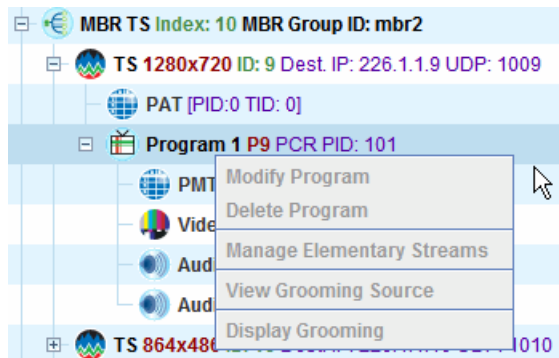
Bulk Configuration

This chapter describes how to access and use the VMG **Bulk Configuration** tool.

> ⓘ **Note:** *Release 2.5.1 introduced the new Bulk Configuration function from the VMG Element Manager main menu. Currently, only MBR-TS configuration is supported via use of the bulk configuration tools.*

> ⓘ **Note:** *A bulk configuration is not a replacement for configurations you perform by using the various functions throughout the VMG Element Manager GUI. It is a software package accessible from the VMG Element Manager Configuration menu that allows you to configure MBR transport stream data from a set of .xls files on your PC, for upload to the VMG's MBR database.*

> ⓘ **Note:** *You must be logged in to the VMG Element Manager as Administrator to use the Bulk Configuration function.*

In This Chapter:

About Bulk Configuration

The goal of bulk configuration is to simplify the configuration of MBR groups in large systems. These MBR groups can be provisioned for one to eight transport streams each, to provide various combinations of resolution parameters and MBR group IDs. An added bonus is that each worksheet provides a human-readable record of the overall configuration.

You can access blank worksheet templates from the *Bulk Configuration Tool* and start building as many MBR.xls files as you may require for your various operations. The .xls file consists of four bulk configuration worksheets that are pre-populated with rows and columns for organization of the following entries:

- **Tests**—for program grooming and configuration. See *"Tests Tab"* on page 230 for details.
- **MBRs**—For MBR stream configuration. See *"MBRs Tab"* on page 233 for details.
- **Audio Language**—For configuration of the language descriptors for specific elementary streams. See *"Audio Language Tab"* on page 236 for details.

- **Program Redundancy**—For program input stream backup configuration. See "Program Redundancy Tab" on page 237 for details.
- **Elementary Streams**—For configuration of the output elementary streams of each transport stream. See "Elementary Streams Tab" on page 239 for details.
- **README**—For reference. See "README Tab" on page 241 for details.

The VMG is unaffected until you return to the *Bulk Configuration Tool* to select a deployment option. Configurations defined by the worksheet format become the MBR TS database when loaded to a VMG if the selected option either replaces or appends to the existing VMG's MBR configuration database. Other options from the *Bulk Configuration Tool* allow you to either clear the VMG's MBR database, or save the VMG MBR database to an .xls file on your PC

Bulk Configuration Tools

Use the **Bulk Configuration** screen (Figure 124 and Table 104) to obtain the bulk configuration spreadsheet (.xls) templates from the VMG, and to apply your configured spreadsheets to the VMG.

	Menu Path	VMG *Element Manager* main menu --> **Configuration** --> **Bulk Configuration Tool**.
	Quick Keys	Alt **c**, Alt **b**

> **Note:** *When first launched, the Bulk Configuration screen displays the names of files in the* ***Application File*** *field and the* ***Source Configuration File*** *field. The files displayed in these fields are not available until you complete the tasks described in "Downloading Selenio VMG Bulk Configuration Files" on page 242.*

Figure 124. Bulk Configuration Tool
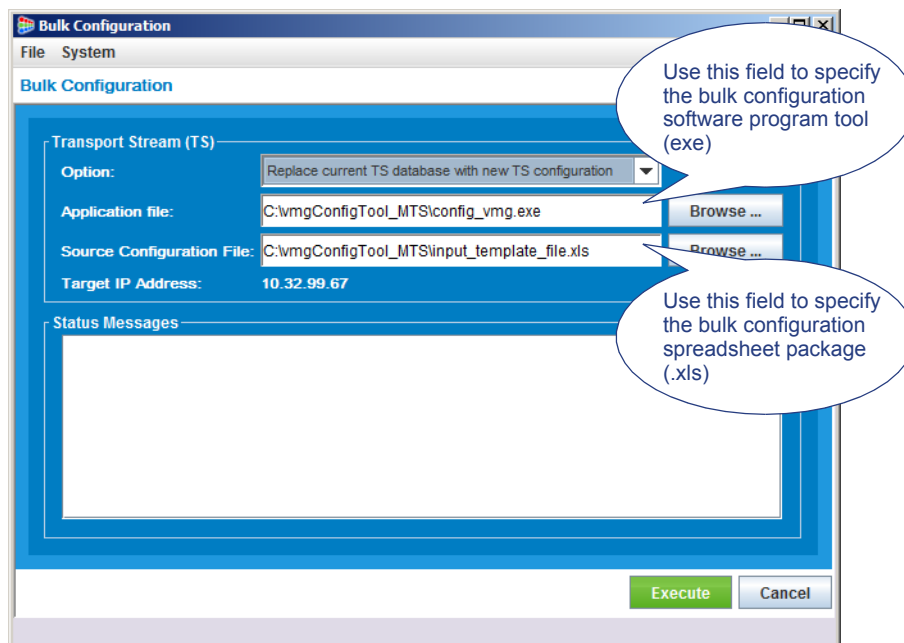
Table 104.   Bulk Configuration Tool

Field	Description
File	Provides graceful exit from the *Bulk Configuration* screen.
System	Provides the **Download Bulk Configuration Software** option.
Option	Drop-down selector to select one of the following options: **Note:** *In the current release, bulk configuration applies only to MBR.* • **Replace current TS database with new TS configuration** The bulk configuration tool clears all transport streams and configures the transport stream based on the configuration file read from the Selenio VMG. The system needs to be out of service when using this option. • **Append new configuration to existing TS database** The bulk configuration appends the transport streams based on the bulk configuration file. The system can remain in service when using this option. • **Clear the TS database** The bulk configuration clears all current transport streams. The system needs to be out of service when using this option. • **Save current TS database to new Configuration File** Retains the existing configuration file under a new configuration file name.
Application File	The location of the application file. Default path: **c:\vmgConfigTool_MTS\config_vmg.exe**
Source Configuration File	For the Replace and Append options, the location of the Excel (.xls) configuration file to be read. Refer to Chapter 10, "Bulk Configuration," for complete details about the configuration files (spreadsheets).
Target IP Address	IP address of the VMG on which the bulk configuration will be deployed.
Status Messages	Status message display area, which populates with INFO and/or ERROR messages after you press the **Execute** button. Messages continue to display until completion of the configuration at the VMG.
Execute	Use the settings in this screen to begin sending the spreadsheet configuration to the VMG system. Prior to upload, the system will query for Administrator password.

Bulk Configuration Spreadsheets

The bulk configuration spreadsheets are the .xls files you edit prior to applying the consolidated configurations onto a VMG system. Your entries to the worksheets create various transport streams, each containing combinations of grooming and network settings that you can deploy from a single point of presence.

The spreadsheet package is organized as described in the following topics:

Note: *Imagine Communications advises that you do not modify or rename the names of the tabs in your worksheets, nor the names of the column heads in the worksheets.*

Entering Data for Spreadsheets

Drop-down selectors are provided for most of the cells in the VMG bulk configuration spreadsheets, to assist in providing workable parameters for specific purposes. To access the drop-down selector at a cell:

1. Position the cursor in the cell requiring modification.
2. Left-click the cell's drop-down arrow, or alternately, right-click to present the popup menu and select **Pick from Drop-down List…**

    The options available for this cell are now displayed.
3. Select an option to place it into the cell.

Helpful information is also provided in the **ReadMe** tab of the spreadsheet pack. See also

Note: *When creating a five-profile MBR—where the first TS is Full HD using the same MBR Group ID— the Bulk Configuration Tool will split this into two MBR groups:*

- A group with a single Full HD TS.
- A group with the remaining 4 TSs.

The first MBR with Full HD has max audio and max data set to 8 (default for 1 TS)

Since the 2nd MBR with 4TS is using the same MBR Group ID, the max audio and max data for this group will be same as the 1st MBR, i.e. 8.

Tests Tab

The **Tests** tab (Figure 125 and Figure 126) contains columns in which to enter or select values to define program grooming for the transport streams associated with the .xls file.You use this sheet to set program names, networking parameters for input and output, and quality parameters for audio and video. You can also define which rows are to be included/excluded from configuration runs.

The configuration reference for the **Tests** tab is provided in Table 105 on page 230.

Figure 125.   Bulk Config Sheet: Tests Tab (A - M)

Table 105.   Bulk Config Sheet: Tests Tab (A - M)

Column		Description
A	Skip Test (1:skip)	Value, as either 0 or 1, to indicate whether or not to skip testing that uses data on this row.
		0: do the test
		1: skip the test.
B	Test case	Test Case: value to define a number for the test.
C	mbR Group ID	Alphanumeric string to define a unique MBR group ID, which is the name of the video/audio file to be applied to an MBR program map. You can either enter an MBR Group ID, or use the existing one.
D	MultiTS ID (A6 Group ID)	unique group ID for the MBR TS group.
E	Input Port	Source GigE interface for use by the program.
F	Input IP (Multicast+Unicast)	Multicast IP address, in dotted decimal format, for input stream.
		Address range: 224.0.0.1 - 239.255.255.255.
G	Input Source IP	Source IP address, in dotted decimal format.
H	UDP Port	Value, in the range 1-65535, to define the port on which the incoming stream is to be transported.
I	Input TS Name	Name of the input transport stream.
J	Input Program Number	Value to set program number.
K	Input resolution class	Type of horizontal x vertical resolution to use for SD or HD programming.

Table 105.   Bulk Config Sheet: Tests Tab (A - M)

Column		Description
L	Output Port	Destination GigE port number for use by the transport stream.
M	Output IP	Multicast or unicast IP address, in dotted decimal format, for output stream. Address range: 224.0.0.1 - 239.255.255.255.

Figure 126.   Bulk Config Sheet: Test (N - AD)

UDP Port	Redundant output IP	Redundant UDP Port	TS Name	Program number	Program name	TS Bandwidth (Mbps)	Video Bit Rate (Mbps)	Resolution	Aspect Ratio	Video Profile	Closed Caption Type	Masked Top Lines	PMT PID	Video PID	Audio ESs (numbe:PID, or number)	Data Ess (number:PID, or number)
output_mcast_port	redundant_output_ip	redundant_output_port	output_ts_name	output_program_number	output_program_name	output_ts_bw	video_bitrate	video_resolution	aspect_ratio	video_profile	cc_type	blank_to_lines	pmt_pid	video_pid	audio_pids	data_pids
1111		0	DISC_HD-1	1	DISC_HD-1	6.25	5.585	1280x720	16:9	Main	CEA 608+708	0	100	101	1:102, 2:103	
1112		0	DISC_HD-2	1	DISC_HD-2	3.49	2.85	1280x720	16:9	Main	CEA 608+708	0	100	101	1:102, 2:103	
1113		0	DISC_HD-3	1	DISC_HD-3	1.66	1.2	768x432	16:9	Main	CEA 608+708	0	100	101	1:102, 2:103	
1114		0	DISC_HD-4	1	DISC_HD-4	1.18	0.75	640x360	16:9	Main	CEA 608+708	0	100	101	1:102, 2:103	
1115		0	DISC_HD-5	1	DISC_HD-5	0.95	0.48	512x288	16:9	Main	CEA 608+708	0	100	101	1:102, 2:103	
1234		0		1	Gige 5-t7-1	10	5	640x360	16:9	High	CEA 608+708	0	100	101	1:102, 2:103, 3:	
3100		0		1	Gige 5-t12-1	4	3	640x360	16:9	High	CEA 608+708	0	100	101	1:102, 2:103	

Table 106.   Bulk Config Sheet: Tests (N - AD)

Column		Description
N	UDP Port	UDP port number.
O	Redundant output IP	IPv4 address on the redundant output transport stream on the mirrored GigE port, in dotted decimal format.
P	Redundant UDP Port	Value, in the range 1-65535, to define the destination UDP port for the redundant output transport stream on the mirrored GigE port.
Q	TS Name	Output transport stream name.
R	Program Number	Value to define the program number, in the range 1-131072.
S	Program Name	Alphanumeric string to define the name for the program.
T	TS Bandwidth (Mbps)	Value, in the range .01 Mbps to 13.0 Mbps, to define the bitrate of the output transport stream.
U	Video Bit Rate (Mbps)	Value, in Mbps, to define maximum video bitrate allowable. The video bitrate is applied to video elementary stream. This value cannot exceed that defined for TS bandwidth.
V	Resolution	Values to set horizontal (H) and vertical (V) resolutions as high (yellow), medium (blue), or low (red) for each transcoded program. Use the drop-down selector to set resolution, in accordance with the following scheme: For the complete list of resolution values, see "Configuration Reference" on page 325. Default: 640x360
W	Aspect Ratio	Entry to specify the ratio of the program width to the height, as either *automatic*, *4:3*, or *16:9*.

Table 106.   Bulk Config Sheet: Tests (N - AD) (Continued)

Column		Description
X	Video Profile	Video capability, as either high, main, or baseline.
		High = Typically for HD TV applications. Allows 8x8 transform size.
		Main = Typically for SD TC that use MPEG-4 formats.
		Baseline = typically for low-cost applications, such as video conferencing and mobile usages.
Y	Closed Caption Type	Closed caption standard. Two modes are supported:
		• CEA 608
		• CEA 608 + 708
Z	Masked Top Lines	Enable or disable masked top lines.
AA	PMT PID	ID of the program map table (PMT), as a value in the range 48-8175. Default: 100.
AB	Video PID	Video PID. Default: 101.
AC	Audio ESs (number:PID, or number)	List of Audio PIDs, using format "Audio_ES_num:PID" and comma separator. For example:
		• 1:102, 2:103 (Map to 1st Audio and configure PID Map to 2nd Audio and configure PID). or
		• 1:102 (Map to 1st Audio ES Stream).
AD	Data ESs (number:PID, or number)	List of Data PIDs using format "Data_ES_num:PID" and comma separator. For example:
		• 1:104, 2:105 (Map to 1st Data and configure PID Map to 2nd Data and configure PID). or
		• 1:104 (Map to 1st Data ES Stream).

MBRs Tab

Use the **MBRs** tab (Figure 127) to enter your multi-bitrate transport stream settings. An MBR (multi-bitrate) transport stream enables transcoding of a single input stream (HD or SD in either MPEG-2 or H.264 format) into (max) four H.264 SPTSs per grooming operation. All programs groomed to MBR TSs are transcoded to H.264 video.

The configuration reference for the **MBRs** tab is provided in Table 107 on page 233.

Note: *See also "Configuration Reference" on page 325, for supported sampling and bit rates for channels.*

Figure 127. Bulk Config Sheet: MBRs

Table 107. Bulk Config Sheet: MBRs

Column		Description
A	MBR Group Name	Unique system-generated ID for the MBR group.
B	Enable ESAM	Set as either Yes (enable), or No (disable).
C	Enable SCTE-35 Cue Forwarding.	Forward SCTE35 cue: Entry, as either Yes or No, to indicate whether or not to enable forwarding of SCTE 35 information on input streams. D
D	CUE PID	Set value to define SCTE-35 cue PID to be forwarded. Default:0. 0 = 'automatic' mode, in which the first cue PID referenced in the PMT is selected.
E	GOP M	Value to define the spacing of the P frames in the output. The higher the value, the lower the data rate: • For H.264 HD or SD: Default: 4. Acceptable Values: 1, 2, or 4.
F	GOP N	Value to define the number of frames in each GOP. The higher the value, the lower the data rate. • For MBRTS H.264 HD or SD: Acceptable Values: 25, 32, 60, Optimized x25, Optimized x32, Optimized x60. • NOTE: In Full HD mode with 720p input, the VMG will double the GOP N value entered in the Bulk Configuration Tool spreadsheet. See also Table 100, "GOP N Options for MBR," on page 218 for more information about GOP N values for MBR.

Table 107.   Bulk Config Sheet: MBRs (Continued)

Column		Description
G	IDR Interval	Value to specify the interval between instantaneous decoder refresh (IDR) frames, or number of frames between random access points.
		Default: 160 frames.
		• Acceptable Values, for GOP N 25 or Optimized x25: 25, 50, 75, 100, 125, 150, 175, 200, 250.
		• Acceptable Values, for GOP N 32 or Optimized x32: 32, 64, 96, 128, 160, 192, 224, 256, 288, 320.
		• Acceptable Values, for GOP N 60 or Optimized x60: 60, 120, 180, 240, or 300.
		• NOTE: In full HD mode with 720p input, the VMG will double the IDR frame value entered in the Bulk Configuration Tool spreadsheet. See also Table 101, "IDR Interval Options for MBR," on page 218 for more information about IDR values for MBR.
H	Audio Codec	Specify method to be used for decoding audio.
		Default: AAC-LC
		Acceptable Values: HE-AAC, HE-AACv2, AAC-LC, MPEG1L2, MPEG2LC, AC-3 (Dolby Digital), and E-AC-3 (Dolby Digital Plus).
I	Audio Sampling Rate (kHz)	Value to define the number of audio samples per second. Higher values equal better sound quality.
		Default: 48 kHz.
		Acceptable values: 8 kHz, 11.03 kHz, 12 kHz, 16, kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz, 48 kHz.
J	Audio Channels	Type of channel to be used for the audio stream.
		Default: stereo
		Acceptable Values: mono, stereo, or 5.1 surround.
K	Audio Bitrate (kbps)	Define bitrate for all audio streams within the MBR transport stream. Audio bit rate filters on the basis of the combined audio codec, channel, and sample rate settings.
		For acceptable values (kbps): refer to tables provided in "Configuration Reference" on page 325.
L	Audio Gain	Value to set the gain on an audio stream level. *Audio Gain* is applied to all audio streams within the MBR TS. If the input program has two or more audio PIDs, all audio outputs will have the same gain.
		Default: 0 (no gain)
		Acceptable Values: -24 dB to +24 dB
M	Audio Pass-Through	Enable or disable AC-3 (Dolby Digital) input audio passthrough.
		• None: disable audio passthrough.
		• AC-3 (Dolby Digital): enable audio passthrough.
		Default: None
N	Audio Start PID	Set value to define the starting PID value. The PID will be validated within all elementary streams.
		Default: blank
O	dd_LFE_on_off	For 5.1 surround configuration only: enable (On) or disable (Off) 3/2 mode.
		Off = non 3/2 mode.
		On = 3/2 mode.

Table 107.   Bulk Config Sheet: MBRs (Continued)

	Column	Description
P	dd_bitstream_mode	Value to set one of the following options for the bitstream mode (AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus) only): • 0 - main audio service: complete main (CM) • 1 - main audio service: music and effects (ME) • 2 - associated audio service: visually impaired (VI) • 3 - associated audio service: hearing impaired (HI) • 4 - associated audio service: dialogue (D) • 5 - associated audio service: commentary (C) • 6 - associated audio service: emergency (E) • 7 - associated audio service: voice over (VO)
Q	dd_dialog_normalization	Set value to define dialog normalization, in the range 0 dB (passthrough) and -1 dB (loudest) to -31 dB (least loud).
R	dd_DRC_line_mode_ profile	Value to set one of the following options for the DRC line mode profile (AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus) only): • 0 - No compression • 1 - Film standard compression • 2 - Film light compression • 3 - Music standard compression • 4 - Music light compression • 5 - Speech compression
S	dd_DRC_RF_mode_ profile	Value to set one of the following options for the DRC RF mode profile (AC-3 (Dolby Digital) or E-AC-3 (Dolby Digital Plus) only): • 0 - No compression • 1 - Film standard compression • 2 - Film light compression • 3 - Music standard compression • 4 - Music light compression • 5 - Speech compression
T	dd_DRC_line_mode_ profile2	See description for column R (above).
U	dd_DRC_RF_mode_ profile 2	See description for column S (above).
V	dd_surround_channel_ 90_phaseshift	Enable (On) or disable (Off) 90-degree phase shift to surround channels. Default: Off
W	dd_surrouBnd_channel_ 3dB_attenuation	Enable (On) or disable (Off) 3dB attenuation to surround channels. Default: Off
X	Input Table Processing	Set type of table processing to apply to the input stream, as either DVB, ATSC, or SDT.
Y	Output SDT	Enable (yes) or disable (no) SDT passthrough or generate on the MBR transport stream.
Z	SDT Option	Select pass-through or generate.
AA	SDT Service Name (Leave empty to use the input program name).	Type an alphanumeric string, up to 64 characters, to identify the SDT service for the transport stream.

Audio Language Tab

Figure 128.   Bulk Config Sheet: Audio Language

Table 108.   Bulk Config Sheet: Audio Language

Column		Description
A	Skip Test (1skip)	Value, as either 0 or 1, to indicate whether or not to skip testing that uses data on this row.
		0: do the test
		1: skip the test
B	Input Port	Source GigE interface.
C	Mcast IP	Multicast IP address, in dotted decimal format, for input stream.
		• Address range: 224.0.0.1 - 239.255.255.255.
D	Input Source IP	Source IP address, in dotted decimal format.
E	UDP Port	(optional) Value, in the range 1-65535, to define the port on which the incoming stream is to be transported.
F	Input TS Name	Name of the input transport stream.
G	Input Program #	Value to set program number.
H	Audio PID	Select input audio PID.
I	Audio Language Code	String to set a language descriptor. See also "Language Descriptor Settings" on page 334.

Program Redundancy Tab

The VMG supports input-level program redundancy. At the detection of a missing program, the VMG automatically switches to a redundant or backup program.

In a program redundancy configuration, a switch to backup results when either of the following events occur:

- Missing MPTS/SPTS streams are identified by checking the PAT.
- Missing program streams are identified by checking the PMT.

You can assign a backup program for every input program, and any input program can be assigned to back up a running primary program. The backup program can be another program on the same GigE port or it can be on a different GigE port in the same chassis.

For bulk configuration, use the **Program Redundancy** tab (Figure 129) to apply settings for backup of streams. The configuration reference for the Program Redundancy tab is provided in Table 109 on page 237.

Figure 129.   Bulk Config Sheet: Program Redundancy

Table 109.   Bulk Config Sheet: Program Redundancy

Column		Description
A	Skip Test (1:skip)	Value, as either 0 or 1, to indicate whether or not to skip testing that uses data on this row.
		0: do the test.
		1: skip the test.
B	Input Port	Value, in the range 1-8, to specify the GigE input port number to be used.
C	Mcast IP	Input multicast IP address, in dotted decimal format.
		Address range: 224.0.0.1 - 239.255.255.255.
D	Input Source IP	Optional cell in which to specify the IP address of the source where the port receives data. This value is used only for multicast (IGMPv3) transport streams.
E	UDP Port	Value, in the range 0-65535, to define the UDP port on which the incoming stream is to be transported.
F	Input TS Name	Alphanumeric string to define the name of the primary input transport stream.
G	Input Table Processing	Type of table processing to apply to the input stream, as either ATSC, DVB, or SDT.
H	Input Program #	Value to define the primary program number.

Table 109.   Bulk Config Sheet: Program Redundancy (Continued)

	Column	Description
I	Backup Input Port	Value, in the range 1-8, to specify the GigE backup input port number to be used.
J	Backup Mcast IP	Input multicast IP address for backup use, in dotted decimal format. Multicast address range: 224.0.0.1 - 239.255.255.255.
K	Backup Input Source IP	Input IP address, for backup use, in dotted decimal format.
L	Backup UDP Port	Value, in the range 0-65535, to define the UDP port on which the incoming stream is to be transported.
M	Backup Input TS Name	Alphanumeric string to define the name of the backup input transport stream.
N	Backup Input Table Processing	Type of backup table processing to apply to the input stream, as either ATSC, DVB, or SDT.
O	Backup Input program #	Value to define the backup program number.
P	Recovery Method	Define method of recovery from backup program to primary program, as either automatic or manual. 0: automatic Enable automatic fail-over option from primary to backup program and recovery operation from backup to primary, as based on PAT/PMT detection. 1: manual Enable automatic fail-over operation from primary to backup program, as based on manual selection.

Elementary Streams Tab

This sheet includes the configuration data for the output ESs for each TS. The MBR Group Id, Output TS IP and port from the **Tests** sheet are used as identifiers on this sheet. Using this identifier, if some rows in the **Tests** sheet are skipped, corresponding rows in this sheet are also skipped.

Caution: *Do not delete this tab page from your BCT spreadsheets. See the VMG Element Manager Upgrade Guide for more details.*

Note: *Configuring this sheet is optional. If ESs are not configuration for a particular MBR Group ID, the Bulk Configuration Tool will create default output ES from the input ES detected in the corresponding input source program.*

To configure the ESs for a TS, each ES that should be included for grooming needs to have a row on this sheet. For each TS identifier, there must a one video ES created (1 row). Additional rows are created for audio and data ESs. The fields configured n this sheet include ES type, input ES number, input ES audio type, input ES audio language, audio profile name, output ES PID, and ES reserved PID, s output ES Type, Output Stream type, and Output Sub-stream type.

Figure 130.   Bulk Config Sheet: Elementary Streams (A - L)

Table 110.   Bulk Config Sheet: Elementary Streams (A - L)

Column		Description
A	MBR Group Name	Unique system-generated ID for the MBR group.
B	Output TS IP Address	Specifies the IP address of the source where the port transmits data.
C	Output TS UDP Port	Value, in the range 0-65535, to define the UDP port on which the output stream is to be transported.

Table 110.   Bulk Config Sheet: Elementary Streams (A - L) (Continued)

Column		Description
D	ES Category	Elementary stream type, as either Video, Data, or Audio.
		For video or data, input ES audio type, input ES audio language, audio profile name are irrelevant. All values entered here will be ignored. Also, ES reserved PID will be defaulted to 'System,' since this field is used to indicate the add/clone of audio ESs in support of the flexible audio function.
		If the reserved PID is set to New, for audio, this indicates that the output ES is pre-configured to support any new input audio ES that might appear in the future. In this case, the input ES audio type and input ES language fields are used to set the preferred matching criteria for the new incoming audio ES. For any other values of reserved PID, these fields are ignored.
E	Stream Type	Value to identify the byte that defines the stream encoding.
		• For data streams, enter a value in the range 1 - 255
		• For audio streams, set one of the following options:
		- MPEG-1 Audio (3)
		- MPEG-2 Audio (4)
		- AC-3 Audio (6)
		- AC-3 Audio (0x81)
		- AAC Audio (0x0f)
		- HE-AAC Audio (0x11)
		- E-AC-3 Audio (0x84)
		- E-AC-3 (Audio (0x87)
		• For video streams, set a value to correspond with one of the following resolutions:
		- MPEG-1 video (1)
		- MPEG-2 video (2)
		- H.264 video (0x1b)
		- SCTE video (0x80)
		Note: *When an ES audio or video type is selected, the stream type is populated from these settings during BCT import.*
F	Sub-stream Type	Text element, such as Teletext, or Subtitle.
G	Output ES PID	Numeric value that identifies the input elementary stream.
H	Reserved PID Status	Select either New, System, or Preconfigured.
I	Input ES PID	Numeric value, in the range 32 - 8175, to define the PID value for this input ES.
J	ES Audio Type	Select one of the following:
		• MPEG-1 Audio
		• MPEG-2 Audio
		• AC-3 Audio (0x6)
		• AC-3 Audio (0x81)
		• AAC Audio (0x0f)
		• HE-AAC Audio (0x11)
		• E-AC-3 Audio (0x84)
		• E-AC-3 (Audio (0x87)

Table 110.   Bulk Config Sheet: Elementary Streams (A - L) (Continued)

Column		Description
K	ES Audio Language	Select a language code. Languages and the associated codes currently supported are listed in "Language Descriptor Settings" on page 334.
L	ES Video Type	Select video type as either MPEG-1 Video, MPEG-2 Video, H.264 Video, or SCTE Video.

README Tab

The **README** tab contains tips and encoding values for use when configuring your worksheets. Information from this tab is for reference only: it is not read by the system during bulk configuration deployment. The README tab contains the following sections:

- Advisory to remind you to enable macros in your Excel file, and to save these files as .xls.
- Tips for providing values in Tests and MBRs cells, and valid resolution combinations for HD and SD resolution classes.
- Information about the checks used by the software to ensure that a bulk configuration is valid:
  - All output program names must be unique.
  - The referenced MBR group IDs in the Tests sheet must also be defined in the MBRs sheet.
  - Resolution combinations must be valid for each Multi TS.
  - TS bandwidth must be set in the range 0.1 to 5 Mbps.
  - Maximum four TSs are allowed per MTS group ID.
  - Excluded audios are done for all streams in an MBR.
  - Audio transcoding values are valid for codec, sampling rate, channel, and bitrates.
  - The input resolution class must be identical for all streams within an MBR.
  - Selected output video resolution must be valid for the selected input resolution class.
- Encoding tables for AAC HE, AAC HEv2, AAC LC, MPEG1 L2, MPEG2 L2, AC-3, E-AC-3

Downloading Selenio VMG Bulk Configuration Files

The bulk configuration files reside on the VMG as a tar package—*vmgConfigTool*—that you access via the VMG Element Manager's **Bulk Configuration** window, for placement on your computer's hard drive. This section describes how to get started with bulk configuration, in the following topics:

- Accessing the Bulk Configuration Template Files
- Understanding Bulk Configuration File Types
- Managing Selenio VMG Bulk Configuration Template Files

Before you can access any bulk configuration tools, you must be logged in to the management interface as an Administrator user.

1. Go to the **Selenio VMG Bulk Configuration** screen (Figure 131).

☞	**Menu Path**	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> <u>B</u>ulk Configuration Tool.
	Quick Keys	Alt **c**, Alt **b**

Figure 131.   Bulk Config Tool Launch
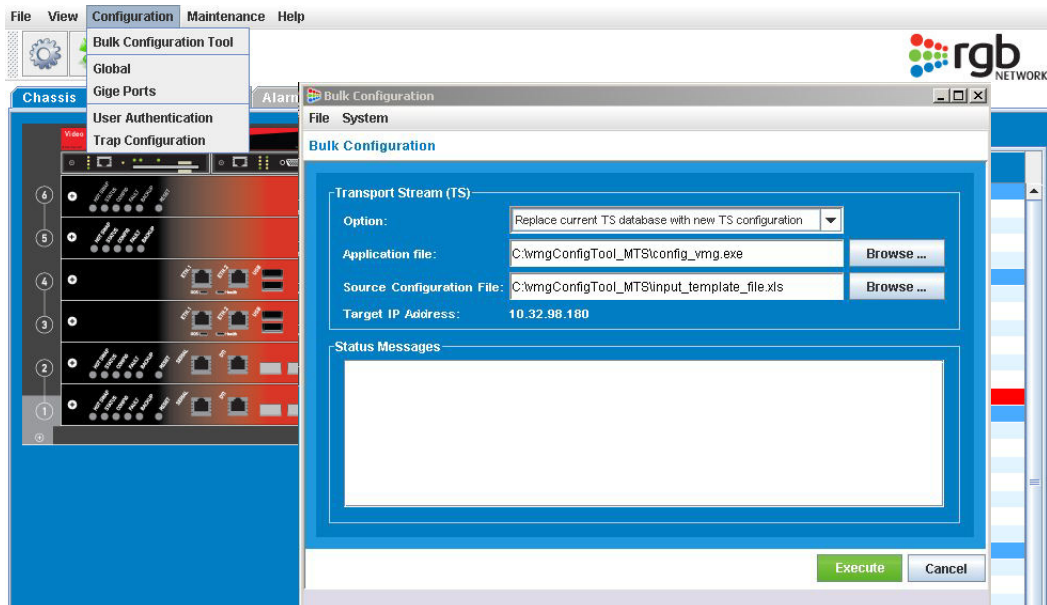
Accessing the Bulk Configuration Template Files

To get started, the bulk configuration files must be downloaded from the VMG to your computer to enable use of the transport stream settings, and to load the software (.exe file) necessary to perform the bulk configuration tasks from the *VMG Element Manager*.

1. With the **Selenio VMG Bulk Configuration** window in view, select **System** -> **Download Bulk Configuration SW...**(Figure 132).

Figure 132.   Bulk Config: System Software Download
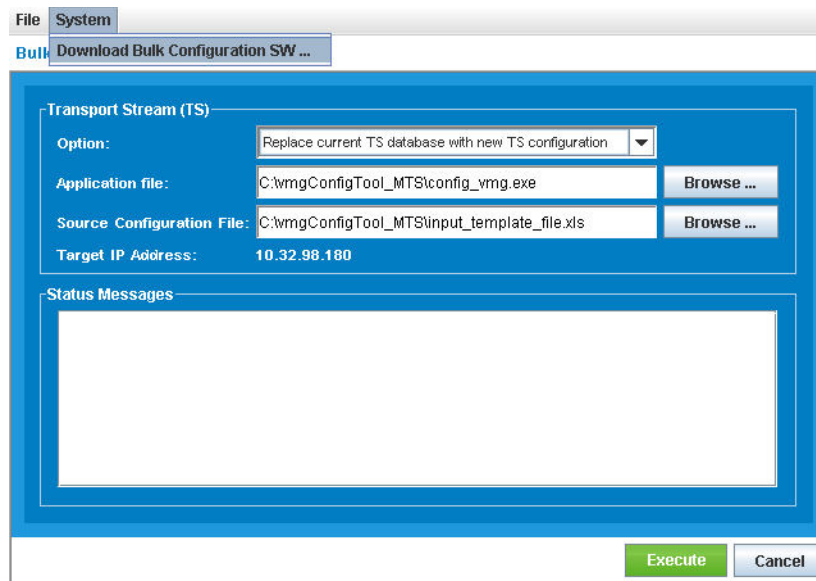
The **Save** window (Figure 133) is now presented.

2. At the **Save** window, perform the following tasks:

    a. Click to highlight the **c**: directory. This will enable installation into *c:\vmgConfigTool_MTS*.

    b. Check to ensure that the **Files of Type** field contains **vmgConfigTool.zip**.

    c. Click **Save** and wait for the transfer process to complete.

Figure 133.   Save Bulk Config Zip File
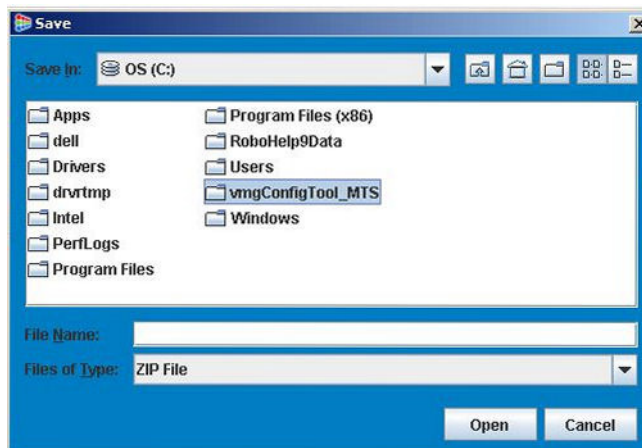
3. Go to the zip file that is now located on your hard drive and extract the files. Note that the **vmgConfigTool_MTS** folder consists of the file types similar to those shown in Figure 134.

> **Note:**   *Due to Windows security, you cannot download the zip file to C drive. Therefore, you need to set up a subfolder on C for use with your Bulk Configuration source files.*

Figure 134. Bulk Config Files on Your PC
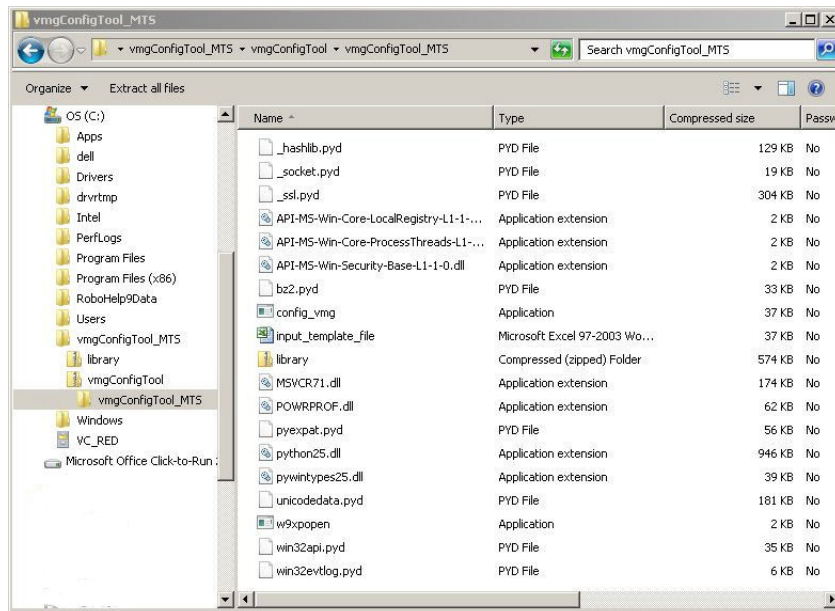
Understanding Bulk Configuration File Types

Files inclusive of the **vmgConfig Tool** directory are contained in the **Library** and the **vmgConfig Tool** folders. Within these folders are the various file types listed in the Table 111.

Table 111. vmgConfigTool Directory Files

File type	Description
.xls	The input template file that contains sample settings for transport stream bulk configuration. Use this file as your template to create additional bulk configurations for the VMG associated with the current login.
library	The library file for the config tool.
.pyd	Various Python dynamic module files.
.dll	The Python application DLL file.

ℹ️ **Note:** *The .xls file (labelled **input_template_file**) is the file you will use as the initial template for your bulk configurations.*

Managing Selenio VMG Bulk Configuration Template Files

RGB recommends that you do not modify the **input_template_file** supplied with your **vmgConfigTool** software. To get started, open **input_template_file.xls,** and save the file as a different name.

ℹ️ **Note:** *Imagine Communications recommends that you do not modify the original input_template_file supplied with your vmgConfigTool software.*

You can save your worksheets to any folder or directory on your computer, as long as you are able to locate them with the browser from the VMG Bulk Configuration screen.

Handling Template Updates

With upcoming new VMG databases, the newer .xls file templates are likely to contain additional columns. To reuse existing worksheet data, in a new template, use the following steps:

1. Rename and save the new .xls file template.

2. Cut data from columns in the existing (older) worksheet and paste it into the identically named columns at the new worksheet.

3. In your new worksheets, and at the new empty columns, type in value required for your services.

4. Save the .xls file.

Using the Bulk Configuration Spreadsheets

Typical usage consists of the following steps, which are described in this section:

Caution: *Before beginning any configurations, ensure that the macros are enabled in your Excel workspace. If you see Security Warning Macros have been disabled, click* **Options...***and change the setting to enable the Macros.*

1. Configure MBRs

In your .xls files, bring the **MBRs** tab into view and set all parameters across the row for the MBR name. You can set up new MBR name(s), or use those already provided.

You can set up as many as 54 video/audio MBR groups for programs groomed to MBR TSs, with up to eight profiles (outputs) each.

For information about the MBRs settings, refer to Table 107, "Bulk Config Sheet: MBRs," on page 233. This name will also be used in the **Tests** tab, as the **MBR_Group_ID**.

2. Configure Tests

At the **Tests** tab, set the MBR name into the **MBR_Group_ID** column, using one to eight rows, and enter or select settings across the worksheet row, for each MBR group row. Use reference information provided in Table 105, "Bulk Config Sheet: Tests Tab (A - M)," on page 230 to tailor your entries.

3. Configure Program Redundancy

At the **Program Redundancy** tab, set parameters for the input source and the backup source.

4. Check the Configuration

Caution: *Check your entries against the following list to ensure minimal errors during the upcoming configuration run:*

- All output program name entries are unique.
- All referenced mbr group_id(s) in the **Tests** sheet are also defined in the **MBRs** sheet
- Resolution combination per MTS (Multi TS) is valid.
- Value to define the output video ES bit rate is less than that defined for the output TS bit rate.
- The TS bandwidth column contains a value in the range 0.1 to 5 Mbps.
- No more than four TSs are associated with each MTS group ID.
- Excluded audios are done for all streams per MBR.
- Audio transcoding values are valid for codec, sampling rate, channel and bitrate.
- Input Resolution Class setting is identical for all streams within the same MBR.
- Selected output video resolution is valid for the selected input resolution class.

Note: *The number of audios in the Excel sheet drives the maximum of supported/needed audios. Up to two are allowed, but where two columns only are provided in the Excel sheet, the Bulk Configuration tool makes sure to honor that number instead.*

5. Save the Configuration

This .xls file should now be ready for use by the **Bulk Configuration** tool.

After completing your entries to a bulk configuration .xls files, return to the **Bulk Configuration** window to upload your configuration to the VMG.

Applying Spreadsheet Data to the VMG

Use steps in this section to apply settings from a spreadsheet package to the VMG.

1. Save the Current Running VMG Configuration

Before attempting to load any configuration to the VMG, use the **Save Running Configuration** (Figure 135) option at the *VMG Element Manager* splash screen to back up the database currently running on the VMG.

Figure 135.   Save Running Configuration

2. Log in to *VMG Element Manager* and go to the **Bulk Configuration** screen.

Menu Path	VMG *Element Manager* main menu --> <u>C</u>onfiguration --> <u>B</u>ulk Configuration Tool.
Quick Keys	Alt **c**, Alt **b**

3. At the drop-down **Option** field, select the type of configuration to be used (refer to **Option** in Table 104 on page 228).

4. At the **Application file** field, browse to select the *vmgConfigTool* to be used for this upload.

5. At the **Source Configuration File** field, browse to select the .xls file to be uploaded for this bulk configuration.

6. Double check to ensure that the target IP address matches that of the VMG for which this configuration is to be applied.

7. Click **Execute** to run the configuration.

As dependent on which option you have selected, the system may query for confirmation of the selected action.

In all cases, the system presents the **Password Verification** dialog box (Figure 136) prior to processing the .xls file configuration for the VMG.

Use your *VMG Element Manager* password, then click **OK** to proceed.

Figure 136. Bulk Config: Upload Confirmation
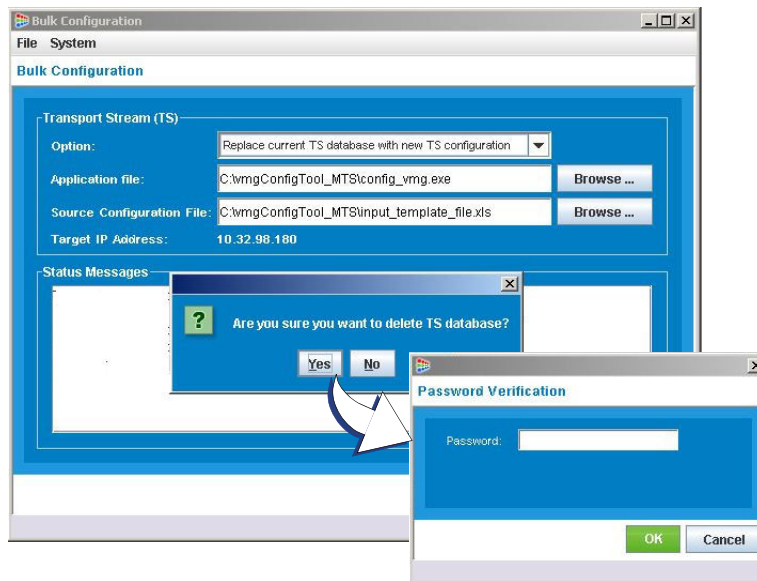
8. Monitor the status messages now displayed in the **Bulk Configuration** window. Status messages are reported as either INFO or ERROR.

Handling Bulk Configuration Errors

Errors read from the input .xls file are reported in the **Status Messages** field of the **Bulk Configuration** window. If the Excel file passes the initial sanity check, the combinations delivered to the VMG are valid and the configuration should run smoothly on the VMG. Conversely, if problems are detected with input stream configurations, these will be reported as errors in the **Bulk Configuration** window, and will require repair prior to another attempt at upload to the VMG.

Note: *Un checked configurations and/or issues that may require repair, which can result in errors, are listed in "4. Check the Configuration" on page 246.*

In the **Status Messages** field, each error message contains the cause of the error notification. Use this information as your guide if you need to return to the .xls files to correct any entries.

Event Signaling and Management

This chapter describes the use of the Selenio VMG *Element Manager* to manage implementation of Event Signaling and Management (ESAM) for MBR transport streams, and the communication between the VMG and a Placement Opportunity Information Service (POIS) server.

In This Chapter:

- "About ESAM," next.
- "POIS and the VMG" on page 250.
- "ESAM Configuration" on page 250.

About ESAM

VMG ESAM support enables processing of real-time signals—SCTE-35 Cue—for stream conditioning (over the network) with a designated POIS server. The VMG serves as the transcoder that sends signals to the POIS server; this server returns stream conditioning data and directives to the VMG. This communication is formatted as XML messages that contain signal validations, start and end times for a signal region, and other data to be inserted into the video stream.

The POIS server cross-references in-band signaling metadata delivered within the live TV feed against expected ad opportunities scheduled by a traditional linear ad system received by the VMG. This conditions the stream for services such as seamless ad insertion. Decisions relevant to insertion of data, such as for ads, in a program are based on the contents of the encapsulated metadata in these streams.

POIS and the VMG

Once the VMG is configured to communicate with a POIS device, messages are exchanged via synchronous HTTP interface between the POIS server and the VMG.

In-Band Cue-Based Communication

The VMG receives SCTE-35 cue messages from multicast linear programs and reports them to the POIS device, as XML-formatted messages (Figure 137 and Table 112).

Figure 137.   POIS and the VMG—In-Band Cue Based
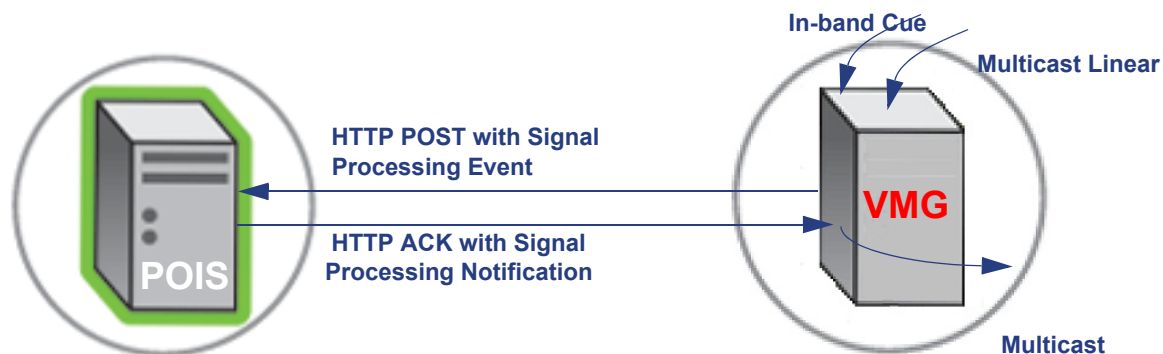
The POIS return an ACK—as an XML-formatted Signal Processing Notification— which includes actions to be performed by the VMG.

Table 112.   VMG—POIS Communications: In-Band Cue-Based

VMG POST Message	POIS ACK

`Post (path) HTTP/1.1`
`Content-Type:application/xml`
`content-Length: <length in bytes>`
`<XML Signal ProcessingEvent Message>`
	`HTTP/1.1`
	`Content-Type:application/xml`
	`content-Length: <length in bytes>`
	`<XML Signal ProcessingEvent Message>`

Any abnormalities detected in the communication stream are reported by the VMG as alarms and events. Refer to Appendix B, – "ESAM Alarms" on page 366 and "ESAM Events" on page 366 for more details.

ESAM Configuration

ESAM is established at the VMG as a result of your settings to enable or disable ESAM for use with a specified POIS server. The VMG is configured to support ESAM processing on up to 26 programs.

Setting ESAM Parameters

Use the **ESAM** global configuration tab to set POIS parameters, define the HTTP Post location, and to set system-wide ESAM capability. The global setting to enable or disable ESAM affects MBR configurations as follows:

• If globally enabled, individual MBR streams may be enabled or disabled for ESAM.

- If globally disabled, all MBR streams are disabled for ESAM.

See "ESAM Tab" on page 65 for all global ESAM parameters.

Applying ESAM Settings for MBR

If ESAM is globally enabled, you can enable or disable ESAM for specific MBR streams, as part of your program mapping configuration

Note: *To find out how to globally enable or disable ESAM, see Chapter 4, "ESAM Tab," on page 65.*

1. With an MBR **Program Mapping** panel in view (similar to the example in Figure 138), look for the **ESAM** checkbox to either enable (check) or disable (un-check) ESAM for the stream.

Figure 138.   ESAM Activation for MBR Stream

2. Click **Apply** (or use Alt **a**) to use the settings.

Advanced Grooming Applications

This chapter describes the use of the *VMG Element Manager* to perform advanced grooming applications. The **Grooming** -> **Mapping** tab provides program and transport stream (TS) information.

Additionally, audio codec configuration tools you can use with MBR Program Mapping are also described in this chapter.

> **Note:** *System configuration must be completed before performing grooming tasks. Refer to Chapter 4, "System Configuration" for more information.*

In This Chapter:

- "Advanced Audio Encoder Configuration," next.
- "Program Redundancy" on page 258.
- "Elementary Stream/PID Management" on page 263.

Advanced Audio Encoder Configuration

Configuration parameters for Dolby Codec are provided from the **MBR Program Mapping** screen, as based on your selection for audio encoding:

- "AC-3 (Dolby Digital) Encode Configuration," next.
- "E-AC-3 (Dolby Digital Plus) Encode Configuration" on page 255.

AC-3 (Dolby Digital) Encode Configuration

The AC-3 (Dolby Digital) audio encoding configurations for MBR Program Mapping are described in the following topics:
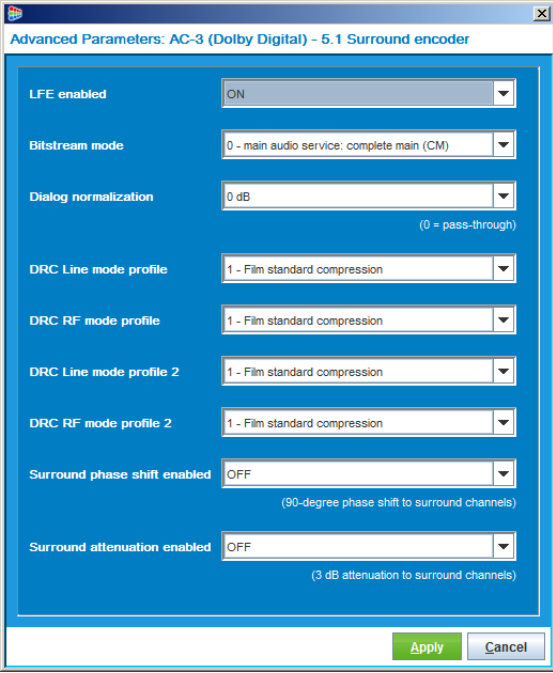
- "AC-3 (Dolby Digital) Channel—5.1 Surround," next.
- "AC-3 (Dolby Digital) Channel—Mono" on page 254.
- "AC-3 (Dolby Digital) Channel—Stereo" on page 254.

AC-3 (Dolby Digital) Channel—5.1 Surround

To configure an AC-3 (Dolby Digital) audio codec with 5.1 Surround encoding in an MBR program groom, use the **Advanced Parameters: AC-3 (Dolby Digital) 5.1 surround encoder** dialog.

Menu Path	Drag an input program to an output MBR groom -> In the **Configure MBR Program Mapping** screen, select **AC-3 (Dolby Digital)** at the **Audio Codec** field, and **5.1 Surround** at **Channels** field -> click **Advanced** button -> **Advanced Parameters: AC-3 (Dolby Digital) 5.1 surround encoder** dialog.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

See Table 113, "Advanced Audio Encoder Settings," on page 257 for available options and default values.

AC-3 (Dolby Digital) Channel—Mono

To configure an AC-3 (Dolby Digital) audio codec with Mono encoding in an MBR program groom, use the **Advanced Parameters: AC-3 (Dolby Digital) mono encoder** dialog.

👉	**Menu Path**	Drag an input program to an output MBR groom ->
		In the **Configure MBR Program Mapping** screen, select **AC-3 (Dolby Digital)** at the **Audio Codec** field, and **mono** at the **Channels** field -> click **Advanced** button ->
		Advanced Parameters: AC-3 (Dolby Digital) mono encoder dialog.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

See Table 113, "Advanced Audio Encoder Settings," on page 257 for available options and default values.

AC-3 (Dolby Digital) Channel—Stereo

To configure an AC-3 (Dolby Digital) audio codec with Stereo encoding in an MBR program groom, use the **Advanced Parameters: AC-3 (Dolby Digital) stereo encoder** dialog.

👉	**Menu Path**	Drag an input program to an output MBR groom ->
		In the **Configure MBR Program Mapping** screen, select **AC-3 (Dolby Digital)** at the **Audio Codec** field, and **stereo** at the **Channels** field -> click **Advanced** button ->
		Advanced Parameters: AC-3 (Dolby Digital) stereo encoder dialog.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

See Table 113, "Advanced Audio Encoder Settings," on page 257 for available options and default values.

E-AC-3 (Dolby Digital Plus) Encode Configuration

The E-AC-3 (Dolby Digital Plus) audio encoding configurations for MBR Program Mapping are described in the following topics:
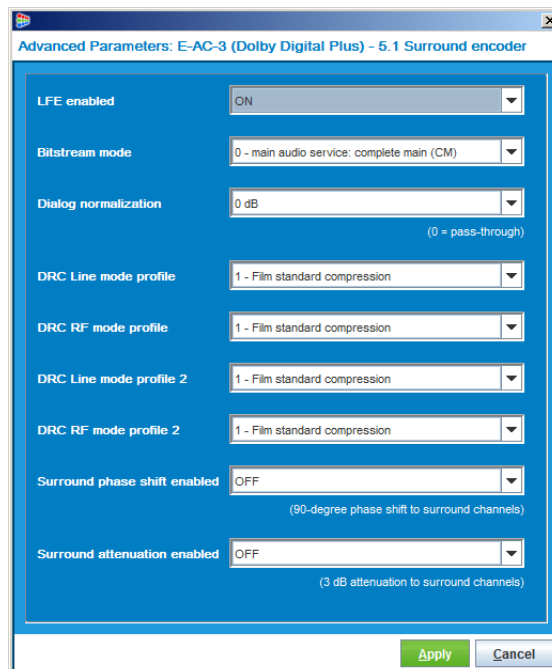
- "E-AC-3 (Dolby Digital Plus) Channel—5.1 Surround," next.
- "E-AC-3 (Dolby Digital Plus) Channel—Mono" on page 256.
- "E-AC-3 (Dolby Digital Plus) Channel—Stereo" on page 256.

E-AC-3 (Dolby Digital Plus) Channel—5.1 Surround

To configure an E-AC-3 (Dolby Digital Plus) audio codec with 5.1 Surround encoding in an MBR program groom, use the **Advanced Parameters: AC-3 (Dolby Digital) 5.1 encoder** dialog.

	Menu Path	Drag an input program to an output MBR groom -> In the **Configure MBR Program Mapping** screen, select **E-AC-3 (Dolby Digital Plus)** at the **Audio Codec** field, and **5.1 surround** at the **Channels** field -> click **Advanced** button -> **Advanced Parameters: AC-3 (Dolby Digital) 5.1 encoder** dialog.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

See Table 113, "Advanced Audio Encoder Settings," on page 257 for available options and default values.

E-AC-3 (Dolby Digital Plus) Channel—Mono

To configure an E-AC-3 (Dolby Digital Plus) audio codec with Mono encoding in an MBR program groom, use the **Advanced Parameters: E-AC-3 (Dolby Digital Plus) mono encoder** dialog.

	Menu Path	Drag an input program to an output MBR groom -> In **Configure MBR Program Mapping** screen, select **E-AC-3 (Dolby Digital Plus)** at the **Audio Codec** field, and **mono** at the **Channels** field -> click **Advanced** button -> Advanced Parameters: E-AC-3 (Dolby Digital Plus) mono encoder dialog.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

See Table 113, "Advanced Audio Encoder Settings," on page 257 for available options and default values.

E-AC-3 (Dolby Digital Plus) Channel—Stereo

To configure an E-AC-3 (Dolby Digital Plus) audio codec with Stereo encoding in an MBR program groom, use the **Advanced Parameters: E-AC-3 (Dolby Digital Plus) stereo encoder** dialog.

	Menu Path	Drag input program to an output MBR groom -> In **Configure MBR Program Mapping** screen, select **E-AC-3 (Dolby Digital Plus)** at the **Audio Codec** field, and **stereo** at the **Channels** field -> click **Advanced** button -> Advanced Parameters: E-AC-3 (Dolby Digital Plus) stereo encoder dialog.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

See Table 113, "Advanced Audio Encoder Settings," on page 257 for available options and default values.

Table 113.   Advanced Audio Encoder Settings

Field	Description	Default
Bitstream mode • For AC-3 (Dolby Digital) and/or E-AC-3 (Dolby Digital Plus).	Applicable to mono, stereo, and 5.1 surround channels. Select an option: • 0 - main audio service: complete main (CM) • 1 - main audio service: music and effects (ME) • 2 - associated audio service: visually impaired (VI) • 3 - associated audio service: hearing impaired (HI) • 4 - associated audio service: dialogue (D) • 5 - associated audio service: commentary (C) • 6 - associated audio service: emergency (E) • 7 - associated audio service: voice over (VO)	0
Dialog normalization • For any audio codec type.	Applicable to mono, stereo, and 5.1 surround. • Select a value from the range 0 dB (passthrough) and -1 dB (loudest) to -31 dB (least loud).	27
DRC Line mode profile • For AC-3 (Dolby Digital) and/or E-AC-3 (Dolby Digital Plus).	Applicable to mono, stereo, and 5.1 surround. Select an option: • 0 - No compression • 1 - Film standard compression • 2 - Film light compression • 3 - Music standard compression • 4 - Music light compression • 5 - Speech compression	1
DRC RF mode profile • For AC-3 (Dolby Digital) and/or E-AC-3 (Dolby Digital Plus).	Applicable to mono, stereo, and 5.1 surround. Select an option: • 0 - No compression • 1 - Film standard compression • 2 - Film light compression • 3 - Music standard compression • 4 - Music light compression • 5 - Speech compression	1
DRC Line mode profile 2 • For AC-3 (Dolby Digital) and/or E-AC-3 (Dolby Digital Plus).	Applicable to mono, stereo, and 5.1 surround. Select an option: • 0 - No compression • 1 - Film standard compression • 2 - Film light compression • 3 - Music standard compression • 4 - Music light compression • 5 - Speech compression	1

Table 113.   Advanced Audio Encoder Settings

Field	Description	Default
DRC RF mode profile 2 • For AC-3 (Dolby Digital) and/or E-AC-3 (Dolby Digital Plus).	Applicable to mono, stereo, and 5.1 surround. Select an option: • 0 - No compression • 1 - Film standard compression • 2 - Film light compression • 3 - Music standard compression • 4 - Music light compression • 5 - Speech compression	1
LFE enabled • For AC-3 (Dolby Digital) and/or E-AC-3 (Dolby Digital Plus).	Applicable for 5.1 surround configuration only: • Select either ON or OFF. Default= • Off, non 3/2 mode • On, 3/2 mode	Depends on 3/2 mode.
Surround phase shift enabled • For any audio codec type.	Applicable for 5.1 surround configuration only, to disable or enable 90-degree phase shift to surround channels. • Select either ON or OFF.	OFF
Surround attenuation enabled • For any audio codec type.	Applicable for 5.1 surround configuration only, to disable or enable 3 dB attenuation to surround channels. • Select either ON or OFF.	OFF

Program Redundancy

The Selenio VMG supports per-input program redundancy. In a program redundancy configuration, a switch to backup occurs when:

• Missing MPTS/SPTS streams are identified by checking the PAT.
• Missing program streams are identified by checking the PMT.

The Selenio VMG allows you to designate any input service as a "standby program" with the exception of the same service. The Selenio VMG returns back to the primary program from the standby program when the primary program recovers from the interruption.

The backup program can be another program on the same GigE port or it can be on a different GigE port in the same chassis, as long as the ports are in the same grooming group.

The health of the standby program will be checked before failover, and the Selenio VMG will not perform the switch if the standby is degraded.

Program Redundancy Best Practices and Considerations

The following considerations should be taken into account when configuring input program redundancy.

- Input-level program redundancy can be modified as long as there are no grooming sessions associated with the input program.
- The primary and backup video types must be the same. For example, an H.264 program cannot be used to backup an MPEG-2 program and vice versa.
- Both primary and backup programs must be in the same grooming group. For example, a primary program in the 8x1 GigE grooming group may not use as its backup a program from the 1x10 GigE grooming group.
- NPM switchover has the same effect as a system reboot on program redundancy; if the backup program has been used as an input source for a grooming session, the backup will revert back to primary after an NPM switchover.
- Program redundancy is not applicable for ghost programs. A ghost program cannot be used as a backup program, and a backup program cannot be configured for a ghost program.

Program Redundancy Operation Modes

The Selenio VMG supports two Program Redundancy modes (Table 114):

- Automatic recovery from the backup program to the primary program.
- Manual selection when the recovery process should occur.

Table 114.   Program Redundancy Modes of Operation

Category	Primary to Backup	Backup to Primary
Automatic Failover to Backup Program / Automatic Recovery to Primary Program	Automatic failover operation is based on detection of a missing PAT/PMT (after approximately 7 seconds).	Automatic recovery operation is based on PAT/PMT detection (after approximately 7 seconds).
Automatic Failover to Backup Program / Manual Recovery to Primary Program	Automatic failover operation is based on detection of a missing PAT/PMT (after approximately 7 seconds).	Manual recovery operation is based on the user selecting when a single program or all programs should be recovered to their respective primary programs.

Configuring Program Redundancy

You can configure program redundancy on a per-input program level basis. Groomed programs using channel substitution will be fully redundant. Use the **Input Program Redundancy Configuration** screen (Figure 139) to define program redundancy settings.

Note: *When configuring redundancy at the input level, the selected program must not yet be groomed to an output.*

Menu Path	**Grooming-Mapping** page, **Inputs** panel --> right-click program --> select **Config Program Redundancy** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 139.   Input Program Redundancy Configuration screen
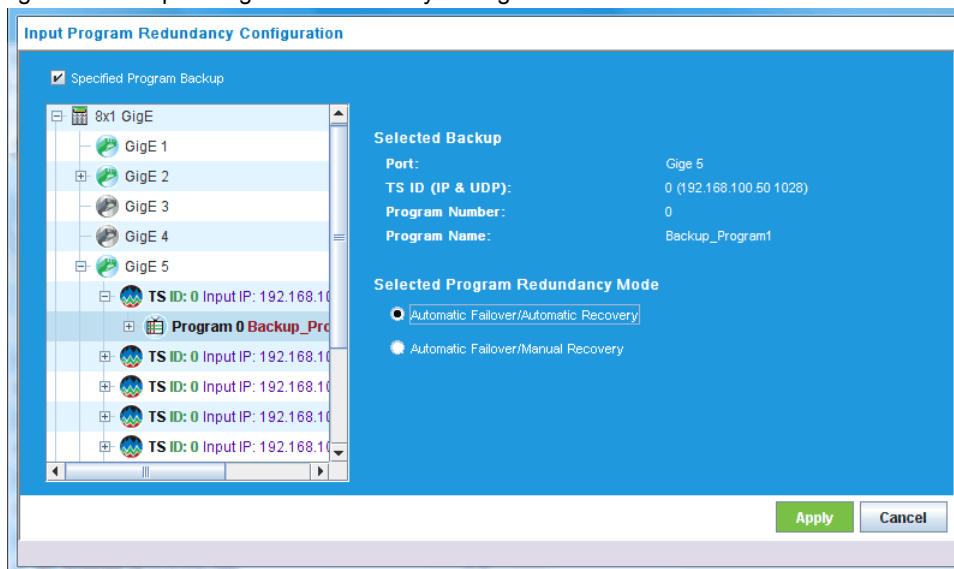
1. At the **Input Program Redundancy Configuration** screen, enable (check) **Specified Program Backup** (at top of screen).

2. Locate and select the program that is to be the backup for the input program.

3. At **Selected Program Redundancy Mode**, click to select either **Automatic Failover / Automatic Recovery** or **Automatic Failover / Manual Recovery**.

   Figure 139 shows an example of program redundancy in which the backup is selected as GigE 5, Transport Stream ID 0, Program Number 0, and Program Name of *Backup_Program1*.

4. Click **Apply** (or use Alt **a**) to create the redundancy configuration.

After you configure redundancy for a program, the **Grooming -> Mapping** tab page shows that redundancy has been configured for the program and whether the primary program is active or the backup program is active (Figure 140).

Figure 140.   Program Redundancy Indicators

"P" indicates the primary program is active.

"B" indicates the backup program is active.
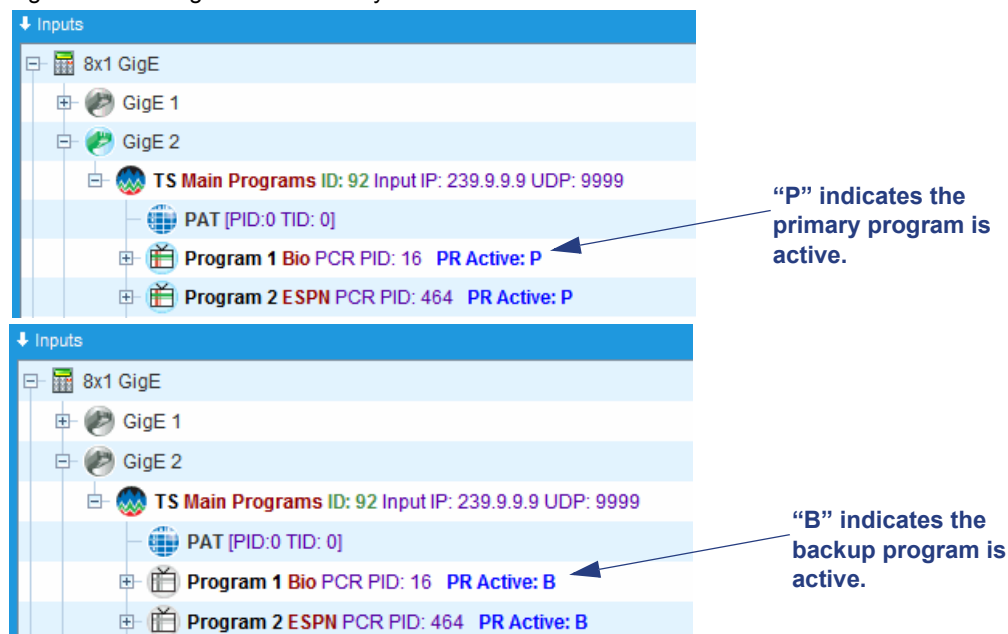
Modifying Input-level Program Redundancy

Use the following steps to change the program used for backup, or to change the redundancy mode:

1. Repeat the steps from "Configuring Program Redundancy" on page 259, and select a different backup program and/or change the **Selected Program Redundancy Mode**.

2. Click **Apply** (or use Alt **a**) at the **Input Program Redundancy Configuration** screen when you have completed your configuration.

Deleting Input-level Program Redundancy

Use the following steps to remove a program redundancy setting:

1. Open the **Input Program Redundancy Configuration** screen.

2. De-select the **Specified Program Backup** option.

3. Click **Apply** (or use Alt **a**).

Manual Recovery Procedure

If you configure program redundancy for a program to have manual recovery, you must manually switch from the backup input program to the primary input program after the primary input program is restored.

Recovering Individual Programs

Use steps in this section to perform a manual recovery for program redundancy operation on individual programs:

1. From the **Inputs** panel of the **Grooming** -> **Mapping** tab page, right-click the primary program for which the backup program is still active and select **Switch Backup to Primary Program** from the popup menu (Figure 141).

   Figure 141.   Program Redundancy: Manual Recovery
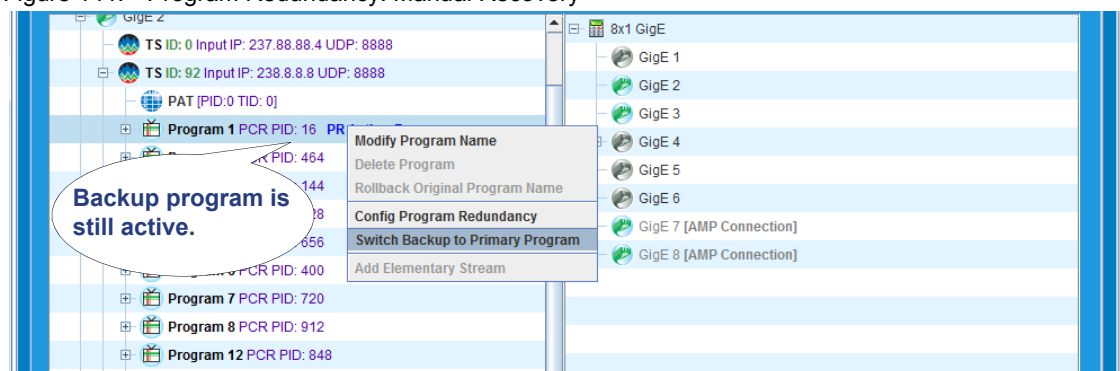
2. At the confirmation dialog (Figure 142), click **Yes** (or use Alt **y**) to complete this operation.

   Figure 142.   Confirm Switch Input Program Redundancy
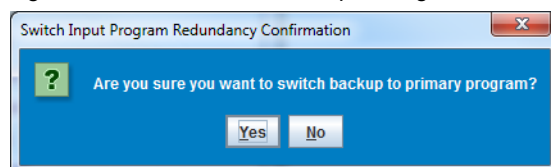
Recovering All Programs

Use steps in this section to perform a manual recovery for program redundancy operation on all programs:

1. From the *VMG Element Manager* main menu, select **Maintenance** -> **Program Redundancy Switch to Primary**.

2. At the **Regroom** confirmation dialog (Figure 143), click **Apply** (or use Alt **a**) to complete this operation.

Figure 143.   Confirm Recovery of All Programs
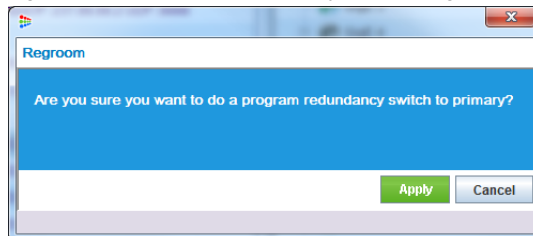
Elementary Stream/PID Management

The Selenio VMG provides the ability to manage input and output elementary streams for purposes of PID and PMT update management. You can create new pre-configured elementary streams, reorder existing streams, create unreferenced PIDs, and perform referenced and unreferenced PID mapping. You can also manage a list of input elementary streams for each ghost program.

> **Note:** *For all transport stream types—except VTR—you use the ES tools provided in the Program Mapping screen. Steps provided in this section are intended for use with a program configurations pertinent to VTR transport streams.*

Topics in this section:

- "Creating an Output Elementary Stream," next.
- "Reordering an Output Elementary Stream" on page 266.
- "Creating an Input Elementary Stream" on page 266.
- "Elementary Stream Remapping" on page 266.
- "Adding an Unreferenced PID as an Elementary Stream" on page 266.
- "Reserved PIDs" on page 267.
- "Elementary Stream Ghost PID Management" on page 268.

Creating an Output Elementary Stream

Use the **Manage Element Streams** screen (Figure 144) to add a new elementary stream to a VTR program.

	Menu Path	**Grooming-Mapping** page, **Outputs** panel --> expand GigE interface and VTR TS --> right-click program --> select **Manage Elementary Streams** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 144.   Manage Elementary Streams - dialog
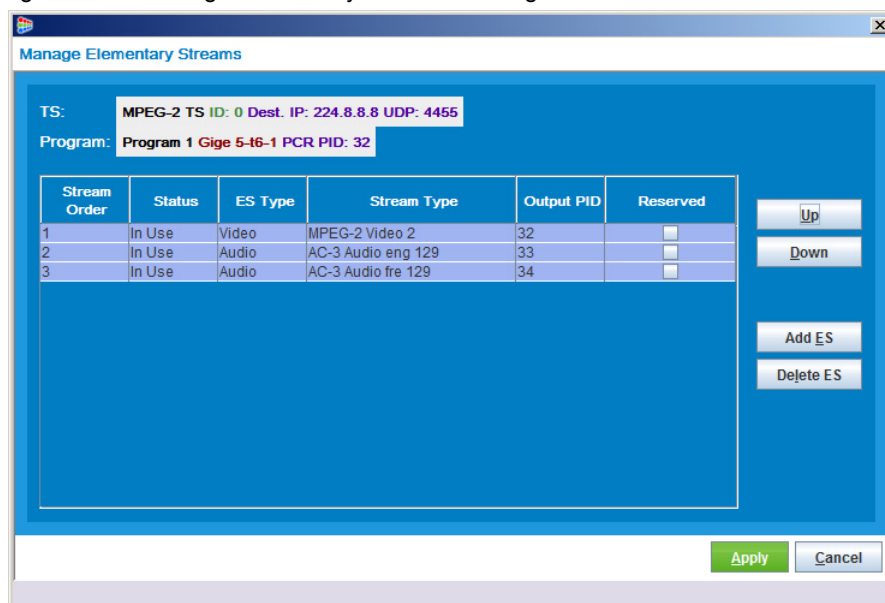
Use buttons on this screen to manage the table rows:

- **Add ES**—Add a new elementary stream row to the Component PIDs table
- **Delete ES**—Remove a selected elementary stream row from the table.
- **Up**—Reposition a selected row toward the top of the table.
- **Down**—Reposition a selected row toward the bottom of the table.

1. At the **Manage Elementary Streams** screen, click **Add ES**.

    A new elementary stream entry will now display in the lowest row of the table (Figure 145).

    By default, the new stream is an AC-3 (Dolby Digital) Audio stream.

> **Note:** *The **ES Type**, **Stream Type**, and **PID** fields in the **Manage Elementary Streams** screen can only be modified when you see the word "**New**" next to the entry in the **Stream Order** column. Once you click **Apply** (or use Alt **a**) to save changes, you will not be able to modify any of these parameters for this particular stream without deleting the stream and adding it again.*

Figure 145.   Add an ES

2. Modify the **ES Type**, **Stream Type**, and **PID** by left-clicking or double-clicking on the field in the respective column. (See also Table 115 for details.)

    At the **ES Type** column, access options for **Audio**, **Data**, or **Video** (Figure 146).

> **Note:** *A VTR transport stream **must** contain configurations for both audio and video.*

Figure 146.   ES Types

At the **Stream Type** column, (as dependent on the selected **ES Type**) select options for data, video, or audio, as described in the following topics:

−   "ES Audio Stream Types," next.

−   "ES Data Stream Types" on page 265.

−   "ES Video Stream Types" on page 265.

At the **PID** column, double-click in the field to render it editable, then type the new PID.

3. Click **Apply** (or use Alt **a**) to save and use the settings displayed in the **Manage Elementary Streams** screen. The new stream will be displayed in the **Outputs** panel of the **Grooming** -> **Mapping** tab page, for the VTR TS.

ES Audio Stream Types

With an Audio ES type, left-click in the **Stream Type** column to access the **Audio Selection** dialog (Figure 147). You can use this dialog to define the audio type and language to be used for the program's ES.

Figure 147.   ES Audio Options
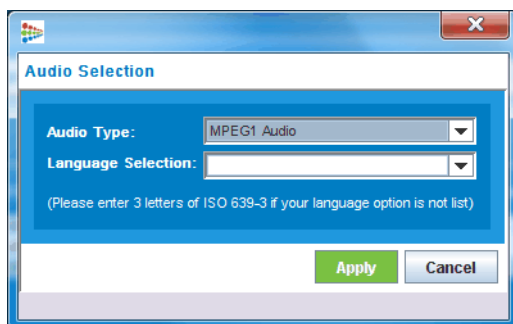
Set **Audio Type** as one of the following:
- MPEG-1 Audio
- MPEG-2 Audio
- AC-3 Audio (6)
- AC-3 Audio (0x81)
- AAC Audio (0x0f)
- HE-AAC Audio (0x11)
- E-AC-3 Audio (0x84)
- E-AC-3 Audio (0x87)

Refer to "Language Descriptor Settings" on page 334 for the list of currently supported languages.

ES Data Stream Types

With a Data ES type, left-click in the **Stream Type** column to access values you can use to define the data for the program's ES (Figure 148).

Figure 148.   ES Data Options

Values are
- Data 5
- 6 Teletext
- 6 Subtitle
- Data 7 to Data 255

ES Video Stream Types

With a Video ES type, left-click in the **Stream Type** column to access options you can use to define the video for the program's ES (Figure 149).

Figure 149.   ES Video Options

Options are
- MPEG-2 Video
- H.264 Video
- SCTE Video

Reordering an Output Elementary Stream

You can reorder the configured elementary streams to change the order of the streams in the PMT. (If, for example, you wish to change the order a stream is placed in the PMT when sent to the end-user's STB.) This will affect the order in which they are matched upon a PMT update.

1. With the **Manage Elementary Streams** screen in view, click on the row containing the stream you want to reorder.

Note: *The selected row will not be highlighted.*

2. Click **Up** or **Down,** as required, to place the stream in its new stream order.

3. Click **Apply** or use Alt **a** to save and use your settings.

Creating an Input Elementary Stream

To create an Input Elementary Stream, you must first create a ghost program within the desired input transport stream. Once the ghost program has been created, the **Add Elementary Stream** option from the popup menu will become selectable. For details on creating ghost programs, refer to "Creating Ghost Programs" on page 114. For details on creating input elementary streams, follow the steps in the section, "Adding an Unreferenced PID as an Elementary Stream" on page 266.

Elementary Stream Remapping

You can create a reserved PID or select any specific PID from existing output PIDs, while performing grooming in the **Configure Program Mapping** screen, as an outgoing PID.

You have the flexibility of selecting any PID value for an outgoing PID. When you select from an existing PID then it should be of the same ES Type and language (for audio) as the corresponding Input ES. If there is no exact match then you cannot select that existing output PID.

You cannot create a Reserved PID for Video if there is an existing video PID in the output program on which you are grooming.

Adding an Unreferenced PID as an Elementary Stream

You can add an unreferenced PID to an input transport stream. This allows you to manage unreferenced PID inputs for various applications in the Selenio VMG output. Unreferenced PID streams are MPEG-2 elementary streams that are encapsulated in the MPEG-2 SPTS or MPTS whose PIDs are not referenced in any PSI (PAT and PMT) tables. These unreferenced PID streams may be purposely inserted for some special control and applications; they could also result from the stream originator's error.

Unreferenced PIDs can come from the program inputs from GigE or 10xGigE interfaces. In some applications, these unreferenced PIDs need to be routed to the appropriate output ports as pass-through, or with or without the PIDs being remapped. In other cases, these unreferenced PIDs need to be dropped, either because such unreferenced PIDs are not needed or the streams are corrupted.

Use the **Add Elementary Stream** dialog to set up an unreferenced PID as an elementary stream.

1. From the **Inputs** panel of the **Grooming** -> **Mapping** subtab, select to ghost program to which you want to add an unreferenced PID.

2. Right-click the Ghost Program, and choose **Add Elementary Stream**.

3. From the pull-down menus, select the **Stream Category**, **Stream Type**, and **PID**.

    Table 115 describes the options available from the **Inputs** panel of the **Add Elementary Stream** dialog:

Table 115.   Add Elementary Stream - dialog

Field	Description	Default
TS	Name of the selected transport stream	Read-only
Program	Name of the selected program	Read-only
Stream Category	Clicking this field will open a drop down menu with the following options from which to choose: Audio, Data, or Video.	Audio
Stream Type[a]	Depending on the selection from *Stream Type*, clicking this field will open various options: • If *Stream Type* is *Audio* -- A new screen will open allowing you to choose **Audio Type** of: *MPEG1, MPEG2, AC-3* (Dolby Digital) *(0x6) or AC-3* (Dolby Digital) *(0x81), or AAC (0x0f).* • If *Stream Type* is *Data* -> A drop down box will appear with a type range from 5 to *255*.	MPEG1 Audio
PID (32...8175)	Type a PID value for this ES. Range = 32 - 8175	Blank

a.   Stream Type *Video* is not supported when creating an Elementary Stream for a ghost program.

4. Click **Apply** (or use Alt **a**) to save and use your settings.

5. Check the **Grooming Mapping Inputs** panel to view results (Figure 150).

    Figure 150.   New Unreferenced PID
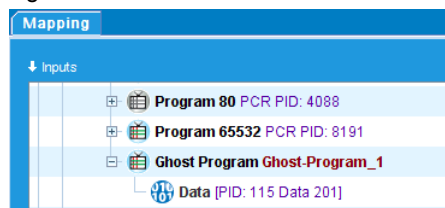
Reserved PIDs

Reserved PIDs allow you to create PIDs under output programs which will maintain PID values and ES Type and Subtype across reboots and regrooming even when the PID is not groomed. These types of output elementary streams are called reserved PIDs. An example of when it is useful to reserve PIDs would be a set top box expecting to receive a specific PID.

The **Manage Elementary Streams** screen can be used to add the ES and to specify its PID and subtype, as well as the language for the audio ES. The subtype of the reserved video stream will be overwritten by the input Video Subtype but the PID value will be maintained. You can delete any reserved ES if it is not groomed from the **Grooming -> Mapping** screen by right-clicking the ES, and choosing **Delete**.

> **Note:**   *When specifying PID values from the **Outputs** panel of the **Grooming -> Mapping** screen, the values **must** be unique.*

There are two ways to create reserved PIDs: via output elementary stream creation or via grooming.

Reserved PIDs via Output ES Creation

To create a reserved PID via output ES:

Create a new output elementary stream as described in the section, "Creating an Output Elementary Stream" on page 263.

Ensure that the PID value is unique to the transport stream for the program under which you are creating the new elementary stream.

Elementary Stream Ghost PID Management

Ghost Programs and PIDs are extra input and output streams not referenced in a Program Association Table (PAT). The Selenio VMG allows you to manage elementary stream (ES) Ghost PIDs in three ways:

* **Unreferenced PID Pass Through.** The PID output is unreferenced in the Program Mapping Table (PMT) and there is no mapping to any other program or transport stream table. Typical applications are Data PID transport and grooming.
* **Unreferenced PID Mapping.** This has no reference in the PMT, but is mapped as a table entry in the PAT at the transport stream level. This is used in various EPG applications.
* **Referenced PID Mapping.** The PID output is referenced as a PMT entry. A typical application might be to associate electronic program guide (EPG) data with one or more programs.

Unreferenced PIDs streams are those MPEG-2 streams encapsulated in the MPEG-2 SPTS or MPTS but their PIDs are not referenced in any PSI (PAT and PMT) tables. These unreferenced PID streams may be purposely inserted for some special control and applications; they could also result from the stream originator's error.

Unreferenced PIDs can come from the program inputs from GigE or 10GigE interfaces. In some applications, these unreferenced PIDs need to be routed to the appropriate output GigE ports as pass-through without or with PIDs remapping. In other cases, these unreferenced PIDs need to be dropped, either because such unreferenced PIDs are not needed or the streams are corrupted.

The Selenio VMG allows you to add and drop the unreferenced PIDs in its inputs from both GigE and 10GigE ports.

The Selenio VMG can groom the unreferenced PIDs from the inputs to the appropriate output transport stream (SPTS or MPTS) with or without PID remapping using the GUI configuration for the unreferenced PIDs.

Unreferenced PIDs associated with program inputs are usually known in advance, so they can be configured through the GUI for pass-through or drop. The GUI enables the user-configurable

remapping as an output PID for the input unreferenced PID; the output PID can also be referenced in the output TS when necessary through GUI configuration.

User-configured unreferenced PID streams are routed based on grooming and grooming group rules.

The Selenio VMG ensures there are no conflicts between unreferenced PIDs and the referenced PIDs in its output MPTS or SPTS. If there are unreferenced PIDs causing conflict in the output MPTS or SPTS, then the groomed unreferenced PID causing the conflict is dropped. This could happen when an unreferenced PID is not allowed to be remapped for output.

Unreferenced PID Pass Through

Use steps in this section to add an unreferenced PID.

1. Create a ghost program, as described in "Creating Ghost Programs" on page 114.
2. Map the unreferenced PID to an output by dragging and dropping the ghost program from the input GigE port to the output transport stream.

    The **Configure Mapping** screen is now displayed (Figure 151). Note the PID number of the component PID, in this case 117. You will need this when you want to create a referenced PID mapping.

    Figure 151.   Result of Ghost Program Groom to Output TS

3. Be sure that the **Stay Unreferenced** box is checked, and click **Apply Configuration** (or use Alt **a**).

The ghost program and its data transport stream with a PID of 117 appears on both the input and output (similar to the example shown in Figure 152) showing the stream has been passed through.

Figure 152.   Ghost Program Passed Through
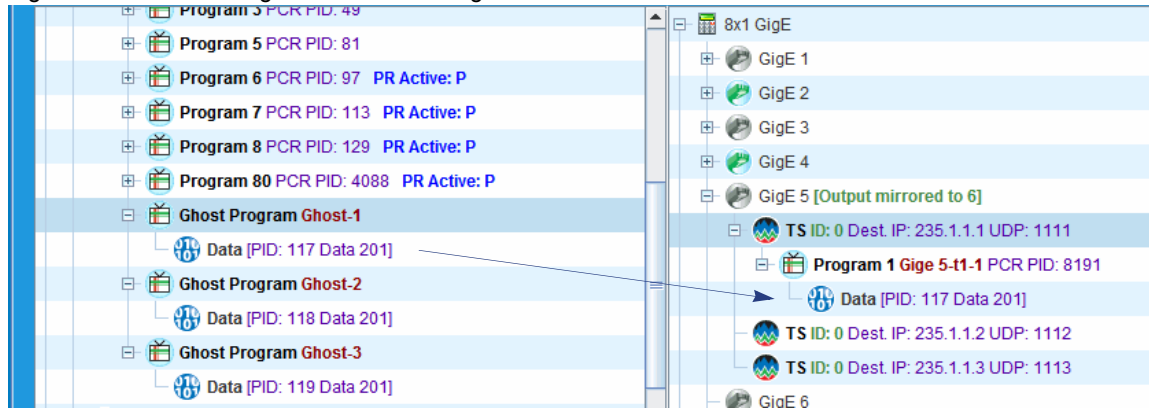
Unreferenced PID Mapping

1. Start with a screen, as shown in Figure 153.

Figure 153.   Starting Unreferenced PID Mapping
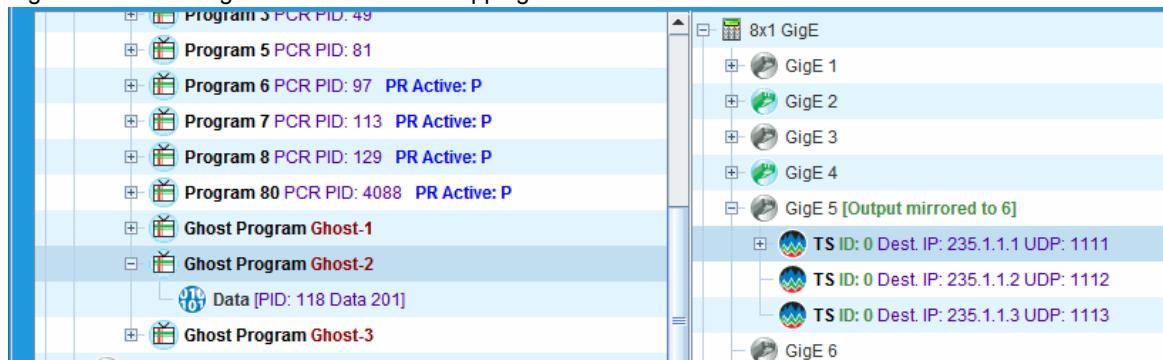
2. Drag the Ghost Program from the input of Figure 153 and drop it on the transport stream you just created. The **Configure Program Mapping** screen (Figure 154) now appears.

Figure 154.   Configure Program Mapping: Unreferenced
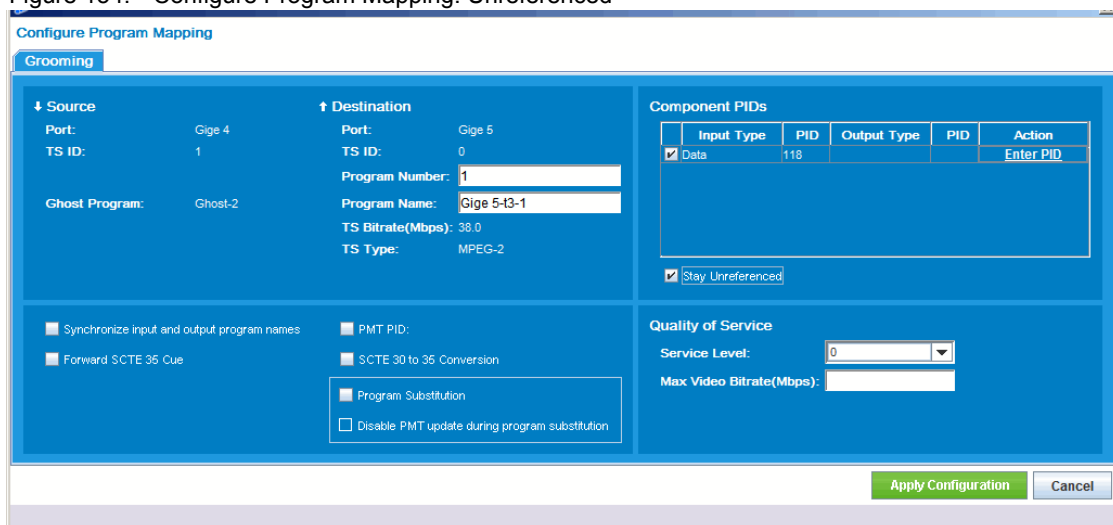
3. Be sure that the **Stay Unreferenced** box is *checked*.

4. In the Component PIDs portion of the screen, click the empty space to the right of the row of the stream. The **Add Elementary Stream** dialog is now presented.

5. Enter the new reserved PID number, (in this case, 118, the same PID number as shown in Figure 154) and click **Apply** (or use Alt **a**).

6. At the **Configure Program Mapping** screen, click **Apply Configuration** (or use Alt **a**). The unreferenced PID is now mapped.
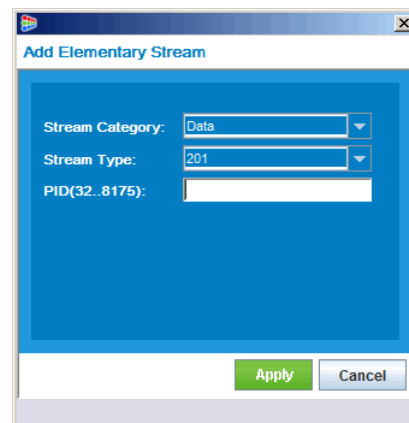
Referenced PID Mapping

Input Ghost ES PIDs can be groomed by the Selenio VMG and referenced as ES PIDs in a program in the output TS as long as the PID value is unique within the output TS.

Figure 155 shows the starting screen with the unreferenced PID input mapped into a Ghost Program on the input.

Figure 155.   Before Referenced PID Mapping
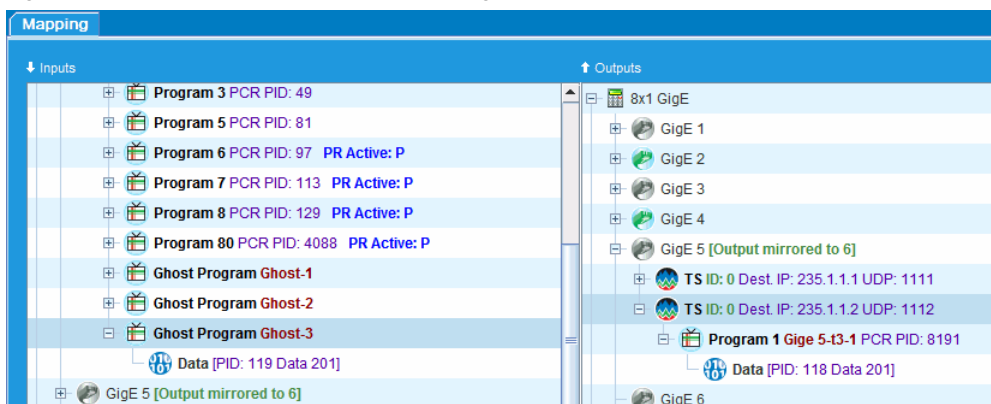
Use steps in this section to map a referenced PID to a program.

1. Drag the Ghost Program from the input of Figure 155 and drop it on the transport stream. The **Configure Program Mapping** screen (Figure 156) is now presented.

Figure 156.   Mapping the Referenced PID
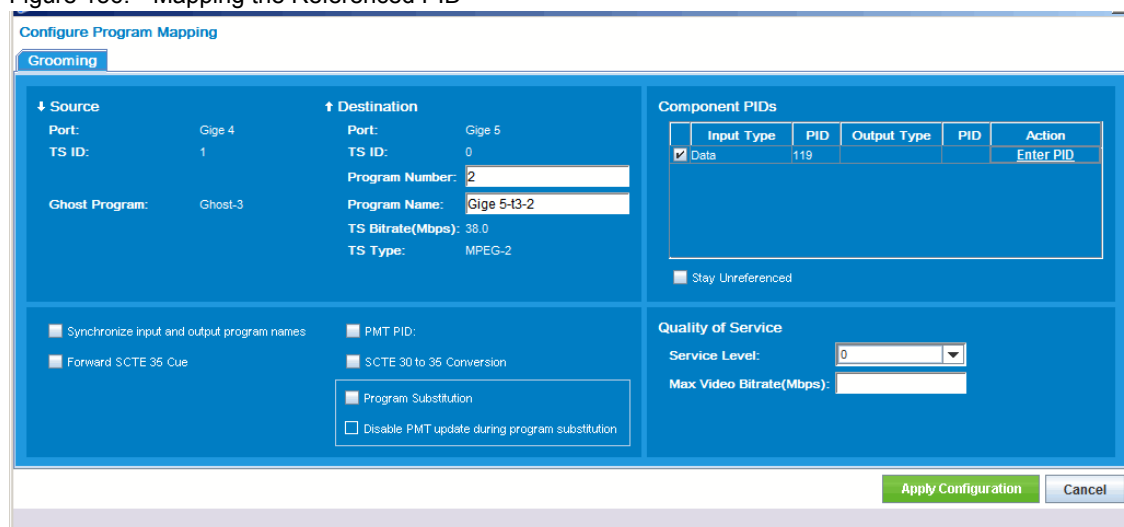
2. Be sure that the **Stay Unreferenced** box is un-checked.

3. Click **Apply Configuration** (or use Alt a). The **Mapping** tab page (Figure 157) shows the mapped PID in both programs from the input and the output.

Figure 157.   After: Referenced PID Mapping
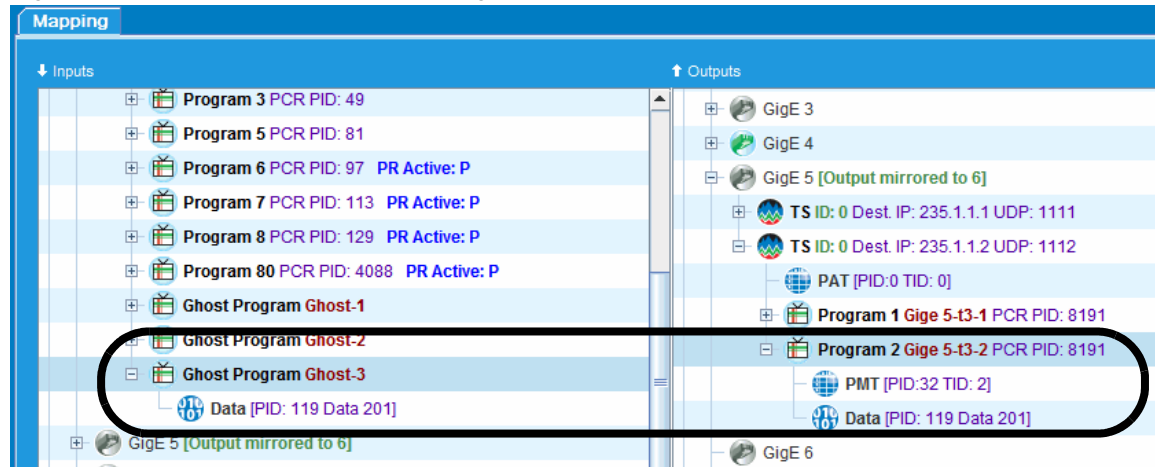
Module Redundancy

This chapter discusses the redundancy features offered by the Selenio VMG Network Processor Module (NPM), Video Processor Module (VPM), and the Transcoding Module (TCM).

In This Chapter:

NPM Status and Health

The LEDs on the front panel of the NPM card indicate its current status and health. This information is also displayed in the chassis view of the *VMG Element Manager*. Refer to "Chassis Tab" on page 39 for details. Table 116 describes the NPM front panel LEDs.

Table 116.   NPM Front Panel LEDs

LED Name	Color/Condition	Description
Hot Swap	Blue	NPM is not ready for hot-swap
	Flashing Blue	Transition between the hot-swap not ready state to ready state, and ready state to not ready state.
	Off	NPM is ready for hot-swap
Chassis Status	Red	Chassis interface fault
	Green	NPM payload powered and out of reset
FPGA Config	Red	FPGA configuration in progress
	Green	FPGA configuration is done
Fault	Red	Fault
	Green	In normal operation
Backup	Red	Standby
	Green	In operation

NPM Redundancy

In order to take advantage of the Selenio VMG's redundancy features, two NPMs must be installed and properly configured as well as a virtual IP address assigned to the Selenio VMG system. The NPM provides video and data service filtering/switching/routing to and from all other cards in the chassis, and supports 1:1 card redundancy. In this redundancy configuration, one NPM is designated as the primary (active) card and the other NPM as the backup (standby) card. During normal use, the standby NPM is in warm-standby mode and ready to become active if either the active NPM encounters a failure or a user initiates a manual switchover. In warm-standby redundancy mode all traffic flows simultaneously into both NPMs in the chassis; however, only the active NPM is processing the data.

High Availability

During system boot, if two NPMs are available they negotiate their roles within the redundant system. One becomes active and the other goes into standby mode. The criteria used to determine this are:

- Configuration database validity.
- Health of NPM software and hardware.
- The cards' previous active/standby role.
- The cards' physical location within the Selenio VMG chassis.

After the active NPM is determined, applications on that card take control of the system and start configuring the hardware based on its persistent configuration data. The active NPM takes control over all network interfaces for video streams, and its physical Ethernet interface becomes active.

The switch between active and standby roles in an NPM redundancy environment is seamless.

The standby NPM continues to keep in sync with the persistent data storage controlled by the active database.

Fast Failover Switch

The NPM Fast Failover switch mechanism allows for seamless transition in the event of a redundancy switch. When a card failure or user initiated switch-over occurs, the standby NPM will detect the failure using a missed heartbeat mechanism. The standby NPM will claim all the MUXs from the failed NPM while the MUX software automatically re-initializes itself and wipes out configuration from the failed NPM.

System Failure

Certain system failure conditions exist that trigger a failover. Some active NPM failure conditions are:

- An unplanned reset of the active NPM.
- Removal of the active NPM:
    - Partial card removal using the ejector handles (allowing the hot-swap procedure to complete).
    - Abrupt card removal (without allowing the hot-swap procedure to complete).

Note: *For more information about the NPM ejector handles, refer to Chapter 3, Physical Installation, Inserting Modules section, in the Selenio VMG Hardware Setup Guide.*

User-Initiated

When a user-initiated switch-over occurs, all applications on the active NPM are asked to free their resources. This action triggers checkpoints to sync the persistent configuration from the active database to the standby database. Once the user initiated switch-over is accepted, configuration changes are no longer allowed and are not saved.

After the flushing procedure is complete, the active NPM relinquishes control of the system and reboots, allowing the standby NPM to take control and go into an active state. All video streams, client connections (GUI, etc.), and connections with ad servers will temporarily go down during the transition.

Refer to "NPM Redundancy Switch" on page 312 for more information on user initiated switch over.

Configuring NPM Redundancy

1. Make sure the same physical setup, including applicable wiring and network connection, exists for both NPM cards.

2. Setup a Virtual IP Address in the *VMG Element Manager* **Global Configuration -> Management Interface** tab (see "Management Interface Tab" on page 56 for more information).

3. If using the Selenio VMG with an ad server, setup a Virtual MAC Address in the *VMG Element Manager* **Global Configuration -> Grooming Group** tab (see "Grooming Group tab" on page 57).

VPM and TCM Status and Health

The LEDs on the front panel of the VPM and TCM cards indicate their current status and health. This information is also displayed in the chassis view of the *VMG Element Manager*. Refer to "Chassis Tab" on page 39 for details. Table 117 describes the VPM and TCM front panel LEDs.

Table 117.   VPM/TCM Front Panel LEDs

LED Name	Color/Condition	Description
Hot Swap	Blue	VPM//TCM is not ready for hot-swap.
	Flashing Blue	VPM/TCM is making transition from hot-swap not ready to ready state, and ready state to not ready state.
	Off	VPM/TCM is ready for hot-swap.
Status	Red	Chassis interface fault.
	Green	Payload up.
Config	Red	FPGA configuration in progress.
	Green	FPGA configuration completed.
Fault	Red	Fault.
	Green	Normal Operation.
Backup	Red	Standby.
	Green	In operation.

VPM and TCM Redundancy

The Selenio VMG offers N+M VPM and TCM redundancy, where N is the number of cards in the system and M is the number of redundancy cards available for the following cards and functions:

- VPM:Grooming, statistical multiplexing, transrating, and digital ad insertion.
- TCM:Grooming and transcoding.

Note: *VPM uses load balancing for redundancy, whereas TCM uses first-fill provisioning.*

Unlike N+1 redundancy, N+M redundancy allows an operator to utilize all the VPM or TCM cards in the Selenio VMG system for video processing and transcoding, thus sharing the load and the probability of a malfunction equally between the VPMs or TCMs instead of dedicating one or multiple cards operating in standby mode to provide redundancy. This N+M redundancy scheme requires VPM or TCM capacity to be over-provisioned (i.e., you allow for more capacity than is operationally needed to allow a successful failover) so that video streams from a failed VPM card(s) can be redistributed across remaining functional VPM or TCM cards without running out of processing capacity on those modules.

Note: *A VPM card cannot provide redundancy for a TCM card and vice versa.*

Functionality

When the system detects a failed VPM or TCM card, the redundancy algorithm will automatically perform intelligent redistribution of output transport stream video processing across all available sources.

Failover

With N+M redundancy, if one VPM or TCM card fails, video processing resources will be redistributed to any other available VPM or TCM card(s) until the failed card can be replaced. It is not necessary to replace the same card in the same slot. VPM or TCM cards can be easily added with no service interruption, or removed from the system with minimal service interruption.
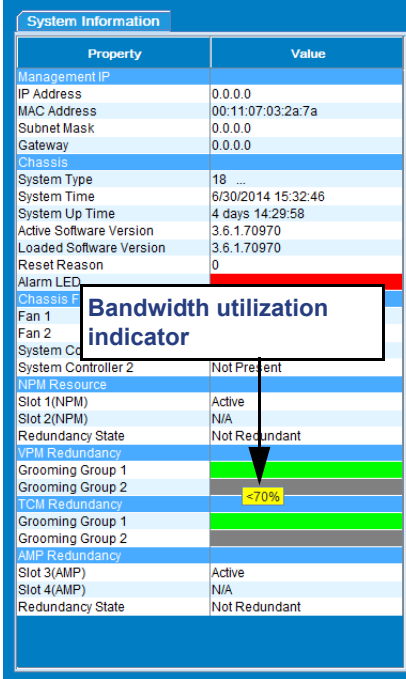
Failover conditions consist of online insertion and removal of a card or a hardware or software failure.

Oversubscription Indication

Depending on available resources, any number of card failures can be reallocated to any number of available cards. The **Chassis** view of the *VMG Element Manager* displays color-coded and text indications of current bandwidth percentage use in order for the user to better gauge at what point oversubscription may occur, and when additional VPMs might be necessary. Figure shows the **Chassis** view with the VPM redundancy status highlighted at the bottom:

For complete descriptions of the VPM Redundancy properties and values, see Table 11, "Chassis: System Information: Management IP," on page 42 and Table 19, "Chassis Tab: Card Information," on page 46.

Additionally, if VPM or TCM resource allocation fails, the undistributed (oversubscribed) program's icon will remain black and white (indicating no video processing is taking place) in the **Outputs** panel of the **Grooming -> Mapping** subtab of the *VMG Element Manager.*

Property	Value
System Information	
Management IP	
IP Address	0.0.0.0
MAC Address	00:11:07:03:2a:7a
Subnet Mask	0.0.0.0
Gateway	0.0.0.0
Chassis	
System Type	18 ...
System Time	6/30/2014 15:32:46
System Up Time	4 days 14:29:58
Active Software Version	3.6.1.70970
Loaded Software Version	3.6.1.70970
Reset Reason	0
Alarm LED	
Chassis F	
Fan 1	
Fan 2	
System Co	
System Controller 2	Not Present
NPM Resource	
Slot 1(NPM)	Active
Slot 2(NPM)	N/A
Redundancy State	Not Redundant
VPM Redundancy	
Grooming Group 1	
Grooming Group 2	<70%
TCM Redundancy	
Grooming Group 1	
Grooming Group 2	
AMP Redundancy	
Slot 3(AMP)	Active
Slot 4(AMP)	N/A
Redundancy State	Not Redundant

Bandwidth utilization indicator

Configuring VPM and TCM Redundancy

VPM and TCM redundancy occurs automatically in the Selenio VMG system. No additional configuration is necessary.

AMP Status and Health

The LEDs on the front panel of the AMP card indicates its current status and health. This information is also displayed in the chassis view of the Selenio VMG *Element Manager*. Refer to "Chassis Tab" on page 39 for details. Table 118 describes the AMP front panel LEDs.

Table 118.   AMP Front Panel LEDs

LED Name	Color/Condition	Description
OOS (Out of Service)	Red	System out of service
	Off	System normal
Health	Solid green	AMP firmware is active, payload enabled
	Flashing green	AMP firmware is active, payload disabled
	Off	AMP firmware is inactive
Hot Swap	Solid blue	AMP board is inactive and ready to be swapped
	Flashing blue	AMP board is activating/deactivating and unsafe to swap
	Off	AMP board is active and unsafe to swap

AMP Redundancy

Each AMP module is paired with an NPM module and follows the same failover behavior as the NPM. In the VMG-6 and VMG-8, the AMP in slot 3 is paired with the NPM in slot 1 to form one group, and the AMP in slot 4 is paired with the NPM in slot 2 to form another group. In the VMG-14, the AMP in slot 6 is paired with the NPM in slot 7 to form one group, and the AMP in slot 9 is paired with the NPM in slot 8 to form another group.

Functionality

Whichever NPM is active, it's paired AMP is active also. In each NPM/AMP group, the NPM is the master. NPM switchover triggers AMP switchover; also, AMP switchover triggers NPM switchover.

Note: *If you have active grooming of programs on standard OTSs and Transcoded+PIP TS, AMP failover will cause video interruption of these programs due to NPM switchover.*

You can trigger NPM/AMP failover through the GUI, but only when both the NPM and AMP are in a fully redundant configuration (that is, two NPMs and two AMPs). However, NPM auto-failover will trigger AMP switchover even if only one AMP is installed. If programs are configured on standard OTSs and Transcoded+PIP TS, video on those programs will be restored after NPM failover. However, MBR TS programs will not be restored if there is no working AMP paired with the new active NPM.

For complete descriptions of the AMP Redundancy properties and values, see and .

System Information	
Property	**Value**
Management IP	
IP Address	0.0.0.0
MAC Address	00:11:07:03:2a:7a
Subnet Mask	0.0.0.0
Gateway	0.0.0.0
Chassis	
System Type	18 ...
System Time	6/30/2014 15:32:46
System Up Time	4 days 14:29:58
Active Software Version	3.6.1.70970
Loaded Software Version	3.6.1.70970
Reset Reason	0
Alarm LED	
Chassis FRU	
Fan 1	Present
Fan 2	Present
System Controller 1	Present ...
System Controller 2	Not Present
NPM Resource	
Slot 1(NPM)	Active
Slot 2(NPM)	N/A
Redundancy State	Not Redundant
VPM Redundancy	
Grooming Group 1	
Grooming Group 2	<70%
TCM Redundancy	
Grooming Group 1	
Grooming Group 2	
AMP Redundancy	
Slot 3(AMP)	Active
Slot 4(AMP)	N/A
Redundancy State	Not Redundant

Configuring AMP Redundancy

AMP redundancy happens automatically in the Selenio VMG system. No additional configuration is necessary.

Monitoring

The *VMG Element Manager* provides various methods you can use to view and control displays of error counts on input and output transport streams and elementary streams.

In This Chapter:

Bitrate Monitoring

Use the **Input-Output Bitrate Monitor** screen to view the real-time bitrate graph (Figure 158).

	from MBR	**Grooming-Mapping** page, **Outputs** panel --> expand GigE interface --> expand MBR TS--> right-click TS and select **Bitrate Monitor** from the popup menu.
	from AVTX+PIP, VTX+PIP	**Grooming-Mapping** page, **Outputs** panel --> expand GigE interface --> expand <AVTX+PIP TS |VTX+PIP TS>--> right-click Main TS or PIP TS and select **Bitrate Monitor** from the popup menu.
☞	**from AVTX, PIP VTR, VTX**	**Grooming-Mapping** page, **Outputs** panel --> expand GigE interface --> right-click <AVTX|PIP|VTR|VTX> TS and select **Bitrate Monitor** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above. or Alt **n** to go directly to the Monitor tab page.

ℹ **Note:** *The Bitrate Monitor can only display the real-time bitrate for one transport stream and to one VMG Element Manager user at a time. Multiple transport streams cannot be simultaneously monitored.*

About the Bitrate Monitor Graph

Note: *The Bitrate Monitor can only display the real-time bitrate for one transport stream and to one VMG Element Manager user at a time. Two transport streams cannot be simultaneously monitored.*

To adjust the view on display, use the selectors across the top of the screen to select the port, transport stream, and legend information.

Figure 158.   Bitrate Monitor Components
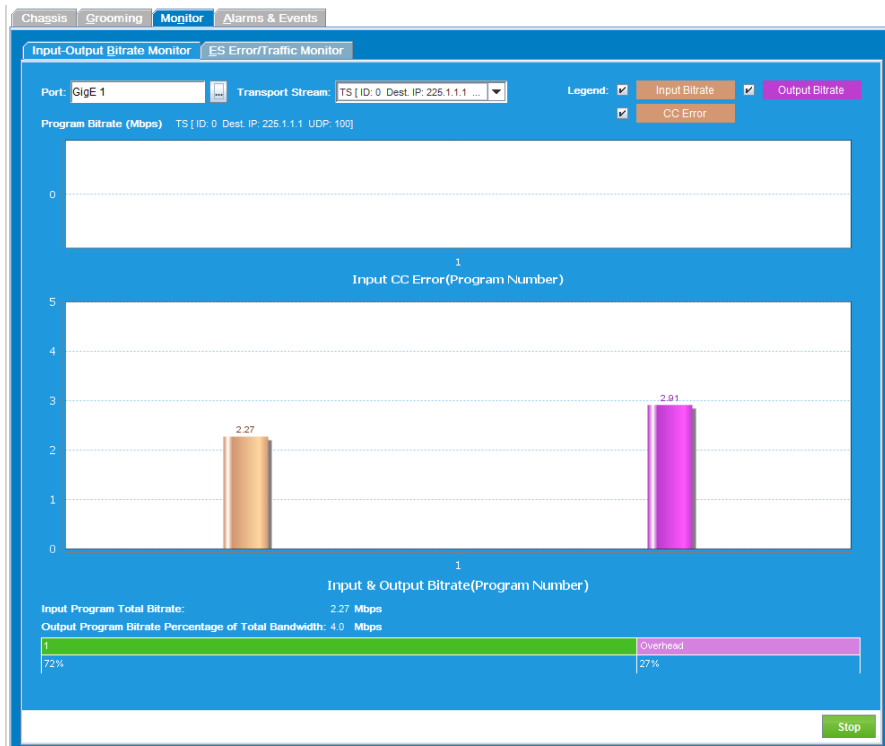
The input and output bitrates are shown in a bar graph by program number in the middle portion of the screen. At the bottom portion of the screen a program's percentage of the total output bitrate is displayed.

Use the **Start/Stop** button at the lower right corner of the screen to activate or halt display of the real-time monitoring display.

Viewing Elementary Stream Traffic Details

Use tools in the **Mo_nitor** tab's **ES Error / Traffic Monitor** tab page (Figure 159) to define the individual input or output elementary streams and the monitoring parameters to be displayed as real-time graph, as described in the following topics:

- "Displaying Input ES Performance Graphs" on page 283.
- "Displaying Output ES Performance Graphs" on page 286.

Figure 159. Traffic Monitor: Graph

Tabs that identify and provide access to each graph that you create.

Access to dialogs in which to select ESs and various types of error counters for your graphing.

Hover on the tab label to reveal details (in yellow block) about the TS associated with the graph.

Access to the error counter selector. You can change the settings at any time.

Display of the currently configured error counters, and legend, for the graph in view.
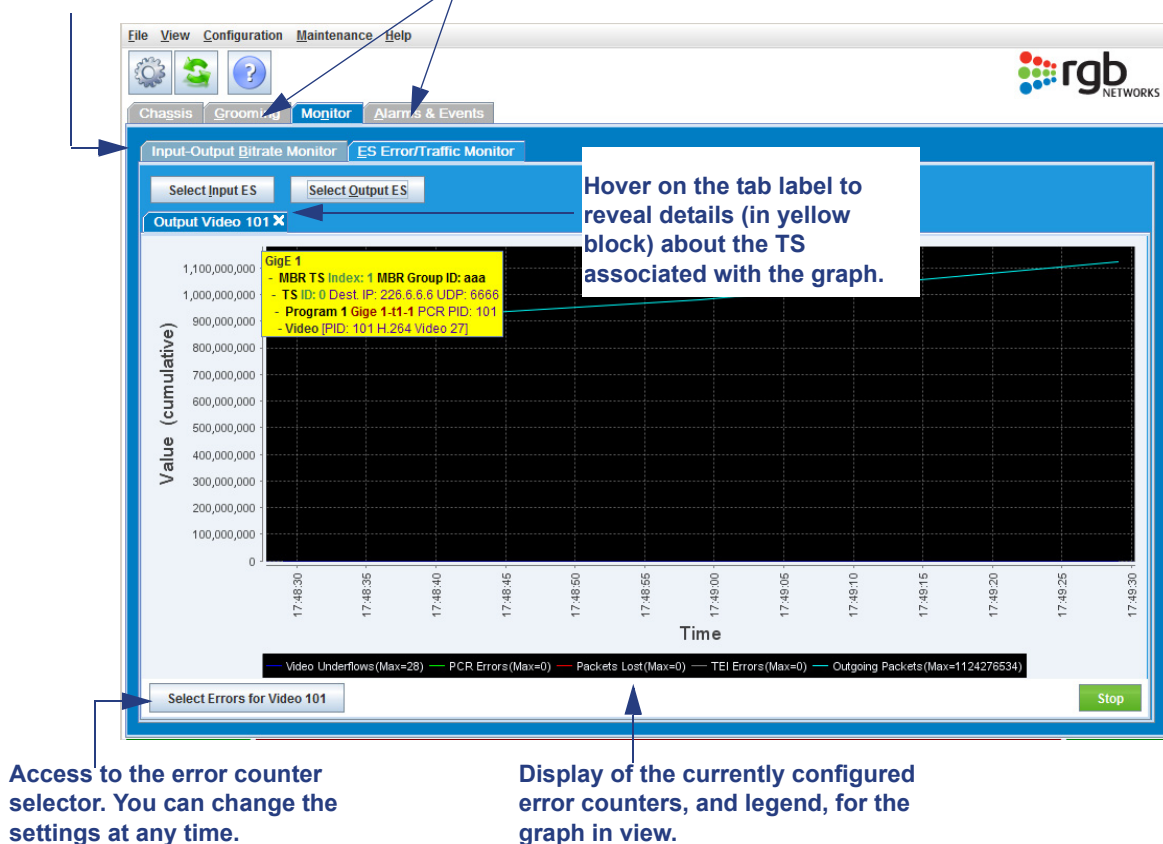
Displaying Input ES Performance Graphs

Use the **Select an Input ES** dialog (Figure 160) to select an audio or video input elementary stream and to define the monitoring information to be reported about a selected stream, as described in the following topics:

- "Input Video ES," next.
- "Input Audio ES" on page 285.

👉	**Menu Path**	**Mo**n**itor tab --> E**S Error/Traffic Monitor --> Select **I**nput ES
	Quick Keys	Alt **n**, Alt **e**, Alt **i**

1. At the **Select Input ES** dialog, click on an audio or video ES. The **OK** button at the bottom of the screen should now be green.

2. Click **OK** (or use Alt **o**) to access parameters to chart audio ES or video ES performance.

Figure 160.   Select Input ES
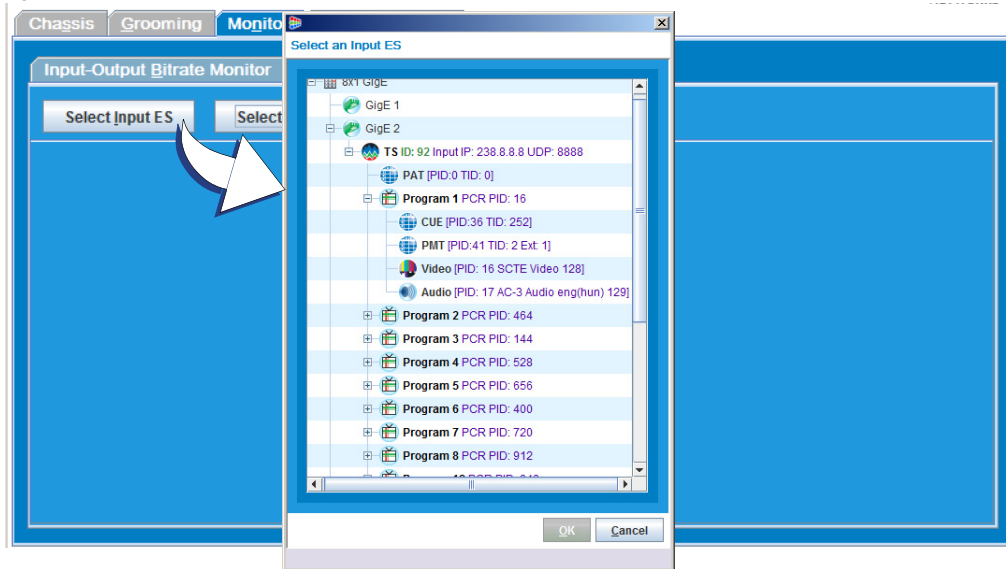
Input Video ES

Use the steps in this section to create a real-time graph that displays performance information about a selected input video ES.

1.   At the **Select an Input ES** dialog, select the video ES to be monitored, and click the green **OK** button (or use Alt **o**) to present the **Select Errors for Video** dialog (Figure 161).

Figure 161.   Monitoring Parameters: Input Video ES
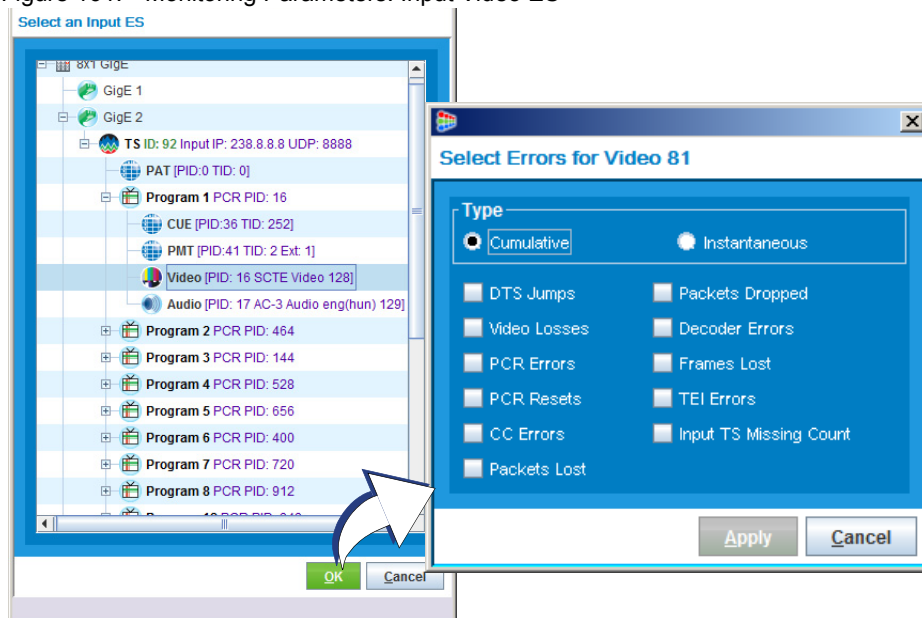
2.   At the **Select Errors for Video** dialog, click to either enable (check) or disable (un-check) the video monitoring options to be used, then click **Apply** (or use Alt **a**) to present the **Input Video** graph (Figure 162).

Figure 162.   Performance Graph Setup: Input ES Video
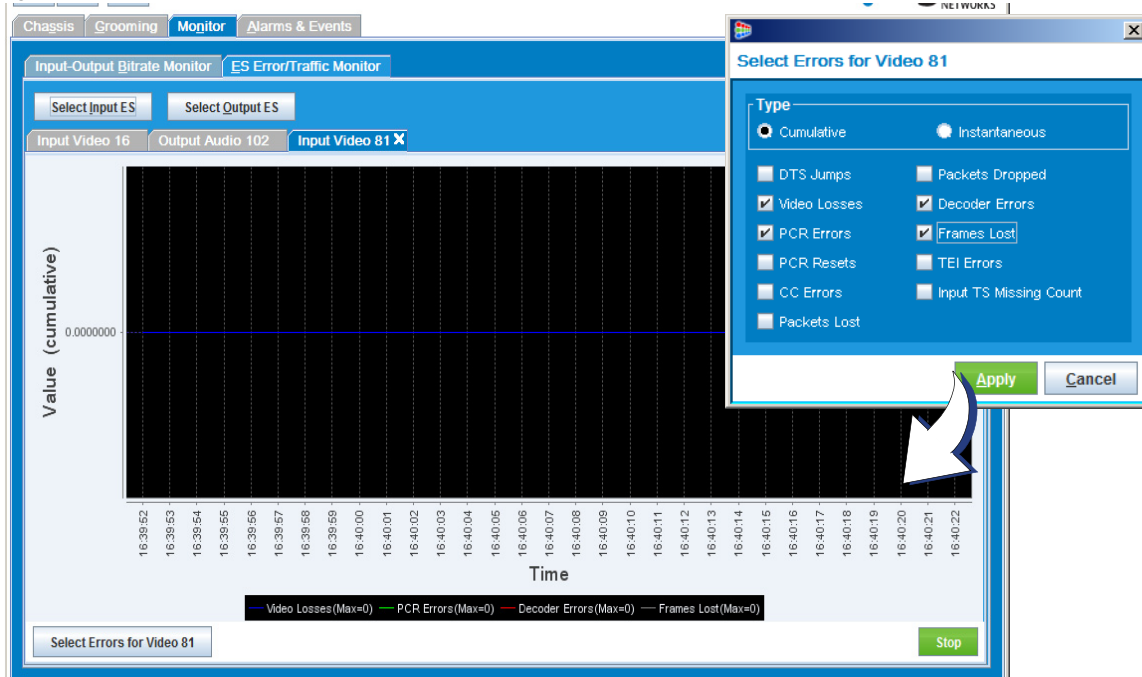
Input Audio ES

Use the steps in this section to create a real-time graph that displays performance information about a selected input audio ES.

1.   At the **Select an Input ES** dialog, select the audio ES to be monitored, and click the green **OK** button (or use Alt **o**) to present the **Select Errors for Audio** dialog (Figure 163).

Figure 163.   Input ES Performance Monitor Setup
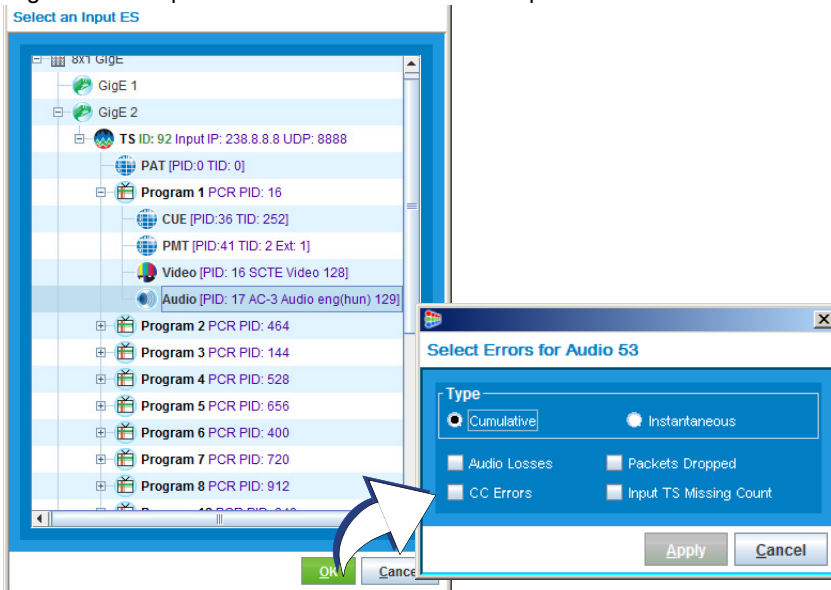
2.   At the **Select Errors for Audio** dialog, click to either enable (check) or disable (un-check) the audio monitoring options to be used, then click **Apply** (or use Alt **a**) to present the **Input Audio** graph (Figure 164).

Figure 164.   Performance Graph Setup: Input ES Audio
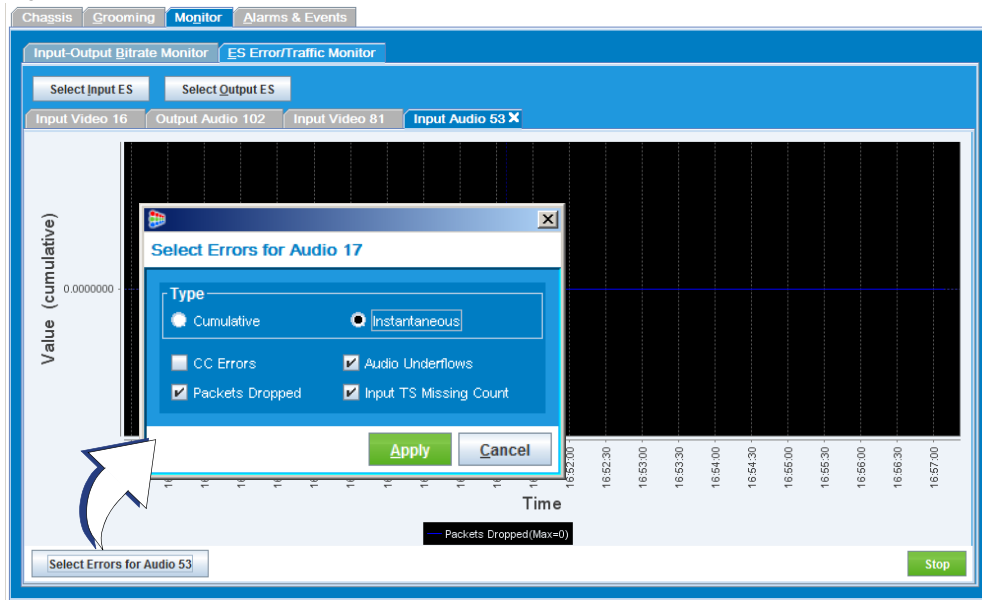
Displaying Output ES Performance Graphs

Use the **Select an Output ES** dialog (Figure 165) to select an output elementary stream and to define the monitoring information to be reported about the selected stream, as described in the following topics:

- "Output ES Audio," next.
- "Output ES Video" on page 287.

Menu Path	Monitor tab --> ES Error/Traffic Monitor --> Select Output ES
Quick Keys	Alt **n**, Alt **e**, Alt **o**

Figure 165.   Select Output ES
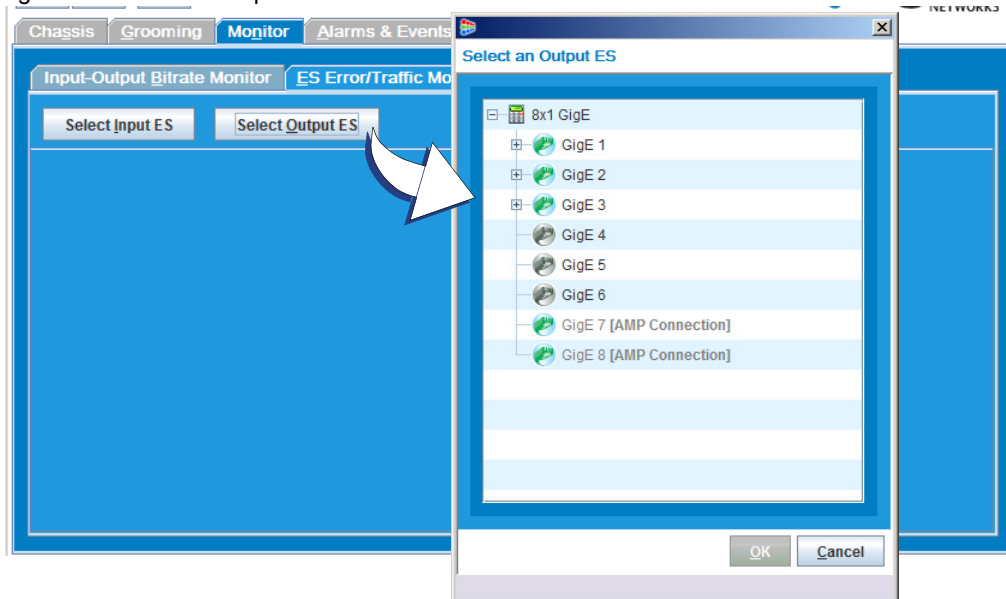
Output ES Audio

Use the steps in this section to create a real-time graph that displays performance information about a selected output audio ES.

1. At the **Select an Input ES** dialog, expand a program and click the audio ES to be monitored.
    The **OK** button, at the bottom of the screen, should now be green (Figure 166).

2. Click the green **OK** button (or use Alt **o**) to present the **Select Errors for Audio** dialog.

3. At the **Select Errors for Audio** dialog, enable (check) or disable (un-check) monitoring options to be used, then click **Apply** (or use Alt **a**). See Table 119 for parameter descriptions.

Output ES Video

Use the steps in this section to create a real-time graph that displays performance information about a selected output video ES.

1. At the **Select an Input ES** dialog, click the video ES to be monitored.
    The **OK** button, at the bottom of the screen, should now be green (Figure 166).

2. Click the green **OK** button (or use Alt **o**) to present the **Select Errors for Video** dialog.

3. At the **Select Errors for Video** dialog, enable (check) or disable (un-check) the monitoring options to be used, then click **Apply** (or use Alt **a**). See Table 119 for parameter descriptions.

Figure 166.   Output ES Performance Monitor Setup
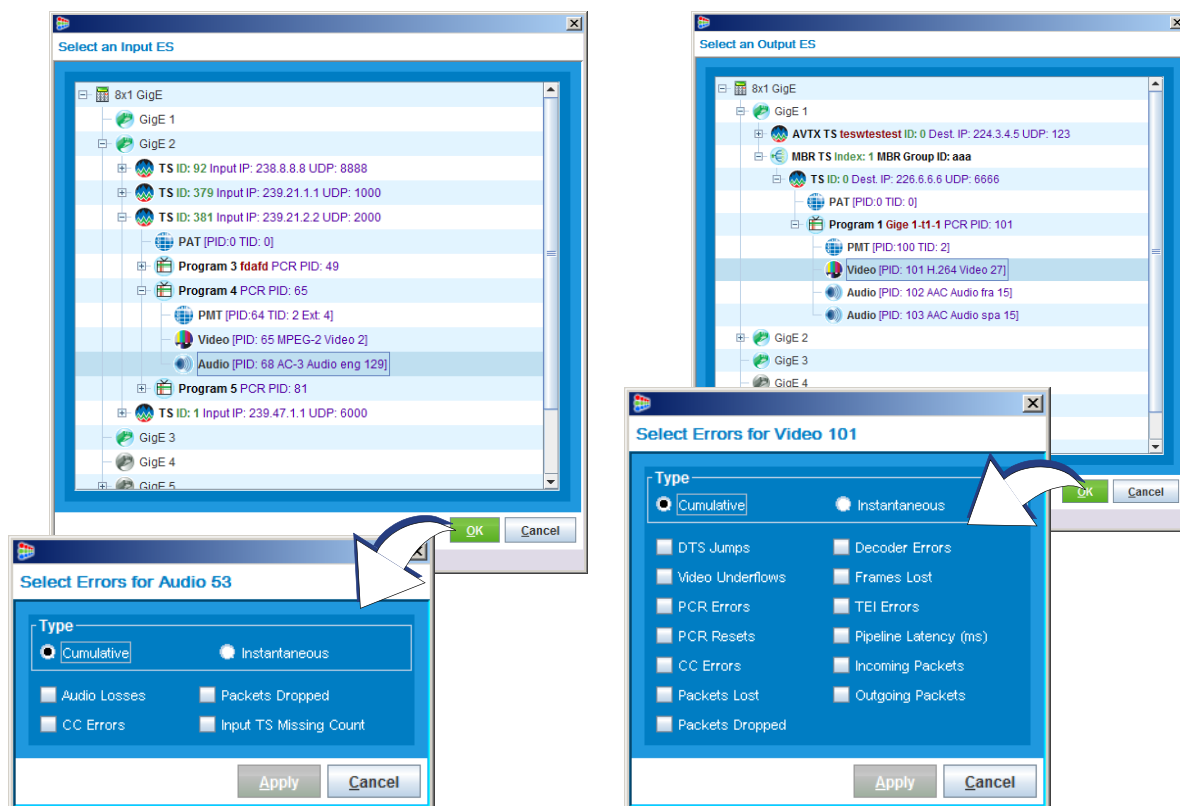
Table 119.   Output ES Error Counters

Field	Description
Audio Losses	Output audio error counter—Allow (check) or inhibit (un-check) the audio loss counter.

Table 119.   Output ES Error Counters (Continued)

Field	Description
CC Errors	Output audio error counter—Allow (check) or inhibit (un-check) the CC error counter.
CC Errors	Output video error counter—Allow (check) or inhibit (un-check) the CC Errors counter.
Decoder Errors	Output video error counter—Allow (check) or inhibit (un-check) the decoder errors counter.
DTS Jumps	Output audio error counter—Allow (check) or inhibit (un-check) the DTS jump counter.
Frames Lost	Output video error counter—Allow (check) or inhibit (un-check) the lost frames counter.
Incoming Packets	Output video error counter—Allow (check) or inhibit (un-check) the Incoming Packets counter.
Input TS Missing Count	Output audio error counter—Allow (check) or inhibit (un-check) the count of missing input transport streams.
Outgoing Packets	Output video error counter—Allow (check) or inhibit (un-check) the Outgoing Packets counter.
Packets Dropped	Output audio error counter—Allow (check) or inhibit (un-check) the dropped packets counter.
Packets Dropped	Output video error counter—Allow (check) or inhibit (un-check) the dropped packets counter.
Packets Lost	Output video error counter—Allow (check) or inhibit (un-check) the lost packets counter.
PCR Errors	Output video error counter—Allow (check) or inhibit (un-check) the Program Clock Reference (PCR) errors counter.
PCR Resets	Output video error counter—Allow (check) or inhibit (un-check) PCR resets counter.
Pipeline Latency (ms)	Output video error counter—Allow (check) or inhibit (un-check) Pipeline Latency counter.
TEI Errors	Output video error counter—Allow (check) or inhibit (un-check) Transport Error Indicator (TEI) Errors counter.
Type	Controls how the audio or video errors are to be reported, as either Cumulative or Instantaneous: • **Cumulative**: View number of audio errors on the output elementary stream, as accumulated since new grooming associated with the transport stream. • **Instantaneous**: View number of audio errors on the output elementary stream, as a delta value resultant of the previous poll and the current poll (polling occurs every 30 seconds).
Video Underflows	Output video error counter—Allow (check) or inhibit (un-check) video underflows counter.

Displaying Error Statistics

You can view error statistics reported by the VMG, as described in the following topics:

- "Audio Elementary Stream Statistics," in next section.
- "Video Elementary Stream Statistics" on page 291.

Audio Elementary Stream Statistics

This section describes how to access statistics for audio elementary streams, as described in the following topics:

- "Input Errors," next.
- "Output Errors" on page 290.

Input Errors

Use the **Display Input Audio ES Error Statistics** dialog (Figure 167) to view the errors reported by the VMG for a selected input audio elementary stream. See Table 120 for parameter descriptions.

	Menu Path	**Grooming-Mapping** tab page, **Inputs -->** right-click on an input audio ES and select **Display Error Statistics** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 167.   Input Audio ES Error Statistics: Display
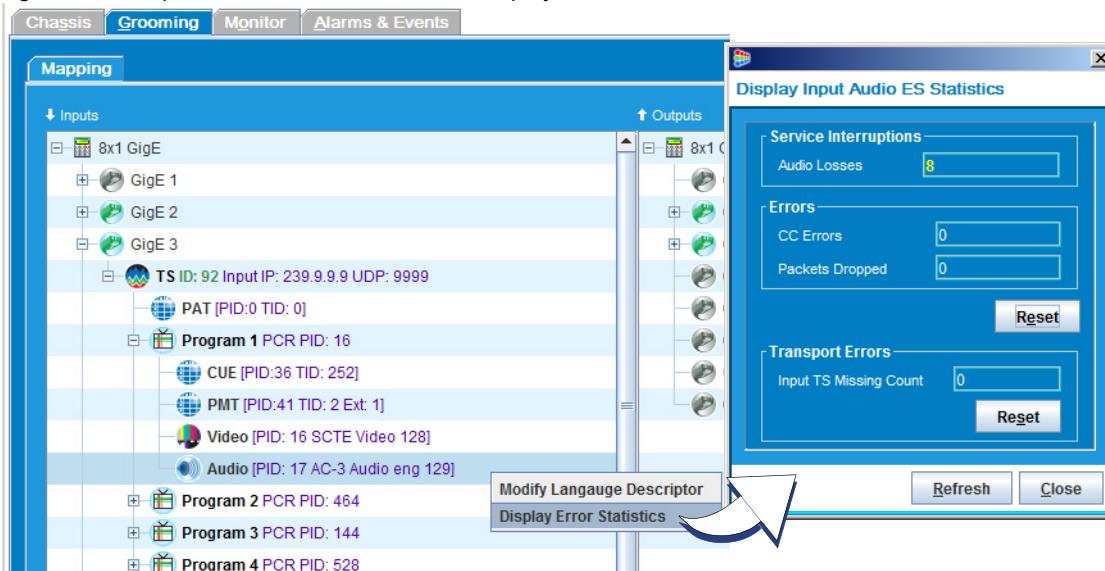
Values displayed for Input Audio ES statistics are cumulative since last **Reset** or **Refresh** of the display.

Output Errors

Use the **Display Output Audio ES Statistics** dialog to view the errors reported by the VMG for a selected output audio elementary stream. See Table 120 for parameter descriptions.

☞	**Menu Path**	**Grooming-Mapping** tab page, **Outputs -->** right-click on an output audio ES and select **Display Error Statistics** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 168.   Output Audio ES Error Statistics: Display
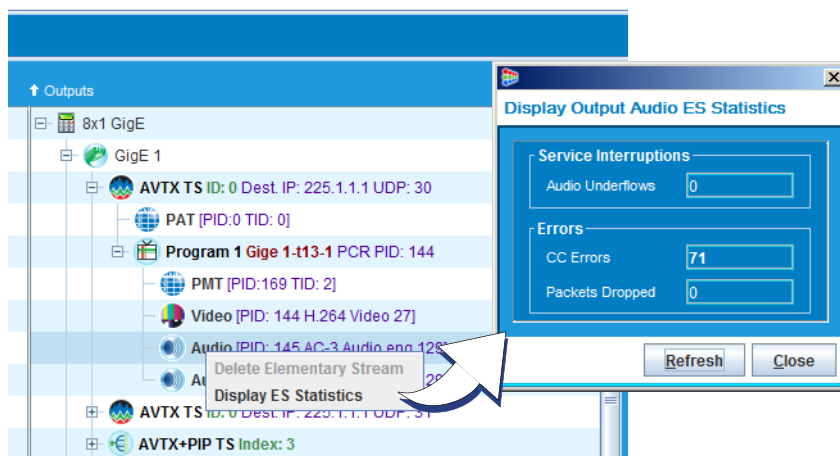
Values displayed for Output Audio ES statistics are cumulative since last **Refresh** of the display.

Table 120.   Audio ES Error Statistics Counters

Field	Description
Audio Losses	Input audio error count—View number of Service Interruptions due to audio losses.
Audio Underflows	Output audio error count—View number of underflow errors reported on the audio stream.
CC Errors	Input audio error count and/or Output audio error count—View number of continuity counter errors reported on the stream.
Input TS Missing Count	Input audio error count—View number of occurrences of PAT timeout (for 2 seconds) on an input audio transport stream.
Packets Dropped	Input audio error count and/or Output audio error count—View number of discarded packets errors reported on the stream.

Video Elementary Stream Statistics

This section describes how to access statistics for video elementary streams, as described in the following topics:

- "Input Video Statistics," next.
- "Output Video Statistics" on page 292.

Input Video Statistics

Use the **Display Input Video ES Error Statistics** dialog (Figure 169) to view various types of error counts associated with the selected video elementary stream. See Table 121 for field descriptions.

Menu Path	**Grooming-Mapping** tab page, **Inputs -->** right-click on an input video ES and select **Display Error Statistics** from the popup menu.
Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 169.   Input Video ES Error Statistics: Display
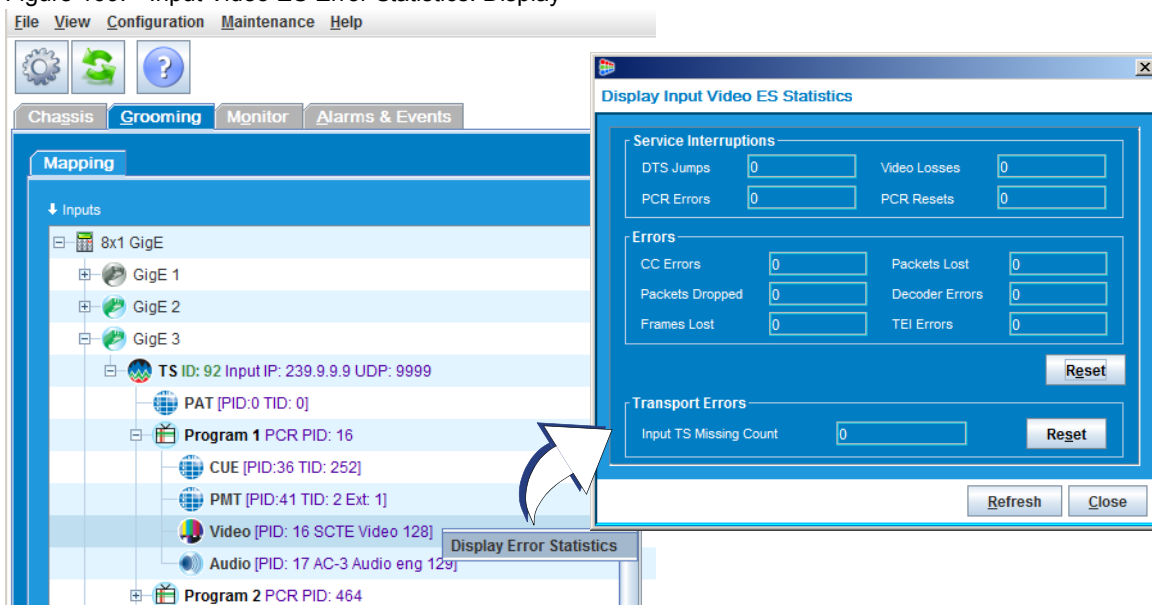
Values displayed for Input Video ES statistics are cumulative since last **Reset** or **Refresh** of the display.

Output Video Statistics

Use the Display Output Video ES Statistics dialog (Figure 170) and to view the errors reported by the VMG for a selected output audio elementary stream. See Table 121 for field descriptions.

☞	**Menu Path**	**Grooming-Mapping** tab page, **Outputs -->** right-click on an output video ES and select **Display Error Statistics** from the popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 170.   Output Video ES Errors: Display
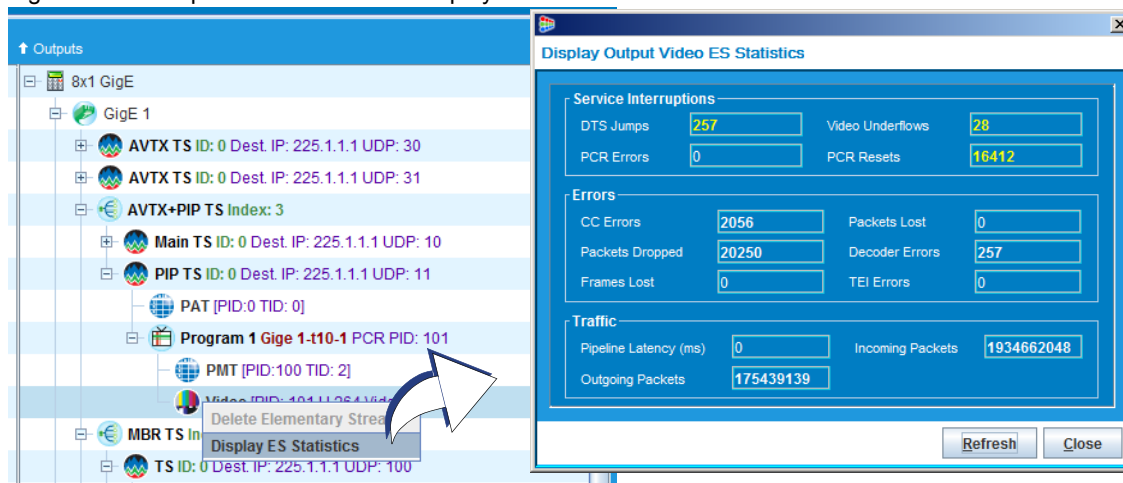
Values displayed for Output Video ES statistics are cumulative since last **Refresh** of the display.

Table 121.   Video ES Error Statistics Counters

Field	Description
CC Errors	Input video error count and/or Output video error count—View number of continuity errors counted on the elementary stream.
Decoder Errors	Input video error count and/or Output video error count—View number of decoder errors counted on the elementary stream.
DTS Jumps	Input video error count and/or Output video error count—View number of DTS Jumps counted on the elementary stream.
Frames Lost	Input video error count and/or Output video error count—View number of lost frames counted on the elementary stream.
Incoming Packets	Input video error count—View number of incoming packets counted on the elementary stream.
Input TS Missing Count	Input video error count—View number of missing transport streams counted on the elementary stream.
Outgoing Packets	Input video error count—View number of outgoing packets counted on the elementary stream.
Packets Dropped	Input video error count and/or Output video error count—View number of packet drops counted on the elementary stream.
Packets Lost	Input video error count and/or Output video error count—View number of lost packets counted on the elementary stream.
PCR Errors	Input video error count and/or Output video error count—View number of PCR errors counted on the elementary stream.

Table 121.   Video ES Error Statistics Counters (Continued)

Field	Description
PCR Resets	Input video error count and/or Output video error count—View number of PCR resets counted on the elementary stream.
Pipeline Latency (ms)	Output video error count—View number of milliseconds to process video transcoding instruction sets on the elementary stream.
TEI Errors	Input video error count and/or Output video error count—View number of Transport Error Indicator (TEI) Errors counted on the elementary stream.
Video Losses	Input video error count—View number of video losses counted on the elementary stream.
Video Underflows	Output video error count—View number of video underflows counted on the elementary stream.

Additional Monitoring Operations

Additional monitoring operations are available directly from a graph in view, via the popup menu (Figure 171 and Table 122).

☞	**Menu Path**	**Monitor tab --> ES Error/Traffic Monitor** tab page --> right-click on graph to view popup menu.
	Quick Keys	Alt **g** to access **Mapping-Grooming** page, then navigate as described above.

Figure 171.   Graph Page Popup Menu
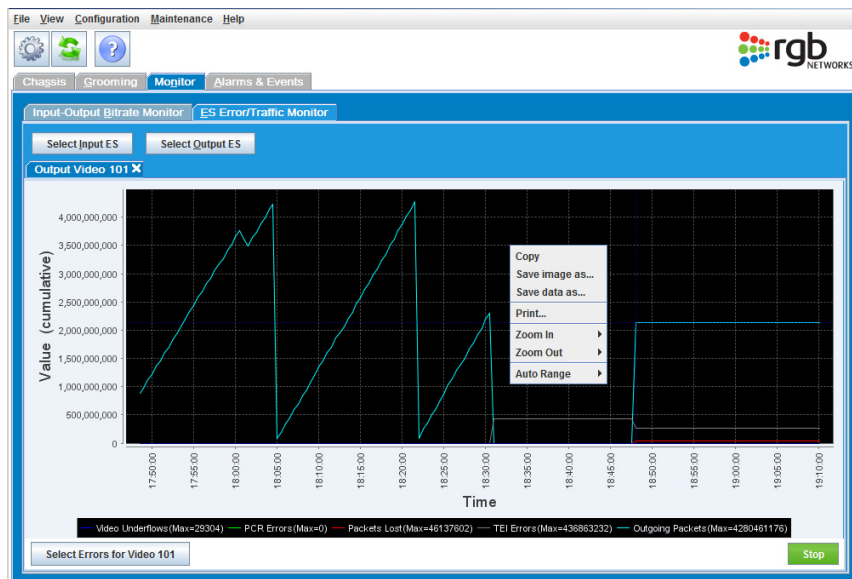
Table 122.   Monitoring Page Options

Popup Menu Option	Description
Copy	Make a copy of the image currently in view. You can paste the image into any documentation platform.
Save Image as...	Preserve the image currently in view, as a graphic file in a specified location. This option presents the Save dialog, which allows you to specify the location and name for the (.png) image file.
Save data as...	Preserve details associated with the image currently in view, as a spreadsheet file (.csv) to a specified location. this option presents the Save dialog, which allows you to specify the location and name for the (.csv) file.
Print...	Send the image from your computer to the currently configured default printer, to obtain hardcopy of the graphic on display.
Zoom in...	• Both Axes:
Zoom out...	• Domain Axis:
Auto range...	• Range Axis:

System Maintenance

This chapter describes the VMG maintenance functions that are available from the VMG *Element Manager* home page and the System Maintenance menu.

In This Chapter:

Database Backup / Save Running Configuration

Imagine Communications recommends that the Selenio VMG running configuration be saved at least once per week to ensure availability of the most up to date database in the event of a system failure.

The VMG supports two methods for backing up the configuration, as described in the following topics:

- "Saving the System Configuration—From System Maintenance Option," next.
- "Saving the System Configuration—From Home Page" on page 296.

Saving the System Configuration—From System Maintenance Option

🖘	**Menu Path**	*VMG Element Manager* main menu, select **Maintenance** -> **Backup DB Configuration**
	Quick Keys	Alt **m**, Alt **b**

Figure 172. Maintenance—DB Backup
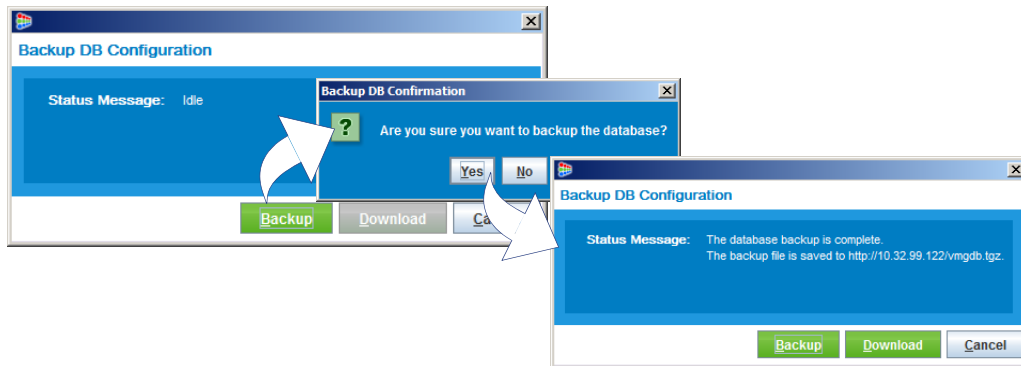
1. In the **Backup DB Configuration** dialog, click **Backup** to get started. The **Download** button on this dialog will not be sensitized until the backup has generated the tar file, at the conclusion of this process.

   The system will now query for confirmation of this backup.

2. At the **Backup DB Confirmation** screen, click **Yes** to continue.

3. Wait for the **Backup DB Confirmation** screen to display completion of the backup, in the Status Message section. This status message also contains the path and tar file name of the file generated by this backup process.

4. Click the **Download** button to access the Windows **Save** screen, which allows you to place the new .tgz file to your specified location.

Saving the System Configuration—From Home Page

1. Click the **Save Running Configuration** link at the VMG *Element Manager* home page.

2. Wait for completion of the database tar process. Notifications similar to those shown in Figure 173, will display when files are compressed into binary format, and when the tarred database is completed. You can save the tarred files when you see the ***Click here to get dbbackup.tgz*** link.

Figure 173. Tar the Running Config and Save Locally
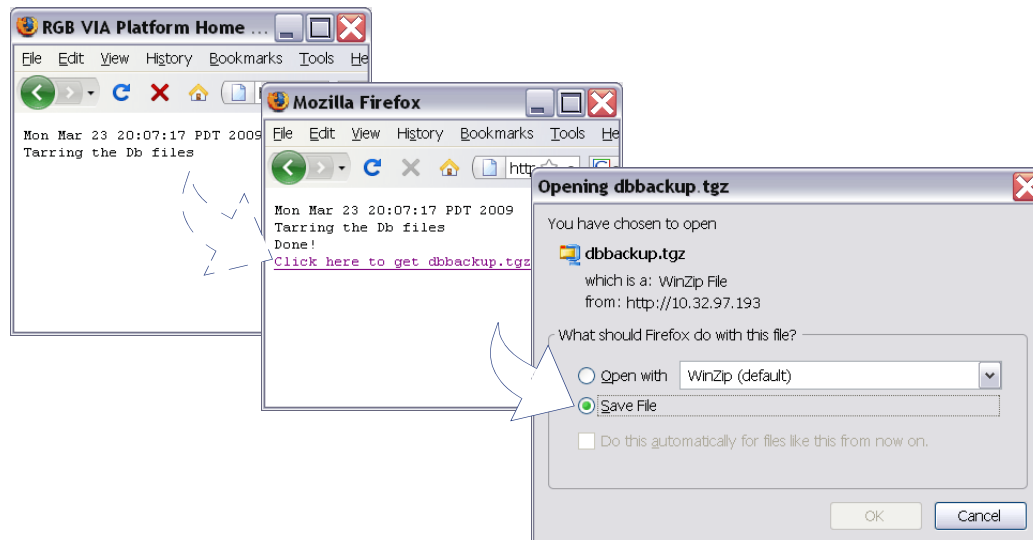
3. Click on the ***Click here to get dbbackup.tgz*** link to present the **Opening dbbackup.tgz** screen.

4. Click **Save File** and **OK** to save the backup config file to the local workstation.

> **Note:**   *Note that the screen may not be identical to that shown in* Figure 173, *as dependent on the browser in use.*

Database Restoration

When restoring the database to the same Selenio VMG from which the database was saved, or restoring a database to a different Selenio VMG, the following guidelines must be considered:

- The configuration database is not valid for an earlier version of software from which it was saved.
- A configuration database from one chassis type (Selenio VMG-6, Selenio VMG-8, or Selenio VMG-14) is not valid for a different chassis type.
- When restoring a configuration database to a different Selenio VMG from which it was originally saved, new licenses will need to be installed on the restored Selenio VMG. Contact Imagine Communications Customer Support for more information.

Use steps in this section to restore a VMG database:

1. Make sure the backed up configuration file resides on an FTP server or on a locally saved backup file the can be accessed by the Selenio VMG.

2. Use the **Restore DB Configuration** screen (Figure 174 and Table 123) to specify the name and location of the file to be retrieved.

	Menu Path	*VMG Element Manager* main menu, select **M̲aintenance -> Restore D̲B Configuration** to present the **Restore DB Configuration** screen.
	Quick Keys	Alt **m**, Alt **d**

Figure 174.   Restore DB Configuration

Parameters for local file DB restoration.

Parameters for FTP DB restoration.

Table 123.   Restore DB Configuration Fields

Field	Description	Default
Source	Specify the source of the file to be used for restoring the configuration, as either **FTP Server,** or **Local File**.	Local File
Host IP Address	For FTP setup, type the P address of the host server where the configuration database reside. This address must be associated with an FTP server, and it must be accessible to the VMG.	Blank
User Name	For FTP setup, type the login user name for the FTP server.	Blank
Password	For FTP setup, type the login password for the FTP server.	Blank
Restore license file	Restore (check) or do not restore (un-check) the license file with the database retrieval.	Checked
Directory and File Name	Type the absolute path where the configuration database is located on the FTP server. • Example: /ftproot/dbbackup.tgz	Blank

3. Click **Restore** (or use Alt **r**).

4. At the **Restore DB Confirmation** query, click <u>**Yes**</u> (or use Alt **y**) to confirm the restoration, or <u>**No**</u> (or use Alt **n**) to abort the operation.

5. If **Yes**, watch for the successful restoration message, and click **OK** to dismiss the popup screen.

6. Reboot the VMG to enable activation of the restored database. Refer to "System Reboot" on page 310
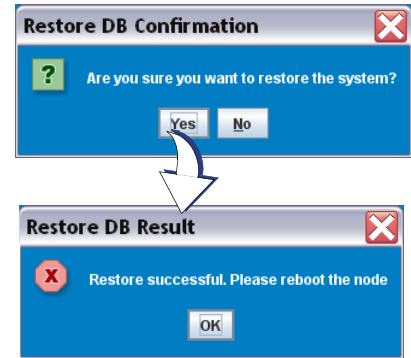
Software Upgrade

Use the VMG *Element Manager* software upgrade function to install the most current VMG software onto the VMG system and the AMP modules. Two software packages are provided with each new VMG release, which are tailored for use specifically with the VMG system modules, or the AMP modules:

- **sw.tar**

  This software package contains the software for the NPM, TCM, and VPM and is to be used whenever you are upgrading the system to the most current VMG release.

- **AmpBuild.xxxx.rgb**

  This software package contains the software for the AMP and is to be used only if AMPs are installed in the VMG. Where applicable, this upgrade should be performed after successful reboot of the VMG following a sw.tar upgrade.

Note: *Refer also to the Video Multiprocessing Gateway Software Upgrade Guide for detailed upgrade procedures. This guide, which is provided with all new VMG releases, provides instructions for handling upgrades and downgrades over multiple VMG releases.*

This section contains information about VMG software upgrades, in the following topics:

- "Upgrade Sequences," next.
- "Upgrade Steps" on page 300
- "The Software Upgrade Processes" on page 304.

Upgrade Sequences

To upgrade to the current software release, the VMG must already be loaded with (minimally) VMG software release 3.0.3. If the VMG is using a very early release, accomplishment of the 3.0.3 release requirement will require additional steps (Table 124).

Table 124.   Release Sequences for Software Upgrades

Release Currently Running on the VMG	Number of Steps to Perform SW Upgrade	Requirement
Pre 2.5.1	More than 2	Upgrade to 3.0.3
2.5.1	2	
2.5.2	2	
2.5.3	2	
3.0.x	2	
3.0.3 (GA)	1	
3.1.x	1	
3.2.x	1	
3.3.x	1	
3.5.x	1	
3.6.x	1	

Refer to the *Video Multiprocessing Gateway Software Upgrade Guide* for any specific release, for detailed upgrade procedures.

Upgrade Steps

Use steps 1 through 6 in this section to upgrade the Selenio VMG or an AMP module to the latest software.

1. Contact Imagine Communications to acquire/download the upgrade package.

2. Store the sw.tar file and/or the AmpBuild_xxxxx.rgb file on an FTP server accessible by the Selenio VMG.

3. Use the **Upgrade Software** screen, as appropriate for your selected upgrade type, to set criteria for loading new software for the VMG.
    Options are displayed in the following figures, and described in Table 125 on page 303:

    •   Upgrade from **FTP Server** (Figure 175).
    •   Upgrade from **HTTP URL** (Figure 176).
    •   Upgrade from **Local System File** (Figure 177).
    •   Upgrade from **Local AMP File** (Figure 178).

☞	**Menu Path**	VMG *Element Manager* main menu --> **Maintenance** --> **Software Upgrade**
	Quick Keys	Alt **m,** Alt **u**

Figure 175.   Upgrading Software from FTP Server

See Table 125 for a description of the software upgrade parameters associated with selection of **FTP Server** as the software source.

Figure 176.   Upgrading Software from HTTP URL

See Table 125 for a description of the software upgrade parameters associated with selection of **HTTP URL** as the software source.

Figure 177. Upgrading Software from Local System File

See Table 125 for a description of the software upgrade parameters associated with selection of **Local System File** as the software source.

Figure 178. Upgrading Software from Local AMP File

4. Click **Upgrade** (or use Alt u) to begin the upgrade.

5. At the upgrade confirmation query, click **Yes** (or use Alt **y**) to confirm and proceed with the upgrade, or click **No** (or use Alt **n**) to abort the upgrade operation.

– If **Yes**, the software upgrade procedure now begins by performing a validation check for image corruption and compatibility with the Selenio VMG system.

– When the new image has been downloaded to the applicable module, the **Upgrade Status** field will return a value of **Completed**.

6. After a system software upgrade completes, reboot the VMG to enable activation of the new software.

Note: *It is not necessary to reboot the system following an AMP upgrade.*

To perform a reboot, check the **Reboot chassis after successful software upgrade** option from the **Upgrade Software** screen. See also "System Reboot" on page 310 for more details about the *VMG Element Manager* **Reboot** tools.

Table 125.   Software Upgrade Fields

Field	Description	Default
Current Version	Current version of software installed.	Read-only
Protocol	Select protocol for retrieval of the configuration database, as one of the following options: • FTP Server • HTTP URL • Local System File • Local AMP File	Local System File
Host IP Address	Applicable only to FTP: Type the IP address of the host server where the configuration database resides. This address must be associated with an FTP server, and it must be accessible to the VMG.	Local System File
User Name	Applicable only to FTP: Type the login user name of the FTP server.	Blank
Password	Applicable only to FTP: Type the login password for the FTP server.	Blank

Directory and File Name	Type the absolute path where the configuration database is located, as appropriate for the selected Protocol and using the recommended syntax:
	• For FTP:
	`/ftproot/sw.tar`, or `/ftproot/AmpBuild_xxxxx.rgb`
	• For HTTP URL:
	`http://server.com/build-path?BUID=build#)`
	• For Local System File:
	`C:\file_directory_path\sw.tar`
		Blank

AMP File <1|2> Name	Type the absolute path where the AMP configuration is located locally. Following are examples of path entries that refer to AMP locations. • AMP one-file image: AmpBuild_4.7.5-15164.noarch.rgb • AMP two-file image: AmpBuild_4.7.5-15188.noarch.001.rgb	Blank
Reboot chassis after successful software upgrade	Either reboot the chassis (check) or do not reboot the chassis (un-check) after the software has been upgraded. Note that before the new software can take effect, the Selenio VMG requires a reboot. See also "System Reboot" on page 310 for additional information. This option is not required for AMP upgrade.	Un-checked
Upgrade Status	View the current status of the software upgrade process once started: • *In Progress* – The upgrade procedure is currently being performed. • *Completed* – The upgrade procedure completed successfully. • *Failed* – The upgrade procedure encountered an error.	Read-only

The Software Upgrade Processes

The VMG performs many tasks during software upgrade sessions. This section illustrates the overall process as well as the processes for NPM and AMP upgrades, in the following topics:.

- "VMG System Upgrade Process," next.
-

VMG System Upgrade Process

Issuing an upgrade instruction—for FTP, Local, or HTTP protocols—to the VMG results in NPM system processes (Figure 179).

Figure 179.   VMG Upgrade Process
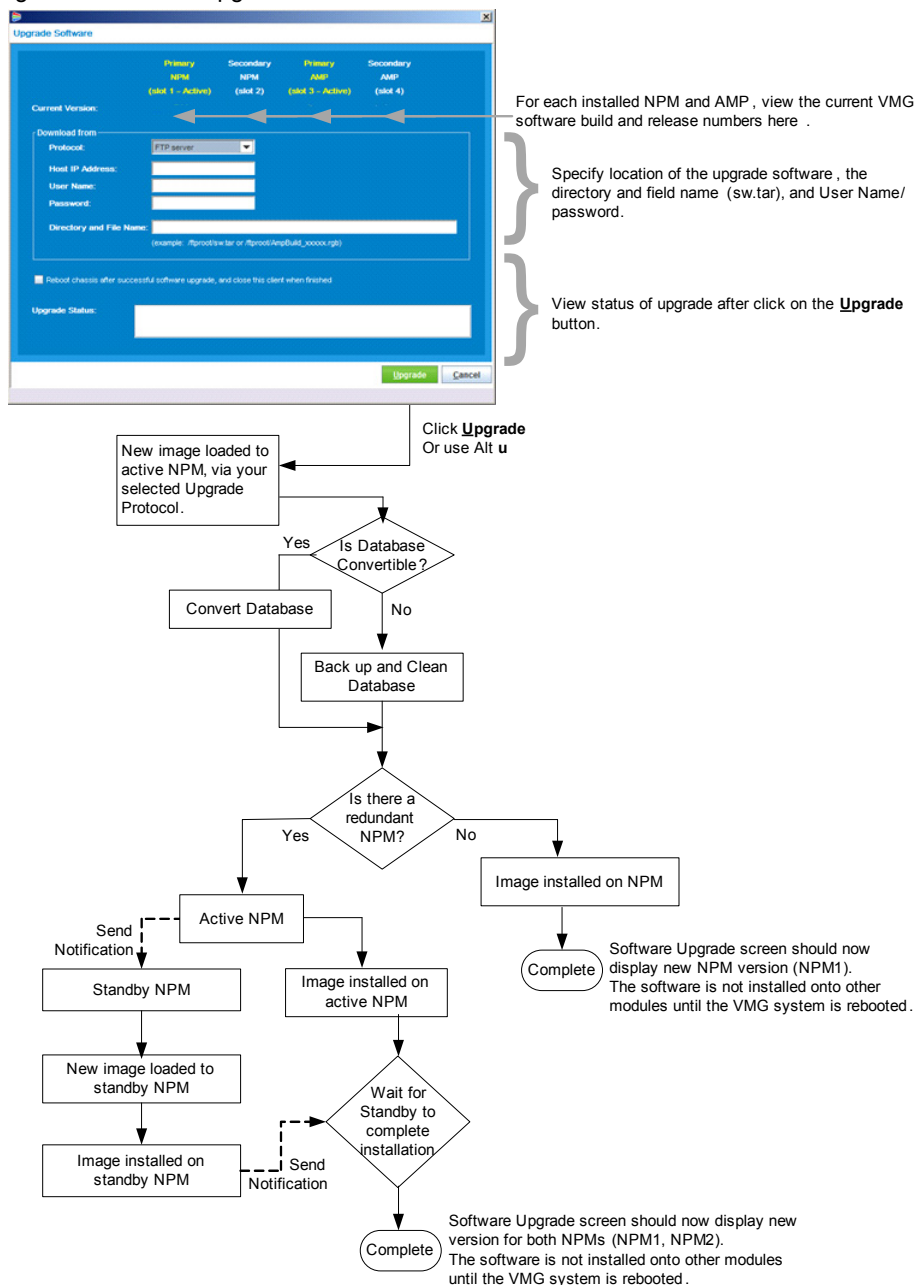
AMP Upgrade Process

Issuing an upgrade instruction—for the Local AMP File Protocol—to the VMG results in AMP system processes (Figure 179).
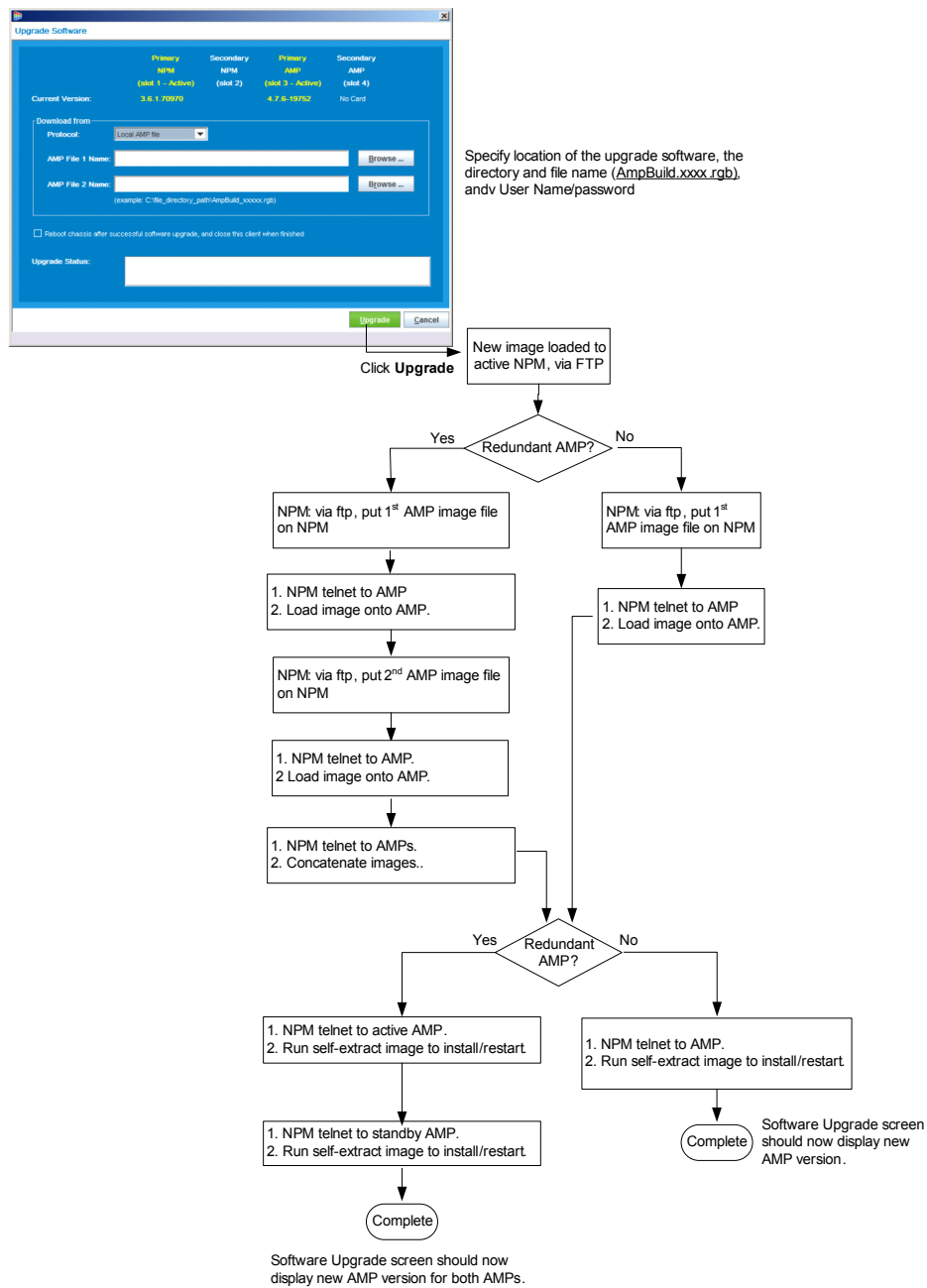
License Management

VMG License Key management is described in the following topics:

- *"VMG License Types,"* next.
- *"License Configuration" on page 307.*
- *"Acquiring License Keys" on page 309.*
- *"Entering License Keys" on page 309.*

VMG License Types

The Selenio VMG supports the license types listed and described in Table 126. Each license is issued on a per chassis basis, and will only work with the corresponding device. Bandwidth allocation for bandwidth-based licenses corresponds to the bitrate configured for the transport stream.

Note: *This note applies to the Transrating License listed in the following table.*

Table 126.   VMG License Types

License Type	Description
Base License Key	Allows configuration of non-video related features, such as the chassis and interfaces. Enables grooming and multiplexing functions.
Transrating License (Bandwidth Based) Key	In combination with the Base license, allows creation and configuration of MPEG-2, ATSC, SCTE, or DVB transports with SPTS transrating and MPTS transrating/statistical multiplexing. This is a bandwidth-based license; creation of an output transport stream will be rejected if the bandwidth needed is not available. Requires VPM.
MPEG-2 SD Transcoding License (Number Based) Key	In combination with the Base License, allows creation of SD MPEG-2 output programs through the Transcoding Module (TCM) when "Transcoding" is enabled in output transport streams. Input format can be either MPEG-2 or H.264, and must be of a supported SD or HD resolution. Transcoded output transport streams must be configured as SPTS. Requires TCM.
MPEG-2 HD Transcoding License (Number Based) Key	In combination with the Base License, allows creation of HD MPEG-2 output programs through the Transcoding Module (TCM) when "Transcoding" is enabled in output transport streams. Input format can be either MPEG-2 or H.264, and must be of a supported HD resolution. SPTS only is supported in Transcoded output transport streams. Requires TCM.
H264 SD Transcoding License (Number Based) Key	In combination with the Base License, allows creation of SD H.264 output programs through the Transcoding Module (TCM) when "Transcoding" is enabled in SPTS. Input format must be MPEG-2 or H.264 and of a supported SD or HD resolution. This license is also used to enable PIP or multi-bitrate stream outputs. Requires TCM.
H264 HD Transcoding License (Number Based) Key	In combination with the Base License, allows creation of HD H.264 output programs through the Transcoding Module (TCM) when "Transcoding" is enabled in SPTS. Input format must be MPEG-2 or H.264 and of a supported HD resolution. Requires TCM.

License Configuration

Use the **License Manager** screen (Figure 180 and Table 127) to establish licensing information for the VMG.

Menu Path	VMG *Element Manager* main menu --> **Maintenance** --> **License Manager**
Quick Keys	Alt **m,** Alt **l**

Note: *Display of decimal marks in the **License Manager** screen—as either comma or period separators—is dependent on standards for your locale.*

Figure 180.   License Manager

Table 127.   License Manager Fields

Field	Description
Serial Number	Displays the serial number of the Selenio VMG
Base License Key Transrating License (Bandwidth Based) Key MPEG-2 SD Transcoding License (Number Based) Key MPEG-2 HD Transcoding License (Number Based) Key H264 SD Transcoding License (Number Based) Key H264 HD Transcoding License (Number Based) Key	These fields display the currently installed license keys, if installed.
Base License	Indicates if the base license entered is valid and currently enabled.

Table 127.   License Manager Fields (Continued)

Field	Description

Transrating Bandwidth License (Mbps)
MPEG-2 SD Transcoding Number License
MPEG-2 HD Transcoding Number License
H264 SD Transcoding Number License
H264 HD Transcoding Number License
	These fields display the respective number of purchased, used, and available licenses for each type:
	• *Purchased* – The total number of licenses or bandwidth purchased.
	• *Used* – The number of purchased licenses or bandwidth currently in use.
	• *Available* – The number of purchased licenses or bandwidth currently available for use.
	• *Enabled* – Applies to Base License only. A Base License can only be enabled or disabled. No number or bandwidth licensing is associated with it.
	• *Status* – Indicates if the particular license is valid. Examples of an invalid license are:
	   - Invalid serial number information due to erroneous configuration from one Selenio VMG to another.
	   - Licensing capacity is less than allowable configuration for the Selenio VMG.
	   - Missing or corrupt license file due to system malfunction.
	   - When the *Status* field is un-checked, contact Imagine Communications Customer Support for additional assistance.

New License Key Type	The type of new license corresponding to the license key being entered in the *New License Key* field. Options are: Base, Transrating bandwidth, DPI Bandwidth, DPI Number, Program Substitution, MPEG2 SD, MPEG2 HD, H264 SD, H264 HD.
New License Key	The new license key to install.

Acquiring License Keys

To acquire the appropriate license keys, contact Imagine Communications and submit the following information:

- The Selenio VMG chassis serial number.
- The type(s) of license(s) desired.

Note: *The Selenio VMG chassis serial number is located at the top of the **License Manager** screen.*

Entering License Keys

Use the **License Manager** screen to set license keys.

Menu Path	VMG *Element Manager* main menu --> **M**aintenance --> **L**icense Manager
Quick Keys	Alt **m,** Alt **l**

1. Select the appropriate license type from the **New License Key Type** drop down list.
2. Enter the corresponding license key in the **New License Key** field.

Note: *To avoid key entry errors due to typos, copy the key from the email in which the key was provided, then paste it into the **New License Key** field.*

3. Click the **Apply New License** button (or use Alt **a**) to apply the license key.
4. Repeat steps 1- 3 for each additional license to be installed.

System Reboot

⚠️ **Caution:** *Performing a system reboot will interrupt all video services.*

To reboot a Selenio VMG from *Element Manage*r, go to the **Reboot** screen.

👉	**Menu Path**	VMG *Element Manager* main menu --> <u>M</u>aintenance --> <u>R</u>eboot
	Quick Keys	Alt **m,** Alt **r**

1. At the **Reboot** screen, click to select the appropriate reboot condition and click **Apply reboot** (or use Alt **a**) to confirm. See Table 128 for descriptions about these options.

2. At the **Password Verification** screen (Figure 2) enter the Administrative password and click <u>O</u>K (or use Alt **o**).

3. The system now queries for confirmation of the reboot by presenting a Reboot Confirmation dialog.

   Depending upon which **Reboot** option was selected in the **Reboot** options popup screen, one of the following confirmation queries (Figure 128) is presented.

4. Click <u>O</u>K (or use Alt **o**) in the **Reboot Confirmation** screen to enable the VMG reboot.
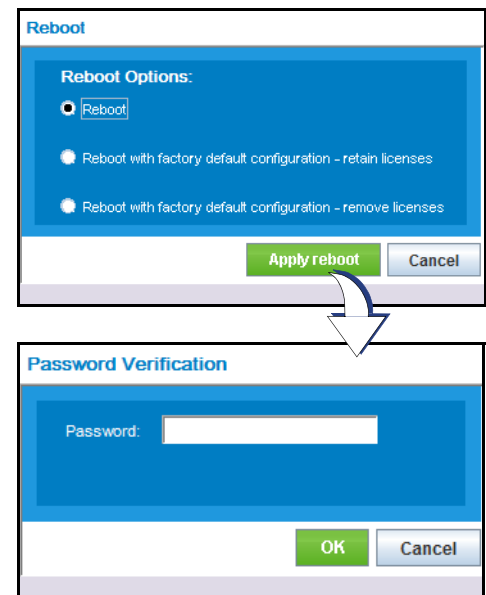
Table 128.   Reboot Options

Reboot • Preserve the current configuration. • Preserve all licenses.	Reboot Confirmation ⊠ ? This option will reboot the VMG and close the Element Manager. Do you wish to proceed? Yes No
Reboot with factory default configuration-retain licenses • Reset the database to its factory default setting. • Preserve licensing.	Reboot Confirmation ✕ ? This option will reboot the VMG and reset the database to factory default configuration while retaining the licenses. Do you wish to proceed? Yes No
Reboot with factory default configuration-remove licenses • Reset the database to its factory default settings. • Remove all licenses.	Reboot Confirmation ✕ ? This option will reboot the VMG, reset the database to factory default configuration, and *remove* the licenses. Do you wish to proceed? Yes No

System Shutdown

If power must be removed from the Selenio VMG chassis, as when moving the Selenio VMG chassis to a different rack, perform a system shutdown.

Use the **System Shutdown** screen to issue a system shutdown instruction to the VMG.

⚠ **Caution:** *Performing a system shutdown interrupts all video services and powers down the chassis. After the system is shut down, the Selenio VMG chassis must be manually powered on using the facility power switch.*

Menu Path	VMG *Element Manager* main menu --> <u>M</u>aintenance --> <u>S</u>ystem Shutdown
Quick Keys	Alt **m,** Alt **s**

1. At the **System Shutdown** screen, click <u>Yes</u> (or use Alt **y**).
2. At the **Password Verification** screen, enter your password and click <u>OK</u> (or use Alt **o**) to complete this operation.
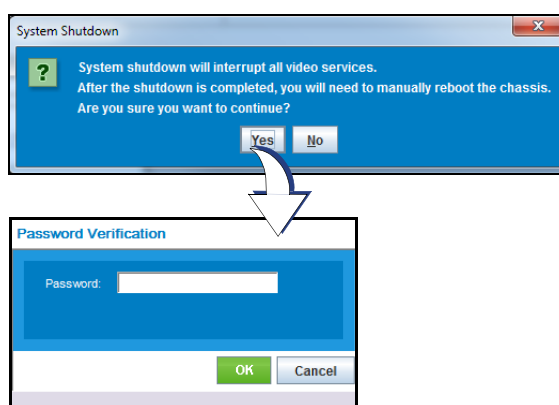
NPM Redundancy Switch

In addition to the Selenio VMG initiating an NPM redundancy switch when certain failover conditions are met, the redundancy condition can be manually switched over by using the **NPM Redundancy Switch.** Activating the redundancy switch causes the standby NPM to become active and the currently active NPM to switch to standby after the system is rebooted.

⚠️ **Caution:** *If you have AMP cards installed and configured, performing an NPM redundancy switch will cause a switchover to the standby AMP card as well.*

ℹ️ **Note:** *The NPM Switchover feature only applies if two NPMs are installed in the VMG chassis, the system is fully redundant, and the standby NPM has been online for at least three minutes. If the standby NPM has not been online for at least three minutes, the VMG Element Manager will not allow manual switchover.*

Use the **NPM Switchover** screen (Figure 181) to manually perform an NPM redundancy switch.

Menu Path	VMG *Element Manager* main menu --> <u>M</u>aintenance --> <u>N</u>PM Switchover
Quick Keys	Alt **m,** Alt **s**

Figure 181. NPM Switchover Confirmation
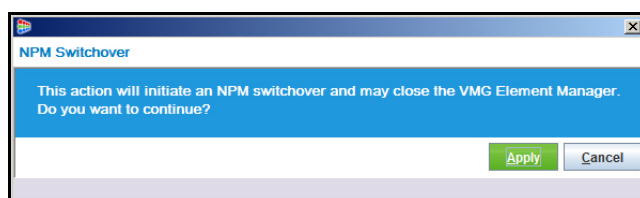
At this screen, click **Apply** (or use Alt **a**) to proceed with the NPM switchover.

An attempt to use this function with only NPM in the system will result in display of an error message.

Figure 182. NPM Switchover Error
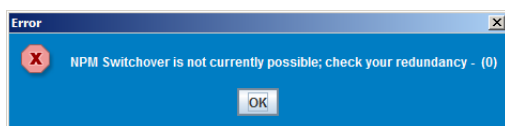
Click **OK** to dismiss this screen and to abort the switchover operation.

Program Redundancy Switch to Primary

This operation requires that program redundancy be configured prior to attempting the switchover. See also "Program Redundancy" on page 258 for more information. Use the **Regroom** screen (Figure 183) to implement a program switchover.

Menu Path	VMG *Element Manager* main menu --> <u>M</u>aintenance --> <u>P</u>rogram Redundancy Switch to Primary
Quick Keys	Alt **m,** Alt **p**

Figure 183. Regroom
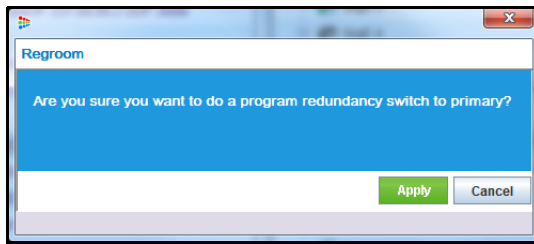
At this screen, click **Apply** (or use Alt **a**) to proceed with the program redundancy switchover,

Time Offset Table (TOT)

The TOT conveys additional information about summer and winter time periods and gives the local time offset with respect to UTC for different countries or regions. If the TOT is locally generated, user interaction is required to define the country or region in which the receiver is operated.

The Selenio VMG supports the required DVB tables, including TOT.

Use the **Setup Time Offset Table (TOT)** screen to set parameters for TOT (Figure 184 and Table 129).

Menu Path	VMG *Element Manager* main menu --> **Maintenance** --> **Setup Time Offset Table (TOT)**
Quick Keys	Alt **m,** Alt **t**

Figure 184. Setup Time Offset Table (TOT)

Start Time and End Time fields are displayed after you select a value in the DST Offset field.

1. At the **Setup Time Offset Table (TOT)** screen, use the drop-down selection fields to set regional, clock, and calendar values.

2. Click **Apply** (or use Alt **a**) to save and use your TOT settings.

Table 129. Tot Time Offset Settings

Field	Description	Default
Country Code	The three character country code.	USA
Region ID	The region identifier, with range 0 to 60. If there is only one time zone in the country, this value is zero. Otherwise, the time zones are numbered from 1 (most easterly) up to 60, (the most westerly).	0

Table 129.   Tot Time Offset Settings (Continued)

Field	Description	Default
DST Offset	The Daylight Savings Time (DST) offset: (range is -2:00, -1:30, -1:00, -0:30, 0, +0:30, +1:00, +1:30, +2:00). The value is 0: when DST is not applicable; otherwise the offset to be applied to current time when DST is in effect. For instance, in the US, the local time offset when DST is not in effect is -8, and when DST is in effect, it is –7. So, the DST offset is +1. polarity is 1 as time is behind UTC.	00:00
The following fields will only be displayed if the DST offset is set to anything but 00:00.		
Start Time: Day	Indicates what day DST takes effect in the current year. Choices are: 1st, 2nd, 3rd or Last Sunday.	1st Sunday
End Time: Day	Indicates what day DST ends in the current year. Choices are: 1st, 2nd, 3rd or Last Sunday.	1st Sunday
Start Time: Month	Indicates the month DST takes effect in the current year. Choices are: January - December	Jan
End Time: Month	Indicates the month DST ends in the current year Choices are: January - December.	Jan
Start Time: Hour	Indicates the hour (military time) DST takes effect in the current year. Choices are: 0-23.	0
End Time: Hour	Indicates the hour (military time) DST ends in the current year. Choices are: 0-23.	0
Start Time: Minute	Indicates the minute DST takes effect in the current year. Choices are 0-59.	0
End Time: Minute	Indicates the minute DST ends in the current year. Choices are: 0-59.	0

System Alarms and Events

This chapter describes the use of the *VMG Element Manage*r to monitor system health. The **Alarms & Events** tab on the Selenio VMG *Element Manager* screen provides system information and health status.

To view the complete list of VMG Alarms and Events, refer to Appendix B, "Selenio VMG Alarms and Events" on page 336.

In This Chapter:

- *"Active Alarm,"* next.
- *"Event History" on page 317.*

Active Alarm

For each alarm generated from the VMG, the time raised, acknowledged status, severity, category, type, and description are displayed in the **Active Alarm tab page.** The information on this screen can be sorted by clicking on the column headings. Clicking on the **Apply** button will retrieve the most recent alarms, if any.

Use the **Active Alarm** tab page to view the currently active alarms reported by the VMG (Figure 185 and Table 130).

	Menu Path	**Alarms&Events** tab --> **Active Alarm** tab
	Quick Keys	Alt **a**, click **Active Alarm** tab

Figure 185. Active Alarm Tab Page
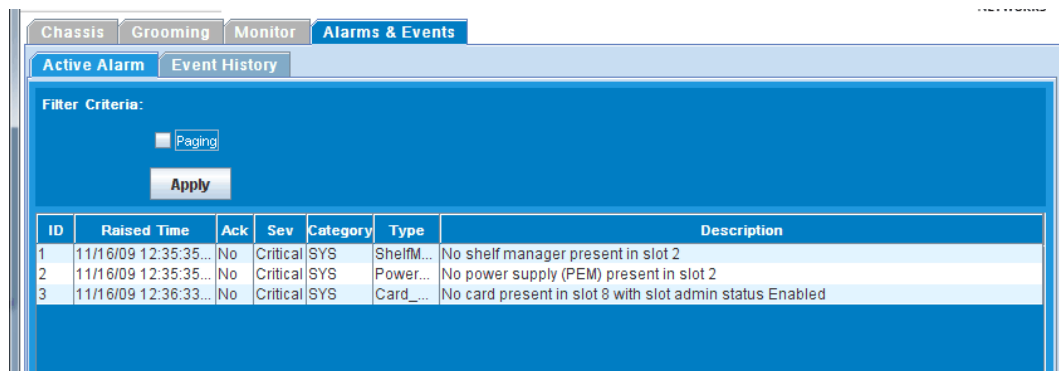
Table 130. Active Alarm Tab Page

Field	Description
ID	The identification number of the alarm.
Raised Time	The time the alarm occurred.
Ack	Shows if the alarm has been acknowledged or not. Until an alarm is acknowledged, the central telco alarm/bell will be active.
Severity	The severity of the alarm. One of Critical, Major, Minor, or Info.
Category	The general category for the alarm. See Appendix B, "Selenio VMG Alarms and Events" for details.
Type	The type of alarm that occurred.
Description	A description of the alarm.

Once an alarm has been triggered, it must be acknowledged to activate the alarm cutoff.

Acknowledging Alarms

Current status of alarm acknowledgment is reported in the **Ack** column of the **Alarm** tab page as either *Yes* (acknowledged) or *No* (not acknowledged).

Acknowledged alarms remain in the **Active Alarm** list until cleared. Once an alarm condition is resolved, the alarm is removed from the active list. For example, when a port is not functioning ("operationally down") an alarm is added to the list. Later, after the port becomes operationally up, the alarm is cleared and removed from the list.

Use the **Active Alarm** tab page to acknowledge alarms:

1. Ensure that the alarm to be acknowledged has not already been acknowledged. The Ack column should report No.
2. Click on the alarm in the **Active Alarm** list to highlight your selection.
3. Right-click and choose **Ack Alarm** from the popup menu.

   Note that the *Ack* column for the selected alarm row now reports Yes, and acknowledgment of an alarm is recorded in the Event History.

Paging - Alarms

The paging option allows you to move quickly through the alarm displays, on a pagination basis. When enabled, you can choose to view the previous or next page of alarm reports, or jump to the first or last pages.

Use the **Active Alarm** tab page to enable or disable the paging function for the displayed alarms.

- Enable (check) or disable (un-check) **Paging** in the **Filter Criteria** section of the **Active Alarm** screen.
  - If paging is selected, four buttons are displayed for navigating the alarm log: **First, Previous, Next**, and **Last** (Figure 186).
  - If paging is disabled, the **First, Previous, Next**, and **Last**.buttons are hidden from view.

Figure 186.   Active Alarms List with Paging Enabled
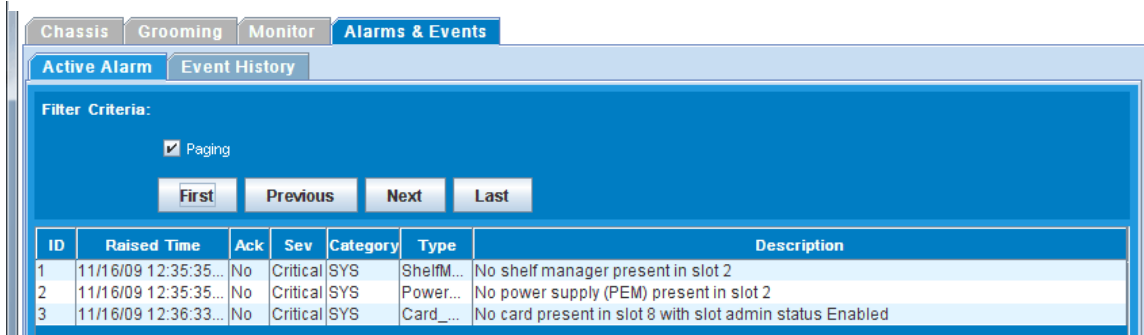
Event History

An entry is added to the event history table each time an event occurs. Some events result in alarms being raised or cleared. Acking an alarm adds an entry to the list. This provides a history of alarms on the system. For each event, the time stamp, severity, category, type, and description are displayed on the Event History tab page.

- The information on this screen can be sorted by clicking on the column headings.
- Clicking the **Apply** button will retrieve the latest events, if any.

Use the **Event History** tab page (Figure 187 and Table 131) to view the current events reported by the VMG.

Menu Path	**Alarms&Events** tab --> **Event History** tab
Quick Keys	Alt **a**, click **Event History** tab

Figure 187.   Event History

Table 131.   Alarms & Events - Event History Settings

Field	Description
ID	The identification number of the event.
Time Stamp	The time the event occurred.
Severity	The severity of the event: Critical, Major, Minor, or Info.
Category	The general category for the event. See Appendix B, "Selenio VMG Alarms and Events" for details.
Type	The type of event that occurred.
Description	A description of the event.

Paging - Events

The paging option allows you to move quickly through the event log, on a pagination basis. When enabled, you can choose to view the previous or next page of event logs, or jump to the first or last pages.

Use the **Event History** tab page to enable or disable the paging function for the displayed events.

• Enable (check) or disable (un-check) **Paging** in the **Filter Criteria** section of the **Event History** screen.

  – If paging is selected, four buttons are displayed for navigating the alarm log: **First, Previous, Next**, and **Last** (Figure 188).

  – If paging is disabled, the **First, Previous, Next**, and **Last**.buttons are hidden from view.

Figure 188.　Event History with Paging Enabled

Troubleshooting

If you are experiencing problems with your Selenio VMG, please contact Imagine Communications Customer Support. Prior to doing so, you should gather as much information as possible about the problem so that you can provide a comprehensive description of the situation to Customer Support.

In This Chapter:

LED Indicators

The LED indicators on the Selenio VMG should be your first line of inquiry if any Selenio VMG component is not performing correctly.

The LED indicators are fully described in the Selenio VMG *Hardware Setup Guide* that accompanies your Selenio VMG-6, Selenio VMG-8, or Selenio VMG-14 chassis.

Event Log Analysis

If asked to do so by customer support, access the event log. You will be instructed on this procedure by the customer support engineer.

Software Upgrade

Use the *Selenio VMG Element Manager* to upgrade any software image of the Selenio VMG.

See "Reboot the VMG to enable activation of the restored database. Refer to "System Reboot" on page 310" on page 299 for details about upgrading software.

See the *Video Processing Gateway Software Upgrade Guide* for upgrade procedures.

Clearing the Java Web Start Cache

If you need to downgrade your *Selenio VMG Element Manager* software, be sure to clear the Java web start cache.

Note: *Steps in this section are based on working with a PC loaded with Windows 7 Professional.*

Go to the Windows **Java Control Panel** (Figure 189) to get started:

Menu Path	Windows: Control Panel --> double-click the Java icon.
	or
	Windows: Start Menu --> Control Panel --> Java

Figure 189.   Java Control Panel
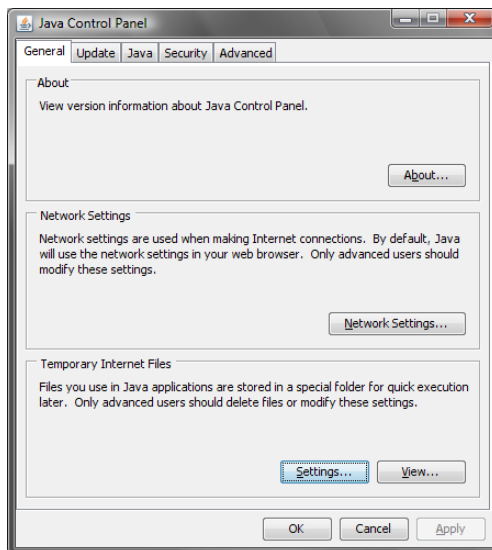
1. Click the **Settings...** button in the *Temporary Internet Files* section. The **Temporary Files Settings** screen (Figure 190) is now presented.

Figure 190.   Temporary Files Settings
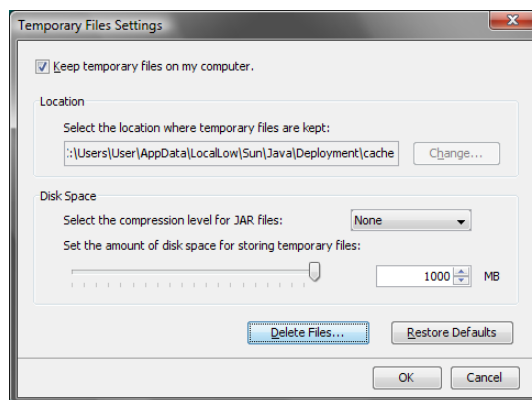
2. Click the **Delete Files...** button. The **Delete Temporary Files** confirmation screen (Figure 191) is now presented.

Figure 191.   Delete Temporary Files

Be sure to select Applications and Applets
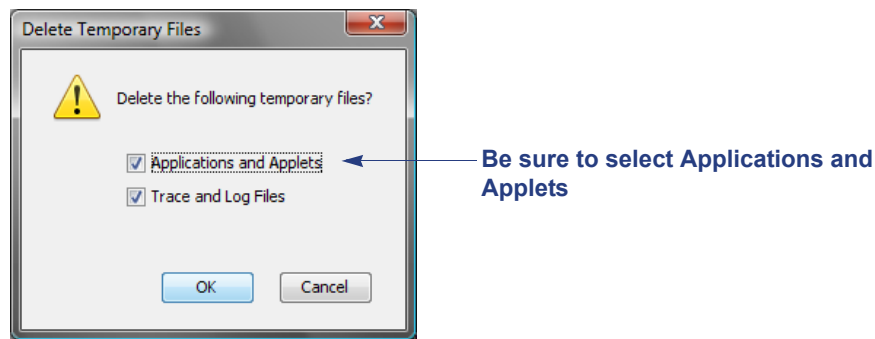
3. Ensure that the *Applications and Applets* option is selected, and click the **OK** button to clear the cache.

Contacting Customer Support

Note: *For Selenio VMG products or software purchased through other distribution partners, please contact their customer service for product support.*

Before you contact Customer Support, have the following information handy:

- A clear description of the problem.
- Steps to reproduce the problem, if applicable.
- Serial number of the Selenio VMG, as shown in the **System Type** screen.

Menu Path	**Chassis** tab page, **System Information** -> *Chassis* section --> right-click on *Chassis Type* row and select **Detail**. or **Chassis** tab page, **System Information** -> *Chassis* section --> double-click on *Chassis Type* row.

Figure 192.   System Type Information
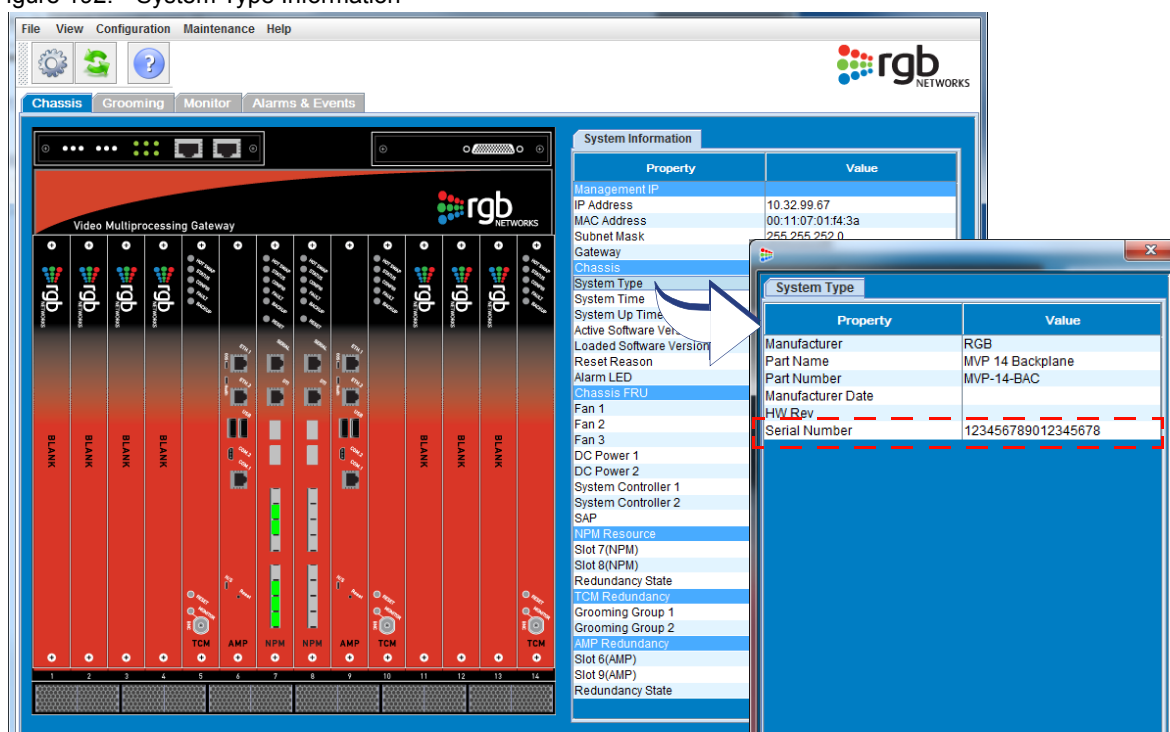
Customers who purchased their product directly from Imagine Communications, or have purchased extended product support directly from Imagine Communications should contact customer support via one of the methods listed in Table 132.

Table 132.   Customer Support Contact Information

Method	Details
Phone	+1 (877) RGB-NETW (877-742- 6389) or +1 (408) 701-2800
Customer Portal	http://support.rgbnetworks.com
Email	support@rgbnetworks.com

Searching the Customer Portal

To search the **Customer Portal** for a specific document or solution, proceed as follows:

1. Log in to the RGB Customer Portal site (http://support.rgbnetworks.com).

Figure 193.   RGB Customer Portal Home Page
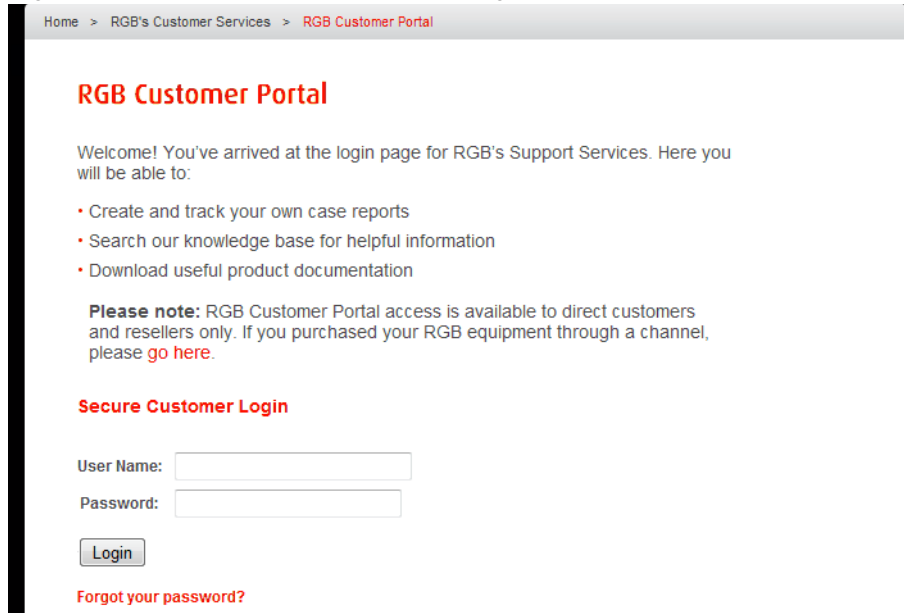
2. From the **RGB Customer Portal** home page, click on the **Knowledge Base** tab:

Figure 194.   Customer Portal Home Page Options
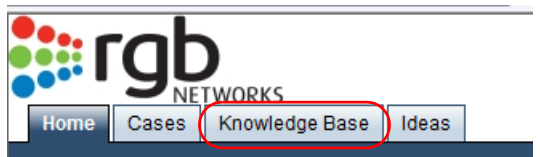
Direct Customers - RGB Customer Portal home   **Resellers - RGB Customer Portal home**
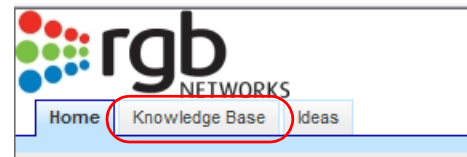
3. From the **Knowledge Base** home page, enter the desired search term in the **Search** box and tap the `[Enter]` key:

Figure 195.   Knowledge Base Search Options

Direct Customers - Knowledge Base search   **Resellers - Knowledge Base search**
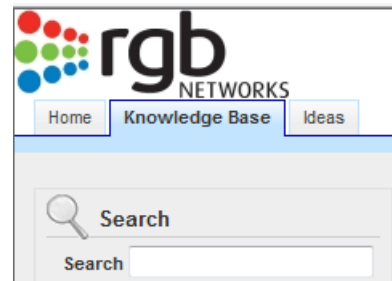
Configuration Reference

This appendix contains tables of supported sampling and bit rates for channels.

In This Appendix:

- "Audio Configuration Reference,"
- "Resolution Configuration Reference" on page 329
- "Locales and Decimal Entries" on page 330.
- "Dolby Dynamic Range Scale Entry Guidelines" on page 333
- "Video Profile Configuration Reference" on page 334.
- "Language Descriptor Settings" on page 334

Audio Configuration Reference

Reference tables provided in this section:

- "Audio Capacities—AMP," next.
- "Audio Bitrates and Sampling Rates," on page 326.
- "AAC HE Audio Configuration Reference," on page 326.
- "AAC HEv2 Audio Configuration Reference," on page 327.
- "AAC LC Audio Configuration Reference," on page 327.
- "MPEG-1 LII," on page 328.
- "MPEG-2 LII," on page 328.
- "Encode Dolby (AC-3)," on page 328.
- "Encode Dolby Plus (E-AC-3)," on page 328.

Table 133.   Audio Capacities—AMP

Audio Codec	Channels	Weight	Max
HE-AAC	1	0.40	225
	2	0.57	157
	5.1	0.70	86
HE-AACv2	2	0.44	204
AAC-LC	1	0.36	250
	2	0.49	183
	5.1	0.70	128
MPEG-1 LII	1	0.28	321
	2	0.32	281
MPEG-2 LII	1	0.28	321
	2	0.32	281
AC-3 (Dolby Digital)	1	0.34	264
	2	0.42	214
	5.1	0.58	155
E-AC-3 (Dolby Digital Plus)	1	0.39	230
	2	0.56	160
	5.1	0.86	104

Table 134.   Audio Bitrates and Sampling Rates

Audio Codec	Default Sample Rate (kHz)	Default Channels	Default Bitrate (Kbps)
HE-AAC	44.1	Stereo	80
HE-AACv2	44.1	Stereo	40
AAC-LC	44.1	Stereo	128
MPEG-1 LII	48	Stereo	192
MPEG-2 LII	24	Stereo	128
AC-3 (Dolby Digital)	48	Stereo	192
E-AC-3 (Dolby Digital Plus)	48	Stereo	128

Table 135.   AAC HE Audio Configuration Reference

Sampling Rate (kHz)	Channel	Bit Rates																			
		10	12	14	16	20	24	28	32	40	48	56	64	80	96	112	128	160	192	224	256
16	mono(1)	x	x	x	x	x	x	x	x	x											
	stereo(2)				x	x	x	x	x	x	x	x									
	surround(6)										x	x	x	x	x	x	x				
22.05	mono(1)	x	x	x	x	x	x	x	x	x	x										
	stereo(2)				x	x	x	x	x	x	x	x	x								
	surround(6)										x	x	x	x	x	x	x	x			
24	mono(1)	x	x	x	x	x	x	x	x	x	x										
	stereo(2)				x	x	x	x	x	x	x	x	x								
	surround(6)										x	x	x	x	x	x	x	x			
32	mono(1)				x	x	x	x	x	x	x	x									
	stereo(2)					x	x	x	x	x	x	x	x								
	surround(6)												x	x	x	x	x	x			

Table 135.   AAC HE Audio Configuration Reference (Continued)

Sampling Rate (kHz)	Channel	10	12	14	16	20	24	28	32	40	48	56	64	80	96	112	128	160	192	224	256
44.1	mono(1)				x	x	x	x	x	x	x	x	x								
	stereo(2)								x	x	x	x	x	x	x						
	surround(6)														x	x	x	x	x	x	x
48	mono(1)				x	x	x	x	x	x	x	x	x								
	stereo(2)								x	x	x	x	x	x	x						
	surround(6)														x	x	x	x	x	x	x

Table 136.   AAC HEv2 Audio Configuration Reference

Sampling Rate (kHz)	Channel	10	12	14	16	20	24	28	32	40	48	56	64
16	stereo(2)	x	x	x	x	x	x	x	x	x			
22.05	stereo(2)	x	x	x	x	x	x	x	x	x	x		
24	stereo(2)	x	x	x	x	x	x	x	x	x	x		
32	stereo(2)				x	x	x	x	x	x	x	x	
44.1	stereo(2)				x	x	x	x	x	x	x	x	x
48	stereo(2)				x	x	x	x	x	x	x	x	x

Table 137.   AAC LC Audio Configuration Reference

Sampling Rate (kHz)	Channel	6	7	8	10	12	14	16	20	24	28	32	40	48	56	64	80	96	112	128	160	192	224	256	320	384	448	512
8	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x														
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x										
11.03	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x												
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								
12	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x												
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								
16	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x												
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x						
	surround(6									x				x	x	x	x	x	x	x	x	x						
22.05	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x									
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
	surround(6	x												x	x	x	x	x	x	x	x	x	x					
24	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x									
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
	surround(6	x												x	x	x	x	x	x	x	x	x	x					
32	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
	surround(6	x															x	x	x	x	x	x	x	x				
44.1	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	surround(6	x															x	x	x	x	x	x	x	x	x	x	x	
48	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	surround(6																x	x	x	x	x	x	x	x	x	x	x	x

Table 138.   MPEG-1 LII

Sampling Rate (kHz)	Channel	Bit Rates												
		32	48	64	80	96	112	128	160	192	224	256	320	384
32	mono(1)	x	x	x	x	x	x	x	x	x				
	stereo(2)			x		x	x	x	x	x	x	x	x	x
44.1	mono(1)	x	x	x	x	x	x	x	x	x				
	stereo(2)			x		x	x	x	x	x	x	x	x	x
48	mono(1)	x	x	x	x	x	x	x	x	x				
	stereo(2)			x		x	x	x	x	x	x	x	x	x

Table 139.   MPEG-2 LII

Sampling Rate (kHz)	Channel	Bit Rates												
		8	16	24	32	40	48	56	64	80	96	112	128	144	160
16	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
22.05	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	stereo(2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 140.   Encode Dolby (AC-3)

Sampling Rate (kHz)	Channel	56	64	80	96	112	128	160	192	224	256	320	384	448	512
32	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	stereo(2)				x	x	x	x	x	x	x	x	x	x	x
	5.1surround(6)									x	x	x	x	x	x
44.1	mono(10	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	stereo(2)				x	x	x	x	x	x	x	x	x	x	x
	5.1surround(6)									x	x	x	x	x	x
48	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	stereo(2)				x	x	x	x	x	x	x	x	x	x	x
	5.1surround(6)									x	x	x	x	x	x

Table 141.   Encode Dolby Plus (E-AC-3)

Sampling Rate (kHz)	Channel	56	64	80	96	112	128	160	192	224	256	320	384	448	512
48	mono(1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	stereo(2)		x	x	x	x	x	x	x	x	x	x	x	x	x
	5.1surround(6)								x	x	x	x	x	x	x

Resolution Configuration Reference

Reference tables provided in this section:

- "HD Input Resolution Class," next.
- "SD Input Resolution Class," on page 329.
- "Full HD Input Resolution Class," on page 329.
- "Resolution Combinations for SD, HD, and Full HD," on page 329.

Table 142.   HD Input Resolution Class

Yellow (high)	1280x720, 1024x576, 960x720, 960x540
Blue (medium)	864x486, 848x480, 768x432, 640x480
Red (low)	640x360, 624x352, 512x288, 480x368, 480x320, 480x272, 416x240, 352x240, 320x240, 320x180, 320x176, 192x192, 128x96, 96x96

Table 143.   SD Input Resolution Class

Yellow (high)	1024x576
Blue (medium)	768x432, 720x576, 720x480, 640x480
Red (low)	640x360, 624x352, 512x288, 480x368, 480x320, 480x272, 448x336, 416x240, 400x360, 400x224, 352x288, 352x240, 320x240, 320x180, 320x176, 192x192, 128x96, 96x96

Table 144.   Full HD Input Resolution Class

Green	1920x1080, 1280x720

Resolutions can be combined as shown in Table 145:

Table 145.   Resolution Combinations for SD, HD, and Full HD

HD	**SD**	**Full HD**
• 1 Yellow + 1 Blue + 2 Red. • 1 Yellow + 3 Red. • 2 Blue + 2 Red. • 1 Blue + 3 Red. • 4 Red.	• 2 Blue + 2 Red. • 1 Blue + 3 Red. • 4 Red.	• 1 green

Locales and Decimal Entries

The Selenio VMG Element Manager will accept and display decimal values as commonly displayed for the language (and country) selected as the *Format* in the *Region and Language* menu from the control panel of Windows 7. In addition, either a period or a comma will be accepted during input of fields allowing a fractional value but will be displayed based on the *Format* defined by the selected language (and country).

Table 146.   Localization and Decimal Entries

Input	Display	Screens	Effect
x	x	TS bitrate for several Create, Modify, and Configure screens	Rounded to nearest bit per second.
x	x	Video ES bitrate for several Create Modify, and Configure screens.	Rounded to the nearest bit per second.
x	x	Audio sample rates for several Create Modify and Configure screens.	Rounded to nearest bit per second.
x	x	Dynamic range scale low for Dolby global configuration.	Rounded to nearest tenth.
x	x	Dynamic range scale high for Dolby global configuration	Rounded to nearest tenth.
	x	Transrating bandwidth license (Mbps) at License Manager, for purchased, used, and available	Display only.
	x	Input-Output Bitrate Monitor, and Input Program Total Bitrate and TS Total Bitrate labels on graph bars.	Display only.
	x	Input-Output Bitrate Monitor and Input Program Total Bitrate and TS Total Bitrate labels at bottom of screen.	Display only.

Bitrate Configuration Reference

An automatic bitrate assignment can maximize the bitrate available for video streams within the configured range in the output transport stream. Automatic bitrate assignment also takes into account other (non-video) elementary streams in the output TS.

Note: *For VTX+PIP streams, the VTX component is limited by the VTX/H.264 limits, and the PIP component is limited by the PIP/H.264 component.*
For AVTX+PIP streams, the AVTX component is limited by the AVTX/H.264 limits, and the PIP component is limited by the PIP/H.264 component.

Guidelines for bitrate entries are provided in the following topics:

- "Bitrate Entry Guidelines," next.
- "Bitrate Tables" on page 331.

Bitrate Entry Guidelines

The type of decimal mark symbol displayed and/or entered at the Selenio VMG *Element Manager*—to express a TS bitrate value—is dependent on the locale settings of the client computer logged in to *Element Manager*. This symbol is either a comma (,) or a period (.) character, and it is used to designate the beginning of the fractional portion of the value entered to define a TS bitrate. For example, in Spain this value is written as *18,5* Mbps.

Figure 196. Comma Marks Example

The *Element Manager* rounds out and displays your bitrate entries as follows:

*   For comma (,) decimal mark entries:
    If your entry extends beyond the 6th place, it is automatically rounded out to the nearest millionth, and the comma mark is displayed in the result. For example, an entry of *0,1234568* will be rounded up to display *0,123457*.

    If you enter a period in place of the comma, the period will be converted to a comma and interpreted as a fractional value. For example, an entry of *4.5* will be converted and displayed as *4,5*.

*   For period (.) decimal mark entries:
    If your entry extends beyond the 6th place, it is automatically rounded out to the nearest millionth, and the period mark is displayed in the result.

    For example, an entry of *0.1234568* will be rounded up to display *0.123457*.

    If you enter a comma in place of the period, the comma will be converted to a period and interpreted as a fractional value. For example, an entry of *4,5* will be converted and displayed as *4.5*.

    When the entered values are again displayed on another logged client, any fractional values will be displayed with the decimal mark symbol appropriate to the locale settings of that client computer.

Bitrate Tables

Table 147. AVTX/VTX Transcode Bitrates

Input Resolution Class	Output				
	Resolution Class	Type	Audios	Max TS TS Bitrate Range (Mbps)	Max V ES Video ES Bitrate Range (Mbps)
HD	HD	MPEG2	2	8 - 20	8 - 15
HD	HD	MPEG2	4	8 - 14	8 - 12
HD	SD	MPEG2	2	1 - 20	1 - 7
HD	SD	MPEG2	4	1 - 14	1 - 7

Table 147.   AVTX/VTX Transcode Bitrates

Input Resolution Class	Output					
	Resolution Class	Type	Audios	Max TS TS Bitrate Range (Mbps)	Max V ES Video ES Bitrate Range (Mbps)
HD	HD	H.264	2	2 - 18.5	2 - 15
HD	HD	H.264	4	2 - 11	2 - 9
HD	SD	H.264	2	0.5 - 18.5	0.5 - 7
HD	SD	H.264	4	0.5 - 11	0.5 - 7
SD	SD	MPEG2	2	1 - 5	1 - 4
SD	SD	H.264	2	1 - 4.5	1 - 3
HD	PIP	H.264	0	0.1 - 1.2	0.1 - 1.0
SD	PIP	H.264	0	0.1 - 0.5	0.1 - 0.3

Table 148.   MBR Transcode Bitrates

Input Resolution Class	Output					
	Resolution Class	Type	Profiles	Sum of TS	Sum of V ES	Audios
HD	Full HD	H.264	1	13	9	8
HD or SD	Not Full HD	H.264	4	13	9	2
HD or SD	Not Full HD	H.264	2	13	9	4
HD or SD	Not Full HD	H.264	1	13	9	8

Dolby Dynamic Range Scale Entry Guidelines

The type of decimal mark symbol displayed and/or entered at the Selenio VMG *Element Manager*—to express a Dolby Dynamic Range value—is dependent on the locale settings of the client computer logged in to *Element Manager*. This symbol is either a comma (,) or a period (.) character, and it is used to designate the beginning of the fractional portion of the value entered to define Dolby Dynamic Range. For example, in Spain this value is written as 18,5 Mbps.

Figure 197.   Comma Marks Example
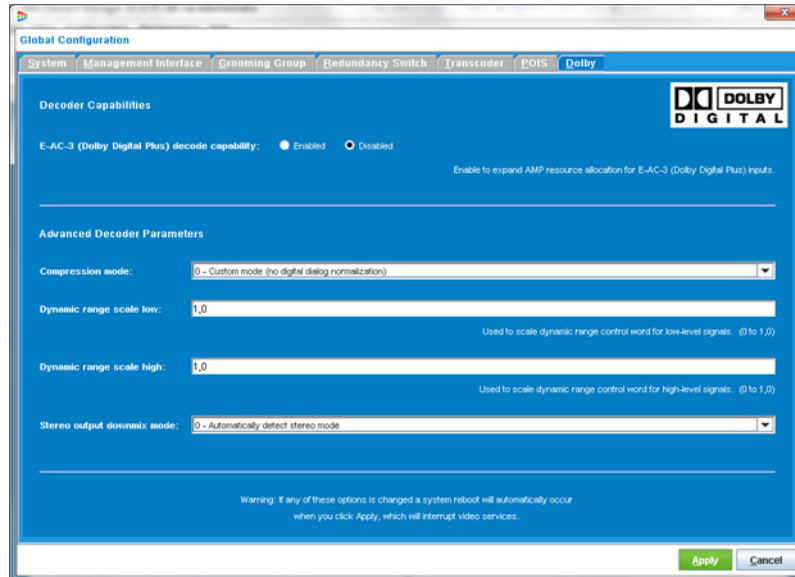
The *Element Manager* rounds out and displays your Dynamic Range Scale entries as follows:

- For comma decimal mark entries:
  If your entry extends beyond the 1st place, it is automatically rounded out to the nearest tenth, and the comma mark is displayed in the result. For example, an entry of *0,18* will be rounded up to display *0,2*.

  If you enter a period in place of the comma, the period will be converted to a comma and interpreted as a fractional value. For example, an entry of *0.5* will be converted and displayed as *0,5*.

- For period decimal mark entries:
  If your entry extends beyond the 1st place, it is automatically rounded out to the nearest tenth, and the period mark is displayed in the result. For example, an entry of *0.18* will be rounded up to display *0.2*.

  If you enter a comma in place of the period, the comma will be converted to a period and interpreted as a fractional value. For example, an entry of *0,5* will be converted and displayed as *0.5*.

Video Profile Configuration Reference

Configuration for video profile applies to grooming with H.264, which sets the video standard to be used for specific classes of applications. Use guidelines in Table 149 when selecting a Profile option.

Table 149.   Video Profile Configuration Options

Option	Description
High	For broadcast and disc storage applications, particularly for high-definition television applications. Allows 8x8 transform size. For high-definition video where each video frame is large, the option to encode with a larger coding block allows the encoder to further improve coding efficiency. A high-end encoder can send out different scaling matrices based on the video content, which tends to offer a better subjective visual quality.
Main	For standard definition digital TV broadcasts that use the MPEG-4 formats including broadcasts as defined in the DVB standard. Allows B-slices and interlaced coding mode (MBAFF and PAFF). Also, it allows CABAC for entropy coding. It offers much better coding efficiency over the baseline profile. Therefore, most broadcast video is encoded at least with *Main* profile.
Baseline	for low-cost applications that require additional data loss robustness. *Baseline* is normally used in some video conferencing and mobile applications. Offers very basic coding tools. It can only encode progressive video and use I or P slices. Also, it allows CAVLC for entropy coding, a simpler but less efficient than CABAC. Many H.246 decoders running on PCs and mobile devices can only decode H.246 video encoded in the *Baseline* profile.

Language Descriptor Settings

Use the **Modify Language Descriptor** dialog, from a selected input audio elementary stream to specify one of the following languages (Figure 150):

Table 150.   Audio Input ES Language Options

Language codes and Languages				
ara-Arabic	**est**-Estonian	**isl**-Icelandic	**nld**-dutch	**sqi**-Albanian
bel-Belarusian	**fin**-Finnish	**ita**-Italian	**nor**-Norwegian	**srp**-Serbian
bul-Bulgarian	**fra**-French	**jpn**-Japanese	**pol**-Polish	**swe**-Swedish
cat-Catalan	**gle**-Irish	**kor**-Korean	**por**-Portuguese	**tha**-Thai
ces-Czech	**heb**-Hebrew	**lav**-Latvian	**ron**-Romanian	**tur**-Turkish
dan-Danish	**hin**-Hindi	**lit**-Lithuanian	**rus**-Russian	**ukr**-Ukranian
deu-German	**hrv**-Croatian	**mkd**-Macedonian	**slk**-Slovak	**vie**-Vietnamese
ell-Greek	**hun**-Hungarian	**mit**-Maltese	**slv**-Slovenian	**zho**-Chinese
eng-English	**ind**-Indonesian	**msa**-Malay	**spa**-Spanish	

Time Zone Settings

Use the **Global System Time** function to specify one of the following time zones for the Selenio VMG (Figure 150):

Table 151.   Global System Time Zone Options

GMT-08 Pacific Time (US & Canada)	GMT+01 Central European Time (Sweden, Spain, Serbia)
GMT-08 Pacific Time (Tijuana, Baja California)	GMT+02 Eastern European Time (Finland, Ukraine, Turkey)
GMT-07 Mountain Time (US & Canada)	GMT+03 Belarus Time
GMT-07 Mountain Time (Chihuahua, La Paz, Mazatlan)	GMT+04 Moscow Time
GMT-07 Mountain Time (Phoenix & Sonora)	GMT+05 Pakistan Time
GMT-06 Central Time (US & Canada)	GMT+05:30 Indian Time
GMT-06 Central Time (Guadalajara, Mexico, Monterrey)	GMT+06 Western Asian Time (Kazakstan)
GMT-05 Eastern Time (US & Canada)	GMT+07 Indo-China Time (Thailand, West Indonesia)
GMT-4 Atlantic Time (Canada)	GMT+08 China Time
GMT-03 Greenland Time	GMT+08 Hong Kong Time
GMT-03 Brazil Time (Rio, Sao Paulo)	GMT+09 Japan Time
GMT-02 Mid-Atlantic Time (Noronha)	GMT+09 Korea Time
GMT-01 Cape Verde Time	GMT+10 Australia Time (Sydney)
GMT+00 Universal Time Coordinated (UTC)	GMT+11 Solomon Islands Time
GMT+00 Western European Time (England, Ireland, Portugal)	GMT+12 Fiji Time

Selenio VMG Alarms and Events

This appendix is a reference for alarms and events supported by the Selenio VMG.

- Alarms are triggered directly by the Selenio VMG, and not by external sources.
- Events are triggered by both the Selenio VMG and external devices.

In This Appendix:

- *"General Alarm and Event Categories,"* next.
- *"Selenio VMG Alarm and Event Model"* on page 337.
- *"Selenio VMG Alarm and Event Severity Levels"* on page 337.
- *"Selenio VMG Hardware Alarms"* on page 338.
- *"Interface and Port (IF_PORT) Alarms"* on page 340.
- Specific alarms and events—per category—as listed in Table 152.

General Alarm and Event Categories

The alarms and events categories used by the Selenio VMG are listed in Table 152.

Table 152.   Selenio VMG General Alarm and Event Categories

Category	Description	Reference
SYS	Alarms and events related to the Selenio VMG hardware, NTP service, and system shutdown.	"Selenio VMG Hardware Alarms" on page 338 "Selenio VMG Hardware Events" on page 341
IF_PORT	Alarms and events related to the Selenio VMG ports and interfaces.	"Interface and Port (IF_PORT) Alarms" on page 340 and "Interface and Port (IF_PORT) Events" on page 347
MPEG	Events related to video processing.	"Video Processing (MPEG) Events" on page 349
GRM	Events related to video grooming.	"Grooming (GRM) Events" on page 362
LIC	Events related to licensing for video operations.	"Licensing (LIC) Events" on page 364
CFG	Events related to configuration	"Configuration (CFG) Events" on page 365
ELM	Events related to Event and Alarm management.	"Event/Alarm Manager (ELM) Events" on page 365
ESAM	Events related to communications between the Selenio VMG ESAM function and a POIS server.	"ESAM Events" on page 366
AAA	Security events for Authentication, Authorization, and Accounting operations.	"Security (AAA) Events" on page 367

Selenio VMG Alarm and Event Model

Alarms represent persistent error conditions due to faults in the Selenio VMG. Events are used to signify the start of a fault condition and raise an alarm. After a fault condition is resolved, another event is used to signify the end of the fault condition and clear the alarm. Alarms are cleared only by resolving the fault condition, not by an operator performing an administrative action. An alarm can be acknowledged by an operator allowing them to indicate that an alarm is known. The Selenio VMG records the acknowledgement of the alarm and performs no further processing on it.

Alarms and events are identified by area (or category) and type. Some alarms and events also include an instance parameter used to differentiate between identical components in the system. For example, the **Fan_Not_Present** event includes an instance parameter that indicates which fan in the system the alarm or event refers to. Other alarms and events include parameters that are simply used to provide specific information about the alarm or event.

Selenio VMG Alarm and Event Severity Levels

Severity levels reported by the Selenio VMG, for alarms and events, as listed in Table 153.

Table 153.   Selenio VMG alarm and event severity levels

Severity	Description
Critical	A severe, service-affecting condition has occurred and immediate corrective action is imperative.
Major	Hardware or software conditions that indicate a serious disruption of service, or the malfunctioning or failure of important hardware or software. Requires immediate attention and response to restore or maintain system functionality.
Minor	For issues that do not have a serious effect on service to customers or are not essential to the operation of the system.
Info	To raise attention to a condition that could possibly be an impending problem, or to notify the customer of an event that improves operation.

Selenio VMG Hardware Alarms

CARD_FAILURE
        Card in main slot <SlotNum> has failed.

Explanation: The card in the specified slot has failed. No services are available

Severity: CRITICAL

Recommended Action(s): Replace the card in the affected slot.

CARD_NOT_PRESENT
        No card in slot <slot#>with slot admin status <AdminStatus>.

Explanation: A card that is administratively enabled is not present.

Severity: CRITICAL

Recommended Action(s): Check that the card is present and working in the specific slot. If not, insert a working card. If the slot is meant to be empty, set the admin status of the slot to Disabled.

CARD_OPER_DOWN
        Card in main slot<SlotNum> is operationally down.

Explanation: A card that is administratively enabled is operationally down.

Severity: CRITICAL

Recommended Action(s): (1) Verify the card in the specified slot has cables connected from enabled ports to active devices. (2) Verify that persistent storage (flash) has not been corrupted and it contains valid copies of kernel and application code, and configuration data.

CARD_OVERHEAT
        Card in main slot <slot#> Current temp=<CurrentTemp#> exceeded threshold temp <ThresholdTemp#)>

Explanation: Card temperature exceeds the threshold.

Severity: CRITICAL

Recommended Action(s): (1) Check ambient temperature. (2) Check air flow.

CARD_TYPE_MISMATCH
        Card in main slot <SlotNum> does not match configured type. Actual type is <Actual CardType>. Configured type is <ConfiguredCardType>.

Explanation: The card in the specified slot does not match the preconfigured card type.

Severity: MAJOR

Recommended Action(s): Either replace the card in the specified slot with the proper card type, or change the configuration of the specified slot to match the currently installed card type.

CFG_OUT_OF_SYNC
      The configuration on standby NPM are out of sync.

      Explanation: The configuration on standby NPM is out of sync.

      Severity: CRITICAL

      Recommended Action(s): Check the configuration at both NPMs.

CHASSIS_OVERHEAT
      Chassis has overheated. Current temp=<CurrentTemp#> exceeded
      threshold temp=<Threshold Temp#)>

      Explanation: VMG chassis temperature exceeds the threshold.

      Severity: CRITICAL

      Recommended Action(s): (1) Check ambient temperature. (2) Check air flow. (3) Remove unused components.

CHASSIS_TEMP
      Cooling state of chassis is <CoolingState>

      Explanation: Chassis cooling state is 'cooling state.'

      Severity: OTHER

      Recommended Action(s): N/A

CHASSIS_TEMP_CRITICAL
      Cooling state of chassis is Critical.

      Explanation: Alarm status of chassis cooling state is critical.

      Severity: CRITICAL

      Recommended Action(s): Telnet from active NPM into 10.0.1.15 or 10.0.2.15 (depending on active NPM slot) and execute the command 'clia shelf -v cs' to get list of sensors in critical state.

CHASSIS_TEMP_MAJOR
      Cooling state of chassis is Major.

      Explanation: Alarm status of chassis cooling state is major.

      Severity: MAJOR

      Recommended Action(s): Telnet from active NPM into 10.0.1.15 or 10.0.2.15 (depending on active NPM slot) and execute the command 'clia shelf -v cs' to get list of sensor in critical state.

CHASSIS_TEMP_MINOR
      Cooling state of chassis is Minor.

      Explanation: Alarm status of chassis cooling state is minor.

      Severity: MINOR

      Recommended Action(s): Telnet from active NPM into 10.0.1.15 or 10.0.2.15 (depending on active NPM slot) and execute the command 'clia shelf -v cs' to get list of sensor in critical state.

FAN_NOT_PRESENT
        No fan (or fan tray) present in slot <SlotNum>.

Explanation: The specified slot does not contain a fan or fan tray.

Severity: CRITICAL

Recommended Action(s): Install a fan or fan tray in the specified slot.

POWER_SUPPLY_NOT_PRESENT
        No power supply <PEMType> present in slot <slot#>

Explanation: A power supply (power entry module: PEM) is not present.

Severity: CRITICAL

Recommended Action(s): Install a power supply in the specified slot.

POWERSUPPLY_NOT_PRESENT
        No power supply (PEM) present in slot <SlotNum>.

Explanation: A power supply (power entry module: PEM) is not present in the specified slot.

Severity: CRITICAL

Recommended Action(s): Install a power entry module in the specified slot.

SHELFMGR_NOT_PRESENT
        No shelf manager in slot <SlotNum>.

Explanation: A shelf manager is not present in the specified slot.

Severity: CRITICAL

Recommended Action(s): Install a shelf manager in the specified slot.

SYS_NOT_REDUNDANT
        System not redundant.

Explanation: The system does not currently support redundancy.

Severity: CRITICAL

Recommended Action(s): Install two working NPMs in the VMG chassis and ensure they
                are configured for redundancy.

Interface and Port (IF_PORT) Alarms

CFG_PORT_MIRROR_DISABLE
        Config change: <p n="PortType"/> port <p n="PortNum"/> is
        mirror-to disabled

Explanation: A port mirror is changed to disabled.

Severity: INFO

Recommended Action(s): N/A

CFG_PORT_MIRROR_ENABLE
       Config change: <p n="PortType"/> port <p n="PortNum"/> is
       mirror-to enabled

   Explanation: A port mirror is changed to enabled.

   Severity: INFO

   Recommended Action(s): N/A

PORT_OPER_DOWN
       <PortType> port <PortNum> is operationally down with admin
       status <AdminStatus>

   Explanation: A port that is administratively enabled is operationally down.

   Severity: MAJOR

   Recommended Action(s): Verify the specified port has a cable connected to an active device.

Selenio VMG Hardware Events

ACT_CARD_RESET
       Action: Card in main slot <SlotNum> reset.

   Explanation: The specified card has been reset.

   Severity: INFO

   Recommended Action(s): N/A

ACT_SET_TIME
       Action: current time set to <CurrentTime>.

   Explanation: The current time has been reset by a VMG *Element Manager* operator.

   Severity: INFO

   Recommended Action(s): N/A

ACT_SWO_STARTED
       Action: A switchover has started due to <SwitchoverReason>.

   Explanation: A switchover has begun.

   Severity: MAJOR

   Recommended Action(s): N/A

ACT_SYSTEM_REBOOT
       Action: System rebooted.

   Explanation: The system was rebooted.

   Severity: INFO

   Recommended Action(s): N/A

ACT_SYSTEM_SHUTDOWN
     Action: System shutdown.

     Explanation: The system was shut down.
     Severity: INFO
     Recommended Action(s): N/A

CARD_FAILURE
     Card in main slot <SlotNum> has failed.

     Explanation: The card in the specified slot has failed. No services are available
     Severity: CRITICAL
     Recommended Action(s): Replace the card in the specified slot.

CARD_NOT_PRESENT
     No card present in slot <SlotNum> with slot admin status
     <AdminStatus>.

     Explanation: An administratively enabled card is not present in the specified slot.
     Severity: CRITICAL
     Recommended Action(s): Insert a working card in the specified slot. If the slot is meant to be
                   empty, set the admin stats of the slot to disabled.

CARD_OPER_DOWN
     Card in main slot <SlotNum> is operationally down.

     Explanation: A card is operationally down in the specified slot.
     Severity: INFO
     Recommended Action(s): N/A

CARD_OPER_UP
     Card in main slot <SlotNum> is operationally up.

     Explanation: Status of the specified card is operationally up.
     Severity: INFO
     Recommended Action(s): N/A

CARD_PRESENT
     Card present in main slot <SlotNum>.

     Explanation: A card is present in the specified slot.
     Severity: INFO
     Recommended Action(s): N/A

CARD_RESET_DL_DOWN
     Action: Card in main slot <SlotNum> reset due to internal (DL)
     error.

     Explanation: The card in the specified slot has been reset, due to an internal (DL) error.
                   This event is reported to the trap server.
     Severity: MAJOR
     Recommended Action(s): N/A

CARD_RESET_FAILED
     Reset of card in main slot <SlotNum> failed.

   Explanation: A reset operation on the specified card has failed.
   Severity: CRITICAL
   Recommended Action(s): Replace the specified card.

CARD_RESET_PPC_LOST
     Action: Card in main slot <SlotNum> reset due to loss of PPC
     heartbeat.

   Explanation: The card in the specified slot has been reset, due to loss of PPC heartbeat.
                    This event is reported to the trap server.
   Severity: MAJOR
   Recommended Action(s): N/A

CARD_RESET_SUCCEEDED
     Reset of card in main slot <SlotNum> succeeded.

   Explanation: A reset operation on the specified card was successful.
   Severity: INFO
   Recommended Action(s): N/A

CARD_TYPE_MISMATCH
     Card in main slot <SlotNum> does not match configured type.
     Actual type is <ActualCardType>. Configured type is
     <ConfiguredCard Type>.

   Explanation: The card in the specified slot does not match the pre-configured card type.
   Severity: MAJOR
   Recommended Action(s): Either replace the card in the specified slot with the proper card
                    type, or change the configuration of the specified slot to match the currently
                    installed card type.

CFG_CARD_ADMIN_DISABLED
     Config change: Card in main slot <SlotNum> admin disabled.

   Explanation: Configuration change: the card in the specified slot was administratively
                    disabled.
   Severity: INFO
   Recommended Action(s): N/A

CFG_CARD_ADMIN_ENABLED
     Config change: Card in main slot <SlotNum> admin enabled.

   Explanation: Configuration change: the card in the specified slot was administratively
                    enabled.
   Severity: INFO
   Recommended Action(s): N/A

CFG_NTP_IPADDR
      Config changed: IP address for NTP server.

Explanation: Configuration change: the IP address for an NTP server has been changed.

Severity: INFO

Recommended Action(s): N/A

CFG_SWO_ENABLED
      Config change: System switchover is enabled.

Explanation: Configuration change: system switchover is now enabled.

Severity: INFO

Recommended Action(s): N/A

CFG_SWO_INHIBITED
      Config change: System switchover is inhibited.

Explanation: Configuration change: system switchover is inhibited.

Severity: INFO

Recommended Action(s): N/A

CFG_Timezone
      Config changed: Time zone is now <TimeZone>.

Explanation: Configuration change: the system time zone has been changed.

Severity: INFO

Recommended Action(s): N/A

CHASSIS_TEMP_CRITICAL
      Cooling state of chassis is Critical.

Explanation: Status of the chassis temperature is now critical severity.

Severity: CRITICAL

Recommended Action(s): N/A

CHASSIS_TEMP_MAJOR
      Cooling state of chassis is Major

Explanation: Status of the chassis temperature is now major severity.

Severity: MAJOR

Recommended Action(s): N/A

CHASSIS_TEMP_MINOR
      Cooling state of chassis is Minor

Explanation: Status of the chassis temperature is now minor severity.

Severity: MINOR

Recommended Action(s): N/A

FAN_NOT_PRESENT
        No fan (or fan tray) present in slot <SlotNum>.

   Explanation: The specified slot does not contain a fan or fan tray.
   Severity: CRITICAL
   Recommended Action(s): Install a fan or fan tray in the specified slot.

FAN_PRESENT
        Fan (or fan tray) present in slot <SlotNum>.

   Explanation: A fan or fan tray is present in the specified slot.
   Severity: INFO
   Recommended Action(s): N/A

NPM_ACTIVE
        NPM card in slot <SlotNum> is now active.

   Explanation: The NPM in the specified slot is now in active state.
   Severity: INFO
   Recommended Action(s): N/A

NPM_STANDBY
        NPM card in slot <SlotNum> is now standby.

   Explanation: The NPM in the specified slot is now in standby state.
   Severity: INFO
   Recommended Action(s): N/A

POWERSUPPLY_NOT_PRESENT
        No power supply (PEM) present in slot <SlotNum>.

   Explanation: A power entry module (PEM) is not present in the specified slot.
                    This event applies only to the VMG-14.
   Severity: CRITICAL
   Recommended Action(s): Install a PEM in the specified slot of the VMG-14.

POWERSUPPLY_NOT_PRESENT
        No power supply <PEMType> present in slot <SlotNum>.

   Explanation: Power supply is not present in the VMG.
   Severity: CRITICAL
   Recommended Action(s): Verify hardware.

POWERSUPPLY_PRESENT
        Power supply (PEM) present in slot <SlotNum>.

   Explanation: A PEM is present in the specified slot.
   Severity: INFO
   Recommended Action(s): N/A

SHELFMGR_NOT_PRESENT
        No shelf manager present in slot <SlotNum>.

 Explanation: A shelf manager is not present in the specified slot.
 Severity: CRITICAL
 Recommended Action(s): Install a shelf manager in the specified slot.

SHELFMGR_PRESENT
        Shelf manager present in slot <SlotNum>.

 Explanation: A shelf manager is present in the specified slot.
 Severity: INFO
 Recommended Action(s): N/A

SWO_FAILED
        Switchover failed.

 Explanation: The switchover operation failed.
 Severity: CRITICAL
 Recommended Action(s): Reboot the system.

SWO_SUCCEEDED
        Switchover completed successfully and NPM in slot <SlotNum> is
        active.

 Explanation: The switchover operation has succeeded.
 Severity: INFO
 Recommended Action(s): N/A

SYS_FULLY_REDUNDANT
        System is fully redundant.

 Explanation: The system is fully redundant: two NPMs are installed and operational. One
       NPM is active, and the other is in standby mode.
 Severity: INFO
 Recommended Action(s): N/A

SYS_NOT_REDUNDANT
        System not redundant.

 Explanation: The system is not currently supporting NPM redundancy, and redundancy was
       expected.
 Severity: CRITICAL
 Recommended Action(s): Install two working NPMs in the VMG chassis, and ensure they
       are configured for redundancy.

Interface and Port (IF_PORT) Events

CFG_DATA_PORT
    Config changed: Auto negotiation on <PortType> port <PortNum> changed to <auto_neg>.

Explanation: Configuration change: the auto negotiation settings for the specified port has changed.

Severity: INFO

Recommended Action(s): N/A

CFG_GROOM_GRP
    Config changed: Port Group Gige 1-Gige 8 is admin <AdminState1>; Port group 10 Gige 1 is admin <AdminState2>;Port group 10 Gige 2 is admin <AdminState3>.

Explanation: Configuration change: A modification has occurred on the grooming group.

Severity: INFO

Recommended Action(s): N/A

CFG_IF
    Configuration changed for interface on <PortType> <IfId>.

Explanation: Configuration change: the configuration of the specified interface has been modified.

Severity: INFO

Recommended Action(s): N/A

CFG_IF_ADD   Interface created on <PortType> <IfId>.

Explanation: Configuration change: the specified interface was created.

Severity: INFO

Recommended Action(s): N/A

CFG_IF_DEL   Interface deleted on <PortType> <IfId>.

Explanation: Configuration change: the specified interface was deleted.

Severity: INFO

Recommended Action(s): N/A

CFG_MGMT_IF
    Config change: Mgmt interface to IP address <ipAddr>, net mask <netMask>, and gateway <defGway>.

Explanation: Configuration change: changes were made to the specified management interface.

Severity: INFO

Recommended Action(s): N/A

CFG_PORT_ADMIN_DISABLED
        Config change: <PortType> port <PortNum> is admin disabled.

Explanation: Configuration change: the administrative status of the specified port was
                 disabled.
Severity: INFO
Recommended Action(s): N/A

CFG_PORT_ADMIN_ENABLED
        Config changed: <PortType> port <PortNum> is admin enabled.

Explanation: Configuration change: the administrative status of the specified port was
                 enabled.
Severity: INFO
Recommended Action(s): N/A

IF_OPER_DOWN
        Interface on <PortType> <IfId> is operationally down.

Explanation: The status of the specified interface is operationally down. The status of an
                 interface matches that of the port on which it is configured.
Severity: INFO
Recommended Action(s): change the status of the port on which the specified interface is
                 configured.

IF_OPER_UP
        Interface on <PortType> <IfId> is operationally up.

Explanation: The status of the specified interface is operationally up.
Severity: INFO
Recommended Action(s): N/A

PORT_OPER_DOWN
        <PortType> port <PortNum> with admin status <AdminStatus> is
        operationally down.

Explanation: The status of the specified port is operationally down.
Severity: INFO
Recommended Action(s): Verify there is a cable connected from the specified port to an
                 active network device.

PORT_OPER_UP
        <PortType> port <PortNum> is operationally up.

Explanation: The status of the specified port is operationally up.
Severity: INFO
Recommended Action(s): N/A

Video Processing (MPEG) Events

CFG_InEs

    InEs modified: TS <InTsIdx><InTsIp><InTsUdp> PG
    <InPgIdx><InPgName><InPgNum> ES <InEsIdx> Pid <InEsPid>.

Explanation: An input elementary stream was modified.

Severity: INFO

Recommended Action(s): N/A

CFG_InEs_ADD

    InEs created: TS <InTsIdx><InTsIp><InTsUdp> PG
    <InPgIdx><InPgName><InPgNum>.

Explanation: An input elementary stream was created.

Severity: INFO

Recommended Action(s): N/A

CFG_InEs_DEL

    InES deleted: TS <InTsIdx><InTsIp><InTsUdp> PG
    <InPgIdx><InPgName><InPgNum> ES <InEsIdx> Pid <InEsPid>.

Explanation: An input elementary stream was deleted.

Severity: INFO

Recommended Action(s): N/A

CFG_InPgm

    InPg modified: TS <InTsIdx><InTsIp><InTsUdp> PG
    <InPgIdx><InPgName><InPgNum>

Explanation: An input program was modified.

Severity: INFO

Recommended Action(s): N/A

CFG_InPgm_ADD

    InPg created: TS <InTsIdx><InTsIp><InTsUdp> PG
    <InPgIdx><InPgName><InPgNum>

Explanation: A ghost input program was created.

Severity: INFO

Recommended Action(s): N/A

CFG_INPgm_DEL

    InPg deleted: TS <InTsIdx><InTsIp><InTsUdp> PG
    <InPgIdx><InPgName><InPgNum>.

Explanation: An input program was deleted.

Severity: INFO

Recommended Action(s): N/A

CFG_InTS

    InTS modified: Index <InTsIdx> Port <PortNum> IP <IP> UDP
    <UDP>.

    Explanation: An input transport stream was modified.

    Severity: INFO

    Recommended Action(s): N/A

CFG_InTS_ADD

    InTS created: Index <InTsIdx> Port <PortNum> IP <IP> UDP <UDP>,

    Explanation: An input transport stream was created.

    Severity: INFO

    Recommended Action(s): N/A

CFG_InTS_DEL

    InTS deleted: Index <InTsIdx> Port<PortNum> IP <IP> UDP <UDP>.

    Explanation: An input transport stream was deleted.

    Severity: INFO

    Recommended Action(s): N/A

CFG_OutEs

    OutEs modified: TS <OutTsIdx><OutTsIp><OutTsUdp> PG
    <OutPgIdx><OutPg Name><OutPgNum> ES <OutEsIdx> Pid <OutEsPid>.

    Explanation: An output ES was modified.

    Severity: INFO

    Recommended Action(s): N/A

CFG_OutEs_ADD

    OutEs created: TS <OutTsIdx><OutTsIp><OutTsUdp> PG
    <OutPgIdx><OutPg Name><OutPgNum> ES <OutEsIdx> Pid <OutEsPid>.

    Explanation: An output ES was created.

    Severity: INFO

    Recommended Action(s): N/A

CFG_OutEs_DEL

    OutEs deleted: TS <OutTsIdx><OutTsIp><OutTsUdp> PG
    <PutPgIdx><OutPg Name><OutPgNum> ES <OutEsIdx> Pid <OutEsPid>.

    Explanation: An output ES was deleted.

    Severity: INFO

    Recommended Action(s): N/A

CFG_OutPgm
  OutPg modified: TS <OutTsIdx> PG <OutPgIdx> Name <Name> Num
  <Num>.

  Explanation: An output program was modified.
  Severity: INFO
  Recommended Action(s): N/A

CFG_OutPgm_Add
  OutPg created: TS <OutTsIdx> PG <OutPgIdx> Name <Name> Num
  <Num>.

  Explanation: An output program was created.
  Severity: INFO
  Recommended Action(s): N/A

CFG_OutPgm_DEL
  OutPg deleted: TS <OutTsIdx> PG <OutPgIdx> Name <Name> Num <Num>.

  Explanation: An output program was deleted.
  Severity: INFO
  Recommended Action(s): N/A

CFG_OutTS_ADD
  OutTS created: Index <OutTsIdx> Port <PortNum> IP <IP> UDP <UDP>.

  Explanation: An output transport stream was created.
  Severity: INFO
  Recommended Action(s): N/A

CFG_OutTS_DEL
  OutTS deleted: Index <OutTsIdx> Port <PortNum> IP <IP> UDP <UDP>.

  Explanation: An output transport stream was deleted.
  Severity: INFO
  Recommended Action(s): N/A

CFG_OutTS_MODIFY
  OutTS modified: Index<OutTsIdx> Port<PortNum> IP <IP> UDP <UDP>.

  Explanation: An output transport stream was modified.
  Severity: INFO
  Recommended Action(s): Verify output TS.

In_TS_NIT_Miss_clear
  InTs (Gige <port>, <ipAddr>/<udp>) NIT recovered.

  Explanation: The DVB Network Information Table was recovered for the input transport
       stream.
  Severity: INFO
  Recommended Action(s): N/A

```
In_TS_NIT_Miss_Set
     InTs (Gige <port>, <ipAddr>/<udp>) NIT missing.
```

Explanation: The DVB Network Information Table timed out for the input transport stream.

Severity: INFO

Recommended Action(s): N/A

```
In_TS_SDT_Miss_Clear
     InTs (Gige <port>, <ipAddr>/<udp>) SDT recovered.
```

Explanation: DVB Service Description Table recovered for the input transport stream.

Severity: INFO

Recommended Action(s): N/A

```
In_TS_SDT_Miss_Set
     InTS (Gige <port>, <ipAddr><udp>) SDT missing.
```

Explanation: DVB Service Description Table timed out for the input transport stream.

Severity: INFO

Recommended Action(s): Source issue. Analyze the upstream stream.

```
Input_Audio_Loss
     InTs: Audio underflow TS <InTsIdx> Port <PortNum> IP <IP> UDP
     <UDP> Pid <APID>.
```

Explanation: Audio underflow was detected for the specified input. This message identifies
when a video elementary stream has detected no bitrate or packets on a defined
PID.
This event is report to the trap server.

Severity: MINOR

Recommended Action(s): Verify the TS.

```
Input_Mismatch
     The input <"reason" > <"state" > the configuration of the
     output_Ts at Port <PortNum"> IP <"IP"> UDP <"UDP">
```

Explanation: Input video mismatch with the configuration.

Severity: MAJOR

Recommended Action(s): Verify configuration

```
Input_TS_Missing
     InTS: Missing <state> TS <InTsIdx> Port <PortNum> IP <IP> UDP
     <UDP>.
```

Explanation: A transport stream was missing for the specified input. This message identifies
when a video elementary stream has detected no bitrate or packets on a defined
PID.
This event is reported to the trap server.

Severity: MAJOR

Recommended Action(s): Verify the TS.

```
Input_Video_Encrypted
     InTS: Video encrypted, no transrating possible slot <Slot> port
     <Port> IP <IP> UDP <UDP> Program <Program>.
```

Explanation: The input video appears encrypted. Transrating is not possible.

Severity: INFO

Recommended Action(s): Contact Imagine Communications Customer Support.

```
Input_Video_Loss
     InTs: Video underflow TS <InTsIdx> Port <PortNum> IP <IP> UDP
     <UDP> Pid <VPID>.
```

Explanation: Video underflow was detected for the specified input. This message identifies when a video elementary stream has detected no bitrate or packets on a defined PID.

Severity: MINOR

Recommended Action(s): Verify the TS.

```
Out_TS_TDT_Miss_Clear
     OutTS (Gige <port>, <ipAddr>/<udp>) NIT source recovered.
```

Explanation: DVB Network Information Table recovered for the output transport stream.

Severity: INFO

Recommended Action(s): N/A

```
Out_TS_TDT_Miss_Clear
     OutTs (Gige <port>, <ipAddr><udp>) TDT source recovered.
```

Explanation: DVB Time and Date Table source recovered for the output transport stream.

Severity: INFO

Recommended Action(s): N/A

```
Out_TS_TDT_Miss_Set
     OutTs (Gige <port>, <ipAddr>/<udp>) TDT source missing.
```

Explanation: DVB Time and Date Table source timed out for the output transport stamp.

Severity: INFO

Recommended Action(s): N/A

```
Out_TS_TOT_Miss_Clear
     OutTS (Gige <port>, <ipAddr>/<udp>) TOT source recovered.
```

Explanation: DVB Time Offset Table source recovered for the output transport stream.

Severity: INFO

Recommended Action(s): N/A

```
Out_TS_TOT_Miss_Set
     OutTS (Gige <port>, <ipAddr><udp>) TOT source missing.
```

Explanation: DVB Time Offset Table source timed out for the output transport stream.

Severity: INFO

Recommended Action(s): N/A

Out_TS-NIT_Miss_Set
> OutTS (Gige <port>, <ipAddr>/<udp>) NIT source missing.

Explanation: DVB Network Information Table timed out for the output transport stream.
Severity: INFO
Recommended Action(s): N/A

Output_IDR_Error
> Port (<port#>, OTS<O/P TS IP>, <O/P TS Port>, Program nos <O/P
> Program#>, ES Pid <ES PID>, has IDRjump: <IDR Gap error
> counter>

Explanation: The packet drop error of the TMUX is over the threshold. The counter is
    provided.
Severity: MAJOR
Recommended Action(s): N/A

OUTPUT_ES_ERROR
> Port (<port#>, OTS<O/P TS IP>, <O/P TS Port>, Program nos <O/P
> Program#>, ES Pid <ES PID>, has Resplice DTSjump:<DTS jump
> error counter>

Explanation: Reported on the input transport stream because the output ES groomed from this
    input has DTS jump errors, due to input ES errors.
    This event is reported to the trap server.
Severity: MAJOR
Recommended Action(s): N/A

Output_ES_ERROR
> Port (<port#>, OTS<O/P TS IP>, <O/P TS Port>, Program nos <O/P
> Program#>, ES Pid <ES PID>, has PCRrst:<PCR reset error
> counter>

Explanation: Reported to signal the Timing module reset (PCR reset) error caused by certain
    errors in the input program. The counter is provided.
    This event is reported to the trap server.
Severity: MAJOR
Recommended Action(s): N/A

OUTPUT_RESPLICE
> Port (<port#>, OTS<O/P TS IP>, <O/P TS Port>, Program nos <O/P
> Program#>, ES Pid <ES PID>, has Resplice PCR:<PCR error
> counter>

Explanation: Reported on the input transport stream because the output ES groomed from this
    input has PCR errors, due to input errors.
    This event is reported to the trap server.
Severity: MAJOR
Recommended Action(s): N/A

OUTPUT_RESPLICE

    Port (<port#>, OTS<O/P TS IP>, <O/P TS Port>, Program nos <O/P
    Program#>, ES Pid <ES PID>, has Resplice UndR:<Underflow error
    counter>

Explanation: Reported to signal the underflow error of the output program is over the threshold. The counter is provided.

Severity: MAJOR

Recommended Action(s): N/A

Recommended Action(s):

OutTS_oversub_cir

    TS <TsIdx> Port <PortNum> IP <IP> <UDP> oversubscription CLEAR.

Explanation: The output transport stream bitrate oversubscription ends.

Severity: MAJOR

Recommended Action(s): Contact Imagine Communications Customer Support.

outTS_oversub_set

    TS <TsIdx> Port <PortNum> IP <IP> UDP <UDP> oversubscription
    SET (bitrate is <bitrate> kbps).

Explanation: The output transport stream bitrate exceeds the configured threshold value.

Severity: MAJOR

Recommended Action(s): N/A

PGRED_FAILOVER2BKUP_FAIL

    Input Program (Gige<port>, <ipAddr>/<udp>, <pgNum>) failed to
    switchover to backup

Explanation: The event is venerated when primary input program is missing/timed out and the configured backup program is not available.
　　　　　　　　This event is reported to the trap server.

Severity: INFO

Recommended Action(s): N/A

V6_AUDIO_CC_ERROR

    V6 Session:<Session ID>, Output:<Transport name> Audio stream
    detected <PARM3> MPEG2TS continuity error(s) in last 60
    seconds.

Explanation: This event is reported every 60 seconds when continuity errors are detected in the audio stream. This signifies that the input has issues, and the user should ensure the input signal is clean.

Severity: INFO

Recommended Action(s): N/A

V6_AUDIO_DECODE_FAILED
> V6 Session:<Session ID>, Output:<Transport name> Audio decode
> failed for <PARAM3> frame(s) in last 60 seconds

> **Explanation:** The event is reported every 60 seconds when audio frames cannot be decoded. This signifies that the input has issues and the user should ensure that the input signal is clean.

> **Severity:** INFO

> **Recommended Action(s):** N/A

V6_AV_DISCARD_PACKET
> V6 Session:<Session ID>, Output:<Transport name> Audio/Video
> discard <number of packets discarded> packet(s) in last 60
> seconds

> **Explanation:** This event is reported every 60 seconds when an extra packet is received unexpectedly. This signifies that the input has a possible extra PID and the user should make sure the input port is not use by other SPTS. This can also happens if the SPTS has a lot of extra PIDs not used for transcoding.

> **Severity:** INFO

> **Recommended Action(s):** N/A

V6_FAIL_DETECT
> V6 event Session: <Session ID>, Detection failed.

> **Explanation:** This event occurs when adding a session fails because the session cannot be detected.

> **Severity:** INFO

> **Recommended Action(s):** N/A

V6_FAIL_INPUT_SETUP
> V6 event Session: <Session ID>, Input <Input address> cannot be
> created.

> **Explanation:** This event occurs when adding a session fails because the input stream cannot be created (possible socket creation error).

> **Severity:** INFO

> **Recommended Action(s):** N/A

V6_FAIL_NOT_SUPPORTED
> V6 event Session: <Session ID>, The codec or attributes that
> prevents the session for being added is not supported

> **Explanation:** This event occurs when adding a session fails because the session codec or other attribute is not supported.

> **Severity:** INFO

> **Recommended Action(s):** N/A

V6_FAIL_OTHER
     V6 event Session: <Session ID>, <Failure Reason>

Explanation: This event occurs when adding a session fails because of reasons not explicitly defined.

Severity: INFO

Recommended Action(s): N/A

V6_FAIL_OUTPU_SETUP
     V6 event Session: <Session ID>, Output: <Output address> cannot
     be created.

Explanation: This event occurs when adding a session fails because the output stream cannot be created (possible socket creation error).

Severity: INFO

Recommended Action(s): N/A

V6_LONG_TIME_GAP
     V6 Session: <Session ID>, Output: <Transport name> Audio decode
     detected <number of gaps detected> long time gap(s) (>200ms) in
     last 60 seconds

Explanation: This event is reported every 60 seconds when long time gaps (>200 ms) are detected in the audio stream.

Severity: INFO

Recommended Action(s): N/A

V6_OUTPU_MISMATCH
     V6 event Output warning: <warning cause>, Session: <Session_ID>
     Step: <Step number>, Output: <output file>

Explanation: This event reports a problem in the generation of an output (file output only).

Severity: INFO

Recommended Action(s): N/A

V6_OUTPU_PACKET_ERROR
     V6 Session:<Session ID>, Output:<Transport name> Audio/Video
     unable to output <Number of packets that could not be sent out>
     packet(s) in last 60 seconds

Explanation: This event is reported every 60 seconds when AV packets can't be decoded. This signifies that the input has issues and the user should make sure the input signal is clean.

Severity: INFO

Recommended Action(s): N/A

V6_OUTQUEUE_10PERCENT
     V6 event Queue for session: <Session ID>, Output: <Transport
     name> has reached 10% full.

> **Explanation:** This event occurs when the input queue to ffmpeg reaches 10% full (3.3 million
>   bytes).
> **Severity:**   INFO
> **Recommended Action(s):** N/A

V6_OUTQUEUE 50PERCENT
     V6 event Queue for session: <Session ID>, Output: <Transport
     name> has reached 50% full.

> **Explanation:** This event occurs when the input queue to ffmpeg reaches 50% full (16.5
>   million bytes).
> **Severity:**   MAJOR
> **Recommended Action(s):** N/A

V6_OUTQUEUE 90PERCENT
     V6 event Queue for session: <Session ID>, Output: <Transport
     name> has reached 90% full. Sever progressing delay. User
     experience degraded. Workload reduction required for proper
     operation.

> **Explanation:** This event occurs when the input queue to ffmpeg reaches 90% full (29.7
>   million bytes).
> **Severity:**   CRITICAL
> **Recommended Action(s):** N/A

V6_PCR_GREATER_DTS
     V6 Session:<Session ID> Output:<Transport name> Audio stream
     detected <number of errors detected> PCR>DTS error(s) in last
     60 seconds

> **Explanation:** The event is reported every 60 seconds when PCR is bigger than DTS. This
>   typical of poorly muxed input streams that suffer disruption or a jump.
> **Severity:**   INFO
> **Recommended Action(s):** N/A

V6_RCSTART_NOT_FOUND
     V6 event Unable to find /etc/rcstart file… could not startup.

> **Explanation:** This Task Manager event indicates that the /etc/rcstart file was not found
>   (probably due to an installation problem).
> **Severity:**   CRITICAL
> **Recommended Action(s):** N/A

```
V6_SESMGR_STP_COMPLETED
     V6 event Completed <workflowName+Step number>, Session:
     <session ID+Workorder ID>, Output: <output file>, Transcoder:
     <Transcoder in-use>, Execution time: <execution time>.
```

Explanation: This event reports the completion of a session step.

Severity: INFO

Recommended Action(s): N/A

```
V6_SESMGR_STEP_FAILURE
     V6 event Failed <WorkflowName+Step number>, Session: <Session
     ID+WorkOrder ID>, Output: <Output file>, Transcoder:
     <Transcoder that failed (error: error_code).
```

Explanation: This event reports a session step failure.

Severity: INFO

Recommended Action(s): N/A

```
V6_SESMGR_STEP_START
     V6 event Started <workflowName+Step number>, Session: <session
     ID>, Work Order: <workorder ID>, Output: <output file>,
     Transcode: <Transcoder in-use>.
```

Explanation: This event reports a session step starting.

Severity: INFO

Recommended Action(s): N/A

```
V6_SESMGR_WO_RESULT
     V6 event Completed <workorder ID>, Session:<session ID>,
     Workflow: <workflow name>, Input: <input file>, Result:
     <result+ execution time>
```

Explanation: This event signals the completion (successful or not) of a work order.

Severity: INFO

Recommended Action(s): N/A

```
V6_SESMGR_WO_START
     V6 event Started <workorder ID>, Session: <session ID>,
     Workflow: <workflow name>, Input: <input file>
```

Explanation: This event signals the start of a work order.

Severity: INFO

Recommended Action(s): N/A

V6_SHORT_TIME_GAP
       V6 Session: <Session ID>, Output:<Transport name> Audio decode
       detected <number of gaps detected> short time gap(s) (<200ms)
       in last 60 seconds.

   Explanation: This event is reported every 60 seconds when short time gaps (<200ms) are
                   detected in the audio stream.
   Severity: INFO
   Recommended Action(s): N/A

V6_STREAM_FPS_TOO_LOW
       V6 event Session: <Session ID>, Output: <Transport name>, is
       not transcoding real-time actual fps: <Actual FPS> / target
       fps: <Target FPS>.

   Explanation: This event occurs when the input queue to Mpeg2TsDmx reaches 90% full (29.7
                   million bytes).
   Severity: INFO
   Recommended Action(s): N/A

V6_TASK_COMM_FAILURE
       V6 event Internal communication problem.

   Explanation: This event is reported by any task if it detects problems with inter-task
                   communication.
   Severity: CRITICAL
   Recommended Action(s): N/A

V6_TASK_FAILED
       V6 event The tasks have failed.

   Explanation: This Task Manager event indicates that a particular task has failed.
   Severity: CRITICAL
   Recommended Action(s): N/A

V6_TASK_OUT_OF_MEMORY
       V6 event Out of memory, exiting

   Explanation: This event is reported by any task that runs out of memory.
   Severity: CRITICAL
   Recommended Action(s): N/A

V6_TASK_RUNNING
       V6 event The task <param1> is running.

   Explanation: This Task Manager event indicates that a particular task is now running.
   Severity: INFO
   Recommended Action(s): N/A

V6_TASK_STARTED
    V6 event The task <param1> was requested to start.

    Explanation: This Task Manager event indicates that a particular task has started, by request.

    Severity: INFO

    Recommended Action(s): N/A

V6_TASK_STOPPED
    V6 event The task has stopped.

    Explanation: This Task Manager event indicates that a particular task has stopped by request.

    Severity: INFO

    Recommended Action(s): N/A

V6_TASK_STOPPING
    V6 event The task <param1> was requested to stop.

    Explanation: This Task Manager event indicates that a particular task has been requested to stop but that there is no guarantee that it will stop. This is different from the force-stop request.

    Severity: INFO

    Recommended Action(s): N/A

V6_TASK_SYS_UP
    V6 event All tasks started successfully.

    Explanation: This Task Manager event indicates that the system has started successfully.

    Severity: INFO

    Recommended Action(s): N/A

V6_WRITE_FRAME_FAILED
    V6 Session:<Session ID>, Output:<Transport name> Audio/Video unable to write <Number of packets that could not be written> frame(s) in last 60 seconds

    Explanation: This event is reported every 60 seconds when AV packets cannot be sent out. This signifies that the input has issues and the user should ensure the input signal is clean.

    Severity: INFO

    Recommended Action(s): N/A

Video_Loss
    Temporary video loss in Ts: <InTsIdx> Port <PortNum> IP <IP> UDP <UPD> Pid<VPID>.

    Explanation: Video underflow was detected for the specified input. This even is reported to the trap server.

    Severity: MINOR

    Recommended Action(s): Verify the TS.

Grooming (GRM) Events

PGRED_FAILOVER_TO_BCKUP
        Grooming session (Gige <port>, ipAddr>/<udp>, <pgNum>) failed
        over to backup.

Explanation: A grooming session has failed over to the backup program.
                        This event is reported to the trap server.
Severity: MAJOR
Recommended Action(s): N/A

CFG_Grm_ADD
        Grooming session <GIdx> ITs<InTslp>/IPg<InPgNum>OTs<OutTsIp>/
        <OutTsUdp>OPg<OutPgNum>/<OutPgName> added.

Explanation: A grooming session was created.
Severity: INFO
Recommended Action(s): N/A

CFG_Grm_DEL
        Grooming session <GIdx> OTs <OutTsIp>/<OutTsUdp> OPg
        <OutPgNum>/<OutPgName> deleted.

Explanation: A grooming session was deleted.
Severity: INFO
Recommended Action(s): N/A

PG_RED_RECOVER_TO_PRIM
        Grooming session (Gige< port>, <ipAddr>/<udp>, <pgNum>)
        recovered to primary.

Explanation: A grooming session has recovered to the primary program.
Severity: INFO
Recommended Action(s): N/A

PGRED_FAILOVR2BKUP_FAIL
        Grooming session (Gige <port>. <ipAddr>/ <udp>, <pgNum>
        failover to backup failed.

Explanation: A grooming session failover to backup program has failed.
                        This event is reported to the trap server.
Severity: CRITICAL
Recommended Action(s): N/A

PGRED_FAILOVER_TO_BCKUP
        Grooming session (Gige<port>, <ipAddr>/<udp>, <pgNum>) failover
        to backup failed.

Explanation: A grooming session failover to backup program has failed.
Severity: MAJOR
Recommended Action(s): N/A

PGRED_FAILOVR2BKUP_FAIL
      Grooming session (Gige<port>, <ipAddr>/<udp>, <pgNum>) failover
      to backup failed.

   Explanation: A grooming session failover to backup program has failed.

   Severity: CRITICAL

   Recommended Action(s): N/A

PG_RED_RECOVER_TO_PRIM
      Grooming session (Gige<port>), <ipAddr>/<udp>, <pgNum>)
      recovered to primary.

   Explanation: A grooming session recovers to the primary program.
                    This event is reported to the trap server.

   Severity: MINOR

   Recommended Action(s): N/A

PGRED_GLB_SWITCH_TO_PRIM
      All grooming sessions using back up input source have been
      switched to primary.

   Explanation: The user has manually switched all grooming session, using backup-to-primary.

   Severity: INFO

   Recommended Action(s): N/A

PGRED_MANSWTCH_TO_BCKUP
      Grooming session (Gige <Port>, <ipAddr>/<udp>,<pgNum>) switched
      to backup.

   Explanation: The user has manually switched to a backup program.

   Severity: INFO

   Recommended Action(s): N/A

PGRED_MANSWTCH_TO_PRIM
      Grooming session (Gige <Port>, OTs <ipAddr>/<udp>/<pgNum>)
      switched to primary.

   Explanation: The user has manually switched to primary program.

   Severity: INFO

   Recommended Action(s): N/A

XCODE_Resolution_CHG
      XC Sess ITS(GigE <port>,<ipAddr>,<pgNum> In Res <ires>) OTS
      (GigE<oport>,<oipSddr>,<opgNum> Out Res<ores>)

   Explanation: A resolution change in a transcoding session has occurred.

   Severity: INFO

   Recommended Action(s): N/A

Licensing (LIC) Events

CFG_LicKey
    Config change: LicType "<LICTYPE>" added.

Explanation: A new license key was configured.
Severity: INFO
Recommended Action(s): N/A

Del_LiKey
    Config Change: Lic Type <LICTYPE> deleted.

Explanation: An existing license key has been deleted.
Severity: INFO
Recommended Action(s): Verify the TS.

InTS_ADD_Fail
    ITS create Failed: <InTsIndex>/<Port Num>/<IP>/<UDP>. No base
    license present.

Explanation: An input transport stream creation was rejected, due to licensing restrictions.
Severity: INFO
Recommended Action(s): Contact Imagine Communications Customer Support.

LiKey_CFG_FAIL
    CDEL_LicKeyonfig failed: LicType "<LICTYPE>" configuration
    failed.

Explanation: Configuration failed for a new license key.
Severity: MINOR
Recommended Action(s): Contact Imagine Communications Customer Support.

LiKey_Error
    Configuration replay failed: Check licensing.

Explanation: Video configuration not applied. Check licensing.
Severity: MAJOR
Recommended Action(s): Contract Imagine Communications Customer Support.

OutPgm_ADD_Fail
    OPg OP FailedTS: <OutTsIndex>/<PortNum>/<IP>/<UDP>
    <OutPgIndex>/<Num>/<LICTYPE>.

Explanation: An output program creation was rejected, due to licensing restrictions.
Severity: INFO
Recommended Action(s): Contract Imagine Communications Customer Support.

OutTS_ADD_Fail
      OTS op Failed: <OutTsIndex>/<PortNum>/<IP>/<UDP><LICTYPE>
      unavailable.

   Explanation: An output transport stream creation was rejected, due to licensing restrictions.
   Severity: INFO
   Recommended Action(s): Contact Imagine Communications Customer Support.

Configuration (CFG) Events

CHASSIS_TYPE_MISMATCH
      On system boot, found config DB for chassis type <DB_CHASSIS>,
      but current chassis is <CURR_CHASSIS>.

   Explanation: The configuration database lists a different type of chassis than the one currently
                 in use.
   Severity: MAJOR
   Recommended Action(s): N/A

Event/Alarm Manager (ELM) Events

CFG_ELM_global
      Config changed: global.

   Explanation: The configuration of the Event and Alarm Manager has been changed.
   Severity: INFO
   Recommended Action(s): N/A

CFG_SYSLOG_global
      Config changed: global.

   Explanation: The configuration of the Syslog server has changed.
   Severity: INFO
   Recommended Action(s): N/A

CFG_SYSLOG_svr
      Config change: syslog server.

   Explanation: The configuration of the Syslog server has changed.
   Severity: INFO
   Recommended Action(s): N/A

ESAM Alarms

```
Fail_to_Connect_to_POIS_Server
```

Explanation: Connection to POIS server has failed.

Severity: MAJOR

Recommended Action(s): None: system attempts to reconnect. This alarm is cleared with connectivity is restored between the VMG and the POIS server.

ESAM Events

```
Loss_Communication
```

Explanation: Loss of communication to the POIS server after socket successfully opened.

Severity: INFO

Recommended Action(s): None: system will attempt to connect to server.

```
HTTP_Server_Timeout
```

Explanation: The HTTP server has timed out.

Severity: INFO

Recommended Action(s): None: the POIS agent will close the socket and re-open it again , in accordance with a defined interval.

```
HTTP_Client_Timeout
```

Explanation: The HTTP client has timed out.

Severity: INFO

Recommended Action(s): None: POIS will close the socket and re-open it again, in accordance with a defined interval.

```
Send_POIS_Agent_Msg_Failed
```

Explanation: Failed to send cue message to POIS agent.

Severity: INFO

Recommended Action(s): None.

```
Signal_Processing_Notif
```

Explanation: Invalid HTTP/Signal Processing Notification message.

Severity: MAJOR

Recommended Action(s): None: POIS discards the notification.

```
IDR_Insertion_Expired
    (ERROR_CUE_INSERTION_FAILED_EXPIRED)
```

Explanation: Cue insertion failed: cue time expired.

Severity: MAJOR

Recommended Action(s): None: No cue induced IDR.

```
IDR_Insertion_Failed
      (ERROR_CUE_INSERTION_FAILED_CURRENTLY_PROCESSING_ACTIVE_CUE)
```

Explanation: Cue induced IDR insertion failed: New CUE received while still processing an active cue message.

Severity: MAJOR

Recommended Action(s): None

```
Cue_Forward_Failed
```

Explanation: Failed to forward cue message

Severity: MAJOR

Recommended Action(s): None. Cue not forwarded.

```
HTTP_Bad_Request
```

Explanation: Response from POIS server indicates bad request.

Severity: MAJOR

Recommended Action(s): None: response is discarded.

Security (AAA) Events

```
CFG_GLOBAL_MOD
      One of more global attributes have been changed.
```

Explanation: Configuration change: one or more AAA global configuration attributes were changed.

Severity: INFO

Recommended Action(s): N/A

```
CFG_SERVER_ADD
      AAA server <serverIndex> added to the configuration.
```

Explanation: Configuration change: the specified AAA server was added to the configuration

Severity: INFO

Recommended Action(s): N/A

```
CFG_SERVER_DEL_AAA
                  Server <serverIndex> deleted from the configuration.
```

Explanation: Configuration change: the specified AAA server was deleted from the configuration.

Severity: INFO

Recommended Action(s): N/A

CFG_SERVER_MOD
        Configuration of AAA server <serverIndex> modified.

        Explanation: Configuration change: the configuration of the specified AAA server was
                     changed.
        Severity: INFO
        Recommended Action(s): N/A

CFG_USER_ADD
        User <userName> added to the configuration.

        Explanation: Configuration change: the specified user was added to the configuration.
        Severity: INFO
        Recommended Action(s): N/A

CFG_USER_DEL
        User <userName> deleted from the configuration.

        Explanation: Configuration change: the specified user was deleted from the configuration.
        Severity: INFO
        Recommended Action(s): N/A

CFG_USER_MOD
        Configuration of user <userName> modified.

        Explanation: Configuration change: the configuration of the specified user was changed.
        Severity: INFO
        Recommended Action(s): N/A

NO_SERVER_RESPONSE
        No response from AAA server <serverIndex> at address
        <serverIPaddr>: <serverPort>.

        Explanation: There was no response received from the specified AAA server on an
                     authentication request.
        Severity: MAJOR
        Recommended Action(s): (1) Verify AAA server IP address (2) Verify connectivity exists
                     between the VMG and the AAA server.

User_Authen_Failed
        or
        Login_Failed   User login authentication failed for <username>.

        Explanation: Login authentication failed for the specified username.
        Severity: MINOR
        Recommended Action(s): N/A

```
User_Authen_Succeed
     or
     Login
     User Authentication succeeded for <username>.
```

Explanation: Login authentication succeeded for the specified username.

Severity: INFO

Recommended Action(s): N/A

```
User_Logout
     or
     Logout
     User <username> logged out.
```

Explanation: The specified user has logged out.

Severity: INFO

Recommended Action(s): N/A

Recommended Action(s):

Glossary

This glossary describes some of the terminology used in this document.

Numeric

3DES—Triple Data Encryption Standard
A mode of DES that encrypts data three times. Three 64-bit keys are used, for an overall key length of 192 bits.

720p
720 horizontal scan lines of image resolution in progressive (p) scan (i.e. non-interlaced).

A

AAA—Authentication, Authorization, and Accounting
The services provided by a security protocol. Examples of security protocols are RADIUS and TACACS+.

AC—Access Criteria

ACG—Access Control Generator

AES—Advanced Encryption Standard
AES is a privacy transform for IPSec and Internet Key Exchange, and is replacing the Data Encryption Standard (DES). AES offers a larger key size and a variable key length.

AFD—Active Format Description

AMP—Application Media Processor
The VMG module that performs audio transcoding.

ANSI—American National Standards Institute

API—Application Programming Interface
A set of functions, procedures, methods, classes or protocols that an operating system, library or service provides to support requests made by computer programs.

AR—Analog Regenerator

ARP—Address Resolution Protocol
ARP broadcasts a packet containing the IP address that the sender specifies to all hosts attached to an Ethernet connection. When the target recognizes that the IP address is its own, it s a response.

ATSC—Advanced Television Systems Committee
ATSC is working to coordinate television standards among different communications media. ATSC is also developing digital television implementation strategies.

AVTX—Audio/Video Transcode
A transport stream that enables both audio and video transcoding.

B

Bandwidth
The maximum amount of data that a transmission device is capable of carrying.

C

CA—Conditional Access
An encryption/decryption management method by which a broadcaster controls a subscriber's access to services.

CAS—Conditional Access Systems
Systems that ensure broadcast service is accessible only to those entitled to access, usually by scrambling or encrypting the service.

CAT—Conditional Access Table
One of the 4 tables in PSI. The CAT provides conditional access to the transport streams.

CBC—Cipher Block Chaining
A DES mode.

CBR—Constant Bit Rate
Constant bit rate encoding ensures that the rate at which a codec's output is consumed is constant. Because it is the maximum bitrate that matters, CBR is useful for streaming multimedia content on limited capacity channels. See also VBR.

CCA—Circuit Card Assembly

CML
An optical signaling method.

Codec
A program or device used for compressing/decompressing or encoding/decoding data and signals.

CPU—Central Processing Unit

CSA—Common Scrambling Algorithm

CVCT—Cable Virtual Channel Table

CW—Control Word
Part of DVB simulcrypt.

CWG—Control Word Generator
Part of DVB simulcrypt.

D

DAVIC
Digital Audio Visual Council

DCCT—Directed Channel Change Table
One of the 9 tables in the ATCS PSIP. The DCCT instructs the receiver to change channels based on viewer preferences, demographics or geographical location. This table works with a DCCSDT in the set top box.

DCCSCT—Directed Channel Change Selected Code Table
One of the 9 tables in the ATSC PSIP. The DCCSCT allows updating some DCC table information data in receivers equipped to handle updates.

DES—Data Encryption Standard
DES specifies a FIPS approved cryptographic algorithm as required by FIPS 140-1. Encrypting data converts it to an unintelligible form called cipher. The cryptographic security of the data depends on the security provided for the key used to encipher and decipher the data. Data can be recovered from cipher only by using exactly the same key used to encipher it.

DET—Data Event Table
One of the 9 tables in the ATSC PSIP. The DET announces the data portion of a video/audio/data event when the data event does not match the exact duration of an video/audio event.

DHCP—Dynamic Host Configuration Protocol
A protocol used by networked devices on an IP network. DHCP allows these devices to join a network with little to no configuration required.

DHEI—Digital Headend Expansion Interface

DM—Dense Modulator

DOCSIS—Data Over Cable Service Interface Specifications
Now known as CableLabs Certified Cable Modems. DOCSIS specifies modulation schemes and the protocol for exchanging bidirectional signals over cable.

DSP—Digital Signal Processing

DVB—Digital Video Broadcast
A European set of defined transmission standards for digital broadcasting systems.

DVB SI—DVB Simulcrypt

DWDM—Dense Wavelength Division Multiplexing
A fiber-optic transmission technique using light wavelengths to transmit data parallel-by-bit or serial-by-character.

E

EAS—Emergency Alert System

An operational structure for national and local emergency alerts used by broadcast, cable, and wireless cable.

EBP—Encoder Boundary Point

Data that is inserted into audio or video elementary streams intended for use in adaptive streaming applications.

ECB—Electronic Code Book

A DES mode

ECM—Entitlement Control Messages

ECMG—Entitlement Control Messages Generator

EDS—Extended Data Services

EIA—Electronic Industries Alliance

EIT—Event Information Table

One of the 9 tables in the ATCS PSIP. EITs are associated with a specific virtual channel in the VCT, contain event information, and point to the location of extended text in the ETT.

Elementary Stream

An individual MPEG data stream, such as a video stream, audio stream, or data stream that is encapsulated in a transport stream.

EM—Element Manager

The graphical user interface for the Selenio VMG.

EMM—Entitlement Management Message

A packet containing the information necessary to decrypt the picture.

EMMG—Entitlement Management Message Generator

The component of the conditional access headend that delivers entitlements to the multiplexers.

EOD—Everything-On-Demand

ERM—Encrypter Resource Manager

Ethernet

A frame based local area network technology. Specified in the IEEE 802.3 family of standards.

ETT—Extended Text Table

One of the 9 tables in the ATCS PSIP. ETTs carry longer text messages than EITs for describing events and virtual channels.

F

FCC—Federal Communications Commission

The agency that regulates communications services, including cable television, that originate in the United States.

FEC—Forward Error Correction

Also referred to as channel coding, FEC is a technique used for controlling errors in data transmission over unreliable or noisy communication channels

FFT—Fast Fourier Transform

FPGA—Field Programmable Gate Array

An array of logic gates that can be hardware-programmed to fulfill user-specified tasks.

FTP—File Transfer Protocol

A network protocol used to transfer data from one computer to another through a network.

FTTP—Fiber to the Premise

FVOD—Free-Video-On-Demand

G

GBP /GBP-2

Gigabit Ethernet Processor module.

GigE—Gigabit Ethernet

Technology for transmitting Ethernet frames at data transfer rates of 1 Gigabit (1,000 megabits) per second.

Grooming

The process of creating customized channel lineups.

GUI—Graphical User Interface

A type of user interface that allows people to interact with electronic devices.

H

H.264

A block oriented motion-compensation based codec. It is equivalent to the MPEG-4 Part 10 standard.

HD—High Definition

High-resolution digital television combined with Dolby Digital surround sound (AC-3).

Headend

A regional distribution point in a television system.

HFC—Hybrid Fiber/Coax

A distribution system combining fiber and coax cable. An HFC system is used to distribute CATV signals into a neighborhood.

HRD—Hypothetical Reference Decoder

I

ICMP—Internet Control Message Protocol

A networking protocol.

IEEE—Institute of Electrical and Electronics Engineers

An international non-profit professional organization that develops a wide array of standards related to electricity.

IF

A high-rate signal

IFFT—Inverse Fast Fourier Transform

IGMP—Internet Group Management Protocol

IP hosts use IGMP to register dynamic multicast group membership. Connected routers discover the group members using the same protocol.

IMPB—IP-MAC-Port Binding

A configuration that binds a source IP address with an associated MAC address and port number.

IP—Internet Protocol

The network layer for the TCP/IP (Internet Protocol) Suite. It is a connectionless, best-effort packet switching protocol.

IP Address

A numerical identifier used by computers and devices on an IP network.

IPMI—Intelligent Platform Management Interface

An open standards specification that defines interfaces which enable system administrators to monitor, manage, diagnose, and recover systems.

IPTV—Internet Protocol Television

A system where digital television is delivered to a network infrastructure using Internet Protocol through a broadband connection. Often, IPTV is delivered in conjunction with Video on Demand and other Internet services, such as web access and Voice over IP.

IRD—Integrated Receiver Decoder

IRT—Integrated Receiver Transcoder

ITU—International Telecommunication Union

An international organization through which governments and the private sector coordinate global telecommunications networks and devices.

J

JRE—Java Runtime Environment

JRE is made up of the Java virtual machine, the Java platform core classes, and supporting files.

L

LAN—Local Area Network

A type of computer network that spans a small physical area such as a home, office, or school.

LED—Light Emitting Diode

A semiconductor diode that emits light when current passes through it. LEDs are used as indicators.

M

MBR TS—Multi-bitrate Transport Stream

An MBR TS enables you to transcode a single input stream into four SPTSs.

MGT—Master Guide Table

One of the 9 tables in the ATCS PSIP. MGT provides program-identification (PID) locations so a receiver can find the other tables, and informs the receiver of changes or table updates.

MIB—Management Information Base

MIB defines the variables needed by the SNMP protocol to monitor and control elements in a network.

MID

Mid-plane.

MOD

Modulator and Up-Converter

MOD

Movies-On-Demand

MPE—Multi-Protocol Encapsulation

MPEG—Moving Pictures Experts Group

A joint standards working group of ISO/IEC that develops video and audio encoding standards.

MPEG-2

A transport, audio, and video standard for compression and storage of broadcast quality television.

MPEG-4

A graphics and video compression algorithm standard based on MPEG-1, MPEG-2, and other related technologies.

MPTS—Multi-Program Transport Stream

A transport stream that contains multiple programs.

MRM—Multiplex Resources Manager

Multiplexing

The process of combining several different signals onto a single communication channel for transmission.

MUX—Multiplexer

A device that combines multiple data sources into a single data stream for transmission. Some MUX's can demultiplexes the single data stream into its composite forms.

N

NEBS—Network Equipment Building System

NIST—National Institute of Standard and Technology

NIT—Network Information Table

One of the four tables in PSI. The NIT provides information about transport streams and multiplexes.

NMP—Network Management Protocol

A Network Management System

NPM—Network Processor Module

The Selenio VMG module that performs network related processing.

NSA—National Security Agency

NTP—Network Time Protocol

A TCP protocol that ensures accurate local time-keeping with reference to radio and atomic clocks, and can synchronize distributed clocks within milliseconds.

NTSC—National Television System Committee

Committee that defined the current standard for analog color television in North America, as well as the name for the standard. The format is 525 lines in 4MHx of video bandwidth.

O

OIF

A standards body

OOB—Out-Of-Band

OTN
An Optical Transport Network

OTS
Output Transport Stream

P

PAT—Program Association Table
One of the 4 tables in PSI. The PAT lists the programs available in a transport stream.

PCR—Program Clock Reference

PDG—Private Data Generator

PEM—Power Entry Module

PHY
Physical link layer

PID—Packet Identifier
Part of the transport stream packet header used to identify tables, elementary streams, and programs.

PIP—Picture in Picture

PLL—Phase-Locked Loop
Part of the clock generator

PMT—Program Map Table
One of the 4 tables in PSI. The PMT contains information about MPEG-2 programs.

POD—Point-Of-Deployment

Program
A collection of audio, video, tables, and elementary streams carried on a channel.

PSI—Program Specific Information
A collection of four tables as part of an MPEG-2 or MPEG-4 transport stream. These four tables include:
- Conditional Access Table (CAT)
- Network Information Table (NIT)
- Program Association Table (PAT)
- Program Map Table (PMT)

PSIP—Program and System Information Protocol

A collection of nine tables that allow the DTV transport stream to provide information about a station's services and programming. These nine tables include:

- Master Guide Table (MGT)
- System Time Table (STT)
- Virtual Channel Table (VCT)
- Rating Region Table (RRT)
- Event Information Table (EIT)
- Extended Text Table (ETT)
- Data Event Table (DET)
- Directed Channel Change Table (DCCT)
- DCC Selected Code Change Table (DCCSDT)

PSIG—PSI/SI Generator

Q

QAM—Quadrature Amplitude Modulation

This is the modulation technique used in systems carrying digital video.

QoS—Quality of Service

Guarantees network bandwidth and availability for applications.

R

RADIUS—Remote Authentication Dial In User Service

A networking protocol that provides centralized AAA services.

Redundancy

A method of providing a backup for critical system components to ensure uninterruptible service in the event of a failure. High availability and reliability.

RF—Radio Frequency

Television signals are modulated onto RF signals and are then demodulated by the television tuner.

RRT—Regional Ratings Table

One of the 9 tables in the ATCS PSIP.

RTP—Real Time Protocol

RTP provides services such as payload type identification, sequence numbering, time-stamping, and delivery monitoring to real-time applications.

RTC—Real Time Clock

RTM—Rear Transition Module

RU—Rack Unit

A common increment of equipment space height. The height of 1 RU is 1.75 inches.

S

SCR

DVB CSA scrambler

SCS—Simulcrypt Synchronizer

SCTE—Society of Cable Telecommunications Engineers

An organization that develops training for cable television installers and engineers and standards for the cable industry.

SD—Standard Definition

Television systems that have a resolution that meets standards but not considered either enhanced definition or high definition.

SDT—Service Description Table

A table ID that indicates the MPEG-2 SI packet type.

SerDes

Serializer/deserializer

SFP—Small Form Factor Pluggable

An optical interface that is used in network switches for Fibre Channel, Gigabit Ethernet and InfiniBand.

SCM—Shelf Control Manager

Manager of the chassis population and infrastructure.

SHO—Super Head-end Office

The central distribution point in a television system. Main office.

SMF—Single Mode Fiber

An optical fiber designed to carry only a single ray of light.

SNMP—Simple Network Management Protocol

A protocol used to monitor and control network devices, and to manage configurations, statistics collection, performance, and security.

SPTS—Single Program Transport Stream.

A transport stream that contains only one program.

SRM—System/Session Resource Manager

Status Bar

Located at the bottom of an application window and displays system status information.

STT—System Time Table

One of the 9 tables in the ATCS PSIP. Allows a broadcaster to present time indicators to the consumer, ensuring that the time is synchronized.

SVOD—Subscription-Video-on-Demand

A Video-on-Demand service offered by subscription, providing viewers with access to select programs from the libraries of featured cable networks.

T

TACACS+—Terminal Access Controller Access-Control System Plus

A networking protocol that provides centralized AAA services.

TBR—Time Base Recovery

TCM—Transcoding Module

The VMG module that performs transcoding.

TCP—Transmission Control Protocol

A connection oriented transport protocol in the Internet (TCP/IP) protocol suite.

TFTP—Trivial File Transfer Protocol

A simple form of the File Transfer Protocol (FTP). TFTP uses UDP and is often used by servers to boot diskless workstations, X-terminals, and routers.

Transcoding

The process of converting one digitally encoded format to another, such as MPEG-2 to H.264 or vice versa.

Transrating

Transrating, or rate shaping, is the process of changing the bitrate of a video stream for the purposes of improving bandwidth and system efficiency.

TS—Transport Stream

One or more multiplexed MPEG-2 or MPEG-4 programs and related data.

TSA—Transfer Switch Adapter

RF redundant switching/routing

TVCT—Terrestrial Virtual Channel Table

U

UDP—User Datagram Protocol

A connectionless transport protocol in the TCP/IP (Internet) protocol suite that runs over the IP network protocol. UDP provides a direct way to send information over an IP network. It is used primarily for broadcasting messages over a network.

V

VBI—Vertical Blanking Interval

A portion of a television signal that carries non-audio/video data, such as closed-caption text.

VBR—Variable Bit Rate

VBR streams vary in bandwidth over time.

VCT—Virtual Channel Table

One of the 9 tables in the ATCS PSIP. The VCT contains a list of all the channels that are or will be online, along with their channel name and number. This table contains the set of data that enables a receiver to tune and locate the service being broadcast.

VHO—Video Hub Office

The regional distribution point in a television system. Satellite office that receives video from SHO.

VIA—Video Intelligence Architecture

An FPGA based modular architecture developed by RGB.

VMG-6—Video Multiprocessing Gateway, 6-slot chassis

VMG-8—Video Multiprocessing Gateway, 8-slot chassis

VMG-14—Video Multiprocessing Gateway, 14-slot chassis

VOD—Video On Demand

A system that allow users to watch video content over a network as part of an interactive television system, either by streaming or by download.

VPM—Video Processor Module

The VMG card that performs video related processing.

VSO—Video Serving Office

The local distribution point in a television system. Central office that receives video from VHO.

VTR—Video Transrating

A transport stream that enables only video transrating.

VTX—Video Transcode

A transport stream that enables only video transcoding.

W

WAN—Wide Area Network

A type of computer network that spans a large geographic area such as a state or country.

WM9

Windows Media 9

WSS
Widescreen Signaling

X

XFI
Serial GbE optical interface

XFP—10 Gigabit Small Form Factor Pluggable
10 Gigabit Small Form Factor Pluggable (SFP). The XFP is a pluggable, hot-swappable optical interface for 10 Gigabit SONET/SDH, Fibre Channel, Gigabit Ethernet, and other applications. XFP modules are optical transceivers, typically 1310nm or 1550nm. Optical XFPs include digital diagnostics.

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