NSG 9000

Universal EdgeQAM

Software User's Guide

VERSION 1.6

NSG 9000

Rev B

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Conventions

NOTE: The Note symbol calls your attention to additional information that you will benefit from heeding. It may be used to call attention to an especially important piece of information you need, or it may provide additional information that applies in only some carefully delineated circumstances.

TIP: The Tip symbol calls your attention to parenthetical information that is not necessary for performing a given procedure, but which, if followed, might make the procedure or its subsequent steps easier, smoother, or more efficient.

In addition to these symbols, this manual uses the following text conventions:

- `Data Entry`: indicates text you enter at the keyboard.
- **User Interface**: indicates a button to click, a menu item to select, or a key or key sequence to press.
- `Screen Output:` shows console output or other text that is displayed to you on a computer screen.
- **Bold**: indicates the definition of a new term.
- *Italics*: used for emphasis, cross-references, and © 2010 Harmonic Inc.hyperlinked cross-references in online documents.

Revision History

Table 0-1: Revision History

Revision	Date	Description	By
A	January 2010	Updating according to 1.6	Tova
B	March 2010	Updating EdgeCluster	Tova

Table of Contents

Chapter 1
Features and Specifications

1.1 Introduction

This guide describes the configuration and monitoring instructions for NSG™ (Network Services Gateway) 9000.

This universal high density EdgeQAM system supports multiple applications and delivers up to 72 QAM-RF output streams. The number of the delivered transport streams is defined according to the device configuration and number of QAM-RF modules mounted in the slots of the device. Each QAM may serve a different application allowing a single device to concurrently support multiple applications. The supported applications are:

- VOD (Video On Demand)
- Broadcast
  - MPTS passthrough
  - Service remux
  - PID remux
- SDV (Switched Digital Video)
  - NGOD (Next Generation On Demand)
  - ISA
- High Speed Data
  - M-CMTS (Modular CMTS)
  - D2E (Direct to Edge)

1.2 Main Firmware Related Features

The following table describes the main features supported by the narrowcast firmware:

Table 1-1: Main Firmware Related Features

Category	Feature	Description
Input	Max input sockets	1000
	Max. Input bit rate	■ Up to 3,000 Mbps (3 Gbps) per device ■ Up to 52 Mbps per socket
	Dynamic Extraction of input	Video only - Dynamic detection of changes in services and PSI tables at the input.
	Input Format	Video - MPEG2 transport over UDP/IP
	VOD - In-band provisioning of IP/UDP unicast sockets	Programs are automatically routed to the required output QAM channel based on their UDP port number. User may select between several different UDP mapping templates. See *4.2.3 Defining Emulation/QAM Mapping Mode* on page 60.
	IP unicast or multicast	Supports IGMP ver 1/2/3
Processing	Multiplexing/ provisioning options	■ Full multiplexing (any input to any output) ■ Multicast of any input stream to multiple transport streams. ■ MPTS socket passthrough - NSG 9000 may be configured to pass input sockets in their entirety to a given output QAM channel. However, passthrough sockets may not be multicast to multiple output QAM channels. ■ Service remux - up to 500 services ■ Spooling of PSI/SI tables
	Switched Digital Video	Supports SDV: ■ NGOD R6 and D6 protocols ■ ISA
	Scrambling	■ DVB-CSA scrambling, in two sub-modes: ❑ Session-based - distinct access criteria per program ❑ Tier-based SimulCrypt - same access criteria for all VOD programs, with up to 3 ECMs per program ■ Motorola Privacy Mode scrambling
	M-CMTS	Serves as an EdgeQAM in WB & NB applications, supports the following DOCSIS 3.0 protocols: ■ DEPI (MPT) ■ DRFI ■ DTI

Table 1-1: Main Firmware Related Features

Category	Feature	Description
Output	Max output bit rate	See *NSG 9000 Hardware and Installation User's Guide*
	QAM-RF	See *NSG 9000 Hardware and Installation User's Guide*
	ASI/GbE Monitoring	The unit duplicates any requested QAM channel to the ASI output port/GbE port for monitoring purposes.
Management	Management and monitoring	Web client MCT (Mass Configuration Tool) Control Panel SNMP NMX - Harmonic's Digital Service Manager
	QAM utilization statistics	When NMX is used for alarms and status monitoring, it may also provide statistical reports of QAM utilization.

1.3 Management Interfaces

Harmonic offers several methods for configuring the NSG 9000 devices and monitoring their status. All management interfaces listed below connect to the NSG 9000 over LAN, via its ETH1 Ethernet port.

Caution: Harmonic strongly recommends using an Ethernet network that is isolated from any other networks or subnets at your site for management of the NSG 9000 gateways. It ensures adequate security, and prevents possible disturbances to the normal operation of NSG 9000 devices due to uncontrolled network activity.

The table below lists the available management interfaces according to the management purpose for which they are designed:

Table 1-2: Management Interfaces

Tool	Purpose	Explanation
Control Panel	Preliminary configuration and monitoring of a single NSG 9000 device	The NSG 9000 control panel is located on the front panel of the NSG 9000. The control panel is active once the NSG 9000 boots up and provides means for preliminary configuration of a single NSG 9000 device. It also allows you to monitor the NSG 9000's status, view its alarms (if present), and troubleshoot them.
Web Client	Configuration and monitoring of a single NSG 9000 device	The NSG 9000 web client is an on-board web-based user interface, that is an integral part of the NSG 9000 firmware. The web client is accessible through Microsoft Internet Explorer, and provides means for configuring a single NSG 9000 device. It also allows the user to monitor the NSG 9000's status, view its alarms (if present), and troubleshoot them. For details on accessing the web client, see *Logging into NSG 9000* on page 11.
MCT (Mass Configuration Tool)	Configuration of multiple NSG 9000 devices	The MCT is a spreadsheet-oriented system designed to configure multiple NSGs simultaneously. MCT is recommended for large-scale NSG deployments. Besides simultaneous configuration of large number of NSG devices, it also allows users to perform firmware upgrade for multiple devices. MCT is sold separately - contact Harmonic Customer Support for more details. Note: MCT is not automatically updated when an NSG is configured through the web client. Using the web client for configuring individual NSG in an MCT-based site, is not recommended. If the web client is used, care should be taken to update MCT with the changed configuration. For details on synchronizing MCT with NSG devices, refer to the MCT online help.

Table 1-2: Management Interfaces

Tool	Purpose	Explanation
3rd party SNMP monitoring	Status and Alarm Monitoring of multiple NSG 9000 devices	The integrated SNMP supports an extended set of SNMP MIBs. In addition, NSG 9000 may generate SNMP traps in the following SNMP versions: v1, v2c, v3.
Harmonic NMX - Harmonic's Digital Service Manager	Status and Alarm Monitoring of multiple NSG 9000 devices	NMX may be used for monitoring general status and alarms of multiple NSG 9000 devices. A single NMX manager may be used to monitor several hundreds NSG 9000 devices, located in several different sites

Chapter 2
Getting Started

2.1 Initial Configuration of NSG 9000

The NSG 9000 device is configured and controlled by a remote management system. Once you have finished cabling the device (see, *NSG 9000 Hardware and Installation User's Guide*), set NSG IP address, that is, the IP addresses of the Ethernet ports located on the back panel of the NSG 9000. To set the NSG IP address, use the control panel located on the front panel of the NSG 9000.

NOTE: The NSG 9000 requires a user name and password to log in to all management interfaces including the serial communications console, web client and FTP. Both user name and password are *configure*.

2.1.1 Configuring Ethernet Ports

NSG 9000 is monitored and configured by a remote management system, via the Ethernet ports located on the back panel of the NSG 9000.

The Ethernet ports labeled ETH1 and ETH2 provide access to two independent networks. The NSG 9000 uses the Ethernet port labeled ETH1 to communicate with the management network. You may set the ETH1 IP address, subnet mask and default gateway.

NSG 9000 uses the Ethernet port labeled ETH2 to communicate with the CAS network. For ETH 2 you may configure only its IP address and subnet mask.

To configure the Ethernet ports of an individual device, use the Control Panel of the device.

The following sections describe how to configure individual NSG 9000 devices using the control panel of the unit.

When you configure the network parameters of ETH ports via the control panel, the application checks the validity of the IP address and network group parameters.

⇨ To configure ETH1 port:

1. Navigate to the Network Config screen (see *page 109*) and click <Enter>.

   The Ethernet Port 1 screen appears.
2. Click <Enter>. The ETH1 IP Address screen appears.
3. Click <Enter>. The Edit IP Address screen appears.
4. Edit the IP address and click <Enter>.

   The program checks whether you entered a valid IP address and only then applies changes. The Edit Ethernet Subnet Mask screen appears.
5. Edit the subnet mask and click <Enter>. The Edit Default GW screen appears.
6. Edit the ETH gateway and click <Enter.>.

   The program checks whether you entered valid network parameters and only then applies changes. The ETH1 IP Address screen appears.

   If invalid network parameters are entered an error message appears.

⇨ To configure ETH2 port

NOTE: If you are using the ETH2 port, you must configure its IP address on a different subnet than that of the Ethernet 1 port.

Once you are in Config mode, do the following:

1. Navigate to the Network Config screen and click <Enter>.
2. Click <Down or Up> to open the Ethernet Port 2 screen.
3. Click <Enter>. The ETH2 IP Address screen appears.
4. Click <Enter>. The Edit IP Address screen appears.
5. Enter the required IP address and click <Enter>.

   The program checks whether you entered a valid IP address and only then applies changes. The Edit Subnet Mask screen appears.
6. Enter the required subnet mask and click <Enter>.

   The program check whether the network group parameters are valid and only then applies the changes. The ETH2 IP Address screen appears.

   If invalid network parameters are entered an error message appears.

NOTE: You can re-configure the Ethernet ports using the MCT or Web client. The MCT allows the configuration of a number of NSG devices and the Web client allows a remote individual configuration.

For further information about the Control Panel, see *B.1 Using the Control Panel* on page 109.

2.2 Full Device Configuration

The NSG 9000 web client allows a full configuration of the NSG 9000 device. It also allows the user to monitor the NSG 9000's status, view its alarms (if present), and troubleshoot them. This manual describes and instructs you on how to configure and monitor the device via the web client.

2.2.1 Web Client Specifications

The NSG 9000 Web Client may run only on PCs that meet the following minimal hardware/software specifications:

Table 2-1: Web Client Specifications

Item	Specification
CPU	Pentium 4
Operating Systems	Windows 2000 or Windows XP
Screen resolution	1024x768 or higher

The web client is accessible through Microsoft Internet Explorer (IE). The following versions of IE are supported:

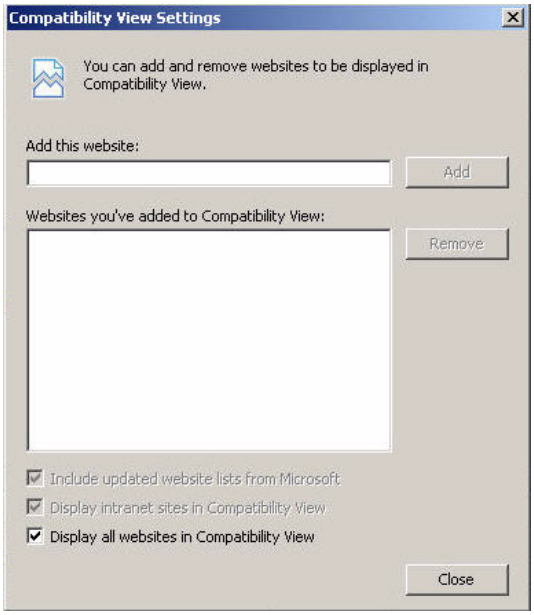
- 5.5
- 6.0
- 7.0
- 8.0 only in compatibility view

Using IE 8.0

To access the web client using IE8, you should use Compatibility View. This view allows to observe browser pages in a mode that is compatible with IE8.

⇨ To set compatibility view

1. Open IE8.
2. Select **Tools** > **Compatibility View Settings**.



3. Check **Display all Websites in Compatibility View**, or specify the IP address for specific sites.

2.2.2 Logging Into the Device via IE

The NSG 9000 device offers two access levels. Each access level offers a different mode of work with the device. The following table lists the various access levels and the available working modes:

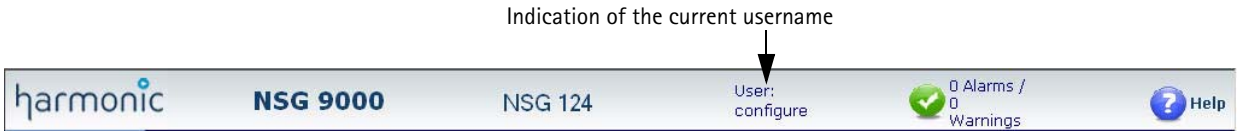
Table 2-2: Access Levels

Access Level	Working Mode
Monitor	Allows only to monitor the operation of the device.
Configure	Allows to configure the device and to define the Config and Guest access level password.

Each access level requires a correct username and password combination. The current access level appears in the title bar.

Username	Password
monitor	monitor
configure	configure

The current access level appears in the upper right hand corner of the web client.



Once the NSG 9000 is properly cabled and setup in your network, you may access it via the web client in order to configure and monitor it.

⇨ To log into the device

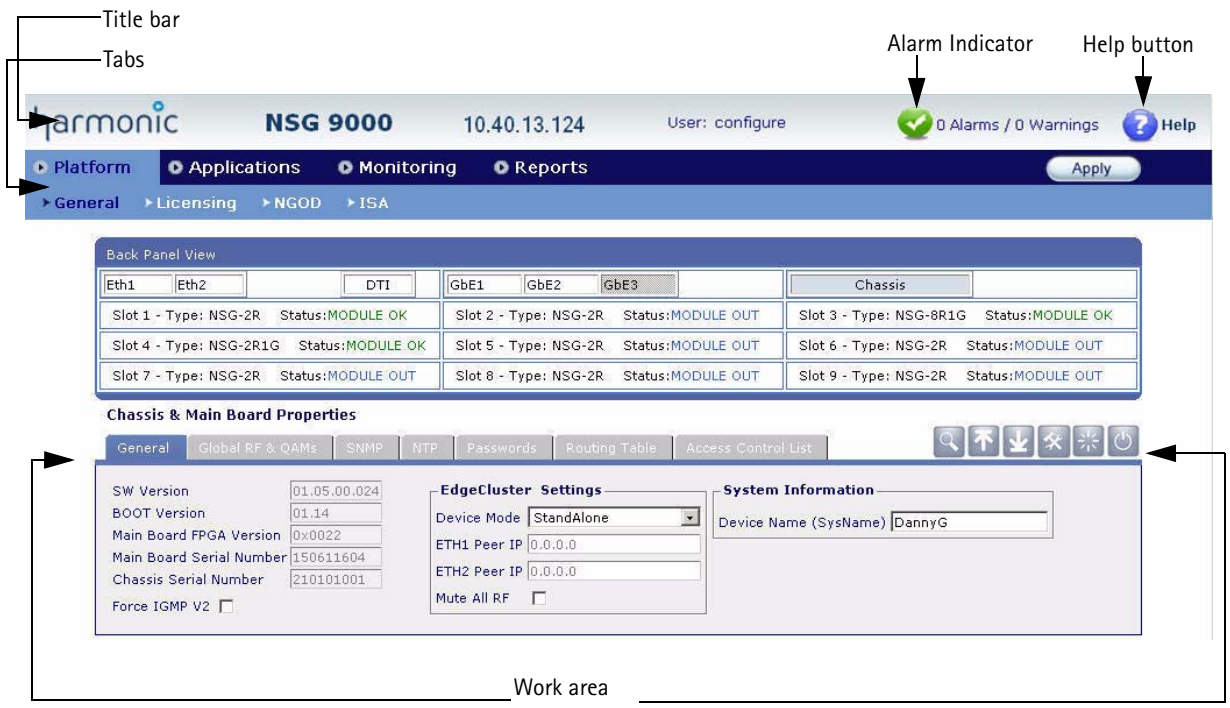
1. Open an Internet browser.
2. In the **Address** box, type the address of the required device.
3. Click **Login.**
4. Type in the required username and password.
5. To save the password for the future, select the Save this Password in your password list box.
6. Click **Ok**.

The web client page appears and you may start working with the device according to the restrictions of your access level.

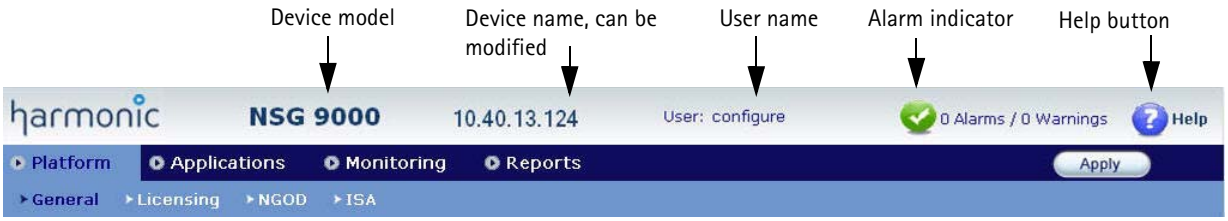
NOTE: To change the password, see *3.3.2 Setting a Password* on page 23.

2.2.3 Understanding the Web Client Page

Once you have logged into the device, the web client page appears. The web client reads data from the NSG 9000 and presents it in an easy to use User Interface (UI). It includes the following sections:



- **Title bar** - displays the following:



  - Device model, for example: NSG 9000
  - Device name - by default it is the IP address of the device. You can select it and type any name for easy identification and click Apply. For example: Rack 5-NSG 3.
  - Logged-in user
  - Alarm indicator - the alarm indicator is actually a link to the Alarm page and the indicator provides the following information:

Table 2-3: Alarm Indication

Alarm Indication	Explanation
Green Alarm button	No active alarms.

Table 2-3: Alarm Indication

Alarm Indication	Explanation
Red Alarm button	There is at least one active alarm. Once the mouse pointer hovers on it, a hint appears displaying the alarm description. Once you click it, the Alarm page opens.
Orange Alarm button	There is at least one active warning. Once the mouse pointer hovers on it, a hint appears displaying the alarm description. Once you click it, the Alarm page opens.
N Active Alarms N Active Warnings	'N' stands for the amount of registered alarms/ warnings. Click the link to open the Alarm page.

- Help button - allows you to access information about the various options provided by the web client. The provided help is a context sensitive help. Upon clicking the help button, the help page relevant to the open web client page appears.

- Tabs bar - Links you to parameters required for NSG 9000 configuration. The Tabs bar is comprised of two sections:
  - Main tabs - includes the tabs listed in the following table and the Apply button
  - Sub tabs - includes tabs related to the Main tab as the following table describes.

Table 2-4: Available Tabs

Main Tab	Sub TaB
Platform	■ General - allows to configure chassis parameters, input and output ports and QAM-RF module parameters. ■ Licensing - allows to manage the licenses ■ NGOD - Currently disabled. ■ ISA - allows to set general ISA parameters to enable communication with the NSG 9000 device
Application	■ VOD - allows to define the VOD parameters. See *page 57*. ■ Broadcast - allows to define service remux. See *page 63*. ■ SDV - allows to define SDV sessions. See *page 69*. ■ M-CMTS - allows to define M-CMTS sessions. See page 71. ■ D2E - for future use only ■ CAS - allows to define the CAS parameters. See page 74.
Monitoring	■ Traffic - shows the traffic that flows out of the device. See *page 89*. ■ Alarms - shows the currently raised alarms. See *page 93*. ■ Diagnostics - allows ASI and IP forwarding for monitoring and analysis purposes. ■ Logs - allows to view the GbE counters, alarm logs, NGOD RTSP messages and RPC communication messages. See *page 104* - *page 105*.
Reports	Allows to view the RF configuration. See *page 106*.

- **Apply button** - to the right of the Tabs bar. A click on this button sends the updated configuration to the device.

- Work area - This section changes according to the selected tab and includes the parameters required for the configuring.

2.2.4 Stages of NSG 9000 Configuration

Configuring the NSG 9000 model includes the following stages:

- Defining/viewing Platform Parameters, a one time configuration. During this stage, define Ethernet 1&2 ports, GbE input ports and view platform parameters such as status of slots, software version, chassis serial number, and more. You can also set general device parameters such as:
  - Device security parameters (device password)
  - SNMP traps
  - NTP
  - Advanced network options - routing table and Access Control list
- Defining QAM-RF module parameters - during this stage define the following:
  - Global RF and QAMs parameters
  - RF port parameters
  - QAMs parameters
  - View a summary of general attributes
- Licensing - during this stage, view the licenses installed on the NSG device, install new licenses if needed, and assign licenses to QAM channels.
- Applications - during this stage, define the parameters of the required application. The available applications are as follows:
  - VOD
  - Broadcast
  - M-CMTS
  - D2E
  - CAS - in case CAS is required, define whether DVB scrambling or Privacy Mode scrambling is required and set the attributes as required

2.2.4.1 Before you Begin

Before you start configuring and provisioning the device, pay attention to the following:

- Fields that are for viewing only, are greyed out.
- To change parameter values, click in the field and type the required values. Once you click away from the field, the web client interface is updated and displays the new parameters. However, the parameters are not sent to the device.
- To apply changes to fields marked with this icon *, you should reset the device.
- To send to the device the newly configured parameters, click **Apply**. Only when you click **Apply**, you actually submit the new parameters to the device.
- To delete rows in a table, check the **Select** box and then click **Delete Selected**.
- A web page dialog includes a **Done** button. When clicking this button, you save the new configuration without applying it to the device and you close the web page dialog.

  To close a web page dialog without saving the configuration, click the ✖ button at the upper right corner of each page. For example, see Add License web page dialog on *page 47*.

Chapter 3
Configuring Platform Parameters

3.1 Platform Tab Overview

The **Platform** tab is the default tab. As soon as you link to the device it opens with the General tab selected. The Platform tab enables you to configure device parameters which are usually a one time configuration and it is recommended to configure as soon as you start working with the device. The Platform parameters are organized in the following tabs:

- Platform > General Tab - The Platform > General tab includes a graphical view of the device back panel. Focusing on each component, allows to view or configure the parameters of the component in focus. By default, Chassis is selected and the General tab is in focus. The following table lists the available components and the tabs related to each component.

Table 3-1: Platform Page – Components and Available Tabs

Selected Component	Available Tabs
Chassis	■ General - view general chassis parameters and define device name. See *page 22*. ■ Global RF & QAMs - set global QAM-RF module parameters. See *page 35*. ■ SNMP - set SNMP parameters. See *page 24*. ■ NTP - set NTP parameters. See *page 25*. ■ Passwords - set access passwords. See *page 23*. ■ Routing Table - set ETH and GbE ports routing table. See *page 26*. ■ Access Control List - set Access Control list. See *page 26*. ■ Port Redundancy - set GbE port redundancy. See *page 29*.
Eth1, 2	General. See *page 22*.
GbE	General. See *page 27*.
DTI	General (Currently not applicable). It provides status and details for both DTI ports, which are used in M-CMTS application.
Slot	■ General - view a general summary of the QAM configuration. See *page 43*. ■ Module - set ITU-T Annex, constellation, symbol rate and more. See *page 37*. ■ Ports - (default view) enable an QAM-RF port, set the number of channels and the power level of the port. See *page 38*. ■ QAMs - view and set QAM parameters such as QAM manager. See *page 41*.

- Platform > Licensing Tab - The Platform > Licensing tab allows to manage your licenses as explained in *3.10.1 Working with Licenses on page 44*.
- Platform > NGOD Tab - The Platform > NGOD tab allows to set the parameters required for the NSG NGOD ERM communication. See *3.11 Configuring NGOD on page 49*.
- Platform > ISA Tab - The Platform > ISA tab allows to set the parameters required for the NSG ISA communication. See *3.12 Configuring ISA on page 50*.

3.1.1 Global Chassis Buttons

Table 3-2: Global Chassis Buttons

Button	Button Name	Comments
	Identify unit	See *page 19*.
	Export Configuration to File	See *page 19*.
	Import Configuration to Device	See *page 19*.
	Firmware upgrade	See *page 20*.
	Factory default	See *page 20*.
	If Chassis is selected Reset Device If Slot is selected, Reset Module	See *page 20*.
	Validate	Validates the QAM-RF module configuration only. See *page 38*.

NOTE: Some of the buttons open a pop-up window which in many cases is blocked by the pop-up blocker. Watch for the **Information bar** message and allow Internet Explorer to display pop-ups from the device. Alternatively, disable pop-up blocking by selecting Tools > Internet Options > Security tab > Custom Level....

⇨ To identify unit

1. Select the **Platform** tab.

   By default Chassis is selected.

2. Click **Identify Unit**.

   The LEDs of Output ports 4, 5 and 6 are blinking and the button toggles to Stop Blinking.

⇨ To Export the configuration to File

1. Select the **Platform** tab.

   By default chassis is selected.

2. Click **Export Configuration to File**.

   The **Export File From Device** dialog appears.

3. Click either of the following:
   - Open - to open the XML file and to view the configuration of the device.
   - Save - to save the XML file with the device configuration at the required location.

⇨ To import configuration

1. Select the **Platform** tab.

   By default chassis is selected.

2. Click **Import Configuration to Device**.

   The **Import File To Device** dialog appears.

3. To locate the required XML file previously exported, click **Browse**.
4. To import, click **Import**.

   Wait until a message notifying you of a successful import appears.

5. For the device to run with the newly imported configuration, reset the device.

⇨ To upgrade firmware

See, *3.1.2 Firmware Upgrade on page 20*.

⇨ To clear configuration and Revert to Factory Defaults

1. Select the **Platform** tab.

   By default chassis is selected.

2. Click **Factory Default**.

   The following message appears:

   `This action will clear configuration and reset the device. Are you sure?`

3. To confirm the action, click **OK**.

   The device configuration is removed and device boots up with factory defaults.

⇨ To reset the device

1. Select the **Platform** tab.

   By default chassis is selected.

2. Click **Reset Unit**.
3. Click **Ok** to confirm the action.

   The reset process takes place.

⇨ To reset a QAM-RF module

1. Select the **Platform** tab.
2. Select the required slot/QAM-RF module.
3. Click **Reset Module**.
4. Click **Ok** to confirm the action.

   The reset process takes place.

3.1.2 Firmware Upgrade

The NSG 9000 ships with firmware and the web client installed. However, Harmonic periodically releases firmware updates. To find out if the provided firmware meets your needs or must be updated, contact Harmonic Technical Support.

NOTE: In case the device is working in a EdgeCluster mode, refer before you start upgrading, to *3.13.2.1 EdgeCluster and Firmware Upgrade on page 55*.

⇨ To upgrade the firmware

1. Copy the new firmware file residing in the provided CD, or on Harmonic's FTP site to your computer.
2. Click **Firmware Upgrade**.

   The following dialog appears:

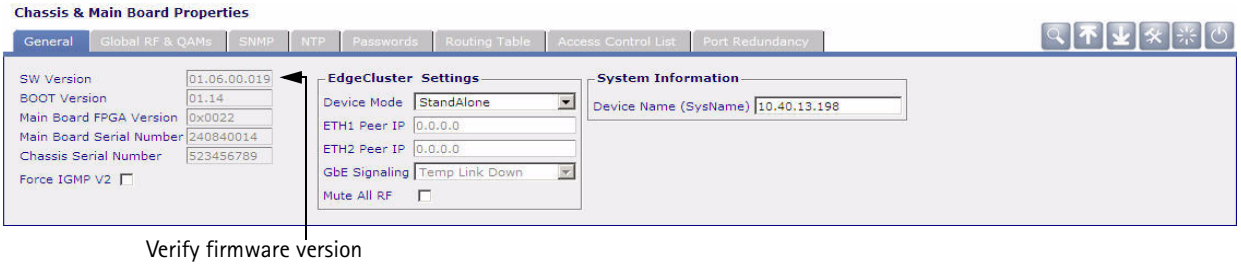
3. Click **Install Firmware Package**.
4. Click **Browse** to locate the software package file.
5. Click **Install**, to transfer and install the firmware on the device.

   The following message appears:

   `Software installation takes a couple of minutes. Do you want to proceed?`
6. To proceed, click **Ok**.
7. Once installation is complete, the following message appears:

   `Software was installed successfully. Do you want to reset the unit?`
8. To reset the unit and to restart with the new firmware click OK.

   The device reboots with the upgraded firmware.
9. Select **Platform** > **Chassis** > **General** tab and verify that the device reports the same version number as the required firmware.



NOTE: The following sections are organized according to the recommended sequence of steps for device configuration.

3.2 Configuring Ethernet Ports

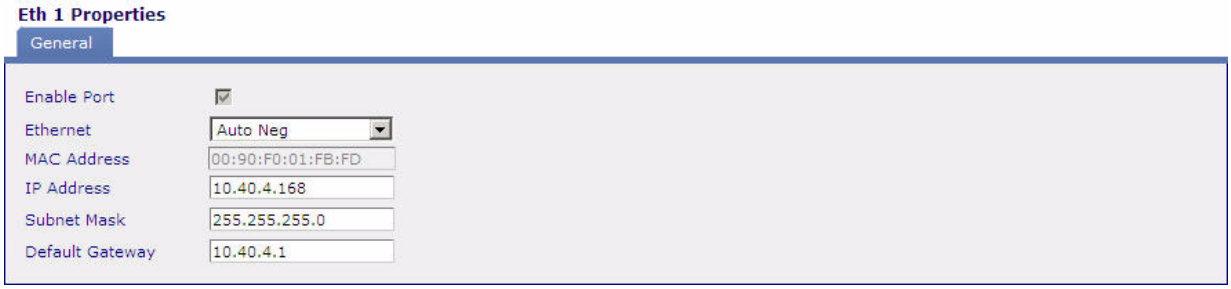
The IP address of the ETH ports or NSG 9000 primary IP address is configured as part of the NSG 9000 installation (see *2.1.1 Configuring Ethernet Ports* on page 11). However, when required, you may change the IP address settings via the **Platform** screen, Ethernet table:

NOTE: Configure the IP address of ETH1 on a different subnet than that of ETH2. Configuring both ports to be on the same subnet may result in serious network communication problems. NSG 9000 uses the ETH1 port to communicate with the network for management purposes and ETH2 for Conditional Access Systems (CAS) purposes.

⇨ To change configuration of ETH1 and ETH2

1. Select the **Platform** tab.
2. Select the required Ethernet port.

   The ETH1 or the ETH2 Properties **General** tab appears.



3. To enable the port, check **Enable Port**.
4. To define the physical layers of the Ethernet communication, open the Ethernet list and select one of the following:
   - Auto Neg - The Auto Negotiation is a handshake protocol used in GbE links. Select this check box to activate the Auto Negotiation protocol only if the other end of the GbE link also uses auto negotiation.
   - 100 BT full - sets the speed to 100 BT and communication mode to full duplex.
   - 10 BT full - sets the speed to 10 BT and communication mode to full duplex.
   - 100 BT half - sets the speed to 100 BT and communication mode to half duplex.
   - 10 BT half - sets the speed to 10 BT and communication mode to half duplex.
5. In **MAC Address**, view the MAC Address.
6. Type the required IP address, subnet mask and default gateway of ETH1 and/or ETH2.
7. Click **Apply** to apply changes.

NOTE: The MAC address is the physical address of the unit. The address is retrieved and presented in the **Platform** page for viewing purposes only.

3.3 Configuring General Device Parameters

3.3.1 Configuring/Viewing Chassis Properties

This procedure allows you to do the following:

- View general device parameters like software version

- Define device name
- Working in IGMP V2 protocol only
- Setting EdgeCluster parameters

⇨ To view/set chassis properties

1. Select the **Platform** tab.
2. In **Back Panel View**, select **Chassis > General** tab.

   The **Chassis Properties & Main Board Properties** section appears.

3. View the following Chassis information:
   - SW Version - The device's firmware version and revision.
   - BOOT Version - The BOOT flash version of the device.
   - Main Board FPGA Version - The version of the FPGA firmware loaded onto the main board.
   - Main Board Serial Number - The serial number of the main board.
   - Chassis Serial Number - The serial number of the chassis.
   - Force IGMP V2 - To set the GbE management to support the IGMPv2 protocol only, select Force IGMP V2. NSG 9000 ignores any IGMPv3 messages and does not generate any IGMPv3 messages.
4. To define EdgeCluster (device redundancy) settings, see *3.13 Configuring EdgeCluster on page 51*.
5. To define device name, focus on the **System Information** section and in DeviceName (SysName), enter a name. The device name should allow easy identification of the device. Once you click Apply, the newly entered device name appears in the title bar. If you type in the title bar another name, once you click Apply it overrides the device name entered in DeviceName box.

NOTE: The System Information parameters are also required for the SNMP manager when defining the attributes of the SYSTEM MIB.

3.3.2 Setting a Password

1. Select the **Platform** tab.
2. Select **Chassis > Passwords** tab.

3. In **User Name**, verify that the required user name appears.

   If you logged as Configure you are authorized to change your password or the password of Monitor.
4. In **Current Password**, enter the current password.
5. In **New Password**, enter the new password.
6. In **Verify Password,** re-enter the new password.
7. To apply the password change, click **Change Password**.

   When logging in, use the newly set password.

NOTE: After three unsuccessful login attempts, or if you forgot the password/user name, reset your password. To reset the password, call Harmonic Customer Support.

3.3.3 Configuring SNMP Parameters

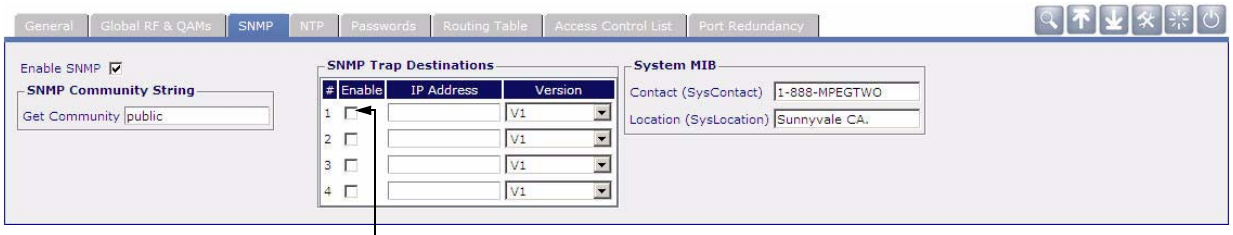
The Simple Network Management Protocol allows network management systems to communicate with network elements. By default the SNMP is enabled and you may disable it when required.

The SNMP Trap Destinations table allows you to create a list of SNMP managers to receive messages from network elements. Once you have accomplished that, configure the SNMP Community String.

The SNMP Community String section allows you to set password like strings for the various network elements. The default string value for the Get community is public. If you wish to block unauthorized SNMP access to your system, change this string to any string of your choice.

⇨ To set SNMP trap parameters

1. Select the **Platform** tab.
2. Select **Chassis** > **SNMP** tab.



Select to enable the row

3. By default SNMP is enabled. Verify that it is enabled.

   To disable SNMP, de-select **Enable SNMP**.
4. In the **SNMP Trap Destinations** table, enable the required table-row by selecting the **Enable** box.
5. Enter the IP Address of the computer to which you wish to forward all SNMP traps from the NSG.
6. Open the **Version** list and select the required SNMP version.
7. In the **SNMP Community String** table, enter the required string value for each community:
   - Get Community - The name of the community having Read access to the network elements. The elements will respond to this community Get commands. The default

string is *public*.

8. In **System MIB**, enter the following information:
   - Contact (SysContact) - enter contact information
   - Location (SysLocation) - enter the location of the device. In other words, the location of the host on which the SNMP agent, or server runs.

3.3.4 Setting Device Time and Date Parameters

Set the device time according to either of the following options:

- Automatically - Synchronize the NSG 9000 time with the Universal Time Coordination (UTC) by connecting to an NTP (Network Time Protocol) server. If you enable this option, you cannot set the time of the unit manually.
- Manually - Use this option when NTP server is not available.

⇨ To set the time of the device according to the NTP server

1. Select the **Platform** tab.
2. Select **Chassis > NTP** tab.

3. To allow to establish communication with the NTP server, select **Enable NTP**.
4. Enter the IP address of the NTP server in **NTP Server IP Address**.
5. Open the **Time Zone** list and select the required local time offset to match between the time of the device, that is UTC time, and the Greenwich Mean Time (GMT).

⇨ To set the time of the device manually

1. Verify that **Enable NTP** is not selected.
2. In **Date**, enter, in the required format, the current date.
3. In **Time**, enter, in the required format, the current time.
4. Open the **Time Zone** list and select the required local time offset to match between the time of the device and the Greenwich Mean Time (GMT).

NOTE: When you manually set the date and time of the device, this event is logged in the unit alarm log.

⇨ To set the daylight saving time of the device

1. Select **Chassis > NTP** tab.
2. Click in **DST Start Date** to open a calendar.
3. Select the required day and month.
4. Click in **DST End Date** to open a calendar.
5. Select the required day and month.

3.4 Configuring Advanced Networking Options

3.4.1 Configuring Routing Table Parameters

The routing table allows you to define Ethernet routes to specific networks. This option is required in special network topologies that require more than the capabilities of a default gateway.

To set the Routing table parameters, do the following:

1. Select **Platform** > **General** tab.
2. In **Back Panel View**, select **Chassis**.
3. In **Chassis and Main Board Properties**, select **Routing Table**.

4. Click **Add Route** to add a blank row to the table.
5. Enter the required values as explained below:
   - Destination - Enter the IP address of the destination device or network.
   - Mask - Specify the subnet mask. The combination of mask and destination IP will determine the exact range of IP destinations that may be accessed through this route.
   - Gateway - Enter the IP address of the gateway through which the NSG will attempt to make a connection to a destination. For ETH1 or ETH2, the gateway must be in the same NSG subnet for either ETH1 or ETH2 ports. For GbE 1, 2 and 3 ports, the gateway must be in the same NSG subnet for each GbE port.
   - Delete - Check this box to remove this route. The route is removed once you click **Delete Route**.

3.4.2 Generating Access Control List

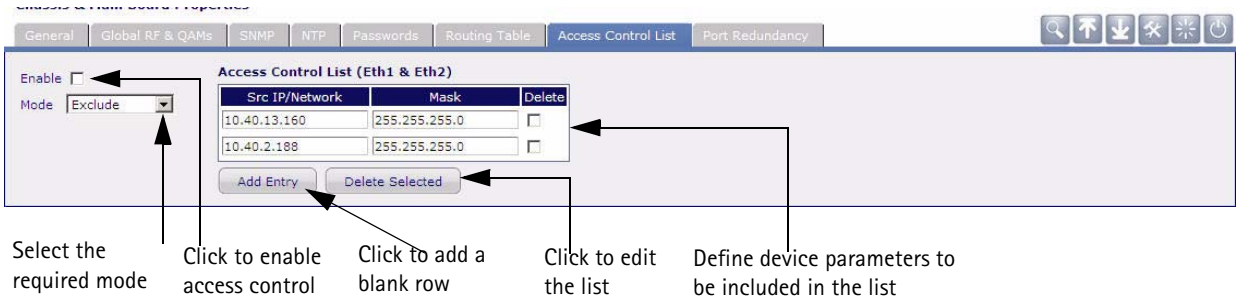
To control the access of other network devices to the NSG 9000 device, you can create either of the following lists of network devices:

- Network devices with permission to communicate with the EdgeQAM
- Network devices that are prohibited from communicating with the EdgeQAM.

⇨ To generate access control list

1. Select the **Platform** tab.

2. Select **Chassis** > **Access Control List** tab.



3. To create the list, click **Add Entry**.

NOTE: You can create a list of up to 10 devices that are prohibited/allowed to communicate with the NSG device.

4. To activate the Access Control feature, click **Enable**.
5. Open the **Mode** list and select either of the following:
   - Exclude - To create a list of network devices that are prohibited from communicating with the device.
   - Include - To create a list of network devices that are allowed to communicate with the device.
6. 6. Define the following parameters:

   Src IP/Network - enter the IP address of the source device, that is the device to communicate or to be banned from communicating with the device.

   Mask - enter the required IP mask. You can allow/block a group of network devices to communicate with the device.

3.4.2.1 Changing Access Control

In case you wish to change the access control to the NSG 9000 device, do the following:

1. 1. Select the **Platform** tab.
2. 2. Select **Chassis** > **Access Control List** tab.
3. 3. Open the **Mode** list and change it to the required mode.

   A message appears notifying you that the list of devices will be removed.
4. 4. Click **Ok**.

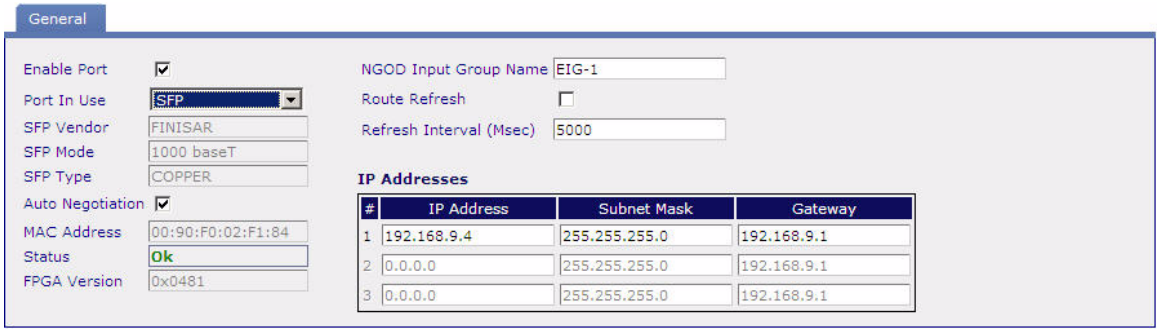
3.5 Configuring GbE Ports

The GbE ports are working as eight independent ports receiving eight different feeds.

⇨ To define GbE port properties

1. Select the **Platform** tab.
2. In **Back Panel View**, select the GbE ports.

The GbE # Properties **General** tab appears.



3. To define the GbE port parameters, do the following:

   Enable Port - select to enable the port.

   Port in Use - select either of the following:

   - SFP - when fiber SFP is mounted
   - RJ45 - when copper SFP is mounted

   SFP Vendor - (Read only) view the vendor of the SFP module mounted in the GbE port.

   SFP Mode - (Read only) view the mode of the SFP module mounted in the GbE. It can be multi mode, single mode or copper.

   SFP Type - (Read only) view the type of SFP mounted.

   - Copper - when copper SFP is mounted
   - when fiber SFP is mounted either of the following is indicated:
     - SX - usually used for short distances (up to 200 m)
     - LX - usually used for long distances (10km and up).

NOTE: If the SFP is not mounted, Not Mounted appears in the SFP Vendor, SFP Mode and SFP Type parameters.

   Auto Negotiation - The Auto Negotiation is a handshake protocol used in GbE links. Select this check box to activate the Auto Negotiation protocol only if the other end of the GbE link also uses auto negotiation.

   MAC Address - view the physical address of the GbE as retrieved from the device. This is a read only parameter.

   Status - reflects the current status of the relevant GbE channel. Displays OK, Link Down, SFP Not Mounted, or Disable Mode.

   FPGA Version - view the FPGA version as retrieved from the device. This is a read only parameter.

   NGOD Input Group Name - Enter the name of the input group according to the D6 standard.

   Route Refresh - When enabled, the NSG routinely sends ARP messages to the gateway of the GbE port. Requests are sent approximately once per 5 seconds, thus preventing expiration of the route.

   Refresh Interval (Msec) - Define, in Msec, how often to send a Ping request.

4. In the **IP Addresses** table, enter the following parameters.

   IP Address1 - type in the required IP address

Subnet - type in the required subnet mask.

Gateway - Enter the IP address of the gateway through which the NSG will attempt to make a connection to a destination. The gateway must be in the same NSG subnet for GbE1, GbE2 and Gb3 ports.

NOTE: When working in emulation mode, you can define additional IP addresses.

3.5.1 Configuring GbE Port Redundancy

3.5.1.1 Overview

NSG 9000 supports 1:1 port redundancy. For each input GbE port with fiber/copper SFP, you can define a backup port with copper RJ-45 connector. The backup port backs up one primary port only.

- Redundancy is always between fiber/copper SFP and RJ-45 SFP, where:
  - Primary port is always fiber/copper SFP
  - Backup port is always copper RJ-45
  - Redundancy combinations are only as follows:

Primary	Backup
GbE port 1 copper/fiber SFP	GbE port 1 copper RJ-45
GbE port 2 copper/fiber SFP	GbE port 2 copper RJ-45
GbE port 3 copper/fiber SFP	GbE port 3 copper RJ-45

- Both Primary and backup ports have the same IP address.
- Only one of the ports can be active at any given time.
- As soon as you enable the port redundancy, you cannot configure or change the configuration of the GbE port.
- Port redundancy is automatic only. If both primary and backup port failed, by default the device defines the primary port as the active port and redundancy is halted until the fault is fixed. In case only the faulty backup port is fixed, a manual revert is required.
- To manually change the active port, use the **Switch** button.

3.5.1.2 Port Redundancy Related Alarms

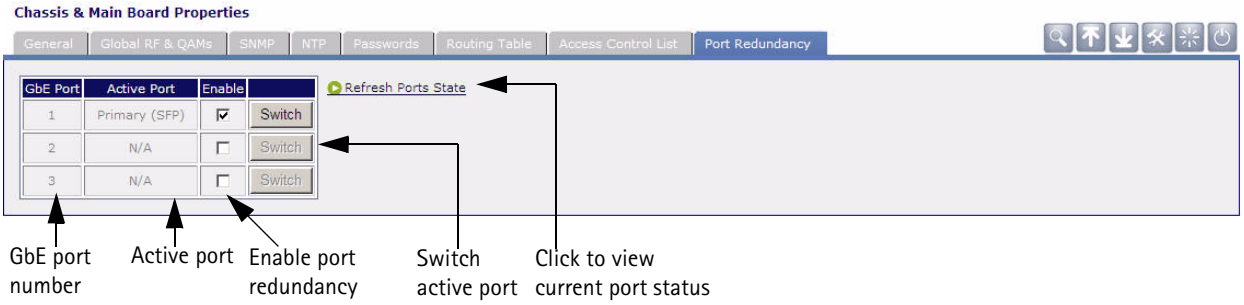
- Triggering redundancy:
  - Link Down
  - No Traffic on Input Port
- After redundancy switch, the following warning is raised: Backup Port Activated

3.5.1.3 Configuring GbE Port Redundancy

⇨ To enable GbE port redundancy

1. Open the web client of the device.

2. Select **Platform** > **Chassis** > **Port Redundancy**.



3. To view the current status of the ports, click **Refresh Ports State**.

   The **Active Port** column is updated to display the currently active port.

4. To enable port redundancy for a specific port, select **Enable** for the required GbE port.

   The **Switch** button is enabled and the configuration of the GbE port is disabled.

NOTE: If you click **Switch** before sending to the device, that is clicking **Apply**, a message appears asking you to click **Apply** and only then **Switch**.

5. Click **Apply**.

   Port redundancy is activated and if the primary port is faulty, an automatic redundancy switch will take place.

⇨ To disable port redundancy

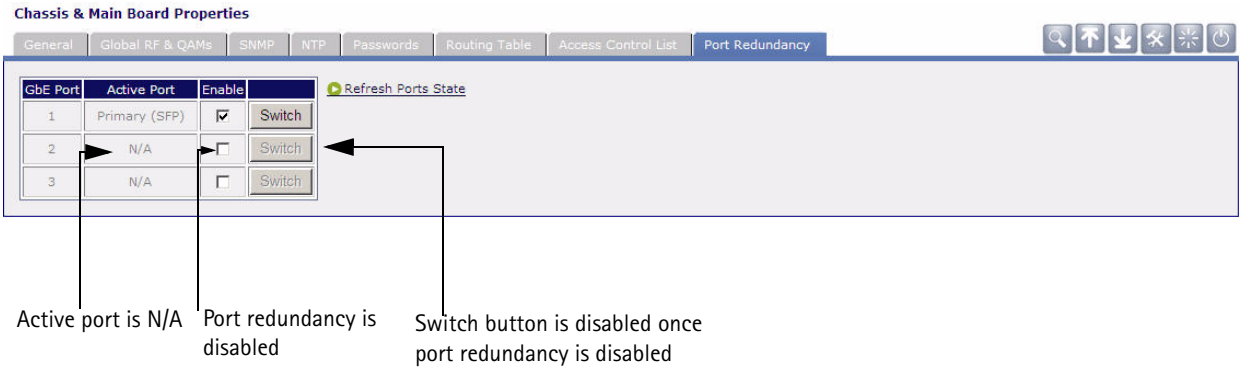
1. Open the web client of the device.
2. Select **Platform** > **Chassis** > **Port Redundancy**.
3. To disable port redundancy for a specific port, de-select **Enable** for the required GbE port.

   The **Switch** button is disabled and the configuration of the port is enabled.

NOTE: If you click **Switch** before sending to the device, that is clicking **Apply**, a message appears asking you to click **Apply** and only then **Switch**.

4. Click **Apply**.

   Redundancy for the port is de-activated and N/A appears as the active port status:



⇨ To switch active port

1. Verify that port redundancy is enabled for the required port.

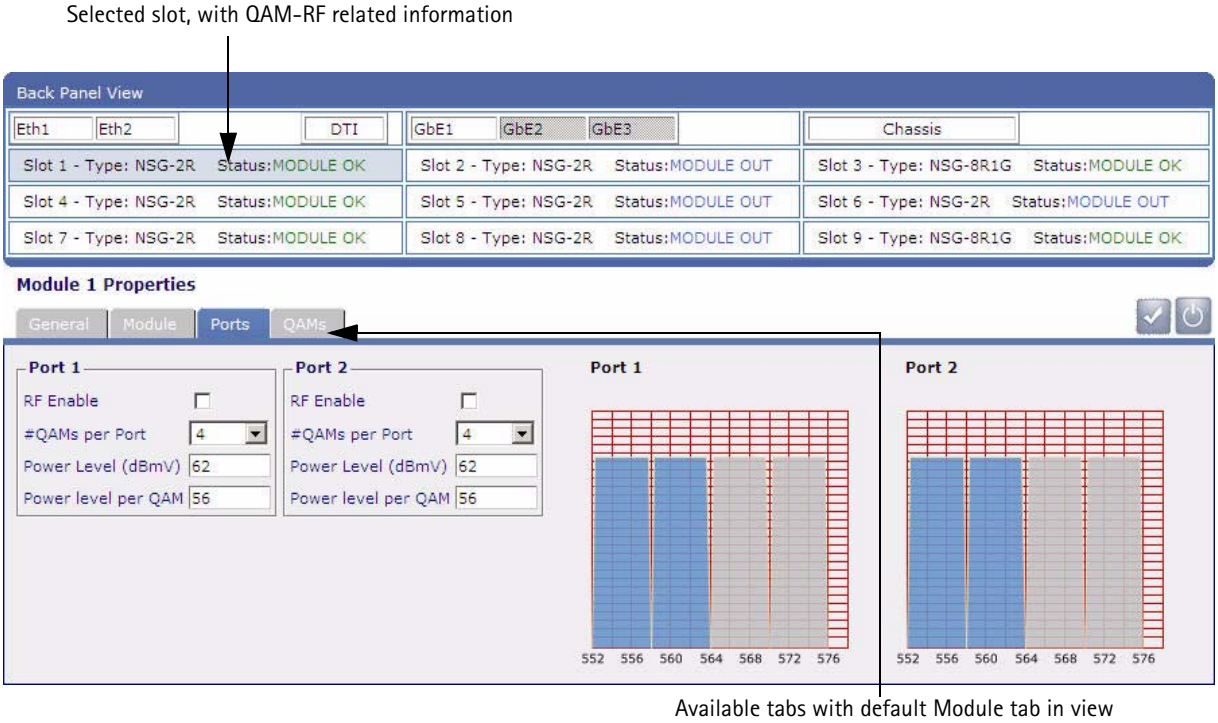
NOTE: The **Switch** button is enabled once you enable redundancy.

2. To switch to the backup/primary port, click **Switch**.
3. In the message that appears, click **OK**.

   The primary/backup port immediately changes and the active port status changes to reflect the switch.

3.6 Configuring QAM-RF Modules

The NSG 9000 device has nine slots. Each slot accommodates a single QAM-RF module.



The Back Panel View section, displays the slots while indicating the following QAM-RF module related information:

- Slot number - a number between 1 - 9
- Type - indicates the configured module type as follows:

Table 3-3: Module Type

Module Type	Explanation
NSG-2R	QUAD, up to four QAM-RF channels per RF port
NSG-2R1G	QUAD, up to four QAM-RF channels per RF port. Channels frequency is between 53-999MHz.
NSG-8R1G	OCTAL, up to eight QAM-RF channels per RF port. Currently only four QAM-RF channels are supported

NOTE: To view the actual mounted module, select the **Module** tab.

- Slot Status - either of the following appears:
  - Module OK - indicates that the slot is occupied with the configured module and the latter is working.
  - Module Out - indicates that the slot is vacant.
  - Module Fail - indicates that the mounted module is faulty or that the applied configuration does not match the currently mounted module.

NOTE: To view licensing granted for this module, select Platform > Licensing > Assign Licenses.

In addition, when selecting a slot, you may access the properties of the mounted module. The Module Properties are arranged in the following tabs:

- Module - the default tab. See *3.9 Configuring a QAM-RF Module on page 37*.
- Port - see *3.9.1 Configuring Module RF Ports on page 38*.
- QAMs - see *3.9.2 Configuring/Viewing QAM-RF Parameters on page 41*.
- General - see *3.9.3 Viewing QAM-RF Module Information on page 43*.

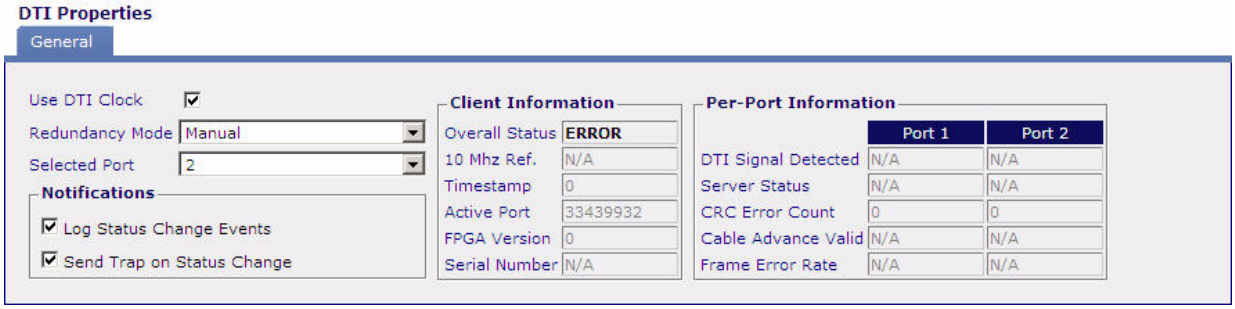
You can also reset each module by clicking the **Reset Module** button. See *page 20*.

The following sections guide you on how to configure the QAM-RF modules. The QAM-RF module configuration includes the following stages:

- Configuring global parameters - the same definitions are sent to all of the QAM-RF modules/QAM channels. The Global configuration is available via the **Platform** > **General** > **Chassis** > **Global RF & QAMs** tab.
- Configuring parameters for each QAM-RF module - To allow the NSG 9000 device to support multiple applications, during this configuration you may override the configuration of global parameters such as module encoding mode and QAM manager. The configuration of each QAM-RF module is available via the **Platform** > **General** > **Slot Module** > **Module/Ports/QAMs** tabs.

3.7 Configuring/Viewing DTI Parameters

TIP: This section is applicable only if a DTI card is installed on the NSG 9000 device. If a DTI card is installed on the NSG 9000 device, select the DTI component and do the following:



- Configure DTI parameters:
  - Enslave NSG 9000-6G clock to the DTI clock by selecting **Use DTI Clock**
  - Define the DTI port redundancy mode, and select the preferred DTI port (if applicable, depending on the redundancy mode)
  - Configure the SNMP traps
- View the following:
  - DTI client properties and status - via the **Client Information** section

- Port Information - via **Per Port Information** section

3.7.1 Configuring DTI Client Parameters

1. Select the **Platform** > **General** tab.
2. In the In **Back Panel View**, select the DTI component.

NOTE: The DTI section is enabled only when a DTI card is installed in the device.

The **General** tab appears.

3. When working in M-CMTS mode, enslave the NSG clock to the DTI clock. To enslave, select **Use DTI Clock**.
4. To set the DTI port redundancy mode, open the **Redundancy Mode** list and select one of the following:
   - Manual - you need to select the DTI port. No automatic switching/activation of ports is done, regardless of the status of the DTI ports.
   - Automatic (no Auto Revert) - selecting the active port is completely automatic, without any intervention and without any preference of a specific port. If the active port fails, the standby port is activated and assumes the role of "active" as long as it is in normal state. If the latter fails, ports will be switched again. This switching can continue any number of times, without any preference of a specific port.
   - Automatic (Auto Revert) - in this mode, the selected port (as defined in **Selected Port**) is always preferred over the other port. In case that the selected port fails, the standby port is automatically activated. Once the selected port is fixed, the NSG automatically switches back to the selected port.
5. To select the active DTI port, open the **Selected Port** list and select either port 1 or 2.

NOTE: The **Selected Port** list is disabled if **Automatic (no Auto Revert)** is selected.

6. In **Notification**, define which notification to send once the status of the DTI client changes:
   - Log Status Change Events - send a notification to the alarm log upon a change in the status of the DTI client
   - Send Trap on Status Change - send an SNMP trap upon a change in the status of the DTI client

3.7.2 Viewing DTI Client and DTI Port Information

1. Select the **Platform** > **General** tab.
2. In the In **Back Panel View**, select the DTI component.

NOTE: The DTI section is enabled only when a DTI client is installed in the device.

The **General** tab appears.

3. To view DTI client information, focus on **Client Information** section.
   - In **Status**, verify that the DTI status is NORMAL. The following table lists the available Status options:

Table 3-4: DTI Client State Options

Status	Explanation
Warmup	Local oscillator has not yet stabilized

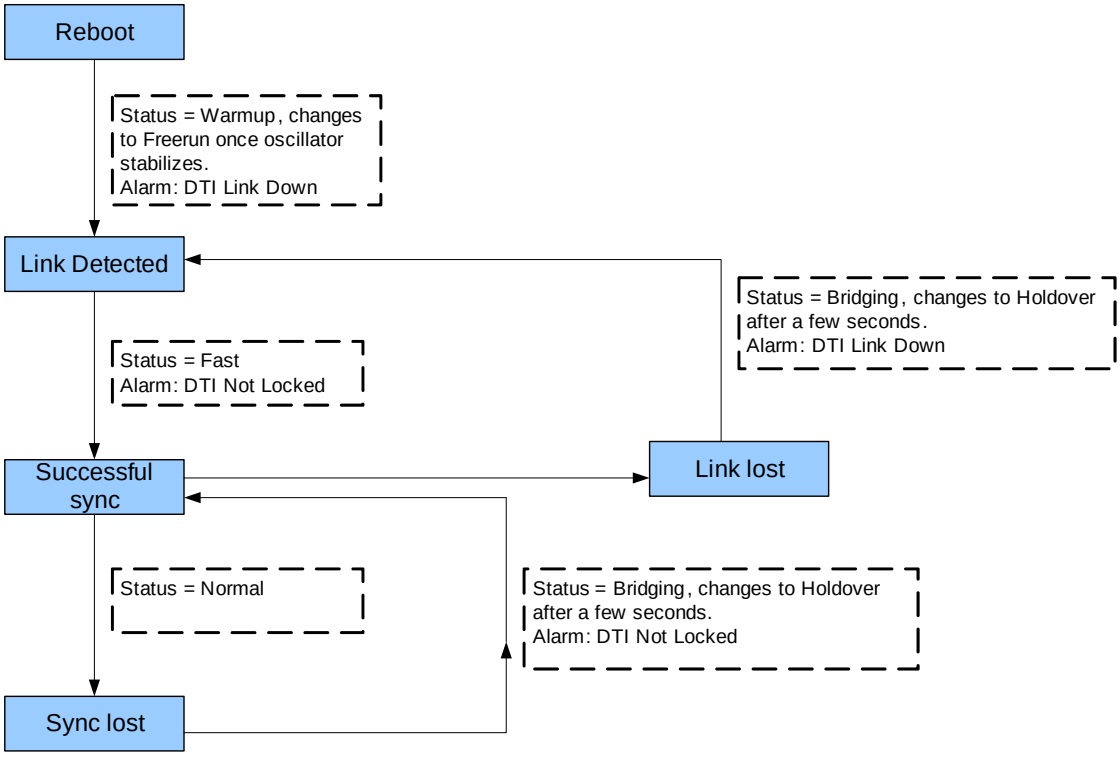
Table 3-4: DTI Client State Options

Status	Explanation
Freerun	DTI client is not locked to the signal of the DTI server, and is running freely using its own internal real-time clock. Freerun indicates that since its last initialization, the client was not locked to the server.
Normal	DTI client is locked to the DTI server, working normally
Bridging	This is a transient state, which may last up to 2 seconds. It indicates that the DTI client has experienced a momentary interruption in its timing signal, but is still able to maintain acceptable timing. NSG 9000 is still locked to the DTI server clock.
Holdover	DTI client lost its sync to the DTI server clock. Working in "best effort mode", with the last known valid time correction
Fast	The DTI client has just acquired a valid signal, and is in the process of locking to it. If this status is displayed for a prolonged time, this indicates a problem with the received DTI signal or with the DTI client.

- In **10Mhz Ref.**, indicates whether the 10Mhz Reference signal is present.
- In **Timestamp**, view the last DTI timestamp
- In **Active Port**, view the currently active DTI port.
- In **FPGA Version**, view the installed FPGA version of the DTI client.
- In **Serial Number**, view the serial number of the DTI client.

4. To view DTI client port information, focus on the **Per Port Information** section. For each port view the following information:
   - DTI Signal Detected - indicates whether a valid DTI signal is detected.
   - Server Status - indicates the status of the server as it is communicated to the client. Available status indications are as follows: Warmup, Freerun, Fast, Normal, or Holdover.
   - CRC Error Count - indicates the number of CRC error occurrences on the DTI link.
   - Cable Advanced Valid - indicates whether cable advance is valid. A valid, i.e. Stable, Cable Advance value is essential in order for the client to lock to the server.
   - Frame Error Rate - indicates the Frame Error Rate as follows: Below 2%, 2% to 5%, or Over 5%.

3.7.2.1 DTI Flow



3.8 Configuring Global RF & QAMs Parameters

TIP: Defining the global parameters of the RF ports & QAM channels is the first stage of the QAM-RF module configuration.

When configuring the QAM-RF module parameters, you may send definition to all of the QAM-RF modules/QAM channels as the following table shows:.

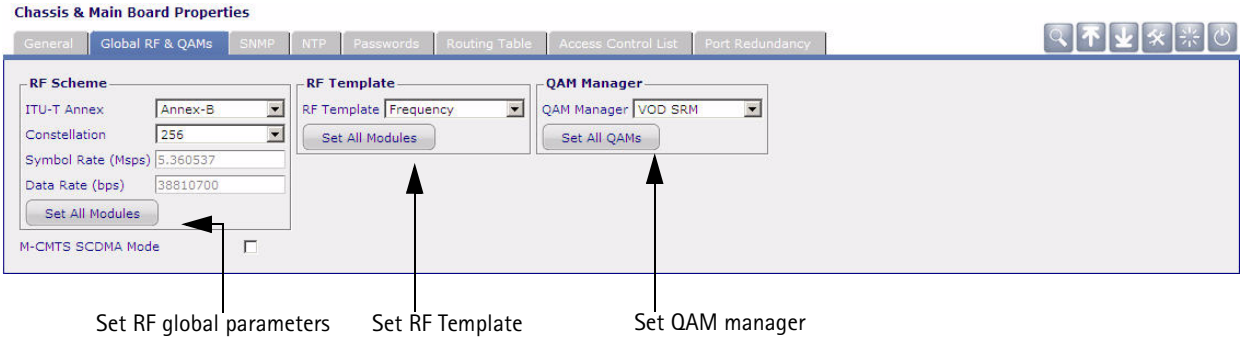
Table 3-5: Setting Global RF&QAM Parameters

Required Action	Required Buttons
To send definitions to all of the QAM-RF modules, click **Set All Modules** and then **Apply**.	1. Set All Modules 2. Apply
To send definitions to all of the QAMs, click **Set All QAMs** and then **Apply**.	1. Set All QAMs 2. Apply

⇨ To define global RF and QAMs settings

1. Select **Platform** > **General** tab.
2. In **Back Panel View**, select Chassis.

3. Select the **Global RF& QAMs** tab.



4. To define the encoding mode, open the ITU-T Annex list and select one of the following:

Table 3-6: Encoding Mode

Encoding Mode	Explanation
Annex-A (DVB)	This mode is used mainly in European and Asian countries. Utilizes bandwidth of 8 MHz per QAM-RF channel.
Annex-B	This is the mode used in North-American countries. Utilizes bandwidth of 6 MHz per QAM-RF channel
Annex-C (Japan)	As implied by its name, used mainly in Japan. It is similar to Annex A in the most part, but utilizes bandwidth of 6 MHz per QAM-RF channel.

5. To define the required constellation, open the **Constellation** list. The Constellation is the type of Quadrature Amplitude Modulation (QAM) used. QAM constellation affects Data Rate and Symbol Rate, and must be set according to HFC network properties. Valid values are:

Encoding Mode	Valid Values
Annex-A or Annex-C	16, 32, 64, 128, 256
Annex-B	64 and 256

6. In **Symbol Rate (Msps)**, (Read-only), view the rate of QAM symbols that are encoded and transmitted per second.
7. In **Data Rate**, (Read-only), view the bit rate of the transport stream in Bps.
8. To apply the configuration to all of the QAM-RF modules, click **Set All Modules**.

NOTE: The configuration will take effect once you click Apply.

9. To select a QAM manager for all of the QAM-RF modules, open the QAM Manager list and select the required QAM Manager. See, *Table 3-9: QAM Manager on page 42*.
10. To send configuration to all of the QAMs, click **Set All QAMs**.

NOTE: The configuration will take effect once you click Apply.

11. To set the QAM-RFs frequency, open the **RF Template** list and select one of the following:

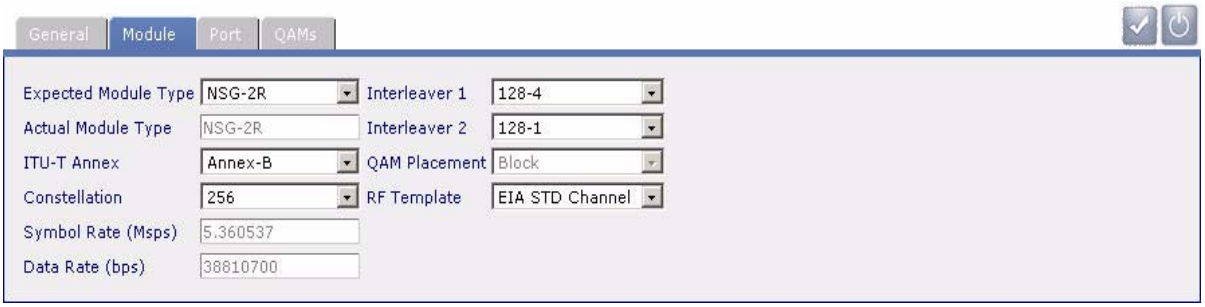
- Frequency - frequency is entered explicitly as numeric frequency values
- EIS-STD - frequency is defined using channel numbers based on the EIA-STD channel table. See *EIA SDT and HRC Standards* on page 116.
- EIA-HRC - RF settings are entered using channel numbers based on the EIA-HRC channel table. See *EIA SDT and HRC Standards* on page 116.

12. To work in M-CMTS SCDMA Mode, tick **M-CMTS SCDMA Mode**.

Once you are done with this configuration, move on to configure each module by selecting the required module and the **Module** tab.

3.9 Configuring a QAM-RF Module

1. Select the **Platform** tab.
2. In **Back Panel View**, select the required slot.
3. Select the **Module** tab.



4. Define/View the following module information:
   - Expected Module Type - view the module that is supposed to be mounted in the slot. See *Table 3-3* on page 31.
   - Actual Module Type - view the currently mounted module type.
   - ITU-T ANNEX - open the list to select the required encoding mode. Changes to the encoding mode override the encoding mode configured during global module configuration. See *3.8 Configuring Global RF & QAMs Parameters on page 35*.
   - Constellation - select the required constellation. The Constellation is the type of Quadrature Amplitude Modulation (QAM) used. QAM constellation affects Data Rate and Symbol Rate, and must be set according to HFC network properties. Valid values are: Annex-A or Annex-C: 16, 32, 64, 128, 256. Annex-B are: 64 and 256. Changes override the constellation configured during global module configuration.

NOTE: You can configure the Symbol Rate 1 & 2 for ANNEX A and ANNEX C only.

   - Symbol Rate - define/view the rate of QAM symbols that are encoded and transmitted per second. You can define the symbol rate in Annex A and C. In Annex B, you can only view its value. Changes override the symbol rate configured during global module configuration.
   - Data Rate - view the defined data rate.
   - Interleaver 1 - view the interleaver values as defined in the QAM tab. NSG 9000 has two optional Interleaver values, set the required value for this interleaver.
   - Interleaver 2 - See Interleaver 1.
   - QAM Placement - See *3.9.0.1 Setting QAM Placement on page 38*.
   - RF Template - define/view the RF Template. Define the RF template for Annex B only. View for Annex A and C. The RF template is defined during the global RFs & QAMs

configuration. See *3.8 Configuring Global RF & QAMs Parameters on page 35*. Changes override the RF template configured during global module configuration.

3.9.0.1 Setting QAM Placement

NOTE: Relevant to QAM-RF module NSG-8R1G only.

The QAM Placement feature allows you to configure the QAM-RF channels as follows:

- Block - standard placement of adjacent QAM-RFs, depending on the selected ITU-T Annex.
- Per QAM - you can place each individual QAM anywhere within the 48Mhz block as long as the following conditions are met:

NOTE: You can validate your configuration using the **Validate** button.

  - QAM placement prevents out-of-block configurations. QAM placement should not surpass the 48Mhz block.
  - The order of the frequencies is from lowest to highest.
  - No overlapping frequencies (according to the symbol rate). The bandwidth range of each signal does not overlap the bandwidth range of its adjacent signal.
  - The QAMs frequency steps of RF port 1 and RF port 2 are identical. If QAM frequencies of RF port 1 are as follows: 500, 506, 515Mhz, offset of +6 and +15 from the lowest, then the frequencies of RF port 2 should be, for example, as follows: 600, 606, 615.

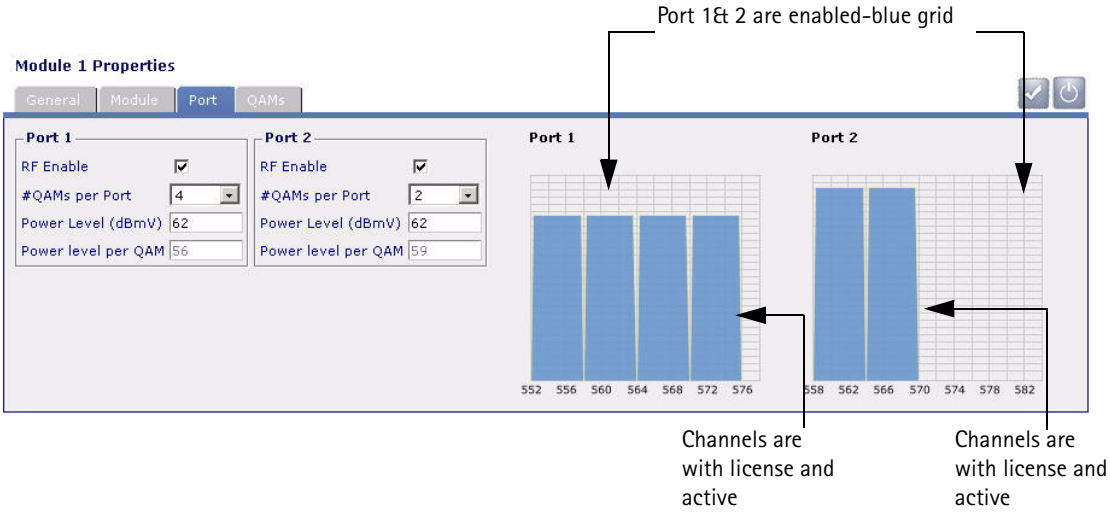
Switching from Block to Per QAM

- Verify that the number of QAM-RF channels is identical in both ports. See, *3.9.1 Configuring Module RF Ports on page 38*.
- When changing from Block to Per QAM, the previously defined frequencies appear and you can change them as required.
- When changing from Per QAM to Block, the default frequencies appear according to the defined ITU-T Annex.

3.9.1 Configuring Module RF Ports

1. Select the **Platform** tab.
2. In **Back Panel View**, select the required slot.

3. Select the Port tab.



4. For each RF port, define the following:
   - RF Enable - select to enable the RF port. Enable the port only after completing the output configuration.
   - #QAMs per Port - select the number of active QAM channels. The number of active channels is license dependent and by default two channels are active. Following is a list of the optional number of active channels:
     1 - only one active QAM channel
     2 - (Default) two active QAM channels
     3 - applies to Annex A only, and activates three QAM channels. The frequency of the QAM channels is consecutive and each channel utilizes six MHz.
     4 - applies to Annex B and C only, and activates four QAM channels. Applies also to Annex A when an NSG-8R1G module is mounted and activates four QAM channels.

NOTE: In dual, triple and quad, the frequency of the QAM channels is consecutive and each channel utilizes six or eight MHz: In ANNEX B and C - 6MHz and in ANNEX A 8MHz.

   - Power Level (dBmV) - The power level of the RF port. Once you define the RF power level, the power level of all QAM channels in the port change accordingly. All QAM channels have the same power level in relation to the defined RF port level.
   - Power Level Per QAM - define the QAM power level for all QAM channels within the port. This value appears in the QAM tab as a read-only value.

NOTE: Any changes to the RF power level affect the QAMs power level and vise versa.

5. Review the port and its QAM channels configuration via the provided bar graphs as explained in the following section.

3.9.1.1 Understanding the RF Port Graph

A bar graph, for each RF port displays the current configuration of the RF port as the following table explains:

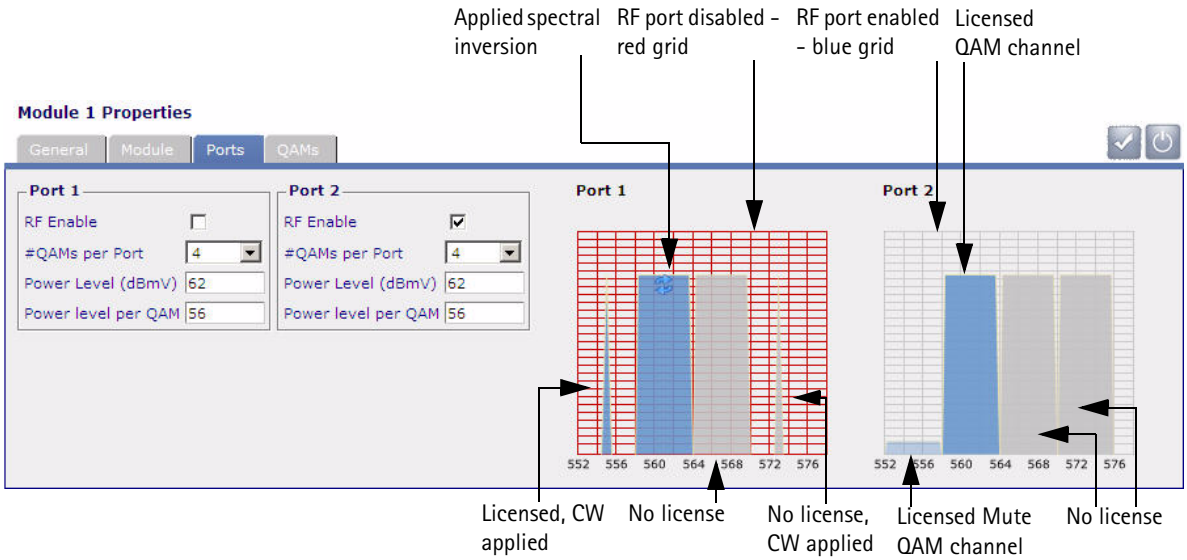


Table 3-7: RF Port Legend

Parameter	Explanation
RF Enable	Blue grid - RF port is enabled Red grid - RF port is disabled
# QAMs per Port	Number of bars in graph. Each QAM-RF channel is represented by a bar.
Power Level (dBmV)	Height of bar. Each bar represents a QAM, however the power level of each QAM depends on the RF port power level.
Bar color	Blue - license is granted and QAM is active Light shade of blue - license is granted and QAM is mute. Gray - no license is granted Light shade of gray - no license and QAM is mute.
Bar shape	Rectangle like - normal Pointy bar - CW is activated Truncated bar - channel is mute.
	Indicates that spectral inversion is applied on this QAM. The arrows appear at the top of the bar.

Once you hover the mouse pointer over a bars you can read QAM channel related information as the following table explains:

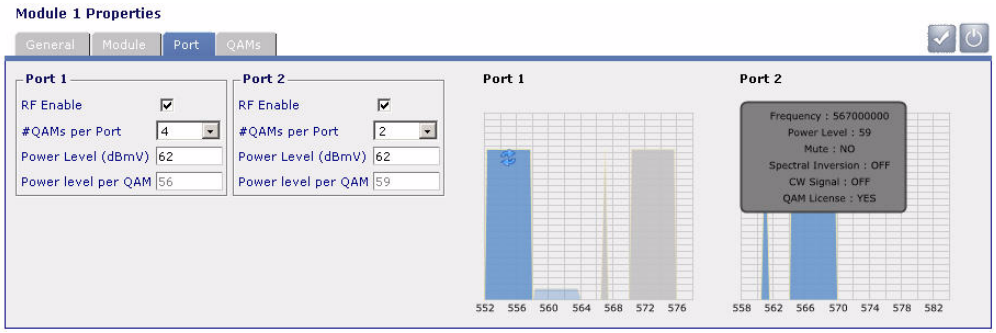
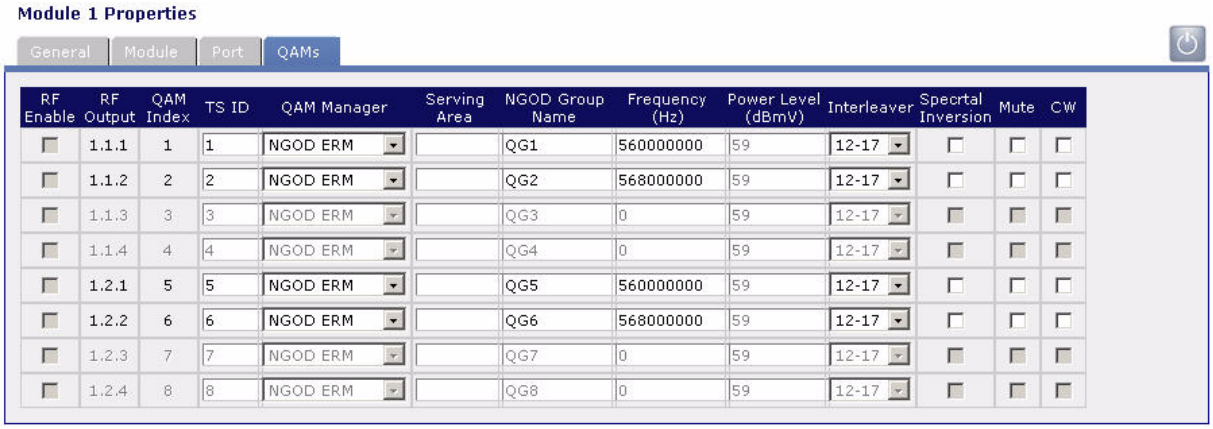


Table 3-8: Hint Explanation

Hint Parameter	Explanation
Frequency	Indicates the center frequency of the QAM-RF channel
Power level	Indicates the power level of the QAM-RF channel
Mute	Indicates whether mute or not
Spectral Inversion	Indicates whether spectral inversion is applied
CW Signal	Indicates whether CW is applied or not
QAM License	Indicates whether QAM license is granted

3.9.2 Configuring/Viewing QAM-RF Parameters

1. Select the **Platform** tab.
2. In **Back Panel View**, select the required slot.
3. Select the **QAMs** tab.



RF Enable	RF Output	QAM Index	TS ID	QAM Manager	Serving Area	NGOD Group Name	Frequency (Hz)	Power Level (dBmV)	Interleaver	Spectral Inversion	Mute	CW
	1.1.1	1	1	NGOD ERM		QG1	560000000	59	12-17			
	1.1.2	2	2	NGOD ERM		QG2	568000000	59	12-17			
	1.1.3	3	3	NGOD ERM		QG3	0	59	12-17			
	1.1.4	4	4	NGOD ERM		QG4	0	59	12-17			
	1.2.1	5	5	NGOD ERM		QG5	560000000	59	12-17			
	1.2.2	6	6	NGOD ERM		QG6	568000000	59	12-17			
	1.2.3	7	7	NGOD ERM		QG7	0	59	12-17			
	1.2.4	8	8	NGOD ERM		QG8	0	59	12-17			

4. Define RF attributes according to the following explanation:
   - RF Enable - Read only parameter. To enable the port, see *3.9.1 Configuring Module RF Ports on page 38*.select to enable the port.

- RF Output - Read only. It indicates the QAM-RF output channel in the following pattern x.y.z where
  x - Module number
  y - RF port number
  z - RF channel number
  For example, 1.2.2 refers to output traffic of module 1, output via RF 2 port, channel 2.
- QAM Index - (Read Only). An index number to identify each QAM channel within the 144 available QAM-RF channels of the device.
- TS ID - sets the ID of the transport stream carried over this QAM-RF channel.
- QAM Manager - The QAM manager determines the functionality of the QAM. The default QAM manager is VOD SRM. You can select one of the following QAM managers:

Table 3-9: QAM Manager

QAM-RF Manager	Application	Explanation
VOD SRM	VOD Service Remux	VOD - the NSG 9000 automatically detects the incoming streams and automatically routes them, according to the indicated UDP, to the required QAM-RF channel. The traffic routed via the QAM-RFs is controlled by the SRM (Session Resource Manager). The SRM may also route to the QAM-RFs service remux.
NGOD ERM (default)	VOD SDV Service & PID Remux	The NGOD ERM controls the QAM-RFs for binding SDV sessions and for routing VOD sessions. The ERM may also route to the QAM-RFs service remux or PID remux. All QAM-RFs send D6 messages to the NGOD ERM if NGOD ERM server is configured and enabled by selecting Applications > NGOD.
ISA SRM	SDV VOD Service & PID Remux	All QAM-RFs are controlled by ISA (Interactive Service Architecture) using the RPC protocol. VOD sessions are provisioned via ISA or by autodetection. The ISA may also route to the QAM-RFs service remux.
Passthrough	Passthrough	The incoming stream is streamed out without any changes, that is without generating new tables, services or PIDs. The traffic is locally routed (device Passthrough manager) to the QAM-RFs as indicated by the UDP port.
M-CMTS	M-CMTS	The QAM-RFs deliver M-CMTS data and are controlled by the CMTS.
D2E	D2E	The D2E server controls the QAMs. Future use only.

NOTE: To change a QAM Manager, verify that no session or service are provisioned/remuxed to this QAM-RF.

- Serving Area - Enter the ID of the area that this QAM channel serves.
- NGOD Group Name - enter the QAM group name according to the D6 standard.

- EIA Channel - Appears when in **RF Template** you select EIS-STD. It indicates the channel number based on the EIA-STD channel table.
- Frequency - The RF frequency (Hz) of this transport stream. The allowed ranges are as follows:

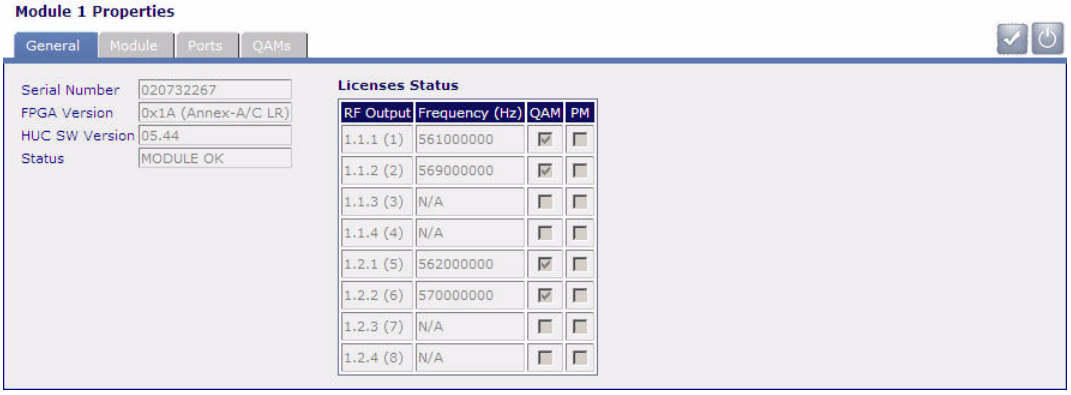
Table 3-10: QAM Channels Frequency

Module Type	ANNEX B (ITU-T) & ANNEX C	ANNEX A (DVB)
NSG-2R	53000000-86700000	54000000-86600000
NSG -2R1G NSG-8R1G	53000000-99900000	54000000-99800000

- Power Level (dBmV) - Indicates the power level as defined in the RF Port tab. See, *3.9.1 Configuring Module RF Ports on page 38*.
- InterLeaver - An advanced QAM configuration parameter. For Annex-B, Interleaver value depends on the constellation in use.
- Spectral Inversion - The spectral inversion is an advanced QAM configuration parameter. If checked, spectral inversion is enabled.
- Mute - Allows you to control the IF signal within the QAM-RF module before it is up-converted. This option should be set to ON at all times.
- CW - Select for testing purposes only.

3.9.3 Viewing QAM-RF Module Information

1. Select the **Platform** tab.
2. In **Back Panel View**, select the required slot.
3. Select the **General** tab.



4. View the following information:
   - Serial Number - The serial number of the mounted module.
   - FPGA Version - The version of the interface FPGA card.
   - HUC SW Version - The version of the Harmonic Up Converter firmware. A version of 06.00 and higher indicates an up converter of 1G.
   - Status - Indicates the status of the module:
     Module OK - the module is mounted and works properly
     Module is Out - the module is not mounted in the slot
     Module Failed - the mounted module is faulty or there is a mismatch between the

module and the configuration.

- License Status - shows the QAM channel number, its frequency, and granted QAM/PM licenses. See, *3.10 Managing Your Licenses on page 44*.

3.10 Managing Your Licenses

The output QAM-RF channels of the NSG 9000 device are license dependent. All licenses are per QAM port and the available licenses are as follows:

- Temporary All License - all of the QAM-RF channels are operating. This license is time limited. It can be limited as follows:
  - 14 days - default license. Once you purchase the device and as soon as the device starts working it works for 14 days with all of its capabilities. This grace period of 14 days allows you to activate your licenses to guarantee device operation according to its licensed functions.
  - 90 day - usually for trial or demo purposes
  - 30 day - usually for trial or demo purposes
- Narrowcast QAM License -(Default Module License for 4 QAM). When you purchase a QAM-RF module, you also receive a license for two QAM channels per QAM-RF port. To operate additional QAM channels of the module, you need to purchase additional QAM licenses.
- PM Scrambling License - Not applicable. Allows you to output TSs scrambled in the Privacy Mode encryption technology of Motorola.

3.10.1 Working with Licenses

To work with licenses, you need to install the purchased licenses on the device. It is recommended to install and to remove licenses using the License Manager tool. Obtain this tool free of charge from Harmonic customer support.

For instructions on how to install, remove, or move licenses across the NSG devices, see License Manager documentation.

For the device to operate according to the purchased license you need to do the following:

Table 3-11: Claiming a License

Action	Explanation
Install a license on the device	Licenses are received from Harmonic as numbered License Packs, and need to be installed onto the NSG device. To instal, use the License Manager. In rare cases, install the license via the web client. See *page 47*.
Assign a license	Activate a license per each QAM-RF channel. If the requested licenses are installed on the NSG device, after the configuration is applied, the relevant license is enabled on this QAM-RF channel.
Viewing license status	View license status: ■ At the top section of the **Assign Licenses** tab ■ **Licenses Summary** tab

Table 3-11: Claiming a License

Action	Explanation
Remove a license from the device	To remove installed licenses, see License Manager. To view deleted licenses, see *page 47*.

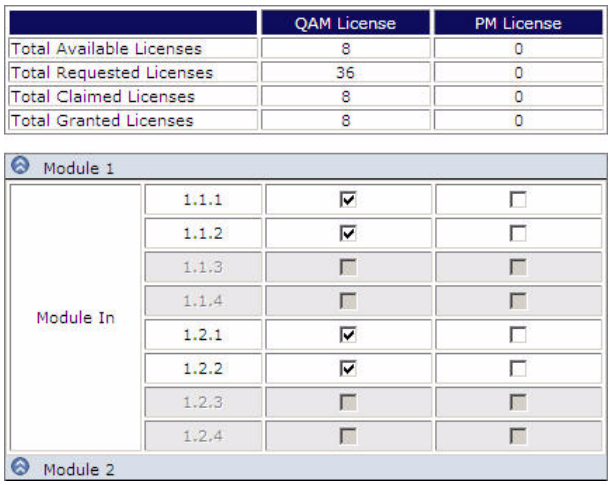
Licenses are limited by time and an alarm is issued 24 and 72 hours before the license expires. Once a license is expired, NSG 9000 disables the channels from the first channel in the first port of the first slot regardless of the channel that has expired.

3.10.1.1 Assigning a License

When assigning a license, you activate a license per each QAM-RF channel. If the requested licenses are installed on the NSG device, after the configuration is applied, the relevant license is assigned/enabled on this QAM-RF channel.

1. Select **Platform** > **Licensing** > **Assign Licenses**.

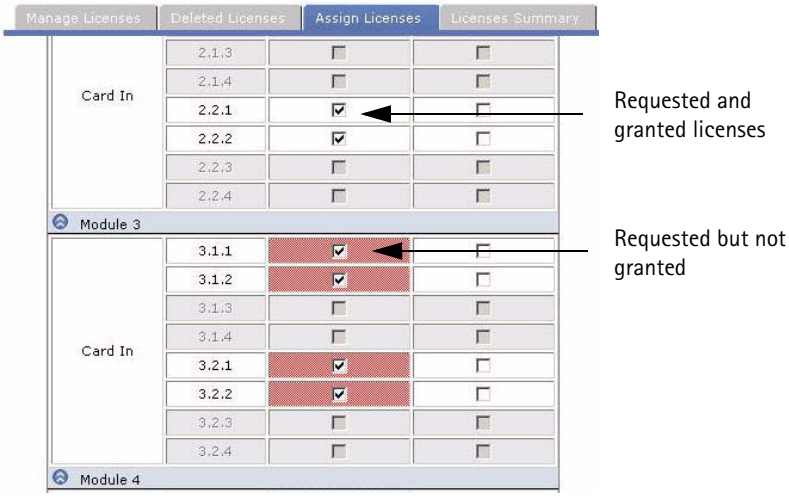
   The **Assign License to QAMs** page opens:



   Once the page opens, you can view the current status of each license:

   - Requested and granted - all checked licenses

- Requested and deferred - all checked licenses with a red background



2. Scroll down to the required module.
3. To request a license, check the required QAM channel(s).
4. To claim the license(s), click **Apply**.

   The licenses are granted and the QAM channels operate according to the granted license.

   If you try to claim more licenses than you purchased, a message appears notifying you of the QAM channel its license is deferred. The channel appears in the table with a red background.
5. To view the total number of the licenses according to their current status, scroll to the top of the page:

	QAM License	PM License
Total Available Licenses	20	0
Total Requested Licenses	36	0
Total Claimed Licenses	20	0
Total Granted Licenses	20	0

Total Available Licenses - the total number of purchased licenses that were added by entering the license key.

Total Requested Licenses - the total number of licenses you checked to allow granting them.

Total Claimed Licenses - the total number of licenses you requested (checked them) and send to the device (click Apply) to claim them. A license is claimed but not granted in the following cases:

- The module is not mounted in the slot
- The module's state is Failed
- QAM channel is not active due to the selected RF mode

Total Granted Licenses - the total number of licenses that you requested and are granted, that is that the QAM is operating according to the license.

3.10.1.2 License Summary

1. Select **Platform** > **Licensing**.

The **Licenses Summary** page appears:

License Type	Qty	In Use
Temporary All Features	0	0
Narrowcast QAM	4	0
PM Scrambling	0	0

2. View the following information:

License Type - lists all the available types of licenses:

- Temporary All License - allows the NSG 9000 device to operate with all of its capabilities. Usually this license type is time limited.
- Narrowcast QAM License - allows to operate the QAM port channels. Usually a module is purchased with a license for two QAM channels per RF port.
- PM Scrambling License - allows to output TSs via the PM license QAM using Motorola Privacy Mode scrambling technology.
- DOCSIS QAM - allows to operate the QAM port channels as part of an M-CMTS system.
- DOCSIS QAM + DTI Sync - allows to operate the QAM port channels as part of an M-CMTS system with DTI sync messages.

Qty - indicates the total number of purchased licenses of that type.

In Use - indicates the number of licenses that were successfully granted.

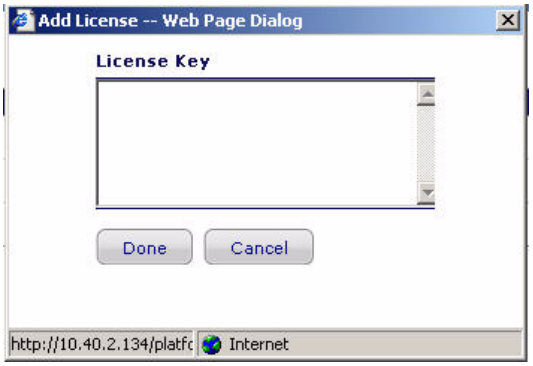
3.10.1.3 Adding/Deleting a License

NOTE: Manage the licenses via the License Manager. Only in rare cases, manage the licenses via the web client as described below.

⇨ To add a license

1. Select **Platform** > **Licensing** > **Manage Licenses**. The following page appears.

2. To add a license, click **Add License**. The **Add License** dialog appears.



3. Enter the license key you received from Harmonic Customer Support.
4. Click **Done**.

   The license is added to the list, the serial and part numbers are generated according to the license key and the license is available. The following details appear in the table:

   License Description - provides details about the license.

   License Part Number - indicates the part number as generated according to the license key.

   License Serial Number - indicates the serial number as generated according to the license key.

   Qty - indicates the number of QAM channels included in this license.

   Expiration Date - indicates when the license expires.

   Delete- allows you to delete a license.

3.10.1.4 Viewing Deleted Licenses

NOTE: You can delete licenses via the License Manager only.

- To view the deleted licenses, select the **Deleted Licenses** tab. The table that appears lists the deleted licenses and their details:

License Description - provides details about the license

Part Number - indicates the part number as generated according to the license key.

License SN - indicates the Serial Number of the license

Key SN - indicates the Serial Number of the key

Qty - indicates the number of QAM channels included in this license

Expiration Date - indicates when the license expired

Deletion Receipt - a string you need to record and use when approaching Harmonic Customer Support.

⇨ To organize the Available\Deleted Licenses table

- By default, the first raw of the table lists the license entered the latest. To arrange the records in a sequential order, click on any of the column names. An arrow appears to indicate the list order.

3.11 Configuring NGOD

When the EdgeQAM is part of an NGOD system architecture, you need to configure the following to allow the QAM-RFs of the EdgeQAM to outflow SDV/VOD sessions:

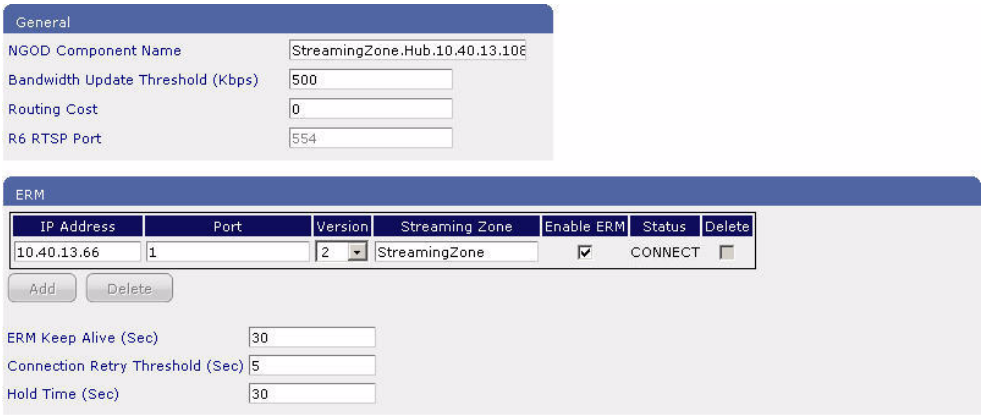
- Configure and enable an NGOD ERM server as explained below.
- Define the NGOD ERM as the QAM-RF manager of the required QAM-RFs. See *3.9.2 Configuring/Viewing QAM-RF Parameters on page 41*.

Setting NGOD ERM parameters requires to set general and the ERM parameters.

3.11.1 Configuring NGOD General Parameters

To allow communication with the ERM, the NSG 9000-6G device supports the D6 and R6 NGOD protocols. When communicating using the R6 protocol, NSG is always listening on port 554(RTSP).

1. Select **Platform** > **NGOD** tab.



2. Focus on the **General** section.
3. In **NGOD Component Name**, enter the component name as defined in the D6 protocol.
4. In **Bandwidth Update Threshold (kbps)**, define the allowed deviation from the current output bit rate of the device. Whenever the bit rate deviation reaches the value defined in this field, the NSG sends the ERM the updated output bit rate.
5. In **Routing Cost**, enter a value as defined in the D6 protocol.
6. In **R6 RTSP Port**, enter 554 as the port number. When communicating using the R6 protocol NSG is always listening on port 554(RTSP).

3.11.2 Configuring ERM Parameters

1. Select **Platform** > **NGOD** tab.

2. Click **Add**, to add an ERM.
3. In **IP Address**, enter the ERM IP address.
4. In **Port**, enter the ERM TCP port number.
5. In **Version**, select the supported version of the protocol. Version 2 is the default version.
6. In **Streaming Zone**, enter the streaming zone as defined in the D6 protocol.
7. To enable the NSG-ERM communication, select the **Enable ERM** box.
8. In **Status**, view the connection status.

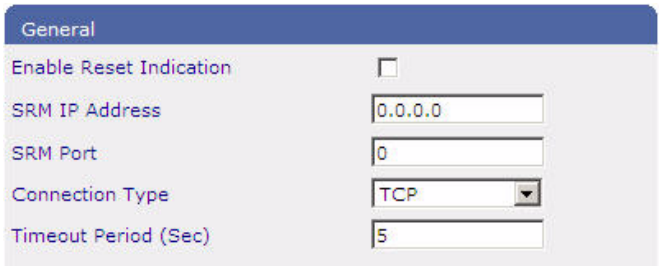
   `Connect` indicates that the connection is ok.

   `Idle` indicates that there is no connection with the ERM.
9. Check **Delete** to remove the line when clicking **Delete**.
10. In **ERM Keep Alive**, enter a period of time in seconds to indicate the duration between the keepalive messages transmitted by the NSG to the ERM. The default is 30 seconds.
11. In **Connection Retry Threshold (sec)**, enter a period of time in seconds to indicate the duration between retrials to connect to the ERM to send D6 messages.
12. In **Hold Time (sec)**, enter a period of time in seconds to indicate the duration between responses to successive Keep Alive and or UPDATE messages received by the NSG. If the duration time elapses and a response is not received, NSG tries to re-establish the connection with the ERM.

3.12 Configuring ISA

When the EdgeQAM is part of an ISA SRM system architecture, you need to configure the following parameters to allow the QAM-RFs of the EdgeQAM to outflow SDV/VOD sessions:

1. Select **Platform** > **ISA** tab.



2. Define the following parameters:
   - Enable Reset Indication - if selected, an indication is sent to the ISA server (either ERM or SRM).
   - SRM IP Address - enter the IP address of the SRM server
   - SRM Port - enter the port number over which the device communicates with the SRM
   - Connection Type - select either TCP or UDP
   - Timeout Period - enter a period of time in seconds to indicate the duration between the NSG trials to connect to the ISA server.

NOTE: EdgeCluster, device redundancy, is not applicable to this version.

3.13 Configuring EdgeCluster

NSG 9000 supports EdgeCluster technology. This technology offers high availability obtained by 1:1 device redundancy. The active and standby devices are configured the same and are provisioned with the same sessions. However, the output ports of the standby device are disabled. Both the active and standby devices communicate with each other via their Eth1 and Eth2 ports:

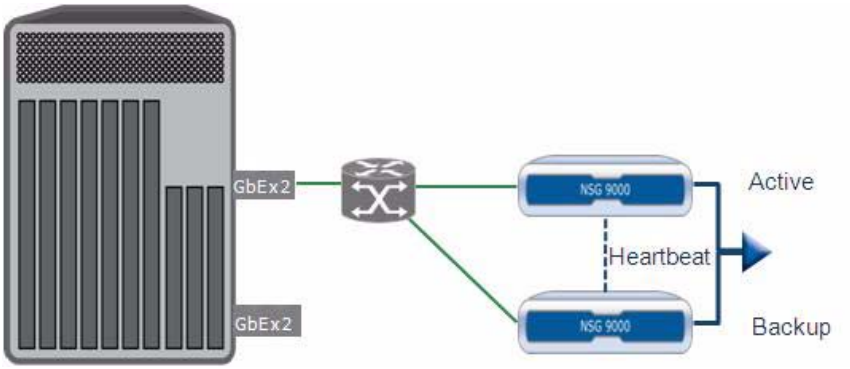
- Eth1 - management port connection. See *NSG 9000 Hardware and Installation User's Guide*.
- Eth2 - connected with an Ethernet crossover cable.

The input ports of both NSG devices must be configured the same including their IP addresses.

The active device sends heartbeat messages in pre-defined intervals. Once a triggering alarm is issued on the active device, the following takes place:

- The active NSG 9000 device stops sending heartbeat messages to the standby device.
- The active NSG 9000 device closes its QAM-RF ports.
- The active NSG 9000 shuts up its GbE ports (Link Down) for a pre-defined period of time to signal the source device that the device is faulty.
- If no heartbeat messages are received by the standby NSG 9000 device, it enables its QAM-RF ports and starts sending heartbeat messages to its peer device. The source device starts transferring data to the standby device.

The following picture is an example of an application of the EdgeCluster technology. In this example, the technology is applied to an M-CMTS system:

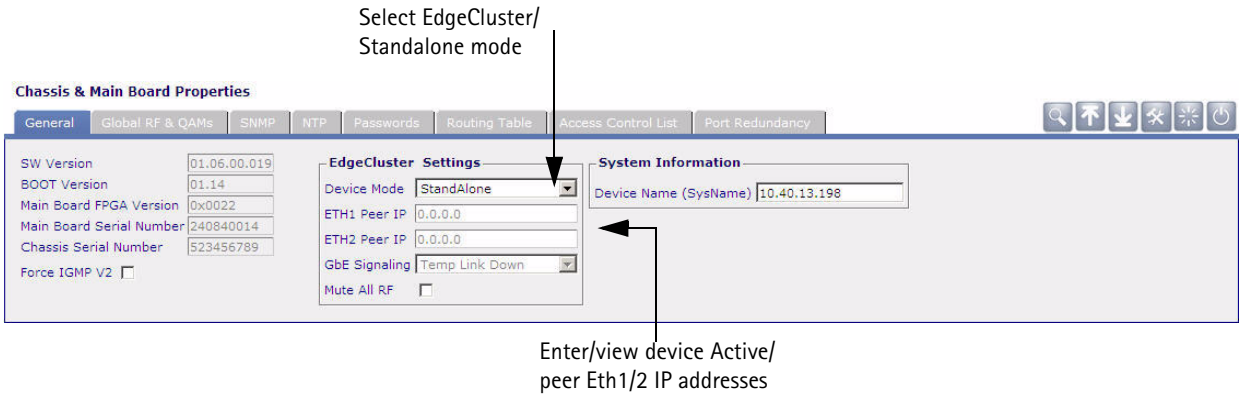


For various EdgeCluster applications with and without switch, see *EdgeCluster Application Note*.

To view the list of the default triggering alarms and to define triggering alarms, see *3.13.1.2 Defining Triggering Alarms on page 54*.

3.13.1 Enabling EdgeCluster

Enabling and monitoring the EdgeCluster feature is done via the **Platform** > **Chassis** > **General** tab.



The EdgeCluster tab includes the following options:

Device Mode - Allows to select either of the following modes:

- StandAlone - when selected, EdgeCluster options are disabled.
- EdgeCluster - when selected, EdgeCluster options are enabled.

ETH1 Peer IP - Allows to configure the IP address of Eth1 of the peer device.

ETH2 Peer IP - Allows to configure the IP address of Eth2 of the peer device.

GbE Signaling - Allows to configure the GbE link during fail-over. By default, GbE Signaling is set to Const Link Down. It is recommended not to change the default configuration.

- Const Link Down - Default option. GbE port is constantly in link down.
- Temp Link Down - GbE port is in link down for a pre-defined time to signal the source device that the device is faulty.

NOTE: GbE Signaling is available only if your edge device is running with either of the following versions:
NSG 9000 version 1.5.3 and up, NSG 9000-6G version 2.2 and up.
Constant link down is required for uBRK10 running with IOS version 12.2SCB and up.

Mute All RF - Select to close all RF ports.

⇨ To enable EdgeCluster

To enable EdgeCluster, perform the following instructions in their sequential order. Failing to perform the instructions according to their order may adversely affect the EdgeCluster capability.

NOTE: The provided instructions assume that a single NSG 9000 device is working (referred to as Active device) and you would like to add a standby device.

NOTE: If your uBR10K is running with IOS version 12.2 SCB and up, use NSG 9000 1.5.3.and up or NSG 9000-6G version 2.2 and up only.

Standby Device	Active Device
1. Configure the designated standby device exactly as its peer device.	
2. Check that the designated standby device is working properly by connecting it to an external analyzer.	
3. Verify that you can connect the devices according to the scheme described in *3.13 Configuring EdgeCluster on page 51*. Note: At this stage don't connect the designated standby device to the HFC network.	
4. In the web client of the designated standby device, select **Platform** > **Chassis** > **General** tab.	
5. Focus on the **EdgeCluster Settings** section.	
6. Select **Mute All RF** and click **Apply**.	
7. Connect the device to the HFC network. Connect the input ports according to the scheme described in *3.13 Configuring EdgeCluster on page 51* and connect the QAM-RF ports cables.	
	8. In the web client of the Active device only, select **Platform** > **Chassis** > **General** tab and focus on the **EdgeCluster Settings** section.
	9. Select **EdgeCluster**. The **Mute All RF** option is disabled.
	10. In **Eth1 Peer IP** and in **Eth2 Peer IP** enter the Eth1 and Eth2 address of the peer device, in this case the standby device, respectively.
	11. Verify that **GbE Signaling** is set to **Const Link Down**.
	12. Click **Apply**.
	13. Verify that Active Peer appears in the title bar of the web client.
14. In the web client of the standby device only, select **EdgeCluster**.	
15. Verify that **Eth1 Peer IP** and **Eth2 Peer IP** are configured as required.	
16. Verify that **GbE Signaling** is set to **Const Link Down**.	

Standby Device	Active Device
17. Click **Apply**.	
18. Verify that Standby Peer appears in the title bar of the web client.	

3.13.1.1 EdgeCluster Indications

Once you set the EdgeCluster configuration, various indications appear at the title bar of the web client and on the front panel LCD display. The indications reflect the status of the device in the EdgeCluster topology as the following table shows:

Device Status	Title bar	Front Panel LCD	LCD Legend
Active	■ Active Peer ■ Failed Peer (upon redundancy switch)	A F	Active Failed
Standby	Standby Peer	S	Standby
RF ports disabled	RF Disabled	D	Disabled

RF ports are disabled

Active device indication

Standby indication

Failed device indication

3.13.1.2 Defining Triggering Alarms

By default, critical hardware alarms are defined as triggering device fail-over. Advanced users may re-define the triggering alarms as explained in *6.3.5 Setting Alarm Parameters* on page 98. To view whether an alarm triggers a redundancy switch, see *6.3.2 Alarm List* on page 91 and *6.3.3 Warning List* on page 95.

3.13.2 EdgeCluster Related Procedures

3.13.2.1 EdgeCluster and Firmware Upgrade

When you wish to upgrade the firmware of NSG 9000 devices working in EdgeCluster mode, perform the following steps in their provided order.

⇨ To upgrade the firmware of the NSG 9000 device in EdgeCluster Mode

NOTE: During this procedure you are instructed to upgrade the firmware of the standby device first.

Standby Device	Active Device
1. In the web client of the Standby device only, select **Platform** > **Chassis** > **General** tab and focus on the **EdgeCluster Settings** section.	
2. In Device mode, select **StandAlone**.	
3. Select **Mute All RF**.	
4. Click **Apply**.	
5. Save the current configuration of the standby device using the MCT software.	
6. Upgrade the firmware as instructed on *page 20*.	
7. Verify that the device is running with the newly installed firmware and apply the required configuration to the device. Note: The standby device is currently working with the new firmware and the required configuration which implies that its QAM-RF ports are disabled.	
	8. In the web client of the Active device only, select **Platform** > **Chassis** > **General** tab and focus on the **EdgeCluster Settings** section.
	9. In Device mode, select **StandAlone**.
	10. Select **Mute All RF**.
	11. Click **Apply**. Traffic is disrupted.
12. In the web client of the Standby device only, de-select **Mute All RF** and click **Apply**. The device is streaming traffic and is working in standalone mode.	
	13. Save the current configuration using the MCT software.

Standby Device	Active Device
	14. Upgrade the firmware as instructed on *page 20*.
	15. Verify that the Active device is running with the newly installed firmware and apply the required configuration to the device.
	16. In the web client of the Active device only, select **Platform** > **Chassis** > **General** tab and focus on the **EdgeCluster Settings** section.
	17. In **Device Mode**, select **EdgeCluster**.
	18. Verify that the peer parameters are correct.
	19. Click **Apply**. Both Active and Standby device are streaming out traffic.
20. In **Device Mode**, select **EdgeCluster**.	
21. Verify that peer parameters are as required.	
22. Click **Apply**.	
23. Verify that Standby Peer appears in the title bar.	

3.13.2.2 EdgeCluster Manual Revert

The following section instructs you on how to revert from the Standby device to the Active device after fixing a faulty Active device.

The following procedure assumes the following:

- The fixed Active device is working in a Standby mode
- EdgeCluster is enabled in both devices
- The designated Standby device is currently the Active device

⇨ To manually revert to the designated Active device

In the web client of the designated Standby device, do the following:

1. Select **Platform** > **Chassis** > **General** and focus on the **EdgeCluster Settings** section.
2. In **Device Mode**, select **SatndAlone**.
3. Select **Mute All RF**.
4. Click **Apply**.
5. In **Device Mode**, select **EdgeCluster**.
6. Click **Apply**.
7. Verify that `Standby Peer` appears in the title bar.

Chapter 4
Defining Applications

4.1 Applications Overview

NSG 9000 operates in the following applications:

VOD Application - The system serves as a highly integrated digital video gateway, capable of multiplexing on-demand content streamed over an IP network.

Broadcast Applications- The system broadcasts remuxed services.

SDV Application - The device streams out SDV sessions provisioned by ISA.

M-CMTS Application - NSG 9000 supports wideband M-CMTS data PIDs. As part of the MCMTS system, NSG 9000 processes down streams and improves downstream data rates by significantly reducing costs.

D2E Application - NSG 9000 supports Multicast IP down streams encapsulated as DOCSIS 3.0 with DBC requests (when required) on dedicated frequencies (D2E server frequencies).

CAS - NSG 9000 supports both DVB-CSA and Privacy Mode scrambling.

NOTE: When provisioning static sessions through the web client or MCT, NSG 9000 may carry up to 500 sessions only. When dynamic sessions are provisioned through ISA SRM or VOD SRM, NSG 9000 may carry up to 2,000 dynamic SDV sessions.

4.2 VOD Application

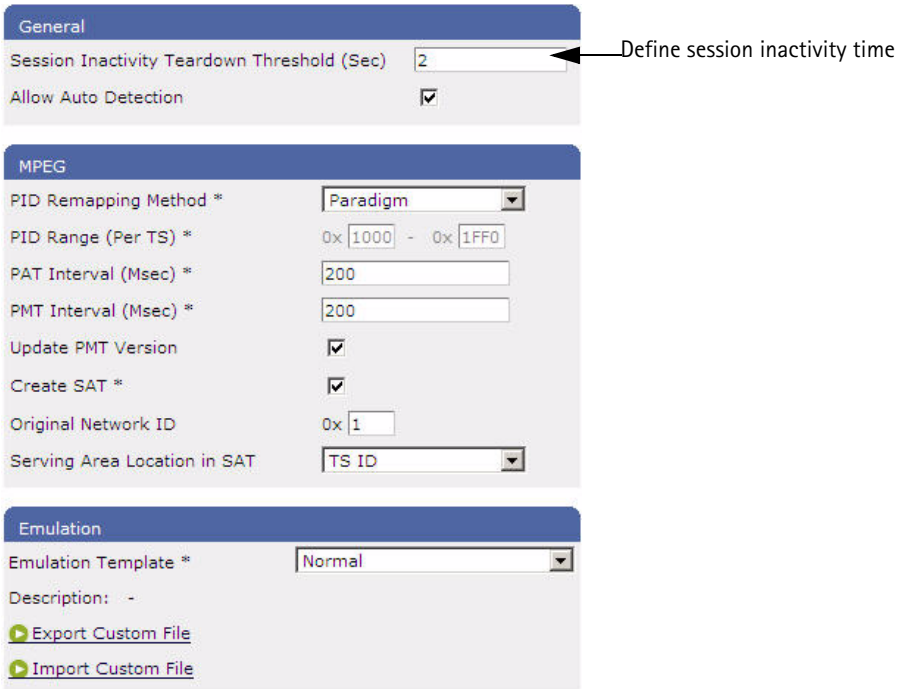
The VOD application includes two tabs:

- Settings - allows you to set the following:
  - General parameters - session inactivity time
  - MPEG related parameters
  - Emulation mode (currently disabled)
- QAMs - a read only page to view QAMs settings

4.2.1 Defining Session Inactivity Time

Define the allowed duration for session inactivity before the session is removed from the output.

1. Select **Applications** > **VOD** > **Settings** tab.



2. In **Session Inactivity Teardwon Threshold (Sec.)**, enter the allowed period of time in seconds for session inactivity. In case the interval is longer than the indicated time, the session is removed from the output port.
3. By default, **Allow Auto Detection** is selected. Verify that this option is selected to allow auto detection, in the input, of the output QAM according to the indicated UDP port.

4.2.2 Defining MPEG Parameters

4.2.2.1 PID Remapping

The PID Remapping option allows you to remap according to a specific paradigm or randomly. In either case, the NSG prevents the assignment of conflicting PIDs.

- Paradigm - The elementary stream PIDs are chosen from a predefined hex-decimal formula for PMT, Video, Audio 1 & 2, ECM, PIDs. The range is:

Formula	Example
Service ID = 0xN	Service ID = 0x34
PMT PID = LeftShift (N) = 0xN0	PMT PID = 0x340
PCR=Video=PMT+1= 0xN1	Video = 0x341
Audio 1&2 = PMT+ 4/5 = 0xN 4,0xN5	Audio 1&2= 0x344, 0x345
ECM=PMT+9= 0xN9	ECM PID= 0x349

NOTE: The Paradigm mode is not suitable for processing services with service IDs greater than 510. If you are using service ID that are greater than 510 you must use the Random mode.

- Random - The NSG remaps incoming PIDs to PID numbers that are randomly selected from a predefined range. Define the range in the PID Range field. The PID range is written in hex-decimal format. Range of acceptable values is 0x21 to 0x1FF0.

Changing the PID remapping mode may interrupt the streams currently flowing through the device. It is recommended to change the remapping mode only when no active streams are flowing through the device.

In addition, changing the PID remapping may affect the operation of some STB (Set-up Boxes.) Various STBs operate better with a specific mode. If you suspect such a case, call the STB vendor before changing the PID remapping.

NOTE: Do not change the default settings unless it is necessary. Changing the parameters may cause serious problems with elementary stream transmission.

NOTE: Changing the PID Remapping mode is global. It applies to the platform and to both VOD and SDV sessions.

⇨ To change PID remapping

1. Select **Applications** > **VOD** > **Settings**:

2. By default the remapping method is Paradigm. To change the remapping method, select **Random**.

   The **PID Range (Per TS)** option is enabled.

3. In **PID Range (Per TS)**, define the PID range (in hex-decimal format) that the NSG will use for random PID assignment. The range of acceptable values is 0x21 to 0x1FF0.

NOTE: Changes take affect after device reset only.

4.2.2.2 Setting PAT/PMT Intervals

1. In **PMT Interval**, define the interval in milliseconds at which PMT packets are sent over the NSG's output transport streams.
2. In **PAT Interval**, define the interval in milliseconds at which PAT packets are sent over the NSG's output transport streams.

NOTE: Changes take affect after device reset only.

3. Select **Update PMT Version** to update the PMT version. This version is incremented every time the PMT's data is changed (e.g. the Video PID changes).

4.2.2.3 Creating and Setting SAT

1. Select **Create SAT** (Service Area Table), to create SAT at the output.

   Once **Create SAT** is selected, the following parameters are enabled:

   - **Original Network ID**
   - **Serving Area Location in SAT**
2. If **Create SAT** is selected, define the original network ID.
3. If **Create SAT** is selected, open the Serving Area Location in SAT list and select one of the following:
   - TS ID - the serving area is written to the TS ID.
   - First Service Name - the serving area is written to the first service name
   - Both - the serving area is written to both the TS ID and the first service name.

4.2.3 Defining Emulation/QAM Mapping Mode

By default the QAM Mapping Mode is set to Normal. However, the NSG 9000 device may emulate the operation of other devices which require a different mapping of the QAMs.

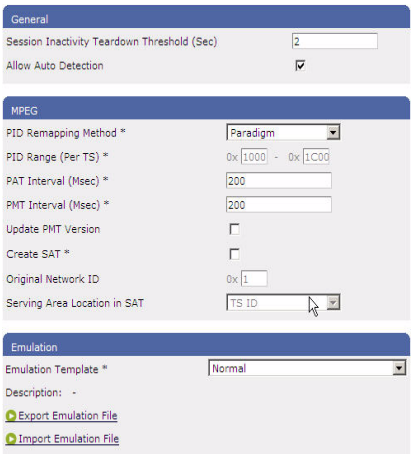
Each Emulation Mode is defined by an XML file. Once you select an emulation mode, NSG 9000 loads the required emulation mode XML file.

You can customize up to four QAM Mapping modes and export them to an XML file and when required you can import them to the device.

To see the emulation mode and its QAM mapping, see *A.1 NSG 9000 Emulation* on page 108.

⇨ To define the QAM mapping mode

1. Select **Applications** > **VOD** > **Settings** tab.



2. Open the Emulation Template list to select the required emulation Template. See, *4.2.3 Defining Emulation/QAM Mapping Mode* on page 60.

NOTE: Changing the emulation template, requires an immediate device reset.

3. Once the device boots up the following applies:
   - According to the emulation template, you should configure additional IP addresses to the input GbE port. See *3.5 Configuring GbE Ports* on page 27.
   - The RF configuration is set to its default values, if the newly selected emulation

template allows two QAMs per port only and if the previous emulation template allowed a different number of QAMs per port (three or four.) That is, if in the newly loaded emulation mode file, *RF Mode = 2*, and in the previous emulation mode file RF *Mode = 2*, the RF configuration is set to its default values.
For example, if you work in Normal emulation mode and change to NSG8108 encoded, the device boots up with default RF configuration, which allows two QAMs per port only.

4. To export one of the defined custom QAM Mapping modes, see *4.2.3.1 Exporting Customized QAM Mapping Mode File* on page 61.
5. To import a customized QAM Mapping mode, see *4.2.3.2 Importing Customized QAM Mapping Mode File* on page 61.

4.2.3.1 Exporting Customized QAM Mapping Mode File

1. Select **Applications** > **VOD** > **Settings**.
2. Click **Export Custom File**.
3. Click either **Open** or **Save** the file of the selected QAM Mapping mode.

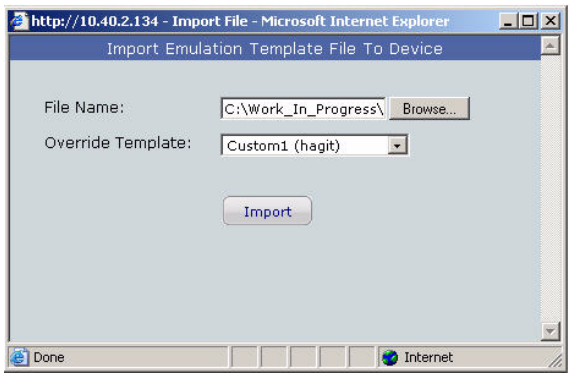
   If you select **Open**, the file opens and you can view it.

   If you select **Save**, a **Save As** dialog opens and you may browse to the required location of the file.

4.2.3.2 Importing Customized QAM Mapping Mode File

1. Select **Applications** > **VOD** > **Settings**.
2. Click **Import Custom File**.

   The following dialog appears:



3. Click **Browse** to locate the required QAM Mapping mode template.
4. Open the **Override Template** list and select which template to override.
5. Click **Import**.

4.2.4 Viewing VOD QAMs

The QAMs tab allows you to view the settings of all the QAMs configured to stream out VOD sessions. These QAMs are managed by the following QAM managers:

- VOD SRM
- NGOD ERM
- ISA SRM

⇨ To view VOD QAMs

1. Select **Applications > VOD > QAMs.**

QAM Manager	GbE Port	GbE IP Address	UDP Port Range	RF Output	QAM Index	TS ID	NGOD Group Name	QAM Frequency	Symbol Rate	Interleave	Spectral Inversion	Status
NGOD ERM	All	All	513 - 767	1.1.2	2	2	QG2	567000000	5.360537	128-4	☐	Active
NGOD ERM	All	All	1281 - 1535	1.2.1	5	5	QG5	561000000	5.360537	128-4	☐	Active
NGOD ERM	All	All	1537 - 1791	1.2.2	6	6	QG6	567000000	5.360537	128-4	☐	Active
NGOD ERM	All	All	2305 - 2559	2.1.1	9	9	QG9	561000000	5.360537	128-4	☐	Active
NGOD ERM	All	All	2561 - 2815	2.1.2	10	10	QG10	567000000	5.360537	128-4	☐	Active
NGOD ERM	All	All	3329 - 3583	2.2.1	13	13	QG13	561000000	5.360537	128-4	☐	Active
NGOD ERM	All	All	3585 - 3839	2.2.2	14	14	QG14	567000000	5.360537	128-4	☐	Active
NGOD ERM	All	All	4353 - 4607	3.1.1	17	17	QG17	552000000	6.95643	12-17	☐	Active
NGOD ERM	All	All	4609 - 4863	3.1.2	18	18	QG18	560000000	6.95643	12-17	☐	Active
NGOD ERM	All	All	4865 - 5119	3.1.3	19	19	QG19	568000000	6.95643	12-17	☐	Active
NGOD ERM	All	All	5121 - 5375	3.1.4	20	20	QG20	576000000	6.95643	12-17	☐	Active
NGOD ERM	All	All	5377 - 5631	3.2.1	21	21	QG21	560000000	6.95643	12-17	☐	Active

2. View the following read-only information:

   QAM Manager - lists the defined QAM manager for this application. In VOD application, the defined QAM manager can be VOD SRM, NGOD ERM, or ISA SRM. See *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41.

   GbE Port - the GbE port routed to this QAM-RF port. The value of this attribute depends on the defined QAM mapping mode. See *4.2.3 Defining Emulation/QAM Mapping Mode* on page 60.

   GbE IP Address - the GbE IP address port that is routed to the QAM-RF port

   UDP Port Range - the UDP port range that is routed to the QAM-RF

   RF Output - see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

   QAM Index - An index number to identify each QAM channel within the 72 available QAM-RF channels of the device. This tab displays the available QAM channels as per the number of QAMs Per Port value.

   QAM Reference No. - (Read Only). This parameter indicates the QAM number of the emulated device. This field appears when the device QAM Mapping mode is NSG 8108 bitmap or encoded and NSG 9116 bitmap or encoded.

   TS ID - see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

   NGOD Group Name - see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

   QAM Frequency see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

   Symbol Rate - see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

   Interleaver - see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

   Spectral Inversion - see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

   Status - Active or Mute, according to the IF configuration. see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41

4.3 Broadcast Application

In Broadcast application mode, NSG 9000 allows to route input content to any output, that is to define a session. NSG 9000 allows to create the following types of sessions:

- Pass through - to route complete input MPTSs by using the Pass Through tab.
- Service Remux - to route specific MPEG services (programs) using the Service Remux tab
- PID Remux - to route individual PIDs using the PID Remux tab.

NOTE: VOD application supports barker channels. A VOD session may stream out also a remuxed service or PID.

4.3.1 Defining a Passthrough Session

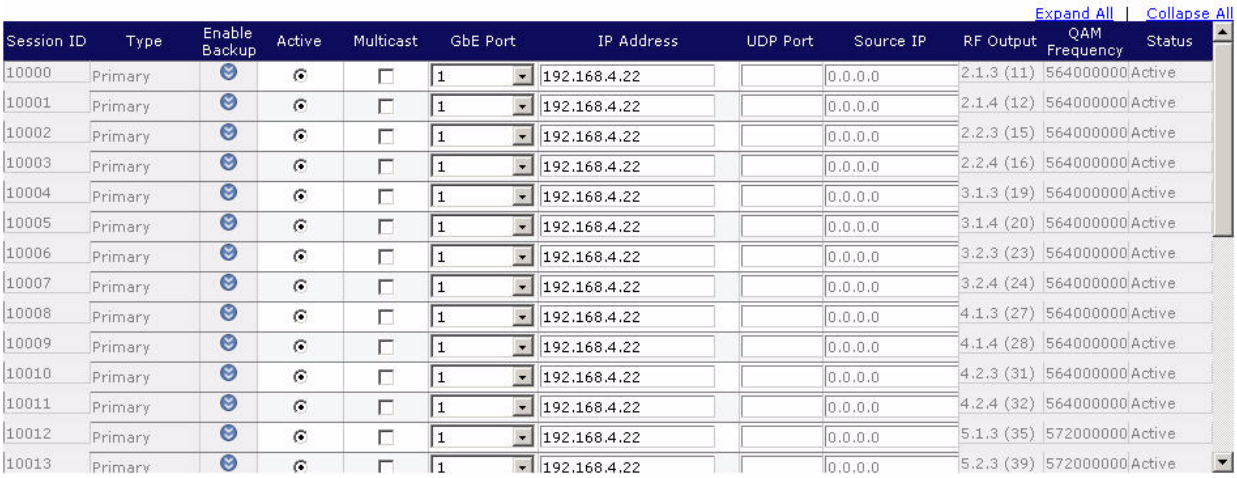
The Pass Through option, allows to output a socket without any changes, that is without remapping and without generating tables. When this option is selected all services in the socket are outputted via the selected output port.

When passing through a TS or a service, you cannot remux a service or a PID included in the pass through TS or service. In addition, you cannot multiplex other input streams to the pass through QAM.

⇨ To configure a pass through a session

NOTE: A session is defined as Pass Through during QAM configuration. (See *3.7.4 Configuring/ Viewing QAM Channels* on page 45). The following procedure guides you on how to define the Pass Through session.

1. Select **Applications** > **Broadcast** > **Pass Through**.



2. Define the following parameters:
   - Session ID- Read only. A sequential number starting at 10000, to indicate the number of the session in the current page.
   - Type - define whether the session is a Primary or Backup session.
   - Enable Backup - see *4.3.1.1 Pass Through Redundancy* on page 64.
   - Active - by default the primary input socket is the active one. Once you enable a backup socket, check this option to activate the required socket. To view the currently active socket, press <F5>.
   - Multicast - select to enable multicast. If selected the **IP Address** box is cleared.

- GbE Port - open the list and select the required input port. Once you define the required GbE port, the **IP Address** field is updated to display the IP address of the selected port.
- In **IP Address**, enter the IP address of the input GbE port.
- In **UDP Port**, enter the UDP port.
- In **Source IP**, enter the IP address of the upstream device that streams the content to the defined GbE port and socket.
- RF Output - Read only. Indicates the output QAM in the following format: X.Y.Z (T) where:
  X – module number (1…9)
  Y – RF port number (1..2)
  Z – channel number (1…4)
  T – QAM index number (1…72)
- QAM Frequency - Read only. indicates the output frequency
- Status - Read only. Indicates whether the QAM is active or mute as the following picture shows:

Expand All | Collapse All

Session ID	Type	Enable Backup	Active	Multicast	GbE Port	IP Address	UDP Port	Source IP	RF Output	QAM Frequency	Status
10002	Primary				1	109.109.109.100		0.0.0.0	1.1.1 (1)	800000000	Mute
10003	Primary				1	109.109.109.100		0.0.0.0	1.1.2 (2)	806000000	Mute
10001	Primary				1	109.109.109.100		0.0.0.0	4.1.1 (25)	561000000	Active

4.3.1.1 Pass Through Redundancy

An input socket may have up to two backup input sockets. By default, the first input socket is the primary socket. If it fails, automatically the following configured socket is activated. If the active input socket is the last one in the list and it fails, the redundancy switch is performed manually only. You need to manually switch to another input socket.

Default primary Input socket

Expand All | Collapse All

Session ID	Type	Enable Backup	Active	Multicast	GbE Port	IP Address	UDP Port	Source IP	RF Output	QAM Frequency	Status
10000	Primary				1	192.168.4.22		0.0.0.0	2.1.3 (11)	564000000	Active
	Backup 1										
	Backup 2										

Backup input sockets

NOTE: Reverting from backup input socket to the primary socket is manual only.

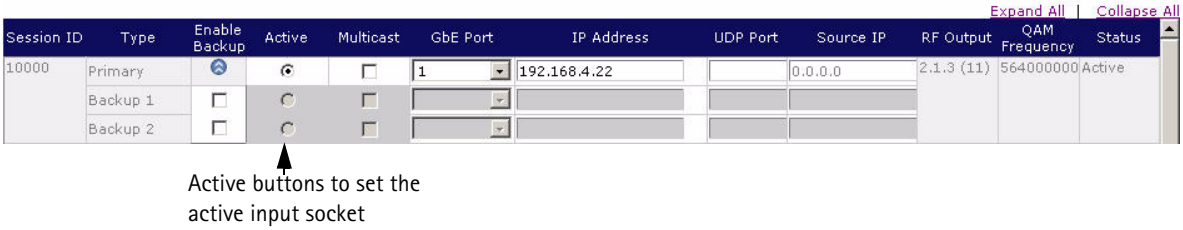
1. Click the **Expand all** button or link Expand All .
2. Configure the required parameters as explained in *1 To configure a pass through a session* on page 63.

⇨ To select the active input socket

By default, the first input socket in the list is the active socket. However, you can define any of the configured input sockets to be active.

NOTE: The automatic redundancy switch automatically activates the following configured input socket. If you select the last input socket in the list as the active input socket, the redundancy switch is manual only and you need to select the input socket.

1. To view the currently active input socket, press <F5> to refresh the page.
2. Click Expand.



Active buttons to set the active input socket

3. To select another input socket as active, click the required Active button.

4.3.2 Defining Service Remux Sessions

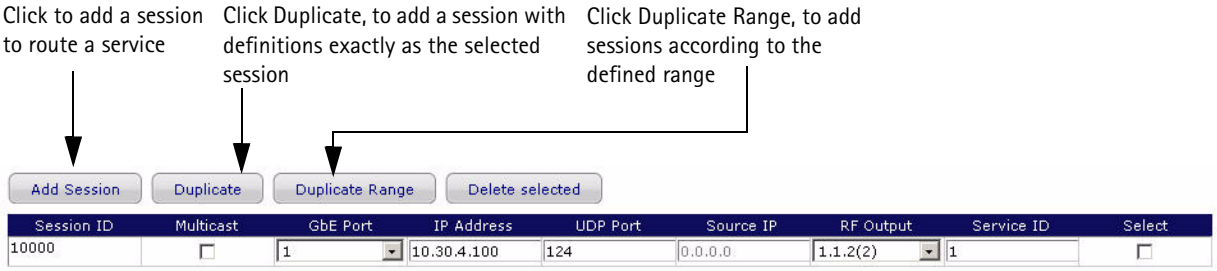
You can route a service from any input to any output. You can select whether to output the service with its input ID or to remap it.

When provisioning static sessions through the web client or MCT, session ID starts at 10,000 and you can configure up to 500 sessions only.

NOTE: You cannot remux PIDs of remuxed services.

To route a service

1. Select **Applications** > **Broadcast** > **Service Remux** tab:



2. Click **Add Session**.

   A row is added to the table with a session ID.

   Session ID- Read only. A sequential number starting at 10000, to indicate the number of the session in the current page.

3. To define the input socket, do the following:
   - Select **Multicast**, if required. If selected, the IP address is removed from the IP Address box.
   - Select the input GbE Port. Open the **GbE Port** list to select the required input port. Once you define the required GbE port, the **IP Address** field is updated to display the IP address of the selected port, unless **Multicast** is selected.
   - In **IP Address**, enter the required unicast/multicast IP address of the input port. By default, the IP address of the selected port appears, unless mulitcast is selected.
   - In **UDP Port**, indicate the UDP port.
   - In **Source IP**, view the IP address of the upstream device that streams the content to the defined GbE port and socket.

4. To define the output to stream out the configured service focus on the *Output* section of the table.
5. To define the output QAM, enter in **RF Output** the required QAM-RF channel in the following format: X.Y.Z (T) where:

   X – module number (1…9)
   Y – RF port number (1..2)
   Z – channel number (1…4)
   T – QAM index number (1…72)

6. In **Service ID** enter the required output service ID. You can output the service with the same input ID number or to remap the service.

⇨ To route a service using the Duplicate button

Once you defined a service and need to route another service with similar configuration, do the following:

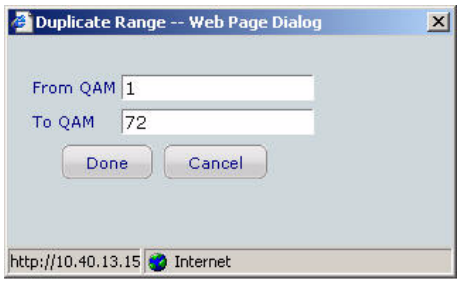
1. In **Service Remux** page, check the **Select** box of the required service/session.
2. Click **Duplicate**.

   The selected row is duplicated and appears as the last row in the table.
3. Define the required parameters as explained in *1 To route a service* on page 65.

⇨ To route a service to a few output ports

1. In **Service Remux** page, check the **Select** box of the required service.
2. Click **Duplicate Range**.

   The following page appears:



3. To define the range of the output QAM (logical port number), enter in **From QAM** and **To QAM** a number between 1-72 to indicate the beginning and the end of the range, respectively.
4. Click **Done**.

⇨ To delete a remuxed service

1. In **Service Remux** page, check the **Select** box of the required service.
2. Click **Delete Selected**.

4.3.3 Defining PID Remux Sessions

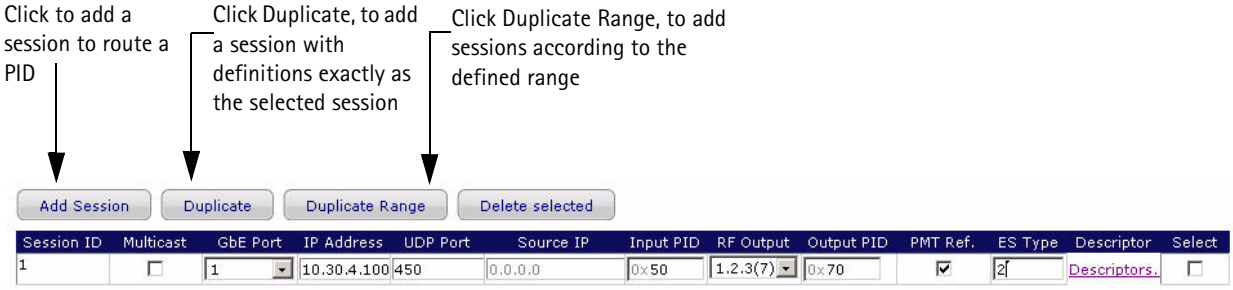
You can route a PID from any input to any output. You can route up to 8 PIDs to an output, or configure up to 576 PID sessions. You can select whether to add a PMT reference to the PID.

You can route an input PID to a few outputs and remap a PID to output it over different outputs. However, you cannot route a PID to the same output with different remapped PIDs.

The PID 0x10 is reserved for the Network Information Table (NIT). If you remux a PID and remap it to PID 0x10, the PAT points to it as a NIT table PID. NSG 9000 ignores any of the PID 0x10 configuration such as PMT reference and added descriptor.

⇨ To route a PID

1. Select **Applications** > **Broadcast** > **PID Remux**.



2. Click **Add Session**.

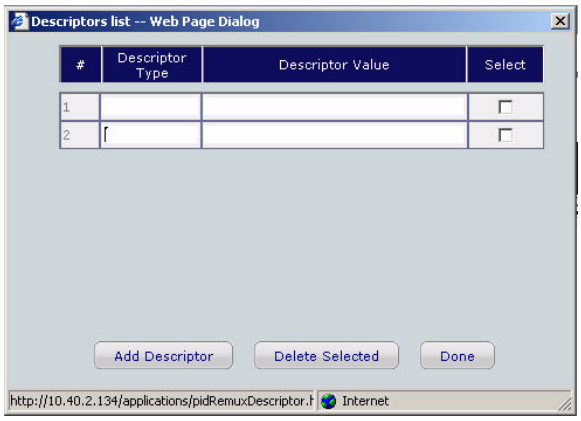
   A row is added to the table with a session ID.

   Session ID- Read only. A sequential number to indicate the number of the session in the current page.

3. To define the input socket, do the following:
   - Select **Multicast** box if required. If selected the **IP Address** box is cleared.
   - To select the input GbE Port, open the **GbE Port** list and select the required port. Once you define the required GbE port, the **IP Address** field is updated to display the IP address of the selected port, unless **Mulicast** is selected.
   - In **IP Address**, enter the required unicast/multicast IP address of the input port. By default, the IP address of the selected port appears, unless mulitcast is selected.
   - In **UDP Port** indicate the UDP port.
   - In **Source IP**, enter the IP address of the upstream device that streams the content to the defined GbE port and socket.
4. To define the required PID, in **Input PID**, enter in hexadecimal the required input PID number.
5. To define the output to stream out the configured PID, enter, in **RF Output**, the required output QAM in the following format: X.Y.Z (T) where:
   X – module number (1…9)
   Y – RF port number (1..2)
   Z – channel number (1…4)
   T – QAM index number (1…72)
6. In **Output PID** enter the output PID number in hexadecimal. You can output the PID with the same input PID number or to remap the PID.
7. To allow PMT reference, select the **PMT Ref** box.

   The **ES Type** field is enabled.
8. If you selected the PMT Reference box, enter the ES Type to stream out the PID. This is the ES type that the PMT table points to. See, *Standard ES Types and Descriptors* on page 118.
9. To add a descriptor, click **Descriptor...**

   The **Descriptor List** page opens.
10. Click **Add Descriptor**.



11. In **Descriptor Type** and **Descriptor Value**, enter the required parameters as defined by the MPEG standard.
12. To close the dialog and save configuration, click **Done**.

⇨ To route a PID using the Duplicate button

Once you defined a PID and need to route another PID with similar configuration, do the following:

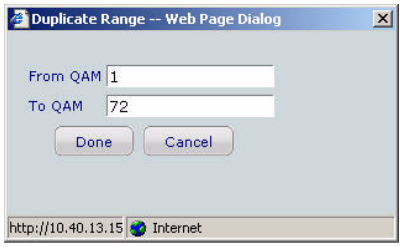
1. In **PID Remux** page, check the **Select** box of the required PID.
2. Click **Duplicate**.

   The selected row is duplicated and appears as the last row in the table.
3. Define the required parameters as explained in *1 To route a PID* on page 67.

⇨ To route a PID to a few output ports

1. In **PID Remux**, check the **Select** box of the required PID.
2. Click **Duplicate Range**.

   The following dialog appears:



3. To define the range of the output QAM (logical port number), enter in **From QAM** and **To QAM** a number between 1-72 to indicate the beginning and the end of the range, respectively.
4. To close the dialog and to apply the required range, click **Done**.
5. Define the required parameters as explained in *1 To route a PID* on page 67.

⇨ To delete a remuxed PID

1. In **PID Remux** page, check the **Select** box of the required PID. To select all sessions, double click the Select column heading.

2. Click **Delete Selected**.

4.4 SDV Application

The SDV application includes the following tabs:

- Settings - allows you to set the following:
  - SDV redundancy
  - MPEG related parameters
- QAMs - a read only page to view QAMs settings
- NGOD Active Sessions - lists all the provisioned NGOD sessions. Unavailable for version 2.0
- ISA Active Sessions - lists all the provisioned ISA sessions.

4.4.1 SDV Settings

4.4.1.1 Redundancy

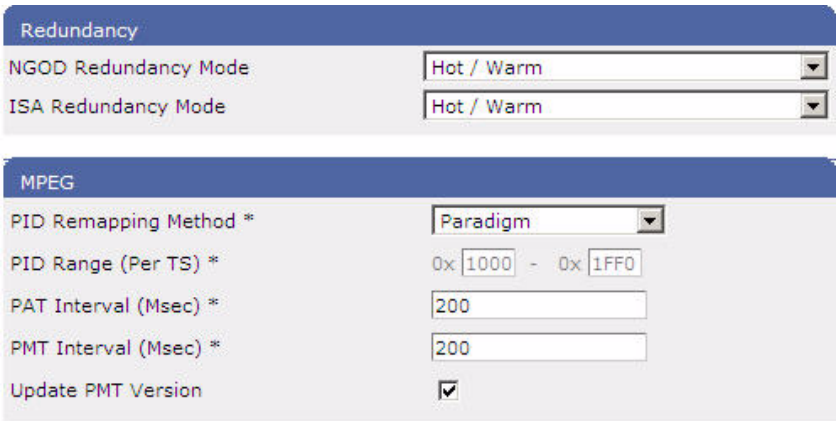
NOTE: SDV redundancy is not supported in NSG 9000 version 2.0.

NSG 9000 supports service redundancy that is activated once the device does not detect the service at the input port. Service redundancy is supported in either of the following methods:

- Hot - NSG 9000 JOINs both the primary multicast group and the backup multicast group. Both primary and backup services are streamed to the input ports to allow short fail-over time.
- Warm - NSG 9000 JOINS the primary multicast group only. Once the device does not detect the service at the input, it JOINs the backup multicast group and the fail-over time is longer.

⇨ To define SDV redundancy mode

1. Select **Applications** > **SDV** > **Settings**.



2. To set the redundancy mode, do either of the following:
   - To set the NGOD redundancy mode, open the **NGOD Redundancy Mode** list and select one of the modes listed in the *Table 4-1: SDV Redundancy Modes* table.
   - To set the ISA redundancy mode, open the **ISA Redundancy Mode** list and select one of

the modes listed in *Table 4-1: SDV Redundancy Modes*.

Table 4–1: SDV Redundancy Modes

Mode	Explanation
Hot/Warm	The default option. The service has only one redundant service. NSG 9000 JOINs the primary service, and upon failure, JOINs the backup multicast group. As a result, the backup service is streamed from the switch to the input port of the device.
Hot/Hot	The service has one redundant service. NSG 9000 JOINs both the primary and backup multicast groups and both groups are steamed to the device. Upon failure, the backup service is provisioned to the device resulting in a short fail-over time.
Hot/Warm/ Warm	The service has at least two redundant services. NSG 9000 JOINs the primary multicast group. Upon failure NSG 9000 JOINs the first backup service and as a result the backup service is streamed into the device. If this trial fails, NSG 9000 JOINs the second backup multicast group.
Hot/Hot/Hot	The service has at least two redundant services. NSG 9000 JOINs all three multicast groups. All three services are streamed to the input ports to allow short fail-over time.

4.4.1.2 Defining MPEG Parameters

See *4.2.2 Defining MPEG Parameters* on page 58.

4.4.2 Viewing SDV QAM Parameters

The QAMs parameters allows you to view all of the SDV available QAMs.

1. Select **Applications > SDV > QAMs**.

QAM Manager	GbE Port	GbE IP Address	UDP Port Range	RF Output	QAM Index	TS ID	NGOD Group Name	QAM Frequency	Symbol Rate	Interleave	Spectral Inversion	Status
VOD SRM	All	All	257 - 511	1.1.1	1	1	QG1	561000000	5.360537	128-4	☐	Active
VOD SRM	All	All	513 - 767	1.1.2	2	2	QG2	567000000	5.360537	128-4	☐	Active
VOD SRM	All	All	2305 - 2559	1.2.1	9	9	QG9	561000000	5.360537	128-4	☐	Active
VOD SRM	All	All	2561 - 2815	1.2.2	10	10	QG10	567000000	5.360537	128-4	☐	Active
VOD SRM	All	All	4353 - 4607	2.1.1	17	17	QG17	561000000	5.360537	128-4	☐	Active
VOD SRM	All	All	4609 - 4863	2.1.2	18	18	QG18	567000000	5.360537	128-4	☐	Active
VOD SRM	All	All	6401 - 6655	2.2.1	25	25	QG25	561000000	5.360537	128-4	☐	Active
VOD SRM	All	All	6657 - 6911	2.2.2	26	26	QG26	567000000	5.360537	128-4	☐	Active
VOD SRM	All	All	8449 - 8703	3.1.1	33	33	QG33	561000000	5.360537	128-4	☐	Active
VOD SRM	All	All	8705 - 8959	3.1.2	34	34	QG34	567000000	5.360537	128-4	☐	Active
VOD SRM	All	All	10497 - 10751	3.2.1	41	41	QG41	561000000	5.360537	128-4	☐	Active
VOD SRM	All	All	10753 - 11007	3.2.2	42	42	QG42	567000000	5.360537	128-4	☐	Active

2. View the following information.
   - QAM Manager - lists the defined QAM manager. In SDV the QAM manager is ISA.
   - RF Output
   - QAM Index
   - TS ID
   - NGOD Group Name

- QAM Frequency
- Symbol Rate
- Interleaver
- Spectral Inversion
- Status
- Active

For explanations, see *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41.

4.4.3 Viewing NGOD Active Sessions

The NGOD Active Sessions tab lists all the NGOD sessions provisioned to the device.

⇨ To view NGOD active sessions

1. Select **Applications** > **SDV** > **NGOD Active Sessions**.

Refresh Sessions | Export Sessions

On Demand Session ID	Session ID	RF Output	Service ID	NGOD Group Name	GbE Port	Destination IP	UDP Port	Details
be074250-cc5a-11d9-8cd5-1-1	741000	1.1.1(1)	1	QG1	1	232.100.10.1	2000	...
be074250-cc5a-11d9-8cd5-1-2	741001	1.1.1(1)	2	QG1	1	232.100.10.2	2000	...

2. To view the currently provisioned session, click **Refresh Sessions**.
3. View the following information:

   On Demand Session ID - a unique session ID generated by the NGOD system.

   Session ID - a unique session ID generated by the NSG 9000-6G device.

   RF Output - the output QAM-RF channel through which the service is streamed out of the device.

   Service ID - the ID of the output service

   NGOD Group Name - the QAM group name.

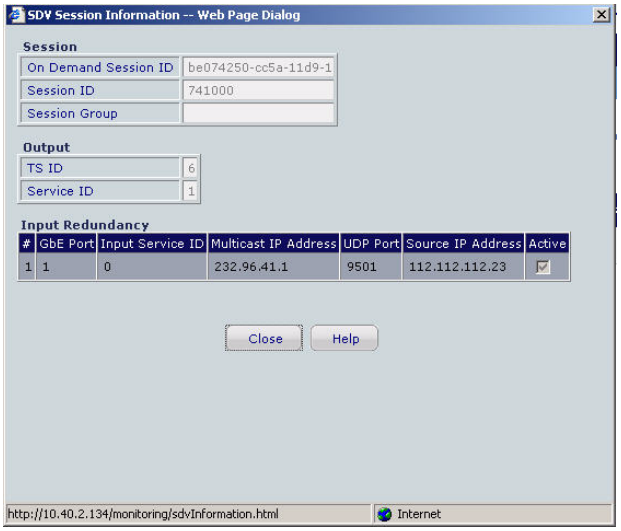
   GbE Port - indicates the GbE input port of the incoming service.

   Destination IP - the IP address (unicast or multicast) of the input session.

   UDP Port - the UDP port of the input session.

4. To view further information, click Details ... .

The following dialog appears:



5. View the following session information:

   On Demand Session ID - a unique session ID generated by the NGOD system.

   Session ID - a unique session ID generated by the NSG 9000-6G device.

   Session Group - an optional field. A value given by the ERM for managing the session list length.

6. View the following Output information:

   TS ID- the ID of the output TS that carries the output session.

   Output Service ID - the ID of the output service.

7. View the following Input Redundancy information:

   # - a sequential number to indicate the number of the listed input redundancy ports.

   GbE Port - indicates the number of the input GbE port.

   Input Service ID - indicates the ID of the input service

   Multicast IP Address - the multicast IP address of the input service

   UDP Port - the UDP port of the input service

   Source IP Address - indicates the IP address of the broadcasting device.

   Active - indicates whether this input port is currently active. The row of the active port is darker.

4.4.4 Viewing ISA Active Sessions

The ISA Active Sessions tab lists all the ISA sessions provisioned to the device.

⇨ To view ISA active sessions

1. Select **Applications > SDV > ISA Active Sessions.**

Refresh Sessions | Export Sessions

Session ID	State	RF Output	Service ID	GbE Port	Destination IP	UDP Port	Active Source IP	Bitrate	Details
000003E95A5A5A5A5A5A	BIND	1.1.1(1)	1	1	232.1.1.1	65535	1: 192.168.6.31	3750000	...
000003EA5A5A5A5A5A5A	BIND	1.1.1(1)	2	1	232.1.1.2	65535	1: 192.168.6.31	3750000	...
000003EB5A5A5A5A5A5A	BIND	1.1.1(1)	3	1	232.1.1.3	65535	1: 192.168.6.31	3750000	...
000003EC5A5A5A5A5A5A	BIND	1.1.1(1)	4	1	232.1.1.4	65535	1: 192.168.6.31	3750000	...
000003ED5A5A5A5A5A5A	BIND	1.1.1(1)	5	1	232.1.1.5	65535	1: 192.168.6.31	3750000	...
000003EE5A5A5A5A5A5A	BIND	1.1.1(1)	6	1	232.1.1.6	65535	1: 192.168.6.31	3750000	...
000003EF5A5A5A5A5A5A	BIND	1.1.1(1)	7	1	232.1.1.7	65535	1: 192.168.6.31	3750000	...

2. To view the currently provisioned sessions, click **Refresh Sessions.**
3. View the following information:

   Session ID - a unique session ID generated by the NSG 9000-6G device.

   RF Output - the output QAM-RF channel through which the service is streamed out of the device.

   Service ID - the ID of the output service

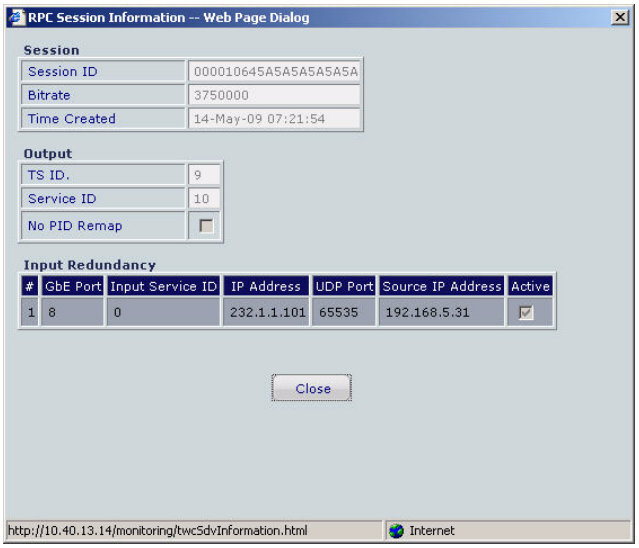
   GbE Port - indicates the GbE input port of the incoming service.

   Destination IP Address - the input IP address (multicast/unicast) of the service

   UDP Port - the input UDP port

4. To view further information, click Details ... .

   The following dialog appears:



5. View the following session information:

   Session ID - a unique session ID generated by the NSG 9000-6G device.

   Bitrate - the bitrate of the session.

6. View the following Output information:

TS ID- the ID of the output TS that carries the output session.

Service ID - the ID of the output service.

No PID Remap - indicates whether PID remapping is applied.

7. View the following Input Redundancy information:

   # - a sequential number to indicate the number of listed input redundancy ports.

   GbE Port - indicates the number of the input GbE port.

   Input Service ID - the ID of the input service

   IP Address - the IP address of the input service

   UDP Port - the UDP port of the input service

   Source IP Address - indicates the IP address of the broadcasting device.

   Active - indicates whether this input port is currently active. The row of the active port is darker.

4.5 M-CMTS Application

When NSG 9000-6G is integrated in an M-CMTS system, do the following:

- Create an M-CMTS session by defining the QAM Manager as M-CMTS
- Configure the session - When you configure an M-CMTS session, you choose to output a socket without any changes, that is without remapping and without generating tables.

⇨ To create an M-CMTS session

1. Select **Platform** > **General** tab.
2. select the required slot.
3. Select the **QAMs** tab.
4. For the required RF Output, open the **QAM Manager** list and select M-CMTS.

   Once you select **Applications** > **M-CMTS** tab, the M-CMTS sessions appear and you can define their parameters.

⇨ To configure an M-CMTS session

When you configure a session, select the required input port and route it to the required output as instructed below:

1. Select **Applications** > **M-CMTS** tab:

Sessions

Session ID	DTI Sync Restamping	DOCSIS Sync Compensation	GbE Port	GbE IP Address	L2TP Session Id	RF Output	QAM Index	Interleaver
10002	☐	0	1	10.30.4.100	55	1.1.1	1	128-4
10000	☐	0	1	10.30.4.100		1.1.2	2	128-4
10001	☐	0	2	11.30.4.100	8	1.2.1	5	128-4
10003	☐	0	1	10.30.4.100		1.2.2	6	128-4
10004	☐	0	1	10.30.4.100		2.1.1	9	128-4
10005	☐	0	1	10.30.4.100		2.1.2	10	128-4
10006	☐	0	1	10.30.4.100		2.2.1	13	128-4
10007	☐	0	1	10.30.4.100		2.2.2	14	128-4
10008	☐	0	1	10.30.4.100		3.1.1	17	128-4
10009	☐	0	1	10.30.4.100		3.1.2	18	128-4
10010	☐	0	1	10.30.4.100		3.1.3	19	128-4
10011	☐	0	1	10.30.4.100		3.2.1	21	128-4
10012	☐	0	1	10.30.4.100		3.2.2	22	128-4

Sessions appear in the table according to your QAM configuration in **Platform** > **General** > **Slot** > **QAMs**. Each session appears with a unique session ID.

Session ID- Read only. A sequential number starting at 10000, to indicate the number of the session in the current page.

NOTE: Steps 2&3 are relevant to primary DS channels only. In case of wideband sessions, move to step 4.

2. Relevant to primary DS channels only - To synchronize with the DTI time, select **DTI Sync Restamping**. The EdgeQAM re-stamps the DTI sync packets.
3. Relevant to primary DS channels only - In **DOCSIS Sync Compensation**, enter the sync compensation. The CMTS core router automatically inserts DOCSIS sync packets into the primary DS QAM channels. To ensure the accuracy of the DOCSIS sync packets, the EdgeQAM re-stamps them. Depending on RF network topology, it may be required to fine-tune the sync messages that flow over the various QAM channels of the EdgeQAM. The fine-tuning ensures consistent timing of CMs across all cable interfaces of the system. To fine-tune the sync offset across cable interfaces, use the **DOCSIS Sync Compensation** option. The sync offset units are ticks of the CMTS 10.24 MHz clock, where 1 tick=97.6 nano-sec. The typical allowed offset difference between modems is +/- 6 ticks. To define the sync compensation value, measure the average Cable Modem (CM) timing offset difference (you can view the timing offset values via the CMTS console) and calculate the desired compensation value for the QAMs of the port. Typically, the compensation value of adjacent QAMs in the port is identical for each QAM in the port.
4. To select the input GbE Port, open the **GbE Port** list and select the required port. Once you defined the required GbE port, the **GbE IP Address** box is updated to display the IP address of the selected port.
5. In **GbE IP Address**, enter the IP address of the GbE input port.
6. In L2TP Session ID, enter the required session ID.
7. View the following Read-only information:
   - In RF Output, view the QAM channel to output the session where:
     X – module number (1…9)
     Y – RF port number (1..2)
     Z – channel number (1…4)
   - QAM Index - see *3.7.4 Configuring/Viewing QAM Channels* on page 45.
   - Interleaver - see *3.7.4 Configuring/Viewing QAM Channels* on page 45.

4.6 D2E Application

The Direct to Edge (D2E) application is for future use only.

When NSG 9000-6G is operating as part of a D2E system, configure it in the same manner as a regular Wideband M-CMTS application:

- Set the QAM manager for the relevant QAMs to M-CMTS
- Configure the sessions as regular Wideband M-CMTS sessions

4.6.1 Viewing ISA Active Sessions

The ISA Active Sessions tab lists all the ISA sessions provisioned to the device.

⇨ To view ISA active sessions

1. Select **Applications** > **SDV** > **ISA Active Sessions**.

   The **ISA Active Sessions** page appears.
2. To view the currently provisioned sessions, click **Refresh Sessions**.
3. View the following information:

   Session ID - a unique session ID generated by the NSG 9000 device.

   RF Output - the output QAM-RF channel through which the service is streamed out of the device.

   Service ID - the ID of the output service

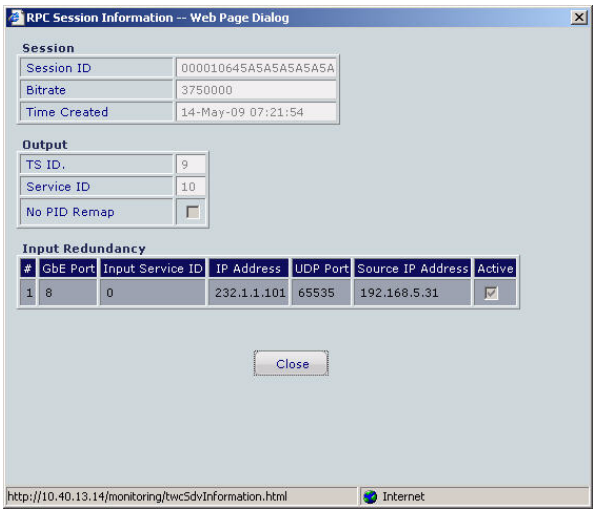
   GbE Port - indicates the GbE input port of the incoming service.

   Destination IP Address - the input IP address (multicast/unicast) of the service

   UDP Port - the input UDP port

   Active Source IP - indicates the IP address of the upstream broadcasting device.
4. To view further information, click Details ''' .

   The following dialog appears:



5. View the following session information:

   Session ID - a unique session ID generated by the NSG 9000 device.

   Bitrate - the bitrate of the session.

   Time Created - the time the session was generated
6. View the following Output information:

   TS ID- the ID of the output TS that carries the output session.

   Service ID - the ID of the output service.

   No PID Remap - indicates whether PID remapping is applied.
7. View the following Input Redundancy information:

- a sequential number to indicate the number of listed input redundancy ports.

GbE Port - indicates the number of the input GbE port.

Input Service ID - the ID of the input service

IP Address - the IP address of the input service

UDP Port - the UDP port of the input service

Source IP Address - indicates the IP address of the broadcasting device.

Active - indicates whether this input port is currently active. The row of the active port is darker.

Chapter 5
Conditional Access System (CAS)

5.1 CAS Overview

The Conditional Access System (CAS) prevents unauthorized viewing of programs by scrambling services that later on can be decrypted using the correct decrypting key.

NSG devices support the following CAS modes:

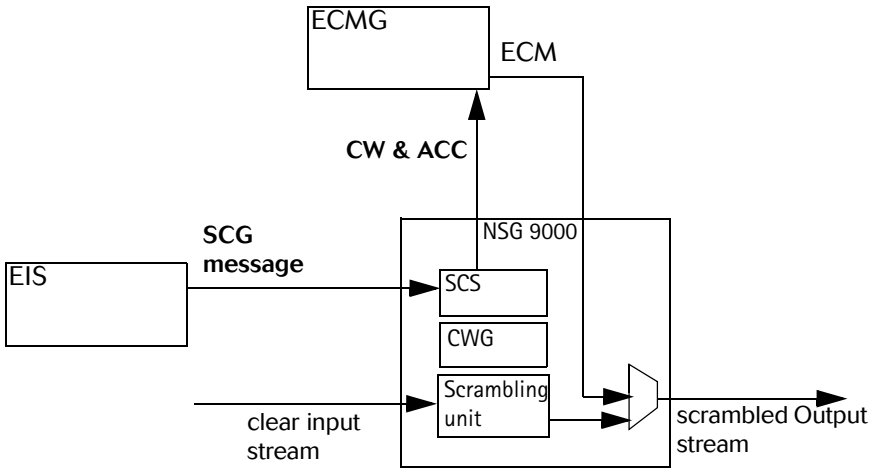
- DVB SCR scrambling - an encryption mode for the DVB protocol.
- Privacy Mode - an encryption mode developed by Motorola Inc.

NOTE: In NSG 9000 you can configure both CAS options at the same time. The configuration is applied to the devices according to the granted license.

5.1.1 DVB SCR Scrambling Overview

A typical CAS is comprised of a few elements. The NSG 9000 includes the SCS, CWS and scrambling modules. Following is a short description of the CAS elements.

- Event Information Scheduler (EIS) - in charge of all of the headend's schedule information and the CAS configuration to ensure that services are encrypted correctly. It initiates the Scrambler Control Group (SCG) message, the actual request sent by the EIS to the NSG 9000 that encryption is required.The SCG message includes the service ID, time slot and the access criteria.
- SimulCrypt Synchronizer (SCS) - controls and manages the scrambling parameters to allow encryption. It receives requests for encryption and passes them on to the Control Word (CW) generator. Once a CW is initiated the SCS passes it to ECMG.
- Control Word Server (CWG) - generates the encryption key.
- Scrambling Unit - encrypts the services.
- Entitlement Control Message Generator (ECMG) - receives control words and access criteria and generates an Entitlement Control Message (ECM) stream in return.



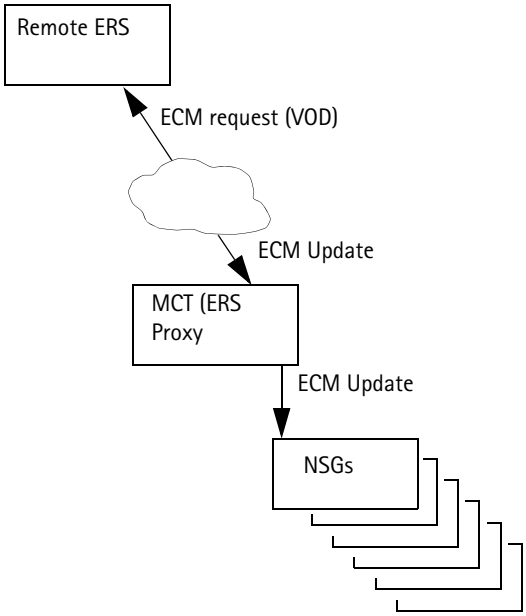
The EIS sends the NSG 9000 an SCG message, a request to encrypt a service component. In turn, the NSG 9000 sends a message to the ECMG which contains the following:

- Control Word (CW) - the encryption key generated by the NSG 9000.
- Crypto Period (CP) - indicates (in seconds) how often the NSG 9000 generates a new CW.
- Access Criteria (ACC) - a permission to access the service.

The ECMG generates an ECM stream that is sent to the NSG 9000 and is added to the TS.

5.1.2 Privacy Mode Scrambling Overview

Privacy Mode is a real-time encryption method which was developed by Motorola and licensed to Harmonic for VOD applications. Privacy Mode requires an MCT machine which serves as the Privacy Mode ERS proxy as the following illustration shows:

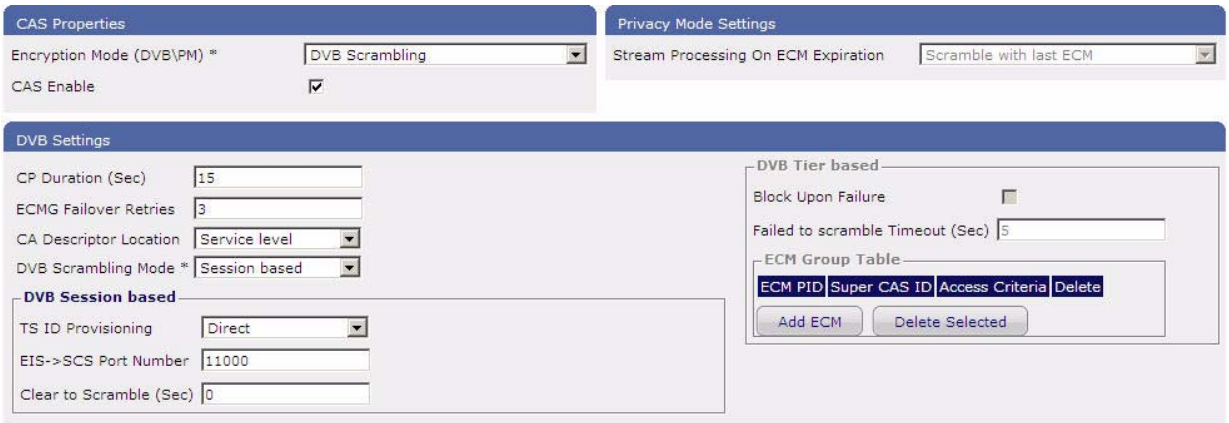


When using Privacy Mode scrambling, the only additional configuration that is required within the NSG web client is to enable CAS and to set the behavior upon ECM expiration. However, Privacy Mode also requires an MCT machine which serves as the Privacy Mode ERS proxy. For information on how to configure Privacy Mode parameters in MCT, refer to the *MCT User's Guide*.

5.2 Defining Global CAS Parameters

⇨ To set global CAS parameters, do the following:

1. Select **Applications** > **CAS**. The following tab opens.

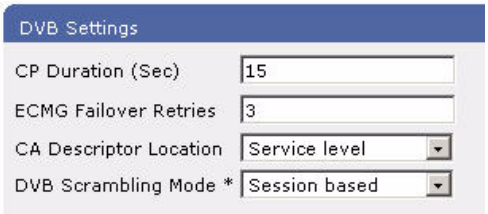


2. In **CAS Properties**, open the **Encryption Mode (DVB\PM)** list and select either of the following:
   - DVB Scrambling - an encryption mode for the DVB protocol.
   - Privacy Mode Scrambling - an encryption mode developed by Motorola Inc.
3. To enable CAS, select the **CAS Enable** box.

   The fields of the selected encryption mode are enabled.

5.3 Defining DVB Scrambling Parameters

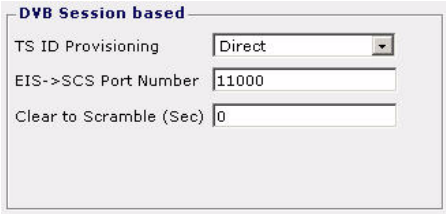
Once you selected the DVB Scrambling mode, and enabled the CAS, move to the DVB Settings section and do the following:



1. In **CP Duration (Sec)**, enter the required value. By default it is 15 seconds. The Crypto Period defines how often the NSG changes the control word (or "key") for encrypted services. Valid values range between 1-6554.
2. In **ECMG Failover Retries**, define the number of times the NSG 9000 unit tries to establish communication with the Entitlement Control Message Generator (ECMG) before issuing the alarm ECMG Connection Failure.
3. In **CA Descriptor Location**, select a location in the PMT for the CA descriptor. The CA descriptor may appear either in a service or elementary level or in both levels.
4. Open the **DVB Scrambling Mode** box and select either of the following:
   - Session based - the EIS is external and it issues an SCG for each service for which encryption is required. When selected, the DVB Session based features are enabled.
   - Tier based - all services are scrambled with the same control word and ECM and there is no external EIS. Once selected, the DVB Tier Based features are enabled.

5.3.1 Defining DVB Session Based Parameters

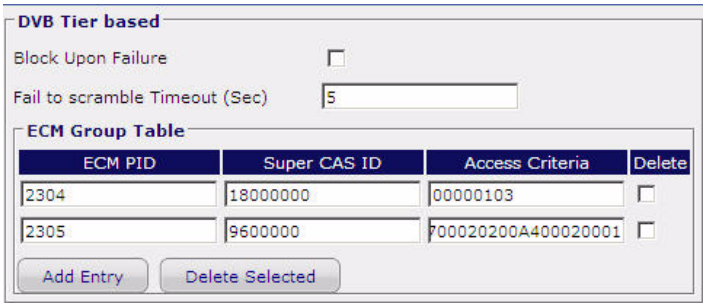
Once you selected this option in DVB Scrambling Mode, define the session based parameters as follows:



1. In **TS ID Provisioning**, select how to generate the TS ID to be provisioned:
   - Direct - The default option. The provisioned TS ID is the same as the output TS ID.
   - By QAM Index - The provisioned TS ID is according to the QAM number that is a number between 1-72.
2. In **EIS SCS Port Number**, define the TCP port through which NSG communicates with the EIS. Valid values range between 1-65535.
3. In **Clear to Scramble (Sec)** enter the clear time in seconds before starting to scramble the service, once the SCG is received. Valid values range between 0-9999. The default value is 0 seconds.

5.3.2 Defining DVB Tier Based Parameters

Once you selected this option in DVB Scrambling Mode, define the tier based parameters as follows:

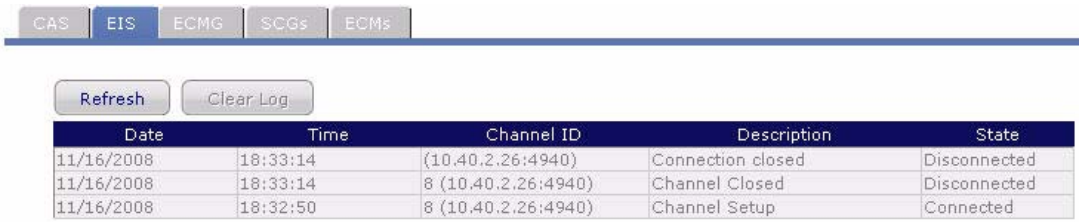


1. Select **Block Upon Failure**, to allow the device to block the stream to protect the content. When a stream is blocked, no picture appears on the end user screen. This action takes place in case the NSG 9000 could not establish communication with the ECMG.
2. In **Failed to Scramble Timeout (Sec)**, define the period of time between outputting the service and recognizing CAS failure. When CAS failure is recognized the following takes place:
   - Scrambling with the last available ECM
   - Block the stream. Applies in case ECM is not available and **Block Upon Failure** is selected.
   - Outflow a clear stream. Applies in case ECM is not available and **Block Upon Failure** is not selected.
3. NSG 9000 version 1.6 and up supports SimulCrypt in DVB Tier Based mode. To configure the ECMs, enter the required values in the ECM Group table as explained below. You can add up to three ECM groups:
   - ECM PID - enter the ECM PID.

- Super CAS ID - enter the Super CAS ID of the ECMG as provided by the vendor.
- Access Criteria - enter an access criteria as provided by the vendor.

5.3.3 Viewing EIS Information

You can work with multiple EIS devices. The EIS tab lists all EIS connected to the device:



Date	Time	Channel ID	Description	State
11/16/2008	18:33:14	(10.40.2.26:4940)	Connection closed	Disconnected
11/16/2008	18:33:14	8 (10.40.2.26:4940)	Channel Closed	Disconnected
11/16/2008	18:32:50	8 (10.40.2.26:4940)	Channel Setup	Connected

⇨ To view EIS log

1. Select **Applications** > **CAS** > **EIS** tab.
2. To update the listed information, click **Refresh**.
3. View the following information:

   Date - indicates the date of connection between the NSG and the EIS.

   Time - indicates the time of connection.

   Channel ID - indicates the channel of communication between the NSG and the EIS.

   Description - shortly describes the connection (setup, closed).

   State - indicates the current status of the NSG and EIS connection.

5.3.4 Defining ECMGs and NSG 9000 Communication Parameters

This section instructs you on how to define the ECMG & NSG 9000 communication parameters.

⇨ To define ECMGs

1. Select **Applications** > **CAS** > **ECMG**. The **ECMG** page appears. Each row in the page represents an ECMG. You can define up to 10 ECMGs.

Active	Name	Priority	SuperCasID (Hex)	Protocol Revision	IP Address	Port	Channel ID	Status
☑	nagra	1	18010000	REV2	192.168.107.205	3335	1	CONNECTED
☐		2	0	REV2	0.0.0.0	0	2	
☐		3	0	REV2	0.0.0.0	0	3	
☐		4	0	REV2	0.0.0.0	0	4	
☐		5	0	REV2	0.0.0.0	0	5	
☐		6	0	REV2	0.0.0.0	0	6	
☐		7	0	REV2	0.0.0.0	0	7	
☐		8	0	REV2	0.0.0.0	0	8	
☐		9	0	REV2	0.0.0.0	0	9	
☐		10	0	REV2	0.0.0.0	0	10	

2. Define the communication parameters according to the following explanation:

   Active - Check the box in the left most column to make the current ECMG active.

   Name - Enter the name of the ECMG brand.

Priority - to allow redundancy, set priority by indicating the primary and secondary ECMG of the same SuperCasID. In case of ECMGs with the same SuperCasID, NSG 9000 always tries to connect first to the ECMG with the highest priority. Assign priority from 1-10 with 1 as the highest priority.

SuperCasID (Hex) - A 32-bit hexadecimal number that consists of the 16-bit CA vendor ID and an additional 16-bit number that distinguishes one ECM generator from another for the same CAS vendor. The super CAS ID determines which access criteria is coupled with each ECMG. The CAS vendor provides this value.

Protocol Revision - Specifies the CAS mode of operation. Select Revision 1, 2 or 3 for SimulCrypt Ver. 1, 2 or 3 respectively.

IP Address - The IP address of the ECMG. The CAS vendor provides this value.

Port - The number (in decimal format) of the TCP port used to connect the ECMG. The CAS vendor provides this value.

Channel ID - indicates the channel of communication between the NSG and the ECMG.

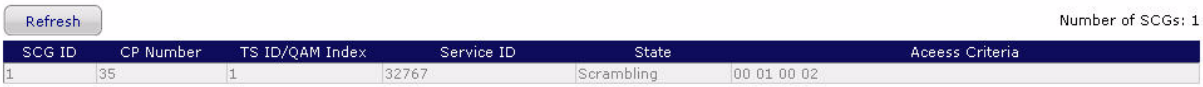
Status - Indicates the state of the connection:

- Connected - The ECMG and NSG are communicating.
- Disconnected - No communication is taking place at the moment.

5.3.5 Viewing CAS Status

5.3.5.1 Viewing the SCG Parameters

1. Select **Applications** > **CAS** > **SCGs** tab. The **SCG** page appears.



The following information is listed:

Number of SCGs - indicates the number of listed SCGs.

SCG ID - The ID number of the SCG.

CP Number - A running counter of the number of Crypto Periods. It indicates the number of times the ECM has been changed for this stream.

TS ID/QAM Index- The stream that carries the service to be encrypted as sent by the EIS.

Service ID - The ID of the program/service being scrambled using the specific SCG.

State - Indicates the status of the service as follows:

- Scrambling - Indicates that the service is encrypted.
- Clear - Indicates that scrambling failed.

Access Criteria - shows all access criteria as provided by the vendor.

2. Click **Refresh** to update the information in the SCG table.

5.3.5.2 Viewing ECM Parameters

The Entitlement Control Message (ECM) page provides information about the ECM stream that is sent to the NSG and is added to the TS.

1. Select **Applications** > **CAS** > **ECMs** tab. The **ECM** page appears and you can view the following information:

Number of ECMs - indicates the number of listed ECMs.

Stream ID - The ID number of the stream.

ECM ID - The ID of the ECM as sent by the EIS.

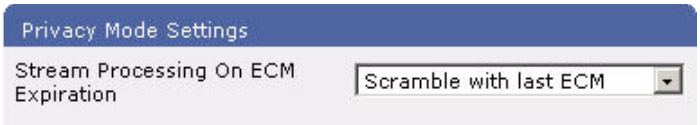
SuperCasID - Identifies the ECMG that encrypts this program. This number is provided by the CAS vendor.

SCG ID - The ID of the SCG that requested the ECM stream.

2. Click **Refresh** to update the information.

5.4 Defining Privacy Mode Scrambling Parameters

1. Select **Applications** > **CAS** > **Privacy Mode Settings** section.



2. Open the **Stream Processing on ECM Expiration** list and select either of the following:
   - Scramble with Last ECM - All NSGs of the VODS should be updated with the new ECM.
   - Don't Scramble - do not scramble the stream.

TIP: Once provisioning/multiplexing is complete, enable the RF ports. See *3.9.1 Configuring Module RF Ports* on page 38.

Chapter 6
Monitoring and Troubleshooting

6.1 Monitoring the NSG 9000 Overview

Monitoring the NSG 9000 comprises the following two aspects:

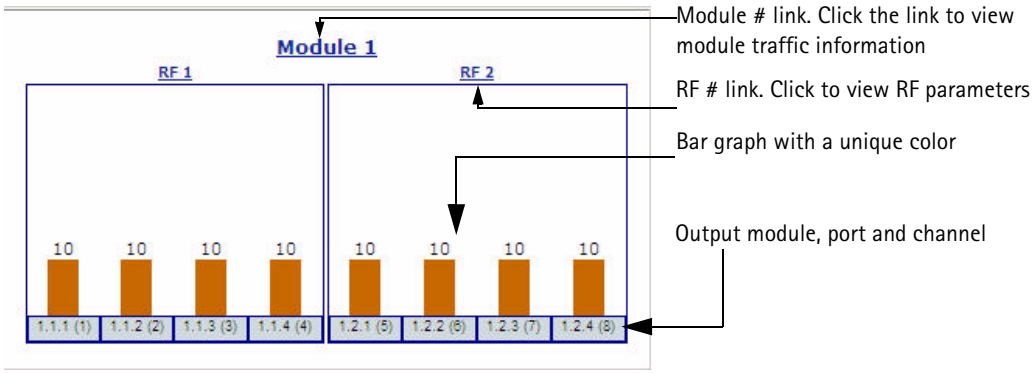
- Monitoring the device utilization
- Monitoring the device status

6.2 Device Utilization

The Traffic tab displays a read-only information about the output streams of the device. This information is displayed in the following views:

- Service View - default view. It displays the output services running over each QAM-RF channel.
- Bitrate View - displays the actual bit rate of each active QAM-RF channel.
- Output view - displays information on the selected output content. See *6.2.4 Viewing Output Information* on page 91.
- Input view - displays the number of incoming services and the current frequency. See *6.2.3 Viewing Input Information* on page 90.

The Service and Bit rate view pages are divided into nine sections. Each section represents a QAM-RF module with both output ports and QAM-RF channels. Each section includes the following:

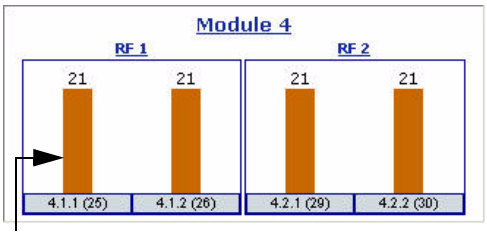


- Module Number - displayed as a link. Once you click it, the Module Traffic page opens. When the module is assigned but no module is mounted in the slot, the module number appears with (Card Missing) indication.
- RF Port Number - displayed as a link. Once you click it, you can view the selected module global configuration and the configuration of the RF parameters. See *6.2.2 Viewing RF Parameters* on page 90.

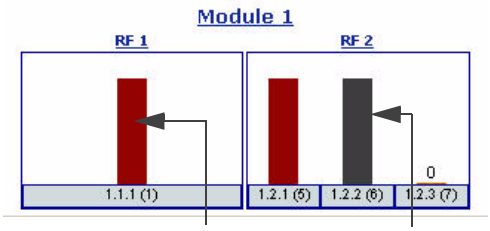
- Bar graph - represents the output TSs of each RF port. Each RF port is represented by a unique color. The available colors are as follows:

Table 6-1: Bar Graph Colors

Color	Explanation
Orange	Service based traffic - VOD, SDV, NGOD and ISA
Dark red	Pass Through sessions
Dark grey	M-CMTS sessions
Light grey	D2E sessions (for future use only)



Orange bars to indicate a service based traffic



Dark red bars to indicate pass through sessions

Dark grey bars to indicate M-CMTS sessions

The number at the top of each bar, indicates the following:

- Service view - the amount of services output in that TS.
- Bitrate view - the actual bit rate in Mbps.

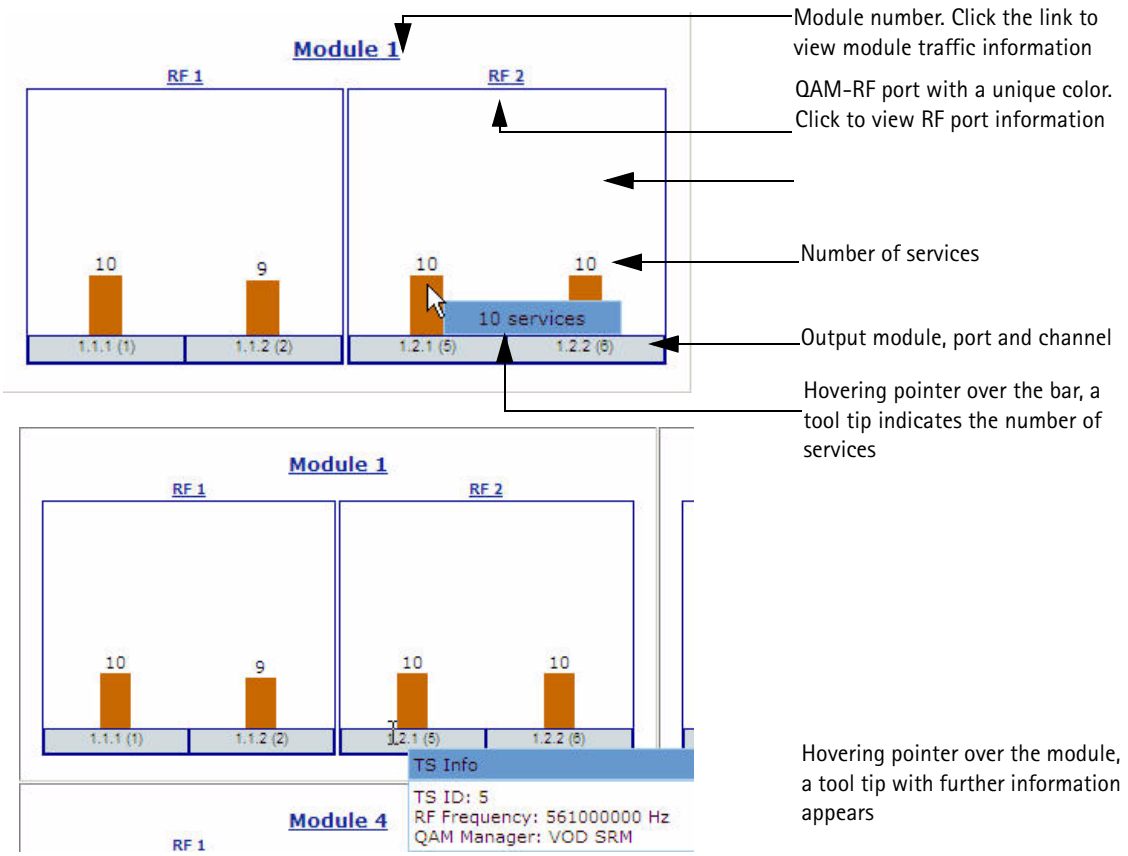
Each bar is labeled in the following pattern x.y.z where:

x - module number
y - RF port number
z - RF channel number

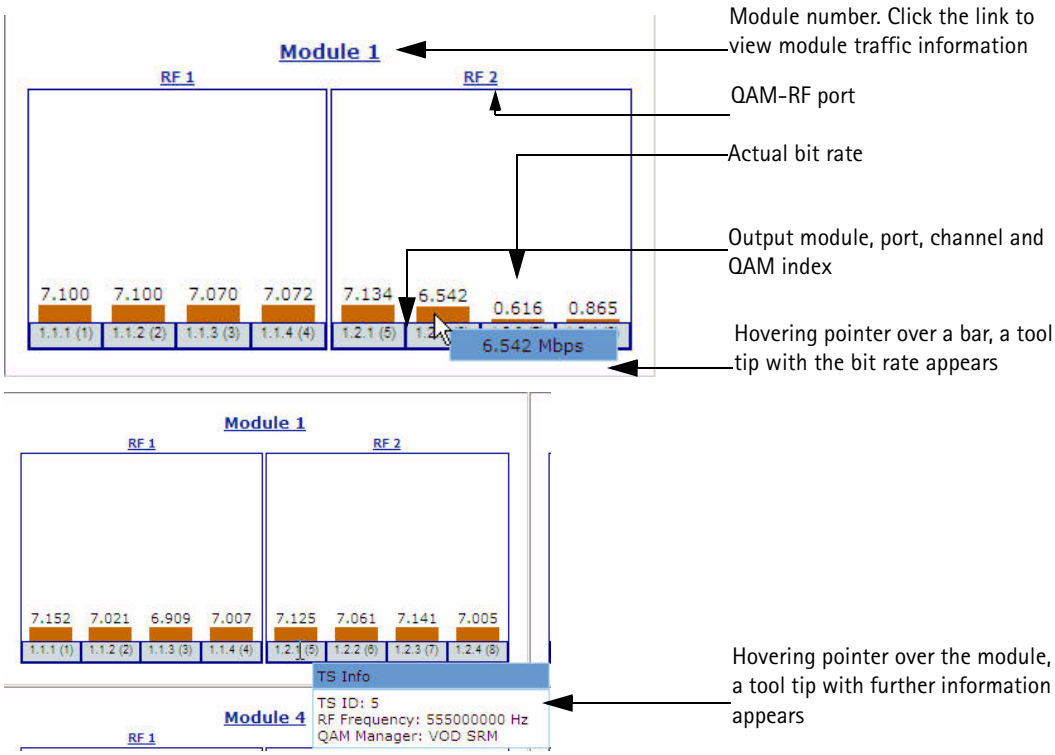
For example: bar 1.2.2 presents output traffic of module 1, output via RF 2 port, channel 2.

NOTE: Hover the mouse pointer over the bar to view the QAM-RF manager. Hover the mouse pointer over the bar label to view the service ID and its frequency.

The following figure shows a section of the Service view:



The following figure shows the same section in Bitrate view:



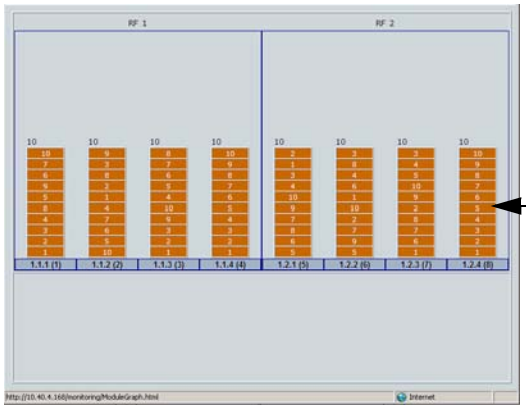
6.2.1 Viewing Traffic

The **Module Traffic** page displays all the services outputted via each QAM-RF channel together with detailed information on each service.

⇨ To view the traffic streamed out of the device in a bar graph display:

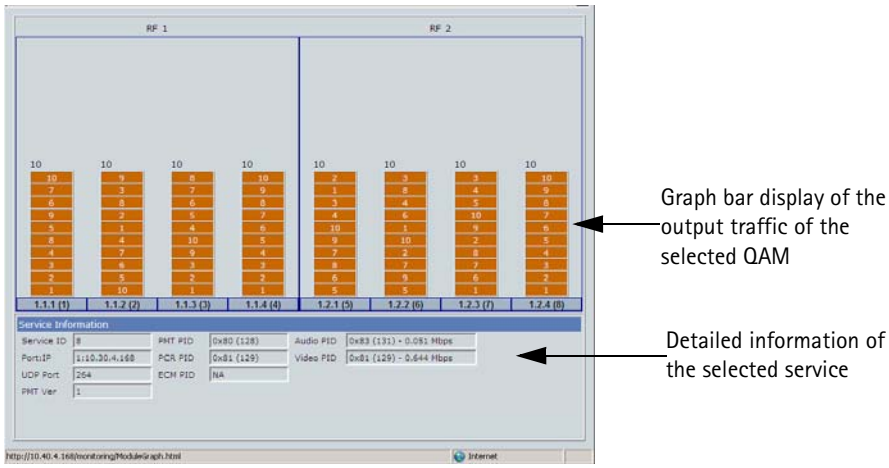
1. Select **Monitoring** > **Service View/Bitrate View**.
2. Click **Module #**.

   The following page opens. It shows the traffic flowing via RF port 1 of module 1:



3. To view detailed information about a service, select the required service in the bar graph.

   The following page opens. It shows the traffic flowing via RF port 1 of module 1 with detailed information regarding service 5 of QAM-RF 1.1.1.:



NOTE: Currently, the Module Traffic page shows only eighteen services per channel.

You can view traffic also via the Input view and Output View pages.

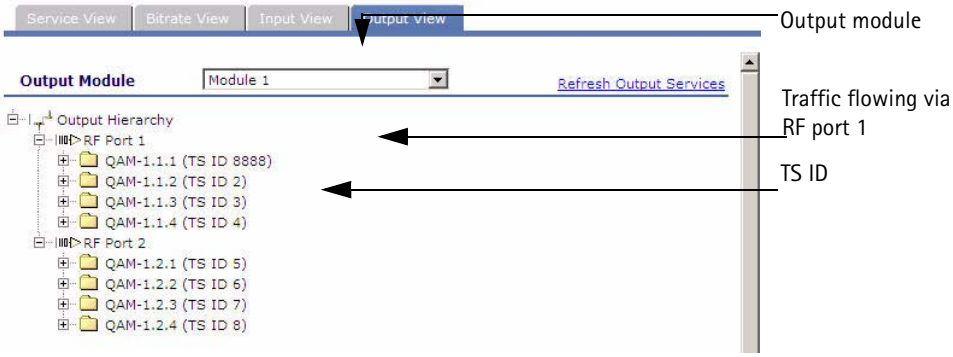
1. Select **Monitoring** > **Traffic** > **Input View/Output View**.
2. To view updated information, click **Refresh Output/Input Information**.
3. View the following service related information:

NOTE: PIDs appear in Hex. and in decimal in the following pattern: Hex. (Decimal.)

- Service ID - Read Only. The ID number of the service.

- Port:IP - The number of the input port and its IP address.
- UDP Port - The UDP according to the source configuration.
- PMT Ver - The version of the PMT PID
- PMT PID - The PID over which the service's Program Map Table (PMT) is transmitted.
- PCR PID - The PID of the service's Program Clock Reference (PCR).
- ECM PID - The PID of the Entitlement Control Message (ECM). In case of simulcrypt, indicates all ECM PIDs.

The following picture shows the Output view tab:

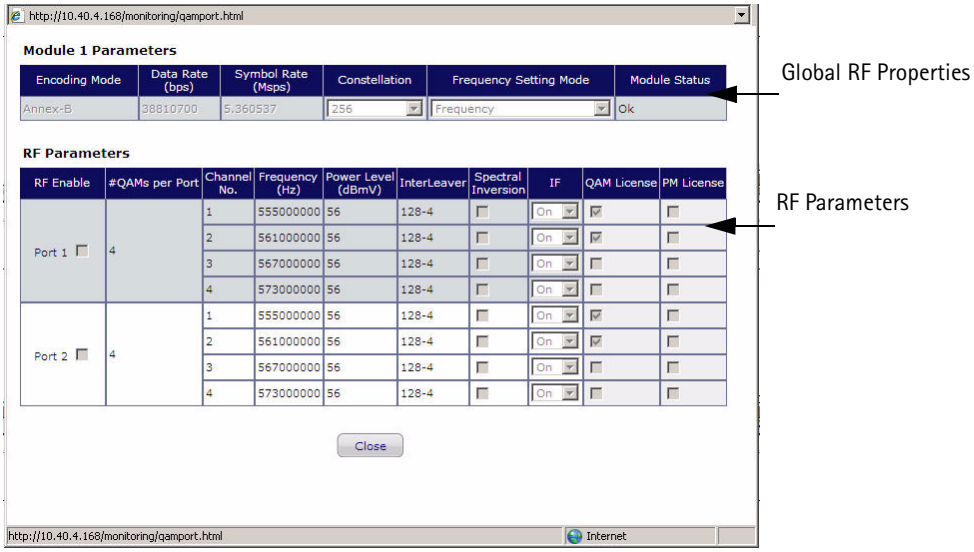


See also *6.2.4 Viewing Output Information* on page 91.

6.2.2 Viewing RF Parameters

1. Select **Monitoring > Service View/Bitrate View**.
2. Click **RF #**.

   The following page opens.



3. In **Module # Properties**, view module parameters.
4. In **RF Parameters**, view RF parameters.

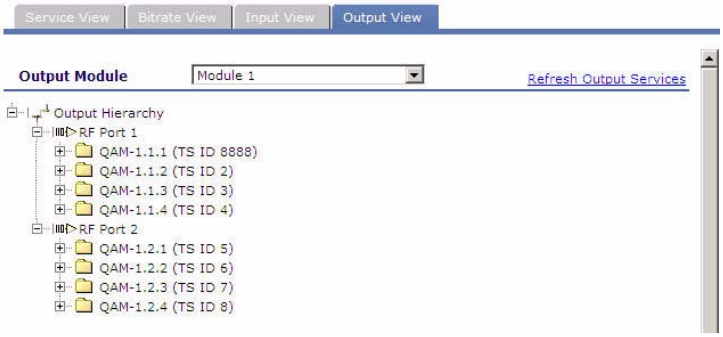
6.2.3 Viewing Input Information

To view the number of incoming services and the input bitrate, do the following:

1. Select **Monitoring** > **Input View** tab.
2. View the required information.

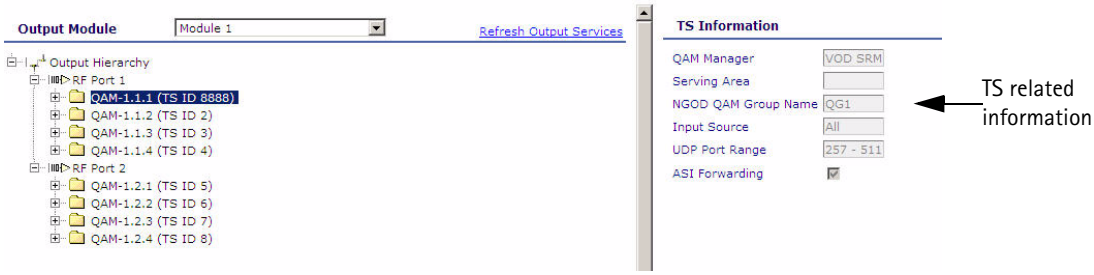
6.2.4 Viewing Output Information

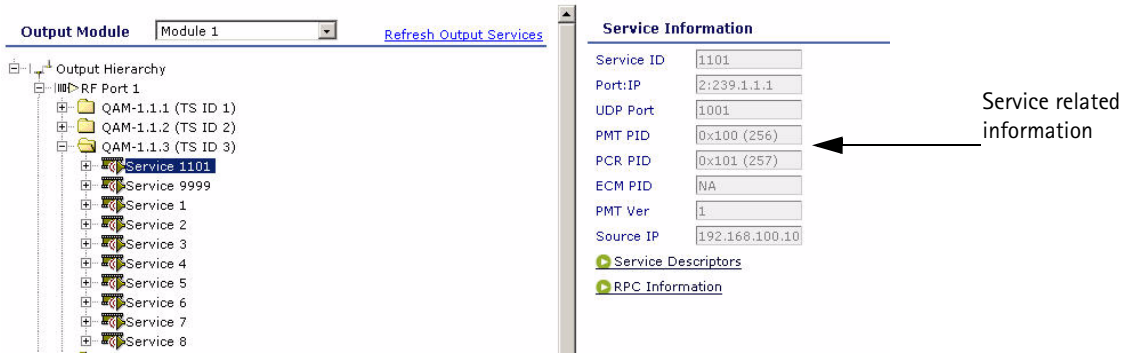
1. Select **Monitoring** > **Output View** tab.

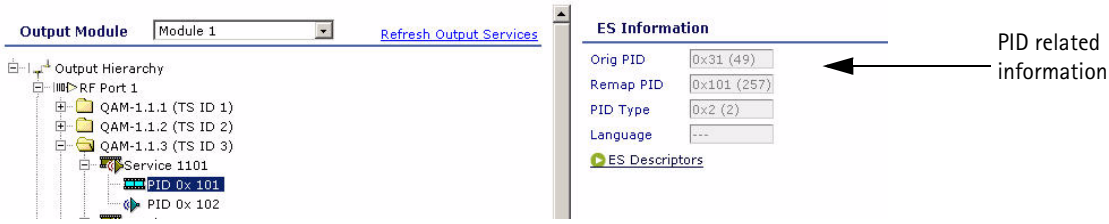


2. Open the **Output Module** list and select the required QAM-RF module.
3. In the tree view, do one of the following:
   - To view TS related information, select the required TS.
   - Drill down to the required service and select it.

4. View the required information. The following information appears:







TS	Service/service Remux	PID	PID Remux
QAM Manager	Service ID	Orig PID	Orig PID
Serving Area	Port:IP	Remap PID	Remap PID
NGOD QAM Group Name	UDP Port	PID Type	PID Type
Input Source	PMT PID	Language	PMT Reference
UDP Port Range	PCR PID	ES Descriptors	ES Descriptors
ASI Forwarding	ECM PID		
	PMT Ver		
	Source IP		
	Service Descriptors		

5. View the required information.

6.3 Monitoring NSG 9000 Status and Alarms

When ever the NSG 9000 detects an internal failure or problems related to the input/output streams, it asserts an alarm to indicate the specific failure.The alarms are exhibited as follows:

Table 6-2: Alarm Exhibition

Component	Reaction Upon Malfunction
Front Panel	The Alarm LED is illuminated in red when an alarm is issued and in orange when a warning is issued.
Web client	■ The alarm indicator turns red ■ The number of active alarms is updated ■ a message appears notifying you of the nature of the problem
NMX	Alarm is issued in the NMX alarm manager

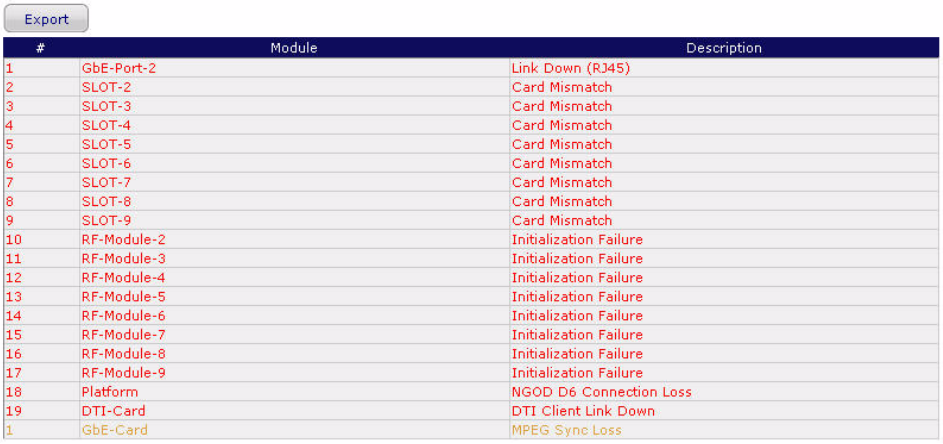
6.3.1 Viewing Alarms Via the Web Client

The **Active Alarms** tab allows you the following:

- View the alarms/warnings
- Save active alarm log as an XML file
- Configuring the alarms

⇨ To view alarms in the web client

1. Select **Monitoring** > **Alarms** > **Active Alarms**.


Export

#	Module	Description
1	GbE-Port-2	Link Down (RJ45)
2	SLOT-2	Card Mismatch
3	SLOT-3	Card Mismatch
4	SLOT-4	Card Mismatch
5	SLOT-5	Card Mismatch
6	SLOT-6	Card Mismatch
7	SLOT-7	Card Mismatch
8	SLOT-8	Card Mismatch
9	SLOT-9	Card Mismatch
10	RF-Module-2	Initialization Failure
11	RF-Module-3	Initialization Failure
12	RF-Module-4	Initialization Failure
13	RF-Module-5	Initialization Failure
14	RF-Module-6	Initialization Failure
15	RF-Module-7	Initialization Failure
16	RF-Module-8	Initialization Failure
17	RF-Module-9	Initialization Failure
18	Platform	NGOD D6 Connection Loss
19	DTI-Card	DTI Client Link Down
1	GbE-Card	MPEG Sync Loss

2. View the alarms. You can also save the alarm log as an XML file. The alarms are listed with the following parameters:
   - # - index number of the alarm.
   - Module - the faulty component.
   - Description - describes the fault that invoked the alarm. Red color entry - indicates an alarm, orange color entry - indicates a warning.

NOTE: You may view the alarms also by moving the mouse pointer to the Alarm indicator located in Title bar. A window opens displaying the current alarms.

⇨ To save active alarms log to file

1. Select **Monitoring** > **Alarms** > **Active Alarms**.
2. Click **Export**.
3. Browse to the required location and click **Save**.

6.3.2 Alarm List

The following table lists the alarms of NSG 9000 according to the module that issues the alarm. The alarms are arranged in alphabetical order with a short description and a solution to remit the alarm. Alarms with a star are NOT reflected in NMX.

Alarm Message	Trigger Device Redundancy	Description	Solution
Platform			
DTI Card Missing	Yes	DTI card is not installed in the device	Install DTI card
Fan X Failure	No	Fan X (x= 1-4) is malfunctioning.	Replace the fan as instructed in the HW User's Guide.
Front Panel Communication Failure	No	Cannot establish communication with the control panel module.	**1.** Replace the front panel. **2.** Replace the Processing module. **3.** Call Customer Support.
Front Panel Missing	No	Front panel is missing.	Verify that the front panel is fastened securely to its place.
High Temperature Failure	Yes	The unit is overheating Raised when board FPGA processor temperature >= 80°C, or board CPU temperature >= 75°C.	Check front panel connection and the speed of the fans.
LCD Communication Failure	No	Cannot establish communication with the LCD panel.	**1.** Replace the front panel. **2.** Replace the Processing module. **3.** Call Customer Support.
NGOD D6 Connection Loss	No	NGOD VREP0-R6 client has lost connection and there are live SDV sessions within the NSG.	Check the Ethernet connection to the R6 client.
No Input Traffic	Yes	All configured and enabled GbE ports receive no input data.	Check source.
Power Supply X Failure	Yes	Power supply (x= 1-2) is malfunctioning.	Replace power supply unit.
System Voltage Error	Yes	Invalid voltage is detected in the device	**1.** Reboot the device. **2.** If persists, call Customer Support.
Temp/Voltage Communication Error	No	Cannot read the temperature or voltage.	Call Customer Support.
Slot			
Card Missing*	Yes	No module is mounted in the slot and the corresponding RF port is enabled.	**1.** Disable the RF port. **2.** Mount a module in the slot. **3.** Enable the corresponding RF port.

Alarm Message	Trigger Device Redundancy	Description	Solution
Card Mismatch*	No	Mismatch between the mounted module and the sent configuration.	Check configuration or mounted module.
GbE Port			
CRC Error	No	At least one packet has CRC error	Check the switch, fiber, and copper connections. Check source (input or output).
ETH Buffer Overflow	No	Management traffic on the GbE port exceeds the port's capacity.	Check sources for excessive management traffic.
Invalid Input Packet	No	The payload length of an input UDP packet is not divisible by 188 bytes a standard length of an MPEG packet	Check source.
L2TPv3 Sequence Error	No	The sequence number of L2TP frames is not sequential, which means that some L2TP frames were dropped in the input.	■ Check input source. ■ Check switch. ■ Check fiber and copper connections.
No Input Traffic on Port	Yes	No input data on a configured and enabled GbE port	Check source
SFP Link Down	Yes	Problematic link to the SFP.	Verify that the fiber is connected properly to the SFP
SFP Missing	Yes	The SFP connector is missing from the GbE port.	Check that the SFP connector is fully inserted
GbE Card			
GbE Controller Failure	Yes	PHY ID Error; instable communication with GbE module.	**1.** Reset unit. **2.** If problem persists, call Customer Support.
MPEG Buffer Overflow	No	Buffer is overloaded with too high bit rate	Reduce bit rate.
General HW Failure	No	GbE module fatal error.	Call Customer Support
TS Out			
TS Out Overflow	No	The actual output bit rate exceeds the configured QAM output bit rate.	Deprovision several services of the specific output until the alarm clears.
TS In GbE Socket			
PAT Corrupted*	No	Invalid PAT	Check source.
PAT Missing*	No	PAT is missing in input signal.	Check source
PMT Corrupted*	No	Invalid PMT	Check source
PMT Missing*	No	PMT is missing in input signal.	Check source
Socket Passthrough Source Failure	No	Socket passthrough is missing in input signal	Check source
PID Remux Source Failure	No	The PID is missing in input signal	Check source

Alarm Message	Trigger Device Redundancy	Description	Solution
CVOD			
Invalid UDP Detected*	No	The UDP is destined to an invalid output port	Check source.
Session			
Service Missing*	No	Service is missing in input signal	Check source.
QAM-RF Module			
Initialization Failure	Yes	Card initialization failed because the actual card is different than the assigned card.	Replace module, or assign proper configuration
Communication Failure	Yes	The device cannot communicate with the QAM-RF module	**1.** Check that the module is properly inserted **2.** Assign the module
Critical Error	Yes	Internal fatal error in the QAM-RF modules	**1.** Re-install the module **2.** If problem persists, call Customer Support.
Processing Error	Yes	QAM-RF global error	Replace module
Temperature Out of Range	Yes	The temperature is out of the defined range Module temperature >= 85°C.	Call Customer Support
QAM Channel			
QAM License Missing	Yes	The QAM License is either expired or is not granted.	Request a QAM license
PM License Missing	Yes	The Privacy Mode license is either expired or is not granted.	Request a PM license
SCR License Missing	Yes	The DVB scrambling license is either expired or is not granted.	Request a DVB scrambling license
DOCSIS QAM + DTI Sync License Missing	Yes	This license is either expired or is not granted.	Request this license
DOCSIS QAM License Missing	Yes	The DOCSIS QAM license is either expired or is not granted.	Request a DOCSIS QAM license
RF port			
Communication Failure	Yes	The device can not communicate with the upconverter.	**1.** Reset unit **2.** Replace the module **3.** If problem persists, call Customer Support
RF Level Out of Range	No	The power level of the RF signal going into the upconverter is out of the allowed range.	Call Customer Support
PLL1 Failure	Yes	Indicates a HW failure	Replace the module

Alarm Message	Trigger Device Redundancy	Description	Solution
PLL2 Failure	Yes	Indicates a HW failure	Replace the module
Power Supply Failure	Yes	Power level to the upconverter momentarily exceeded limits.	Call Customer Support
Software Failure	Yes	Indicates a failure of the RF software.	Replace the module
CAS Privacy Mode			
ECM Expired	No	ECM Expired	Update PM ECM via MCT.
ECM Missing	No	ECM is missing	Updated Privacy Mode ECM via MCT.
DTI Card			
DTI Client Not Locked	Yes	The status of the DTI client is not NORMAL	Check that DTI server status is NORMAL.
Service Remux Session			
PAT Corrupted*	No	Invalid PAT	Check source.
PAT Missing*	No	PAT is missing in input signal.	Check source
PMT Corrupted*	No	Invalid PMT	Check source
PMT Missing*	No	PMT is missing in input signal.	Check source
Service Remux Source Failure*	No	When Service Remux is configured and the input socket is not active.	Check source
CMTS Session			
Socket CMTS Failure*	No	When CMTS socket is configured and the input socket is not active.	Check source
PID Remux Session			
PID Remux Source Failure*	No	When PID Remux is configured and the input socket is not active.	Check source
License			
License Expired	No	License expired	Add and request a new license.

6.3.3 Warning List

The following table lists the warnings of NSG 9000 according to the module that issues the warning. The warnings are arranged in alphabetical order with a short description and a solution to remit the warning. Warnings with a star are NOT reflected in NMX.

Alarm Message	Triggers Device Redundancy	Description	Solution
Platform			
Nearing High Temperature		The unit is close to overheating.	Check front panel connection and the speed of the fans.
NGOD R6 Connection Loss		NGOD VREP0-D6 server has lost connection and there are live SDV sessions within the NSG.	Check the Ethernet connection to the D6 server.
Running on Temporary License*		The system is running with an active temporary license while using the non-default features granted by the license.	Claim the required license.
GbE Port			
Backup Port Activated		Redundancy switch has taken place	Check primary port
SFP Communication Error		Instable communication with the SFP module	**1.** Verify that the SFP module is mounted properly **2.** Replace SFP **3.** Reset unit **4.** If problem persists, call Customer Support
GbE Card			
Exceeding Max Sockets		The number of incoming streams exceeds the allowed limit.	Check the source.
Extraction Buffer Overflow		Extraction descriptor FIFO overrun.	Check PSI bit rate.
GbE Management Rx Failure		Management traffic buffer overload resulting in management packets loss.	Check the bit rate of the management packets.
GbE Management Tx Failure		Detecting problems when trying to transmit management data	**1.** Reset unit. **2.** If problem persists, call Customer Support.
MPEG Sync Loss		GbE traffic contains No valid MPEG data	**1.** Check source. **2.** Check the input cable and replace if defective.
TS Out			
Traffic on Invalid TS*		The input traffic points to an invalid output.	Check source and QAM mapping.
RF port			

Alarm Message	Triggers Device Redundancy	Description	Solution
Nearing Temperature Out of Range		The upconverter's temperature is almost out of the allowed temperature range: (0°C to 70°C).	■ Check for proper operation of the cooling fans. ■ Make sure that air inlets in the device's front panel are clean. ■ If problem persists, power-off the device and contact Customer Support.
DTI port			
DTI Port Link Down		DTI port lost connection with the DTI server	Check DTI cable.
CAS Privacy Mode			
ECM Nearing Expiration		ECM is about to expire.	Update PM ECM via MCT.
License			
License Expires in 24 hours		License will expire in the next 24 hours.	Add and request a new license.
License Expires in 72 hours		License will expire in the next 72 hours.	Add and request a new license.
Redundancy			
No Heartbeat on Eth1*		Standby device does not receive Heartbeat messages from Eth1 of Active device.	Check Ethernet connection.
No Heartbeat on Eth2*		Standby device does not receive Heartbeat messages from Eth2 of Active device.	Check Ethernet connection.

6.3.4 Notification List

The following table lists notifications of NSG 9000. A notification is a message sent from the device to the alarm log to denote a status change without raising any alarm. However, depending on the configuration, a notification issue may trigger an SNMP trap. The notifications are arranged in alphabetical order with a short description.

Notification Message	Trigger Device Redundancy	Description
Switched to Alternate Source	No	The NSG has switched to the alternative IP/UDP source that is configured for this session
DTI Client Status Changed	No	The status of DTI Client has changed to the value reflected in Platform > General DTI.
DTI Active Port Changed	No	The active port of the NSG's DTI client has changed (from 1 to 2 or vice-versa)

6.3.5 Setting Alarm Parameters

The **Alarms** > **Settings** page lists the alarms according to their class, that is the object that issues the alarm.:

Set Default

Class	Alarm Description	Alarm ID	Severity	Assert Threshold (Msec)	Remit Threshold (Msec)	Scan Interval (Msec)	Trig Red	Add To Log	Ser Tra	Dis Ala	Set Def
Platform	High Temperature Failure	10	6	20000	20000	10000	☐	☑	☑	☑	
	Fan 1 Failure	11	6	5000	5000	1000	☑	☑	☑	☑	
	Fan 2 Failure	12	6	5000	5000	1100	☐	☑	☑	☑	
	Fan 3 Failure	13	6	5000	5000	1200	☐	☑	☑	☑	
	Fan 4 Failure	14	6	5000	5000	1300	☐	☑	☑	☑	
	Temperature Warning	15	0	20000	20000	10000	☐	☐	☐	☐	
	Temp/Voltage Communication Error	16	6	0	0	1000	☐	☑	☐	☑	
	System Voltage Error	17	6	60000	60000	20000	☑	☑	☑	☑	
	LCD communication failure	18	6	0	0	1000	☐	☑	☐	☑	
	Power Supply 1 Failure	19	6	0	0	1000	☐	☑	☑	☑	
	Power Supply 2 Failure	20	6	0	0	1100	☐	☑	☑	☑	
	Front Panel Missing	21	6	0	4000	500	☐	☑	☐	☑	
	Front Panel Communication Failure	22	6	0	0	500	☐	☑	☐	☑	
	High Speed Fan	23	0	20000	20000	10000	☐	☐	☐	☐	
	Power Supply 1 Missing	27	0	0	0	1000	☐	☐	☐	☐	

The **Alarms** > **Settings** page includes the following information for each alarm:

Class - the module that issues the alarm

Alarm Description - the alarm text

Alarm ID - the ID of the alarm

Severity - defines whether the alert is an alarm or a warning

You can configure alarm parameters and define triggering alarms as explained below:

⇨ To define alarms settings

1. Select **Monitoring** > **Alarms** > **Settings** tab.
2. Set the following parameters:

NOTE: Once you have changed any of the default values and sent them to the device (Apply), the Set Defaults button appears next to the alarm its parameters were changed.

- Assert Threshold (Msec) - a latency period indicated in milli seconds for this alarm. When a module discovers a condition that would normally cause it to assert this alarm, it waits for the time specified in the **Assert Threshold (Msec)** field before asserting the alarm.
- Remit Threshold (Msec) - a latency period indicated in milli seconds for this alarm. When a module discovers a condition that would normally cause it to remit this alarm, it waits for the time specified in the **Remit Threshold (Msec)** field before remitting the alarm.
- Scan Interval (Msec) - defines how often the device checks for the conditions that raise the alarm. This field allows you to define a break, in milli seconds, in checking for the conditions that raise the alarm.
- Trigger Redundancy - defines whether the alarm triggers a redundancy switch.
- Add to Log - defines whether to write the alarm to the log of active alarms.
- Send Trap - defines whether to send an SNMP trap when the alarm is raised.

- Disable Alarm - when selected, this alarm is not issued upon correlated failure
- Set Default - click to revert the alarm settings to its default settings. This option appears only once you have changed any of the alarm parameters.

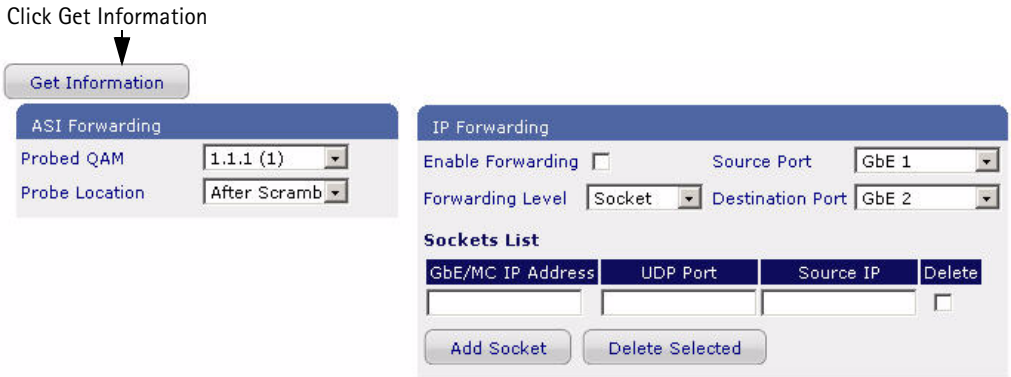
NOTE: The **Set Default** button [Set Default] reverts all alarms to their default settings.

6.4 Diagnosing and Analyzing Traffic

6.4.1 Saving Configuration

You can save the NSG 9000 configuration to a read-only file.

1. Select **Monitoring** > **Diagnostics**.



2. Click **Get Information**.
3. In the **Save HTML Document** dialog, browse to the required location for saving the configuration.
4. Click **Save**.

   The configuration of the device is saved as an XML file on your PC.

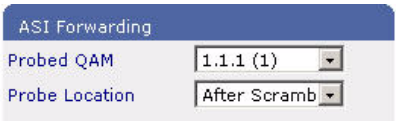
6.4.2 ASI and GbE Forwarding

NSG 9000 may duplicate the incoming content to an ASI port or to any GbE port that is defined as a mirroring port. Connect the mirroring port to devices that accept ASI or/and GbE input such as an MPEG analyzer. For cabling instructions, see NSG 9000 Installation and Hardware guide.

NOTE: Use socket forwarding for diagnostic purposes only and not during normal operation.

⇨ To forward to an ASI Port

1. Select **Monitoring** > **Diagnostics**.



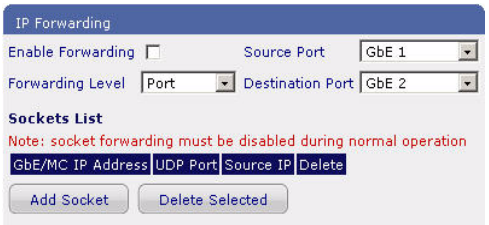
2. Open the **Probe Location** list and select either of the following:
   - Before Scrambler - to probe as a clear stream
   - After Scrambler - to probe as a scrambled stream

3. In **ASI Forwarding** section, open the **Probed QAM** list to select the QAM-RF channel to be forwarded for diagnosis.

⇨ To forward a GbE Input Port

NOTE: Disable socket forwarding during normal operation.

1. Select **Monitoring** > **Diagnostics** and focus on the **IP Forwarding** section.
2. To enable mirroring, select **Enable Forwarding**.



3. Open the **Forwarding Level** list and select whether to forward a port or a socket. If you select a socket, define its parameters in the **Sockets List** table.
4. Open the **Source Port** list and select the GbE port that inputs the required content.
5. Open the **Destination Port** list and select the port to mirror the source port.
6. In the **Sockets List** table, define the following:
   - GbE/MC IP Address - the destination GbE or Multicast IP address of the socket.
   - GbE Port - enter the UDP port
   - Source IP - enter the IP address of the port that streamed the socket into the device.
   - To delete the socket, select **Delete**.

6.5 Generating and Viewing Logs

You can view the following logs:

- Alarms log
- GbE Counters
- NGOD logs
- ISA logs

6.5.1 Alarms Log

The Alarms log displays the recent alarms in a chronological order. The log can display up to 100 alarms.

To view an updated log, refresh the log. You may view, refresh, clear or save the log.

⇨ To view the alarms log

1. Select **Monitoring** > **Logs** > **Alarms Log**.
2. To display the log, click **View Log**.

NOTE: The view Log button toggles to Refresh Log.

Refresh Log | Clear Log | Export

#	Date	Time	Module	Description	Status
1	11/13/2008	14:31:51	Platform	No Input Traffic	Off
2	11/13/2008	14:31:51	Platform	No Input Traffic	On
3	11/13/2008	14:31:28	Platform	No Input Traffic	Off
4	11/13/2008	14:31:25	Platform	No Input Traffic	On
5	11/13/2008	14:30:59	Platform	No Input Traffic	Off
6	11/13/2008	14:30:56	Platform	No Input Traffic	On
7	11/13/2008	14:04:14	Platform	No Input Traffic	Off
8	11/13/2008	14:04:14	TS-Out-3	Traffic on Invalid TS	Off
9	11/13/2008	14:04:14	TS-Out-2	Traffic on Invalid TS	Off
10	11/13/2008	14:04:13	Platform	No Input Traffic	On
11	11/13/2008	14:04:09	TS-Out-2	Traffic on Invalid TS (TS ID 2)	On
12	11/13/2008	14:04:09	Platform	No Input Traffic	Off
13	11/13/2008	14:04:09	TS-Out-3	Traffic on Invalid TS (TS ID 3)	On
14	11/13/2008	14:04:09	Platform	No Input Traffic	On
15	11/13/2008	14:03:56	Platform	No Input Traffic	Off
16	11/13/2008	14:03:56	TS-Out-3	Traffic on Invalid TS	Off
17	11/13/2008	14:03:56	TS-Out-2	Traffic on Invalid TS	Off
18	11/13/2008	14:03:54	Platform	No Input Traffic	On
19	11/13/2008	14:02:15	TS-Out-2	Traffic on Invalid TS (TS ID 2)	On
20	11/13/2008	14:02:14	TS-Out-3	Traffic on Invalid TS (TS ID 3)	On
21	11/13/2008	14:01:14	TS-Out-3	Traffic on Invalid TS	Off
22	11/13/2008	14:01:14	TS-Out-2	Traffic on Invalid TS	Off
23	11/13/2008	14:01:14	Platform	No Input Traffic	Off
24	11/13/2008	14:01:11	Platform	No Input Traffic	On

The log displays the alarms registered up to the time you generated the log and informs you of the following:

- # - a sequential number.
- Date - the date the alarm was issued.
- Time - the time the alarm was issued.
- Module - the module that raised the alarm.
- Description - a brief description of the alarm.
- State - indicates whether the alarm is raised.

⇨ To refresh alarms log

Since the Alarms log displays the alarms up to the time you generated the log, refresh it to view an updated log by performing the following:

- In the **Alarms Log** tab, once the alarms log is displayed, click **Refresh Log**.

  The log is updated to display the latest alarms.

⇨ To clear the log

1. Select **Monitoring** > **Logs** > **Alarms Log**.
2. To clear the log, click **Clear Log**.

   The currently displayed log disappears. Once you click **View Log**, a new log is generated. It includes alarms registered since the last clear log.

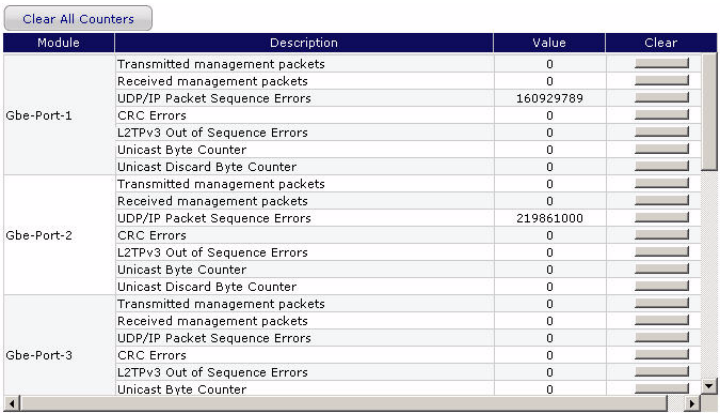
⇨ To save log to file

1. Select **Monitoring** > **Logs** > **Alarms Log**.
2. To save the log, click **Export**.
3. Select a location for saving the file and click **Save**.

   The log is saved as an XML file in the location of your choice.

6.5.2 Monitoring the GbE Ports

The Counters page monitors the operation of the GbE ports.



Clear All Counters

Module	Description	Value	Clear
Gbe-Port-1	Transmitted management packets	0	
	Received management packets	0	
	UDP/IP Packet Sequence Errors	160929789	
	CRC Errors	0	
	L2TPv3 Out of Sequence Errors	0	
	Unicast Byte Counter	0	
	Unicast Discard Byte Counter	0	
Gbe-Port-2	Transmitted management packets	0	
	Received management packets	0	
	UDP/IP Packet Sequence Errors	219861000	
	CRC Errors	0	
	L2TPv3 Out of Sequence Errors	0	
	Unicast Byte Counter	0	
	Unicast Discard Byte Counter	0	
Gbe-Port-3	Transmitted management packets	0	
	Received management packets	0	
	UDP/IP Packet Sequence Errors	0	
	CRC Errors	0	
	L2TPv3 Out of Sequence Errors	0	
	Unicast Byte Counter	0	

Each GbE port is monitored for the following events:

Table 6-3: GbE Port Monitored Events

Event	Description
Transmitted Management Packets	The number of legal management packets transmitted by the active GbE port.
Received Management Packets	The number of legal management packets received by the active GbE port.
UDP/IP Packet Sequence Errors	At least one UDP/IP packet is missing
CRC Errors	The number of Ethernet MAC CRC errors detected by the active GbE port.
L2TPv3 Out of Sequence Errors	Indicates the number of errors in the L2TPv3 Sequence parameter.
Unicast Byte Counter	Counts bytes of UDP/L2TP valid packets with destination IP equal to one of the input port self IPs. The counter does not count management packets.
Unicast Discard Byte Counter	Counts bytes of UDP/L2TP valid packets with destination IP equal to one of the input port self IPs, that are discarded due to non configured CAM. Does not count management packets.

Each time an event occurs, the counter of the event registers another incidence and updates the number of incidence. You may reset the counter when required, and upon reboot, all counters are reset.

⇨ To monitor GbE ports

1. Select **Monitoring** > **Logs** > **Counters** tab. View the following information:
   - Module - indicates the GbE port
   - Description - indicates each event

- Value- shows the number of occurrences

2. To reset a counter, click ▬ in the required row.
3. To reset all counters, click **Clear All Counters**.

6.5.3 Monitoring the ISA Communication

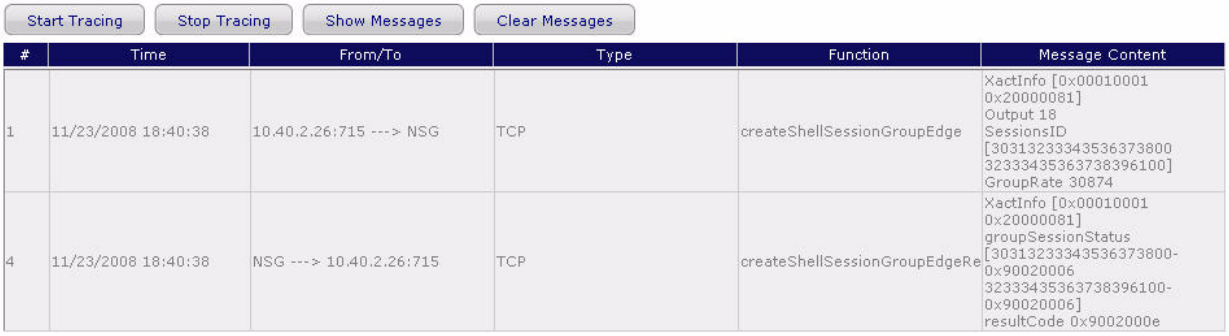
To monitor the communication of ISA with NSG 9000, login as username *config*. See, *2.2.2 Logging Into the Device via IE* on page 13.

Data Logging indication

⇨ To monitor ISA communication with NSG 9000

1. Select **Monitoring** > **Logs** > **ISA RPC**.

   The following page appears:



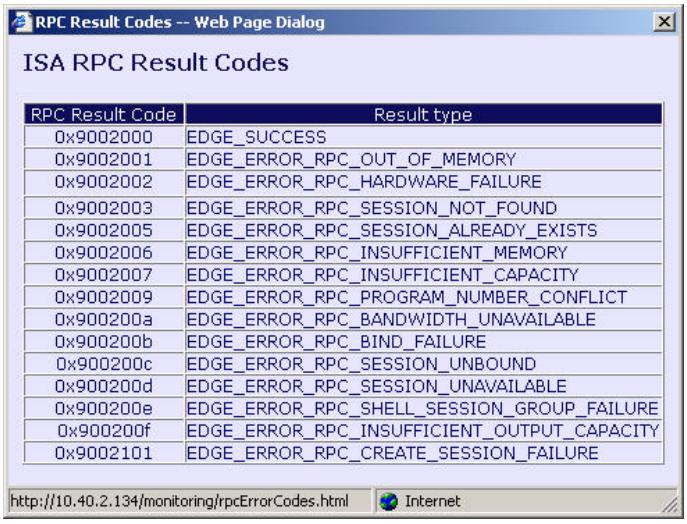
#	Time	From/To	Type	Function	Message Content
1	11/23/2008 18:40:38	10.40.2.26:715 ---> NSG	TCP	createShellSessionGroupEdge	XactInfo [0x00010001 0x20000081] Output 18 SessionsID [30313233343536373800 32333435363738396100] GroupRate 30874
4	11/23/2008 18:40:38	NSG ---> 10.40.2.26:715	TCP	createShellSessionGroupEdgeRe	XactInfo [0x00010001 0x20000081] groupSessionStatus [30313233343536373800- 0x90020006 32333435363738396100- 0x90020006] resultCode 0x9002000e

2. To start tracing the communication, click **Start Tracing**.

NOTE: Device reset does not cancel tracing. If you reset the device while tracing, when the device boots up, tracing continues and Data Logging appears in red in the title bar of the web page indicating that tracing is taking place.

3. To stop tracing, click **Stop Tracing**.
4. To view the communication, click **Show Messages**.
5. View the messages. The messages appear with the following parameters
   - # - a sequential number
   - Time - the time and date of the message
   - From/To - indicates the sender and the addressee
   - Type - indicates the communication protocol via which the message was sent
   - Function - indicates the message purpose
   - Message Content - to read the resultCode parameter, click Result Code. A dialog that

lists and explains the available result codes opens.



RPC Result Codes -- Web Page Dialog

ISA RPC Result Codes

RPC Result Code	Result type
0x9002000	EDGE_SUCCESS
0x9002001	EDGE_ERROR_RPC_OUT_OF_MEMORY
0x9002002	EDGE_ERROR_RPC_HARDWARE_FAILURE
0x9002003	EDGE_ERROR_RPC_SESSION_NOT_FOUND
0x9002005	EDGE_ERROR_RPC_SESSION_ALREADY_EXISTS
0x9002006	EDGE_ERROR_RPC_INSUFFICIENT_MEMORY
0x9002007	EDGE_ERROR_RPC_INSUFFICIENT_CAPACITY
0x9002009	EDGE_ERROR_RPC_PROGRAM_NUMBER_CONFLICT
0x900200a	EDGE_ERROR_RPC_BANDWIDTH_UNAVAILABLE
0x900200b	EDGE_ERROR_RPC_BIND_FAILURE
0x900200c	EDGE_ERROR_RPC_SESSION_UNBOUND
0x900200d	EDGE_ERROR_RPC_SESSION_UNAVAILABLE
0x900200e	EDGE_ERROR_RPC_SHELL_SESSION_GROUP_FAILURE
0x900200f	EDGE_ERROR_RPC_INSUFFICIENT_OUTPUT_CAPACITY
0x9002101	EDGE_ERROR_RPC_CREATE_SESSION_FAILURE

http://10.40.2.134/monitoring/rpcErrorCodes.html Internet

6. To clear messages, click **Clear Messages**.

6.6 Viewing Available Reports

This version of the NSG 9000 web client allows you to view a report of the RF settings. To view global RF settings and RF module settings

1. Select **Reports** > **RF Configuration**.
2. To view RF module parameters, view the following:

Module No. - Slot 1-9	QAM Index - See *3.9.2 Configuring/ Viewing QAM-RF Parameters* on page 41.
Module Type - NSG-8R1G	QAM Manager - See *3.9.2 Configuring/ Viewing QAM-RF Parameters* on page 41.
Annex - Annex-B	Frequency - See *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41.
Symbol Rate - See *3.8 Configuring Global RF & QAMs Parameters* on page 35.	EIA Channel - See *3.9.2 Configuring/ Viewing QAM-RF Parameters* on page 41.
Constellation - See *3.9 Configuring a QAM-RF Module* on page 37.	Power Level - See *3.9.1 Configuring Module RF Ports* on page 38.
QAM Placement - See *3.9 Configuring a QAM-RF Module* on page 37.	Interleaver - See *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41.
RF Template - See,	Spectral Inversion - See *3.9.2 Configuring/ Viewing QAM-RF Parameters* on page 41.
RF No. - See *3.9.1 Configuring Module RF Ports* on page 38.	Mute - See *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41.

RF Enable - See *3.9.1 Configuring Module RF Ports* on page 38.	CW - See *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41.
# QAMs per Port - *3.9.1 Configuring Module RF Ports* on page 38.	
QAM No. - See *3.9.2 Configuring/Viewing QAM-RF Parameters* on page 41.	

6.7 Clearing Configuration During Power Up

You can clear the configuration stored on the NSG 9000 during boot up. Use this option, in case the stored configuration is corrupted and prevents the device from booting up properly. Once you zap the device, it boots up with the factory defaults. To zap the device, use the control panel as explained below:

1. Boot up the device and follow the control panel messages.
2. Wait for the following message: `Press <Esc> to Stop...(5)`

   It appears after the message `Loading...`
3. To zap, that is to clear the configuration, click <Esc>. You have around two seconds to click <Esc>.

   The following message appears: `Press <Enter> to zap...(5)`

   If you do not click <Esc>, boot up process continues regularly.
4. Click <Enter>. You have around two seconds to click <Enter>. If you do not click <Enter>, boot up process continues regularly.

   The device zaps and reboots with factory defaults.

For detailed information about the control panel, see *B.1 Using the Control Panel* on page 109.

Appendix A
QAM Mapping Mode

A.1 NSG 9000 Emulation

To allow narrow casting networks to easily expand their services, and to streamline the integration of NSG 9000 in networks with 8108, 9116 topology, Harmonic provides NSG 9000 with 8108 and 9116 emulation capabilities. In addition NSG 9000 may emulate various applications such as 3x24, that is, an emulation of three units with 24xQAM-RF ports.

Each emulation results in a unique QAM mapping. Details of the QAM mapping of the following emulation modes are provided in this guide:

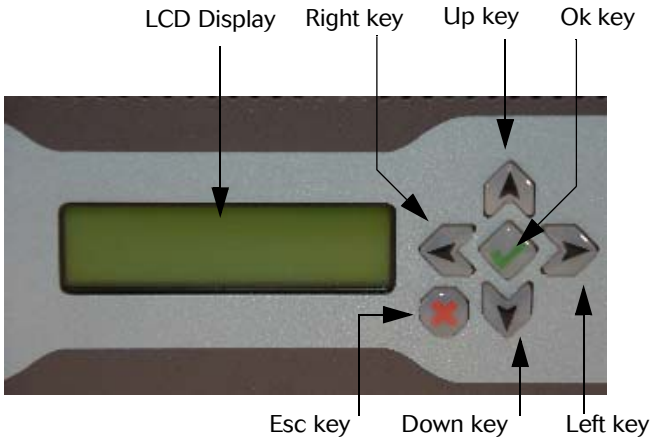
Table 6-4: Emulation Options and QAM Mapping Formula

Emulated Devices	Explanation	Formula
NSG 8108 in bitmap mode	NSG 9000 operates as four and a half NSG 8108	256*[QAM Output]+Service Id
NSG 8108 in encoded mode	NSG 9000 operates as four and a half NSG 8108	256*[QAM Output]+Service Id
NSG 9116 in bitmap mode	NSG 9000 operates as two NSG 9116 and additional two QAM-RF ports. However, due to the bitmap mode, each GbE port is defined by two IP addresses to facilitate two virtual NSG 9116 devices.	256*2^[QAM Output - 1]+Service Id
NSG 9116 in encoded mode	NSG 9000 operates as two NSG 9116 and additional two QAM-RF ports	256*[QAM Output]+Service Id
3x24 emulation mapping mode	NSG 9000 operates as three NSG devices with 24xQAMs	256*[QAM Output]+Service Id

Appendix B
Control Panel

B.1 Using the Control Panel

You can set preliminary configuration and control the NSG 9000 unit via its front panel. The front panel includes a control panel comprised of a Liquid Crystal Display (LCD) and six buttons as the following figure shows:



B.1.1 Control Panel Display

The 2-line, 16-character control panel display shows the screens, sub-screens, sub-screen options, error messages, warnings and alarms. The control panel display is comprised of two lines:

Line 1 - displays the name of the current screen/sub-screen or selected option.

Line 2 - displays the parameter value and all editing tasks are performed in this line. In editing mode the cursor is blinking to indicate the selected character.

B.1.2 Control Panel Screen Concept

The control panel screens are organized in a hierarchical fashion to indicate that a main screen contains sub-screens and sub-screen options. You may access a sub-screen only via its main screen. The available main screens are as follows:

Power Up screen - A main screen that appears as soon as the NSG 9000 boots up and after a thirty minutes of inactivity. The screen shows the company's name, NSG 9000 type and IP address.

Network Config screen - allows to access sub-screens for ETH configuration.

Setup screen - allows to reset the device.

Alarm screen - displays the last active alarm or warning. You can browse through the alarms to view them.

Product Information screen - via its sub-screens you can view information about the NSG 9000.

The following table lists the main screens, their browsing sequence, sub-screens and their options:

Screen	Browsing Sequence	Sub-Sequence	Options
Network Config	Down - Alarms Up - Product Info.	ETH1 IP ETH2 IP	Edit ETH1 Edit ETH2
Alarms	Down - Setup Up - Network Config	Active alarms and warnings	
Setup	Down - Product Info. UP - Alarms	Reset	Reset device
Product Info.	Down - Network Config. Up - Setup	Unit Information Main board Info. Interface module Info. Software Information. Control panel hotkeys help	

B.1.2.1 Moving along the Screens

To move along the screens and sub-screens of the control panel, use the following buttons of the control panel keypad:

Button	Explanation
Up & Down	■ browse through the screens/sub-screens. ■ browse through sub-screen options. ■ while editing, browse through numerical characters.
Left & Right	while editing, move the cursor along the line.
Enter	■ executes a selection of a screen/sub screen and of its available options. ■ quits an editing session and applies changes.
Esc	■ moves up a menu level. ■ quits an editing session without applying changes.

B.1.2.2 Hotkeys

The hotkeys are a combination of up to three keys pressed simultaneously. The following table lists the available hotkeys and describes their functionality:

Hotkey	Explanation
<Esc & Up or Down>	Adjusts the contrast of the display area.
<Esc & Right & Left > Confirm with right arrow	Reset

B.1.3 Configuring Device Parameters

Configure the NSG 9000 unit only after boot up. The control panel allows you to configure the following:

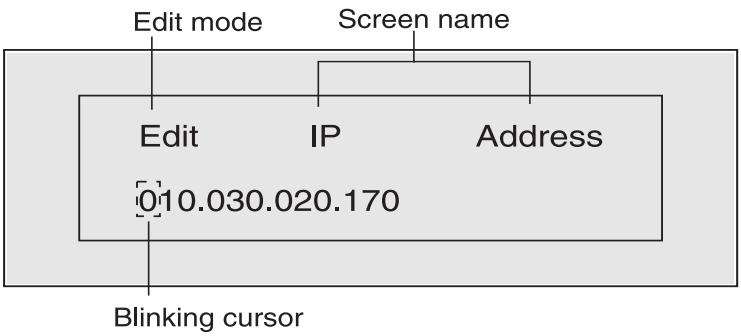
- IP address, subnet mask and gateway of ETH1
- IP address and subnet mask of ETH2

To configure various parameters and to apply the changes, you are required to enter a password. This limitation allows authorized users only to change the NSG 9000 settings. The password is the following sequence of buttons: Left-Right Left-Right Up-Down Enter.

⇨ To configure device parameters:

1. Navigate to the required parameter and click <Enter> twice.
2. Enter the password.

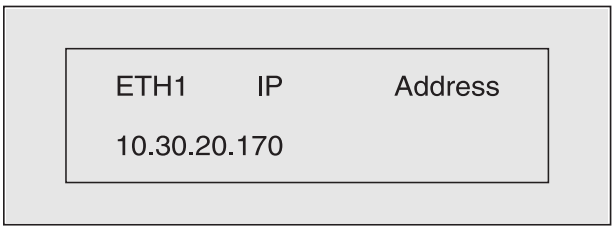
   The screen name changes to Edit (screen name). A blinking cursor appears on the first character of the second line of the screen.



3. Start editing.
4. Do one of the following:
   - To quit the editing session and to apply changes, click <Enter>.

     The screen name appears without the word “Edit”.

     The newly configured parameter appears in the second line of the screen.



   - To quit the editing session without applying the changes, click <Esc>.

     The screen name appears without the word “Edit”.

     Unchanged parameters appear in the second line of the screen.

B.1.4 Reset the NSG 9000 Unit

Via the control panel you may reset the NSG 9000 unit when required.

⇨ To reset the NSG 9000 unit:

- Do either of the following:

  Navigate to the Reset NSG 9000 sub-screen of the Setup main screen and click <enter>,

  Or,

  Press <Esc & Right & Left > and press Right arrow.

  Once boot up starts, the control panel displays the same messages as during power up. If BOOTP is enabled, an additional message appears indicating that the NSG 9000 connects to the BOOTP server.

  You can also clear the configuration stored on the NSG 9000 during boot up. See *6.7 Clearing Configuration During Power Up* on page 107.

B.1.5 Viewing NSG 9000 Parameters

The control panel allows to view the following NSG 9000 parameters:

- Alarms and Warnings - up to 100 alarms/warnings
- NSG 9000 MAC address
- Product Information
- Control panel hotkeys

B.1.5.1 Viewing Alarms/Warnings

You may browse through the alarms/warnings to view them. If an alarm/warning is cancelled, it disappears from the screen and the following alarm/warning is presented. If there are no alarms/warnings, the message “No alarms/Warn” appears. You can view up to 100 alarms/warnings.

⇨ To monitor alarms/Warnings

1. Navigate to the Alarm screen.

   The screen displays the number of alarms and warnings (from left to right)
2. Click <Enter>.
3. Browse through the alarms/warnings, using the <Down or Up> keys.

   When a warning is displayed, the following sign appears at the top right corner of the LCD display: (W).

B.1.5.2 Viewing ETH ports MAC Address

⇨ To monitor the ETH1 MAC Address

1. Navigate to the Network Config screen and click <Enter>.

   The Ethernet Port 1 screen appears.
2. Click <Enter>. The ETH1 IP Address screen appears.
3. Click <Down or Up> until the ETH1 MAC Address screen appears.

⇨ To monitor the ETH2 MAC Address

1. Navigate to the Network Config screen and click <Enter>.

   The Ethernet Port 1 screen appears.
2. Click <Down or Up> to open the Ethernet Port 2 screen.
3. Once the Ethernet Port 2 screen appears, click <Enter>.
4. Click <Down or Up> until the ETH2 MAC Address screen appears.

B.1.5.3 Viewing Product Information

The Product Information screen is related to the following sub-screens:

- Chassis Info - view the serial number of the chassis
- DGBoard Info - view the DGBoard serial number and DGBoard FPGA number
- GbE Info - view GbE FPGA Version
- Slot Info - view per each slot, its type, version, serial number and FPGA
- Software Info - view firmware version
- LCD Hotkeys Help - allows to view the various available hotkeys

⇨ To view product information

1. Navigate to the Product Info. screen.
2. Click <Enter>.
3. Browse through the sub-screens and their related options using the <Down or Up> and <Enter> keys.

B.1.5.4 Viewing Hotkeys

1. Navigate to the Product Information screen.
2. Click <Enter>.
3. Click <Down or Up> until the Hotkey screen appears.
4. Click <Enter>.
5. Click <Down or Up> to view the hotkeys.

Appendix C
Standard ES Types and Descriptors

C.1 Standard Elementary Stream (ES) Types

The following standards are used to define types of elementary stream:

Value	Description
0x0	ITU-T | ISO/IEC Reserved
0x1	ISO/IEC 11172 Video
0x2	ITU-T Rec. H.262 | ISO/IEC 13818-2 Video or ISO/IEC 11172-2 constrained parameter video stream
0x3	ISO/IEC 11172 Audio
0x4	ISO/IEC 13818-3 Audio
0x5	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 private_sections
0x6	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets containing private data
0x7	ISO/IEC 13522 MHEG
0x8	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Annex A DSM CC
0x9	ITU-T Rec. H.222.1
0xA	ISO/IEC 13818-6 type A
0xB	ISO/IEC 13818-6 type B
0xC	ISO/IEC 13818-6 type C
0xD	ISO/IEC 13818-6 type D
0xE	ISO/IEC 13818-1 auxiliary
0xF-0x7F	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Reserved
0x80 - 0xFF	User Private

C.2 Standard ES and Program Descriptors (MPEG)

The following MPEG standards are used to extend the definitions of elementary stream and programs:

Value	Description
0x2	Video stream descriptor
0x3	audio stream descriptor
0x4	hierarchy descriptor

Value	Description
0x5	registration descriptor
0x6	data stream alignment descriptor
0x7	target background grid descriptor
0x8	video window descriptor
0x9	CA descriptor
0xA	ISO 639 descriptor
0xB	system clock descriptor
0xC	multiplex buffer utilization descriptor
0xD	copyright descriptor
0xF	private data indicator descriptor
0x10	smoothing buffer descriptor
0x12	IBP descriptor

C.3 Standard ES and Program Descriptors (DVB)

The following DVB standards are used to extend the definitions of elementary stream and programs:

Value	Description
0x51	Mosaic descriptor
0x52	Stream identifier descriptor
0x56	Teletext descriptor
0x59	Subtitling descriptor
0x5F	Private data specifier
0x60	Service move descriptor
0x65	CA system descriptor
0x66	Data broadcast ID descriptor

Appendix D
EIA SDT and HRC Standards

The EIA (Electronic Industries Association) sets internationally recognized standards for standard frequencies (EIA SDT) and for Harmonic related carriers (EIA HRC).

Table 6-5: EIA SDT and HRC

EIA Channel Number	STD (Zero Offset) MHz	HRC MHz
1	-------	73.7500
2	57.0000	55.7500
3	63.0000	61.7500
4	69.0000	67.7500
5	79.0000	79.7500
6	85.0000	85.7500
7	177.0000	175.7500
8	183.0000	181.7500
9	189.0000	187.7500
10	195.0000	193.7500
11	201.0000	199.7500
12	207.0000	205.7500
13	213.0000	211.7500
14	123.0000	121.7500
15	129.0000	127.7500
16	135.0000	133.7500
17	141.0000	139.7500
18	147.0000	145.7500
19	153.0000	151.7500
20	159.0000	157.7500
21	165.0000	163.7500
22	171.0000	169.7500
23	219.0000	217.7500
24	225.0000	223.7500
25	231.0000	229.7500
26	237.0000	235.7500

Table 6-5: EIA SDT and HRC

EIA Channel Number	STD (Zero Offset) MHz	HRC MHz
27	243.0000	241.7500
28	249.0000	247.7500
29	255.0000	253.7500
30	261.0000	259.7500
31	267.0000	265.7500
32	273.0000	271.7500
33	279.0000	277.7500
34	285.0000	283.7500
35	291.0000	289.7500
36	297.0000	295.7500
37	303.0000	301.7500
38	309.0000	307.7500
39	315.0000	313.7500
40	321.0000	319.7500
41	327.0000	325.7500
42	333.0000	331.7500
43	339.0000	337.7500
44	345.0000	343.7500
45	351.0000	349.7500
46	357.0000	355.7500
47	363.0000	361.7500
48	369.0000	367.7500
49	375.0000	373.7500
50	381.0000	379.7500
51	387.0000	385.7500
52	393.0000	391.7500
53	399.0000	397.7500
54	405.0000	403.7500
55	411.0000	409.7500
56	417.0000	415.7500
57	423.0000	421.7500

Table 6-5: EIA SDT and HRC

EIA Channel Number	STD (Zero Offset) MHz	HRC MHz
58	429.0000	427.7500
59	435.0000	433.7500
60	441.0000	439.7500
61	447.0000	445.7500
62	453.0000	451.7500
63	459.0000	457.7500
64	465.0000	463.7500
65	471.0000	469.7500
66	477.0000	475.7500
67	483.0000	481.7500
68	489.0000	487.7500
69	495.0000	493.7500
70	501.0000	499.7500
71	507.0000	505.7500
72	513.0000	511.7500
73	519.0000	517.7500
74	525.0000	523.7500
75	531.0000	529.7500
76	537.0000	535.7500
77	543.0000	541.7500
78	549.0000	547.7500
79	555.0000	553.7500
80	561.0000	559.7500
81	567.0000	565.7500
82	573.0000	571.7500
83	579.0000	577.7500
84	585.0000	583.7500
85	591.0000	589.7500
86	597.0000	595.7500
87	603.0000	601.7500
88	609.0000	607.7500

Table 6-5: EIA SDT and HRC

EIA Channel Number	STD (Zero Offset) MHz	HRC MHz
89	615.0000	613.7500
90	621.0000	619.7500
91	627.0000	625.7500
92	633.0000	631.7500
93	639.0000	637.7500
94	645.0000	643.7500
95	93.0000	91.7500
96	99.0000	97.7500
97	105.0000	103.7500
98	111.0000	109.7500
99	117.0000	115.7500
100	651.0000	649.7500
101	657.0000	655.7500
102	663.0000	661.7500
103	669.0000	667.7500
104	675.0000	673.7500
105	681.0000	679.7500
106	687.0000	685.7500
107	693.0000	691.7500
108	699.0000	697.7500
109	705.0000	703.7500
110	711.0000	709.7500
111	717.0000	715.7500
112	723.0000	721.7500
113	729.0000	727.7500
114	735.0000	733.7500
115	741.0000	739.7500
116	747.0000	745.7500
117	753.0000	751.7500
118	759.0000	757.7500
119	765.0000	763.7500

Table 6-5: EIA SDT and HRC

EIA Channel Number	STD (Zero Offset) MHz	HRC MHz
120	771.0000	769.7500
121	777.0000	775.7500
122	783.0000	781.7500
123	789.0000	787.7500
124	795.0000	793.7500
125	801.0000	799.7500
126	807.0000	805.7500
127	813.0000	811.7500
128	819.0000	817.7500
129	825.0000	823.7500
130	831.0000	829.7500
131	837.0000	835.7500
132	843.0000	841.7500
133	849.0000	847.7500
134	855.0000	853.7500
135	861.0000	859.7500
136	867.0000	865.7500
137	873.0000	871.7500
138	879.000	877.7500
139	885.000	883.7500
140	891.000	889.7500
141	897.000	895.7500
142	903.000	901.7500
143	909.000	907.7500
144	915.000	913.7500
145	921.000	919.7500
146	927.000	925.7500
147	933.000	931.7500
148	939.000	937.7500
149	945.000	943.7500
150	951.000	949.7500

Table 6-5: EIA SDT and HRC

EIA Channel Number	STD (Zero Offset) MHz	HRC MHz
151	957.000	955.7500
152	963.000	961.7500
153	966.000	967.7500
154	972.000	973.7500
155	978.000	979.7500
156	984.000	985.7500
157	990.000	991.7500
158	996.000	997.7500

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