ProStream 9000™

Stream Processing Platform

RELEASE 10.5.3

Software Guide

Rev A

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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.

IMPORTANT: The Important symbol calls your attention to information that should stand out when you are reading product details and procedural information.

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In addition to these symbols, this guide may use the following text conventions:

Convention	Explanation
`Typed Command`	Indicates the text that you type in at the keyboard prompt.
<Ctrl>, <Ctrl>+<Shift>	A key or key sequence to press.
Links	The *italics in blue* text to indicate Cross-references, and hyperlinked cross-references in online documents.
Bold	Indicates a button to click, or a menu item to select.
`ScreenOutput`	The text that is displayed on a computer screen.
Emphasis	The *italics* text used for emphasis and document references.

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Chapter 1
Logging into ProStream 9000

Overview

In order to enhance the security of ProStream 9000, the device has two access levels. Each access level applies to any form of communication with the device whether it is a web client or a Telnet session. 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:

Access Level	Working Mode
Monitor	Allows only to monitor the operation of the device.
Configure	Allows to configure the device only via a web client and to define the monitor access level password.

The various access levels require a correct username and password combination.

Access Level	Username	Password
Monitor	monitor	monitor
Configure	configure	configure

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

Full Device Configuration

The ProStream 9000 web client allows a full configuration of the device. It also allows the user to monitor the ProStream 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 accessible through a web browser. The following table lists the web client specifications:

Table 1–1: Web client Specifications

Parameter	Explanation
Screen resolution	1280 x 1024
Supported web browsers	■ Internet Explorer 9,10,11 ■ Chrome ■ Firefox ■ Opera ■ Safari

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NOTE: Once you open any of the supported browsers, clean the cache. The browser may save previous GUI files. To clean the cache, select **Tools** > **Internet Options** and in **Browsing History** click **Delete**.

TIP: After upgrading the firmware of a ProStream 9000 device, clean the cache as explained in the note above.

Logging into the Device

To log in via a web client:

1. In a browser, type in the IP Management address of the required device.
2. Click **Login.**
3. Type in the required username and password.
4. To save the password for the future, select **Remember my password**.
5. Click **OK**.

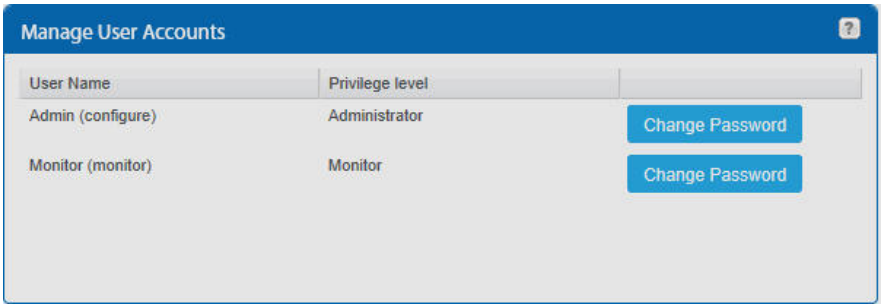
   The web client page appears and you may start working with the device according to the permissions of your access level.

Setting/Changing a Password

To change a password, you do not need to click **Apply**. Once you enter all required information and click **Change Password** the new password is applied.

To set or change a password:

1. Select **Administration** > **User Management** section.



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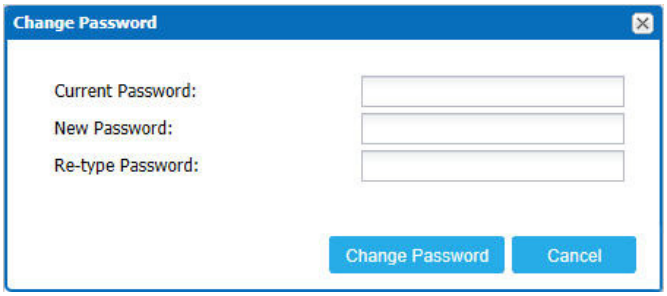
2. If you logged in as *Configure*, you are authorized to change your password or the password of Monitor. In this case, the **User Name** field appears and you need to select either Monitor or Configure and click **Change Password** of the required username.



3. In **Current User Password**, enter the required password.
4. In **New Password**, enter the new password.
5. In **Re-type Password**, re-enter the new password.
6. Click the **Change Password** button.

   When logging in use the newly set password.

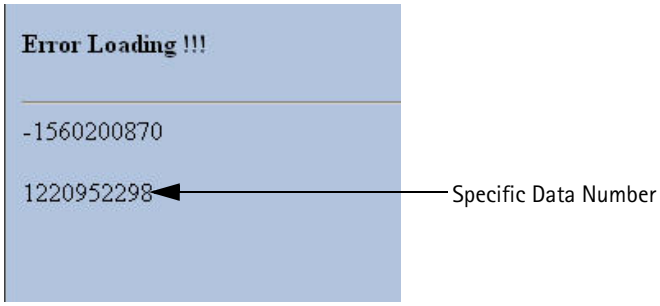
   After three unsuccessful login trials, or if you forgot the password/user name, restore your password. To restore the password, see the following section.

Restoring a Password

In case you forget your password, you can restore it. You have three trials to log in to the device.

If the login fails:

1. Upon your failed trial to log in, a screen appears with the Specific Data Number.



NOTE: The Specific Data Number is generated with each failed login.

2. Record this unique number and immediately contact Harmonic Customer Support and provide customer support with the Specific Data Number.

   Harmonic Customer Support personnel provides you with a temporary password.
3. Open your browser, and type the following:

   `http://<device IP address>/resetpass.htm`
4. Click **Go**.

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5. The **Connect To <IP Address>** dialog appears:

6. In **Username**, type `backdoor`.
7. In **Password**, type the password you received from Harmonic Customer Support.
8. Once you logged into the device, set a password for future logins. See *Setting/Changing a Password* on page 12.

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Chapter 2
Features and Specifications

Introduction

Harmonic ProStream 9000 is a highly integrated MPEG/DVB multiplexer, Transcoder with internal processing card, scrambler and descrambler, for multimedia services carried over digital broadcast networks. It features a modular, high-density chassis that is furnished with up to 5 IOMs (Input/Output Module) and up to 4 IPCs (Internal Processing Card) in a single one-rack-unit (1-RU) chassis. The modularity of the platform allows easy field replacement of cards, as well as field upgrades of SW and HW features.

This guide describes the configuration and monitoring instructions for ProStream 9000, a high density stream processing platform.

Main Features

The following table lists the main features of ProStream 9000. The functionality of ProStream 9000 depends on the installed IPC. ProStream 9000 functions as an encoder or transcoder according to the installed IPC type.

Table 2–1: Main Firmware Related Features

Category	Feature	Description

Input and Output Interfaces	IP IOM	■ Dual GbE card
		  ■ Two independent ports per IP IOM
		  ■ line rate of 1 Gbps per IP IOM
		  ■ Maximum input and output bitrate is 500Mbps per IP IOM
		■ Quad GbE card
		  ■ 2 ports of 1Gbps, connector type RJ45
		  ■ 2 ports of 1Gbps, connector type SFP
		  ■ 1port of 10 Gbps (port 2), connector type SFP+
		  ■ The ports can be used as 4 independent ports or 2 pairs of redundant ports (SFP to SFP and RJ45 to RJ45). Each pair can be configured separately, in other words, one pair can be configured as redundant and one as independent. The transition between modes is not service affecting for the primary port

	ASI SCR IOM	ASI-SCR - up to four ports per IOM
		■ Inputs and outputs DVB-ASI streams
		■ Supports Common Scrambling Algorithm scrambling
		■ May synchronize the device to an external clock coming from a GPS receiver
		■ Bit rate:
		  ■ Maximum output bit rate of 187 Mbps
		  ■ Maximum input bit rate of 210 Mbps
		■ Supports packet size: 188 or 204 bytes

	8VSB	Up to four 8VSB input cards. See *8VSB Modulation* on page 112.

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Table 2–1: Main Firmware Related Features

Category	Feature	Description
Parsing Tables	Dynamic parsing of input	Extracts incoming feeds and displays their structure and elements on the control interface. It displays their bitrate, CC errors, SI PSI structure etc.
Redundancy	Input	■ GbE port redundancy ■ Socket redundancy for each input socket ■ Service redundancy
Processing	Multiplexing/ provisioning options of the device	■ Maximum processing bit rate of 500 Mbps ■ Full multiplexing (any input to any output) ■ Multicast of any input stream to multiple transport streams. ■ Multicast of services with different transcoding configuration ■ IP multicast - supports IGMP ver 2/3 ■ Passing range of PIDs from any input to any output
	DiviTrack over IP	Statistical multiplexing - combines rate shaping using external encoders
	DiviTrackMX (HW dependent, type of IPC)	Statistical multiplexing - combines rate shaping using internal encoders
	Transcoding (HW dependent, type of IPC)	When transcoding modules are mounted: Transcodes incoming H264/MPEG2 programs and outputs them as H264/MPEG2 CBR/VBR services.

	Scrambling	■ Supports the following scrambling algorithm:
		  ■ DVB-CSA
		  ■ AES-NSA2 - for future use
		  ■ AES Fixed Key Control Word (CW) scrambling of outgoing TS over IP - for future use
		  ■ BISS
		  ■ Selective Encryption
		■ Functions as scrambler and in AES-CBC scrambling mode, also as a de-scrambler. For future use only.
		■ Supports PSIG MUX protocol
		■ Supports ECMG redundancy
		■ Internal EIS

Output Bit Rate	Transcoding Bit Rate	Video ■ VBR - in a pool ■ CBR - For HD up to 3 services per pool for best performances. Audio ■ CBR only
Output Monitoring	TS Mirroring	TS Mirroring - Duplicates each output TS (master) from any interface (IP, ASI) to any other TS (slave) in any interface. Supports all master functions such as: rate shaping, scrambling, RSS, tables generation, common PCR, PID range, DToIP. IP Mirroring - Enables you to duplicate all output data from one port (GbE1) of an IP IOM card to the other port (GbE2) of that card.

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Table 2–1: Main Firmware Related Features

Category	Feature	Description
Output Capabilities	SCT35 Insertion	Receives an SNMP trap from SL 10 and generates an SCT35 cue message
	Table Generation	■ Create CAT ■ Create SDT ■ Create NIT
	Table Re-generation	■ PSIP re-generation ■ EIT re-generation
	PID Prioritization	In case of Over subscription, the ProStream 9000 starts dropping PIDs according to their priority.
	PID Range	Allows to pass a range of PIDs from any input to any output. Up to 16 PID ranges per unit.
	Slate	Any service can be configured to have an alternative, or backup input feed or source that is enabled on the output upon disruption of the primary feed. It allows MSOs to inform their subscribers that they are doing anything possible to restore the service.
	Splicing	Allows cable headends and broadcast affiliates to insert locally-generated commercials and short programs into remotely distributed regional programs before they are delivered to home viewers.
	Emergency Alert System (EAS)	Enable MSO to automatically broadcast emergency alert messages through pre-configured channels.
PCR	Input PCR	The PCR can arrive on any input PID, such as video, audio or not on ES
	Output PCR	■ The PCR can outflow on any PID. In transcoding, only over video PID ■ Generate PCR ■ Common PCR
Management	Management and monitoring interfaces	■ Control Panel ■ Web client ■ NMX (Harmonic's Digital Service Manager)

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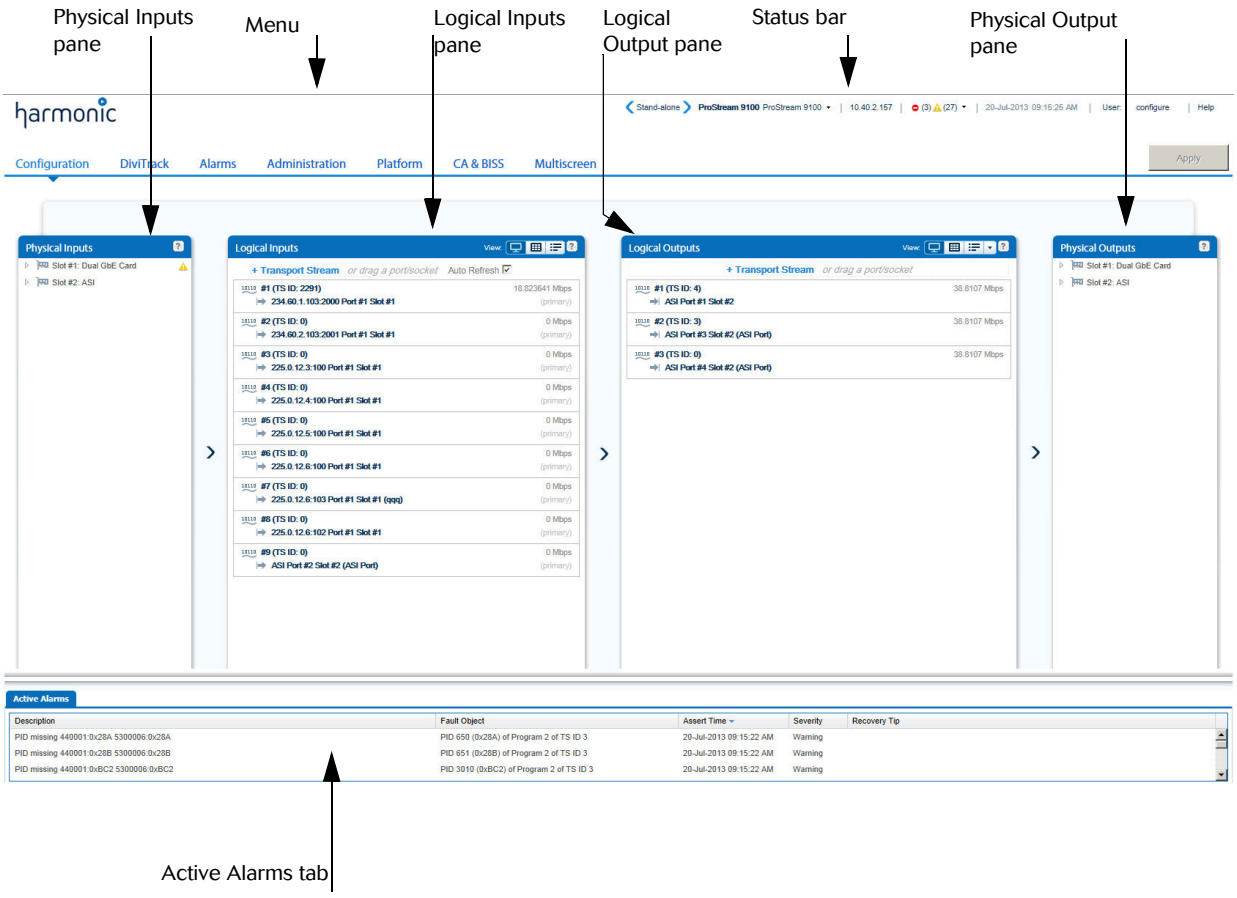
Chapter 3
Configuring and Provisioning

Overview

Once the ProStream 9000 is properly cabled and setup in your network, you may access it via the web client in order to configure, provision and monitor it. The web client reads data from the device and presents it in a User Interface (UI) called the Stand Alone GUI (SAG).

This chapter guides you on how to configure and multiplex a ProStream 9000 stand alone model using the web client.

Web Client Page



The web client page includes the following sections:

Status Bar

The Status bar comprises:

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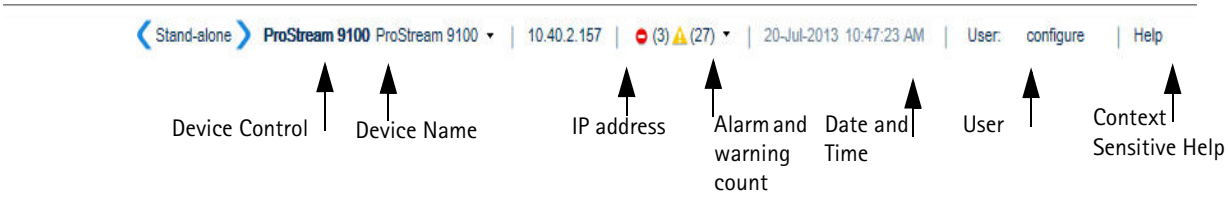
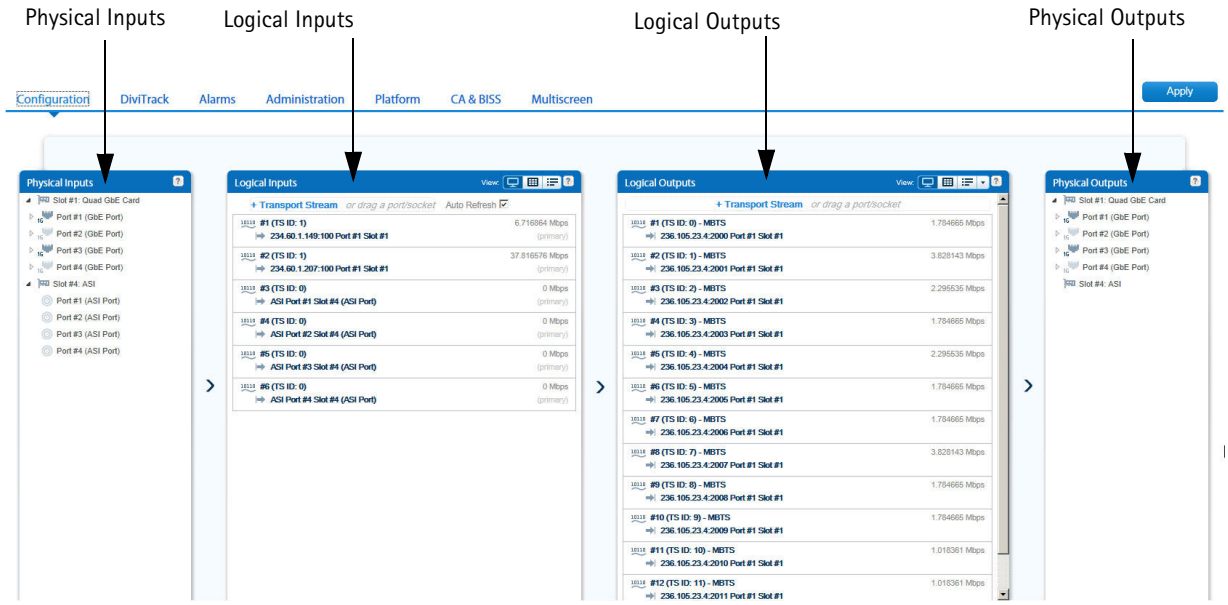
- <device Control > - It displays when the device is controlled by NMX. By default it is Standalone.
- Device name drop-down list:
  - Properties - Short cut to **Platform** > **HW Inventory** submenu.
  - Identify Unit - Set to On to blink the lights on the front panel to locate the unit in a rack.
- IP Address - The management IP address.
- Alarm and Warning Count drop-down list - Click to display a list of the active alarms and warnings
- System Date and Time
- User - Displays the current logged in user
- Context Sensitive Help



Management Panes



The four management panes are:

- The Physical Inputs pane - enables control and monitoring of the device physical input interfaces. See *Physical Input Pane* on page 38.
- The Logical Inputs pane - enables control and monitoring of the input stream. See *Logical Input Pane* on page 38.
- The Logical Outputs pane - enables control and monitoring of the output stream.
- The Physical Outputs pane - enables features of the device physical output interfaces.

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Right-click or double-click any object to see its drop-down menu or options (if available). To identify elements, SAG uses a wide range of icons. See *Stream Config Page Conventions* on page 28.

ProStream Monitoring

Monitoring the ProStream operation involves alarm indicators displayed in the title bar of each of the available Web client pages. The Alarm indicator is also a link to the Alarm page and provides the following information:

Table 3–1: Alarm Indicators

Alarm Indication	Explanation
Green Alarm button	No active alarms.
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 Warning 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' stands for the amount of registered alarms. Click the link to open the Alarm page.

Stages of ProStream Configuration

Configuring the ProStream standalone model includes the following stages:

- ProStream Platform Parameters - configure Ethernet ports, slots and ASI port direction. Usually, this configuration is a one time procedure performed as soon as you start configuring the device. You can also view chassis and GbE port parameters and define various global settings of the device.
- ProStream provisioning - during this stage you may read information from the device and then multiplex it. Multiplexing is done mainly from the Stream Config page and includes the following stages:
  - Input configuration - enabling input ports and in the case of GbE input ports, setting port and socket parameters.
  - Reading data from the device (optional) - the Web client displays the updated data as read from the device.
- Output configuration and multiplexing - with a GbE port, setting port and socket parameters, setting TSs, services and PIDs parameters, arranging the output content (multiplexing), setting output port parameters and enabling the port.
- Scrambling/Descrambling - when ProStream functions as a scrambler/descrambler, set communication parameters to enable communication between the device and the Conditional Access System (CAS). You may also view other CAS parameters such as SCG, ECM and EMM parameters.

  When ProStream functions as a descrambler using the AES protocol, set the CWS*** parameters. For future use only.
- Transcoding - when ProStream functions as a re-encoder, set the re-encoding parameters. Set these parameters via the Transcoding section.

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Before you Begin

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

- Greyed-out fields are for viewing only.
- 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.
- Every web page dialog includes a **OK** button. When clicking this button, you save the new configuration without applying it to the device and you close the web page dialog.
- Every web page dialog includes a **Save** button. When clicking this button, you save the new configuration without applying it to the device.
- To close a web page dialog without saving the configuration, click the button at the upper right corner of each page.
- 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/Remove**.

Platform Parameters

Configure the platform parameters when you start the device configuration. Usually it is a one time procedure that you do via the Platform page. The Platform page is comprised of the following:

- Graphical view of the ProStream back panel - as you select each component, a table presenting its parameters appears. The table enables you to configure and view various parameters.
- Navigation pane - enables access to various platform related features:
  - Firmware Upgrade
  - HW Inventory
  - Management Port
  - Backup/Restore
  - DPI
  - EAS
  - Device Redundancy
  - ESAM

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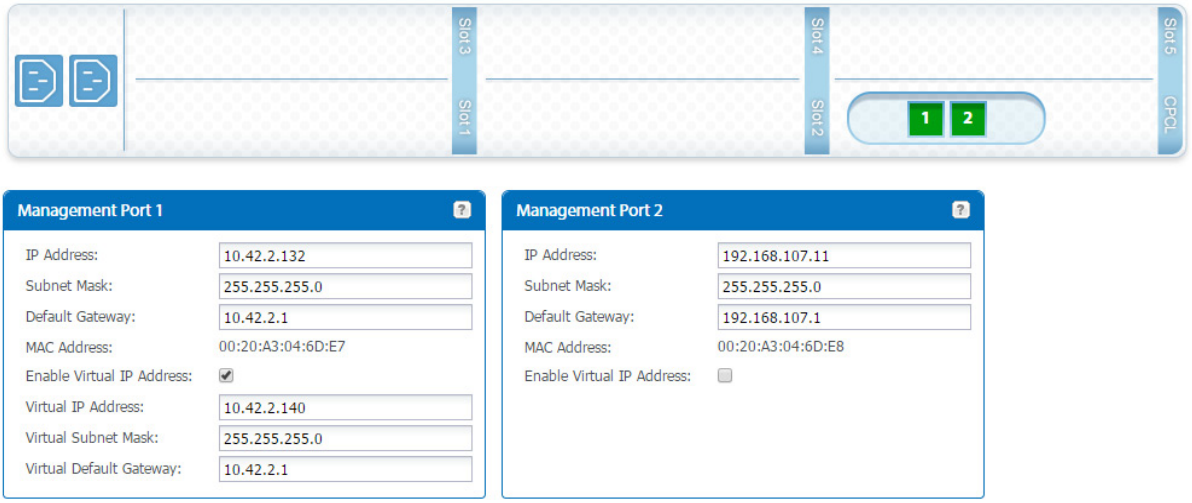
Setting ETH1-2 Parameters

The IP address of the ETH1 port or ProStream primary IP address is configured as part of the ProStream installation (see ProStream Installation and Start Up User's Guide). However, when required, you may change the IP address settings via **Platform > Management Ports:**



To change the ETH port configuration:

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. ProStream uses the ETH1 port to communicate with the network for management purposes and ETH2 for Conditional Access Systems (CAS) purposes.

1. Select **Platform > Management Ports**. The page opens and in the Graphical view ETH ports 1&2 are indicated.
2. In the table that appears for each port, enter the required IP address, subnet mask, and default gateway. You can view the MAC address of the port.
3. Click **Apply** to apply changes.
4. If you configured ETH1, log in to the new IP address.

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

5. Select Enable Virtual IP Address to enable this function. When selected, enter:
   - Virtual IP Address
   - Virtual Subnet Mask
   - Virtual Default Gateway

NOTE: Virtual IP Address is available only for Quad GbE cards not in Hot:Hot redundancy mode.

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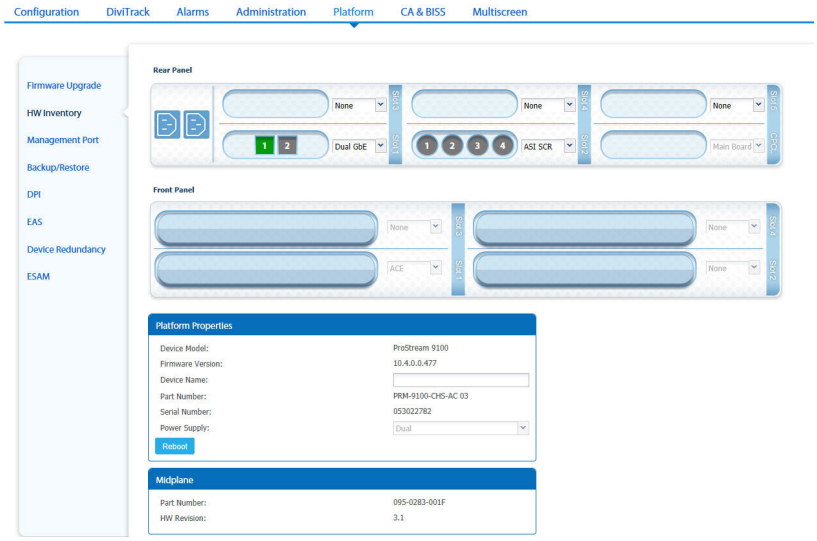
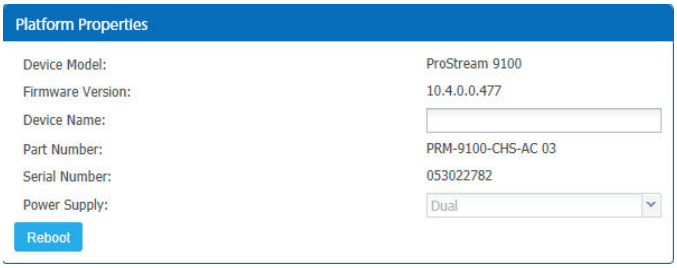
Viewing/Setting Platform Parameters

To set the Platform Parameters:

1. Select the **Platform** > **HW Inventory.**
2. Click any general area. The Platform Properties and Midplane windows appear.



3. In the **Platform Properties** table, view/configure the following chassis parameters:



- Device Model - indicates the device model
- Firmware Version - indicates the firmware version.
- Device Name - type in the required device name.
- Part Number - indicates the part number of the chassis.
- Serial Number - indicates the serial number of the chassis.
- Power Supply - indicates whether single or dual power supply.
- Reboot - enables a device reboot.

4. In the **Midplane** table, view/configure the following chassis parameters:

- Part Number - customer part number.
- HW Revision - indicates the HW revision.

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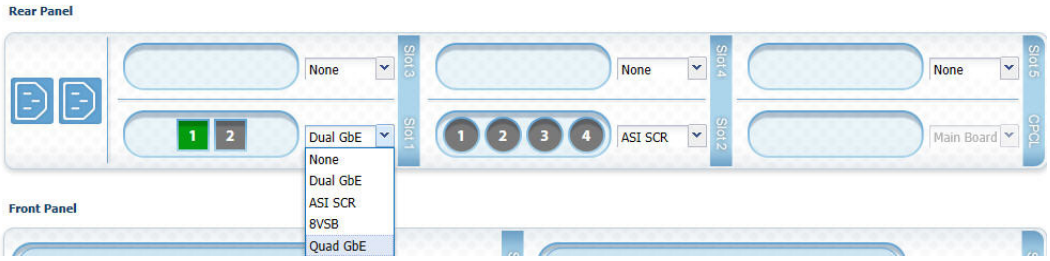
Viewing/Setting Card Parameters

To set the card parameters:

1. Select **Platform** > **HW Inventory**.
2. Select the required slot.
3. The slot presents the actual card inserted in the slot. You can select the required card as per future slot configuration. To configure the slot, open the drop-down list and select the required card:
   - None - no IOM card in the slot
   - ASI SCR - ASI IOM with scrambling support
   - Dual GbE card - GbE 1G IOM card
   - Quad GbE card - GbE 4G IOM card
   - 8VSB card. See *8VSB Modulation* on page 112.



When you open the drop down list next to the slot, the selected card appears in the slot whether you click Yes or No in the message that appears.

If you click **Yes**, physical inputs and outputs (physical sources and destinations) and logical TSs are removed.

If you click **No**, physical inputs and outputs are removed without associated TSs.

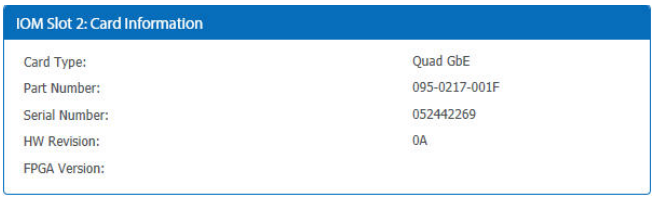
Viewing Card Properties

To view card properties, click the required card.

The **IOM Slot # Card Information** table is updated to display the following:

For ASI SCR IOM Card - view or set the required port direction.

For a Quad GbE card - in the **IOM Slot # Card Information** section, view the following.



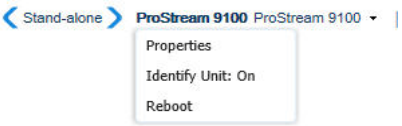
Card Type, Part Number, Serial Number, HW Version and FPGSA Version.

For a Dual GbE card - in the **IOM Slot # Card Information** section, view the following.

Card Type, Part Number, Serial Number, HW Version, FPGSA Version (in), FPGSA Version (out), Firmware Version and EPLD Version.

For 8VSB card and ASI card - in the **IOM Slot # Card Information** section, view the type, serial number and the part number of the card.

Global Platform Configuration



Identify unit

To identify the unit:

1. In the Status bar, open the device name list and click **Identify Unit**.
2. Set to On to blink the lights on the front panel to locate the unit in a rack

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Reset unit

To reset the unit:

- In the Status bar, open the device name list and click **Reboot**.

Access Platform Parameters

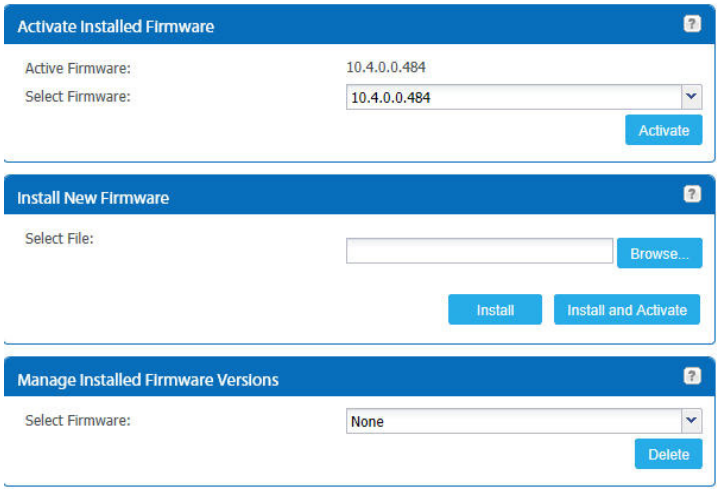
To access the platform parameters:

- In the Status bar, open the device name list and click **Properties.**

  The **Platform** page appears.

Managing Software

The **Software Management** page, found under **Platform> Firmware Upgrade,** enables you to do the following:



- Transfer and install an updated version
- Change the running software - Up to two versions of the firmware package may reside on the ProStream device. Usually, these are the current installed version and the previous installed version. You may change the running firmware as required.

Activate Installed Firmware

To activate the installed firmware:

1. Focus on the Install new Firmware section:

2. In **Active Firmware**, view the currently active firmware.
3. To select the required firmware, open the **Select Firmware** list and select the required firmware.

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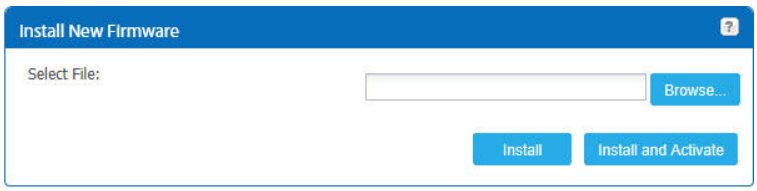
4. To activate, click **Activate**.

Transfer and install an updated firmware version

To transfer and install an updated firmware version:



1. Focus on the Install New Firmware section.
2. Click **Browse** and navigate to the location of the unzipped folder and select the file of the following format:xx.xx.xx.xxx (the file does not have an extension.)
3. Click either of the following:

   Install - transfers the firmware file to the device

   Install and Activate - transfers and installs the firmware on the device

   A message appears notifying that the transfer may take a few minutes.
4. Click **Ok**.

   The selected package is transferred and installed on the device. Progress bars and flashing messages appear indicating the stages and progress of the version transfer and installation.

CAUTION: During the software transfer, do not close the web browser and do not reset the device. Either action may cause the device to hang without a valid firmware for booting up.

   Once the transfer is complete, a message appears asking you whether the device should run with the newly transferred version.
5. Click **Ok**.

   A message appears asking you whether or not to reset.
6. Click **Ok** to reset and run the device with the newly transferred version.

   A message appears asking you whether or not to close the web client.
7. Click **Yes** to close the web client page. This is the recommended option.

NOTE: If you click No, the web client page stays open during reset, but it cannot read data from the device to display updated information.

8. Wait a few minutes until reset is complete and open the web client page.

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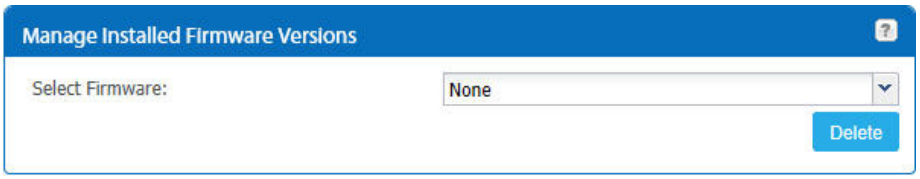
To organize the loaded software versions:

1. Focus on **Manage Software**.



2. Open the **Software Firmware** list to select the required version.
3. To remove a version from the device, click **Remove**.

NOTE: You can have up to three software versions loaded on the device.

Stream Config Page Conventions

The following pictures show the main icons used in the Configuration page:

PID Related icons:

Type	Clear (FTA)	Scrambled	Descrambled	PID Missing
Video				
AVC				
M2				
HEVC				
Audio				
DPI				
TXT				
Data				
Ghost		N/A	N/A	
EMM		N/A	N/A	
ECM		N/A	N/A	
PCR				
PCR on Vid				
PCR on Audio				
RSS				
Program				

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Program and Table related icons

Item	Normal	Disabled	Missing
Table			
Tables (Container)			
Program	See above	N/A	See above
Re-encoding			
Video TX			
Audio TX			
TS			
Pool			N/A
icons for encoding	Same as ES	N/A	Same as ES
MBTS			N/A
MW Profile		N/A	N/A
Descriptor		N/A	N/A
SCG		N/A	N/A
Network		N/A	N/A

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Port related icons

Port	Enabled	Disabled
ASI		
RF		
RJ-45		
1G RJ-45		
10G RJ-45		
100BT RJ-45		
RS232		
SFP 1G		
SFP 10G		
SFP 40G		
DVB-T or 8-VSB		
Socket		
Sockets Container		
Tables Container	Tables	Tables
Cards		

What's Next

Now you are ready to start configuring the ProStream unit and provision services through it.

NOTE: GbE input/output port should be configured before provisioning services through the port.

Configuring Input Ports

ProStream devices may have GbE and/or ASI input ports. Each port may be individually enabled or disabled.

The **Configuration** page contains the Physical Input and Logical Input panes for configuring input ports.

The Input port configuration consists of the following stages:

- Set port mode - applicable only to GbE ports.
- Enable/disable ports - applicable to all types of input ports.
- Set port parameters - applicable to GbE ports only.
- Set socket parameters - applicable to GbE ports only.
- Read the current information from the input ports. (optional)

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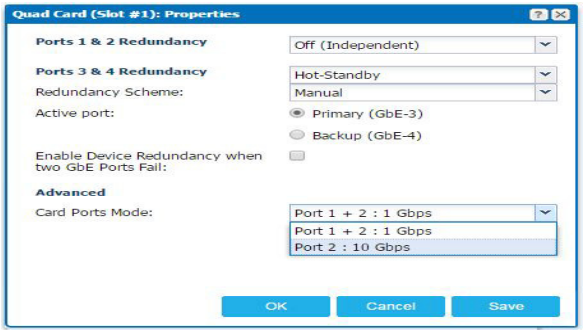
Setting the GbE Port Mode

To set a GbE port mode:

1. In the **Physical Inputs** pane, right-click a slot with a GbE card and select **Properties**.

   The **Properties** dialog appears:



2. Pairs of ports (1&2 and 3&4) can work independently or in one of four redundancy modes. The ports are configured as follows:

   a. Open the appropriate **Redundancy** list and select the input mode required. The redundancy schemes are listed in table *Table 3–2* on page 31. You can select either of the following:
   Off (Independent)
   Hot-Standby

   b. If **Manual** redundancy is used, select the port to be Primary or Backup.

   c. In the **Advanced** section, select the **Card Ports Mode.** You can select either of the following:
   Port 1 + 2: 1 Gbps
   Port 2: 10 Gbps

   Note the following regarding port redundancy:

   - By default, port 1 is the primary port and port 2 of the same IOM module is the backup port.
   - Triggers for a port redundancy switch include: *Missing PID*, *Zero Bitrate* (*Cable Disconnect*, *Socket Loss), PAT/PNT Missing, CC Error.*

   The following table lists the redundancy modes supported:

Table 3–2: GbE Input Redundancy scheme

Parameter	Explanation
Manual	The redundancy switch is performed manually. The **Active Port** parameter appears and you can set the active port.
Automatic	The redundancy switch is performed automatically upon port failure. Once the primary is faulty, the device automatically switches to the backup port and continues receiving content over this port unless it is faulty. The device switches to the primary port only when the backup fails.

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Table 3–2: GbE Input Redundancy scheme

Parameter	Explanation
Manual Revert	The redundancy switch is performed automatically upon port failure. However, switching back to the primary, when fixed, is performed manually. To revert back to the primary port, you should change the Port Usage to Automatic. Once the primary port is active, change Port Usage to Manual Revert.
Automatic Revert	The redundancy switch is performed automatically upon port failure. However, the device automatically switches to the primary when the primary has stabilized and even though the backup is still in order. The baseline is that the primary is preferred.

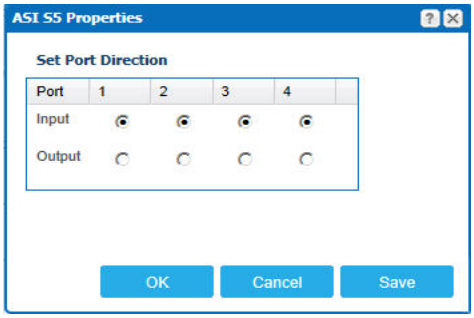
Configuring Input ASI Cards

NOTE: Prior to configuration, define whether the ASI port is an input or output port.

To configure Input ASI cards:

1. In the **Physical Inputs** pane, right-click a slot with a ASI card > **Properties**.

   The ASI **Properties** dialog appears.

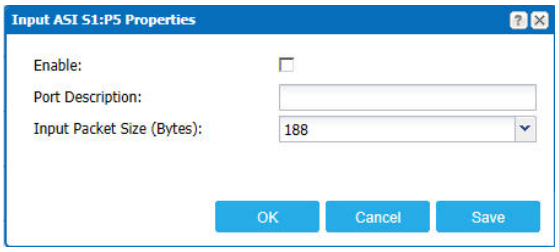


2. Select the required direction. See also ‘See *Viewing/Setting Card Parameters* on page 24. By default the port is an input port.

Configuring Input ASI Ports

To configure Input ASI Ports:

1. In the **Physical Inputs** pane, right-click an ASI port and select **Properties**.



2. To enable the port, select **Enable Port**.

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TIP: Enable the port only once port configuration is complete.

3. In **Description**, edit the default description.
4. In **Packet Size**, select the required packet size.

   You may select 188 (default) or 204 or Auto. In the latter, the ProStream automatically detects the packet size.

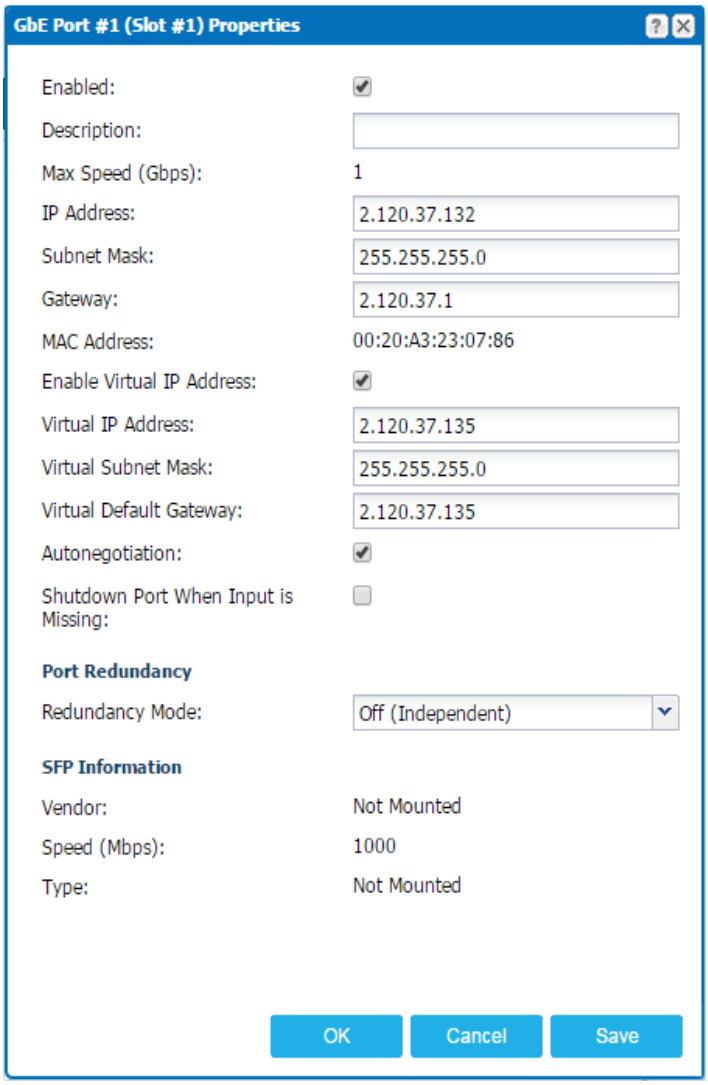
   In case of scrambling over ASI, you may select 188 (default) and 204 only.

Configuring Input GbE Ports

To configure Input GbE Ports:

1. In the **Physical Inputs** pane, right-click a slot with a GbE card and select **GbE Port** > **Properties**

   The **GbE Port Properties** dialog appears:.



2. To enable the port, select **Enable Port**.

TIP: Enable the port only once port configuration is complete.

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3. In **Description**, edit the default description.
4. Configure and view the port parameters according to the following:
   - Max Speed (Gbps) - view the maximum speed of the port, whether 1 Gbps or 10 Gbps
   - IP Address - type in the required IP address.
   - Subnet Mask - type in the required subnet mask.
   - Gateway - type in the IP address of the gateway.
   - MAC Address - (Read only) view the physical address of the GbE as retrieved from the device.
5. Select Enable Virtual IP address to enable this function. When selected, enter:
   - Virtual IP Address
   - Virtual Subnet Mask
   - Virtual Default Gateway

NOTE: T Virtual IP Address is available only for 4 GbE cards not in Hot:Hot redundancy mode.

6. Select Autonegotiation to engage this handshake protocol used in GbE links.

TIP: Select Auto Negotiation only if the other end of the GbE link also uses autonegotiation.

7. Select Shutdown Port when Input is Missing to shift the port automatically to Link Down when no stream is detected at the port.

NOTE: Once a stream is detected, the port automatically shifts to Link Up.

8. Choose the Port Redundancy mode. See *Setting the GbE Port Mode* on page 31.
9. If using ports 3 or 4, select Loopback.
10. The following Port SFP information is displayed in read-only format on ports 1 and 2:
    - SFP Vendor
    - SFP mode
    - SFP type - can be either SX - usually used for short distances (up to 200 m) or LX - usually used for long distances (10km and up).
11. Click **Save** to save the new configuration.
12. Click **OK** to save and close the dialog.

Socket Configuration

Content transmission of Video-over-IP utilizes sockets. Each socket is a terminal for a TS. The socket is defined by a unique combination of destination IP address and UDP port.

You may add up to 128 sockets with up to eight MPTS (Multi Protocol Transport Services) sockets. Each MPTS socket may stream up to 32 services.

NOTE: To change socket type (SPTS, MPTS), delete the socket and reconfigure with the new socket type.

You may add sockets either one by one or multiple sockets in one step. In addition, you may delete sockets at any time.

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Socket IP Address

When defining the IP address of a socket, follow the information provided below:

Table 3–3:

Type	Class	Available Range
Unicast	A	1.0.0.0 - 126.255.255.255
Unicast	B	128.0.0.0 - 191.255.255.255
Unicast	C	192.0.0.0 - 223.255.255.255
Multicast	D	224.0.0.0 - 239.255.255.255

NOTE: The following reserved ranges should not be used:
reserved 224.0.0.0 - 224.0.0.255,
reserved for administration 239.0.0.0 - 239.255.255.255

Adding a Socket

To add a socket:

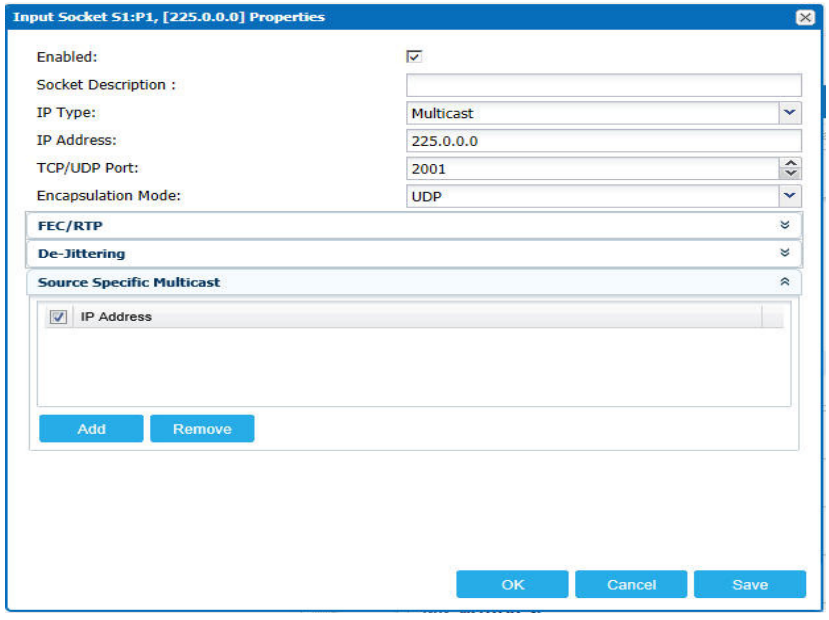
1. In the **Physical Inputs** pane, right-click a slot with a GbE card and select **GbE Port** > **New Socket**.
2. To configure the socket, see following section.

Configuring a Socket

To configure a socket:

1. In the **Physical Input** pane, right-click the required socket and click **Menu**.
2. From the menu select **Properties**.

   The **Input Sockets Properties** dialog appears:



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NOTE: This dialog is furnished with horizontal and vertical scroll bars. To view the vertical scroll bar, scroll the horizontal one to the right-most side of the dialog. Scroll the horizontal one to view all configured sockets.

3. To enable the socket, click **Enable**.
4. Socket Description - enter a description of the socket to easily identify the socket.
5. IP Type - open the list to select whether a unicast or a multicast IP address.
6. IP Address - enter an IP as explained in *Socket IP Address* on page 35.
7. Port - enter a port number. The available range is 1- 65535.
8. Encapsulation Mode - select one of the following:
   - UDP - according to the transmitter/receiver
   - RTP - according to the transmitter/receiver. If FEC is used, select RTP
   - HRTP - to receive a socket encapsulated in Harmonic RTP to allow connection between ProStream 9000 devices.
   - TCP - Input only. It applies to data with low rate that is transmitted over TCP
   - DToIP -
9. FEC - relates to the extra data that is sent on a separate socket(s) and includes the number of rows and columns to be calculated. Higher number of rows and columns, yields a higher overhead and a better error correction ability. Define the FEC parameters as follows:
   - No FEC
   - Pro-MPEG Annex B/SMPE 2022 Annex C
10. De-Jittering
    - De-Jittering Mode - open the list and select one of the following:
      No De-Jittering
      CBR
      VBR
    - Delay - Applies to No De-Jittering. Select the required delay in ms. For CBR and VBR the delay is set to 500 ms.
    - Average Input Bitrate (Mbps) - Applies to No De-Jittering. Select the required average input bitrate.
11. Source Specific Multicast - you can add specific multicast source for the input. You can manage the list with the **Add** and **Remove** buttons.

Adding a Socket or Multiple Sockets

The following table lists the available methods for adding a socket:

Table 3–4: Adding a Socket

Button	Explanation
Increment IP	Adds a single socket with the last socket configuration with an incremented IP address
Increment Port	Adds a single socket with the last socket configuration with an incremented port number
Range	Adds a range of sockets

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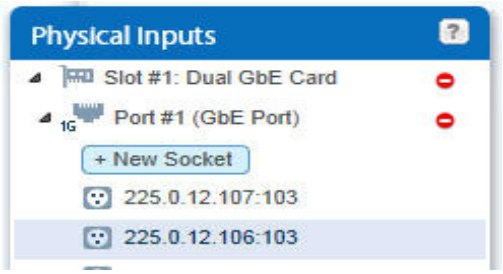
To add a socket:

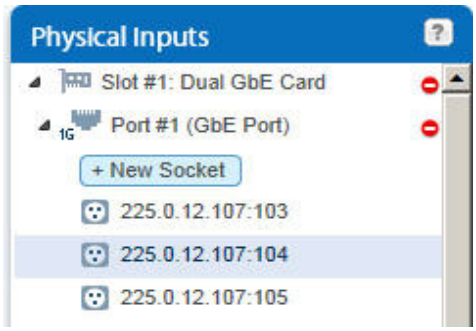
1. In the **Physical Input** pane, right-click the required socket and click **Menu**.
2. Add by incrementing IP - From the menu select **Duplicate > Increment IP**.

   A socket is added with incremented IP.

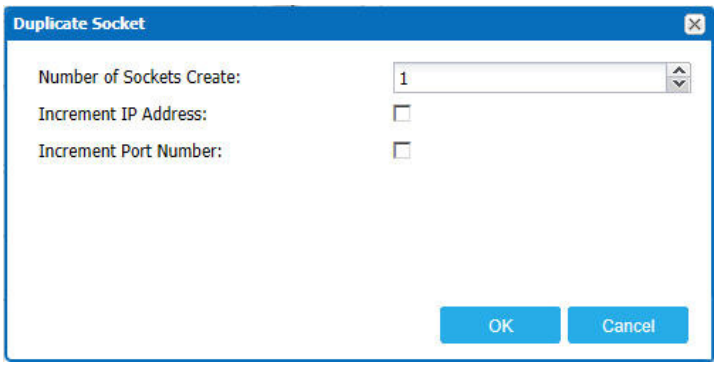


3. To add by incrementing a port - From the menu select **Duplicate > Increment Port**.

   A socket is added with incremented Port.



4. To add by adding a range - From the menu select **Duplicate** > **Range**.



- Number of Sockets Create - select the number of sockets to create
- Increment IP Address - check if the range is with incremented IP address
- Increment Port Number - check if the range is with incremented port number

Input Information (Extraction)

Both **Physical Input** and **Logical Input** panes provide information on the input stream.

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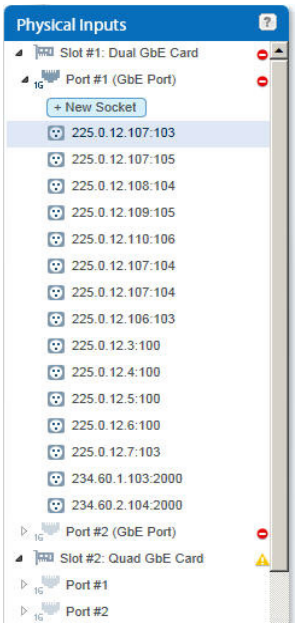
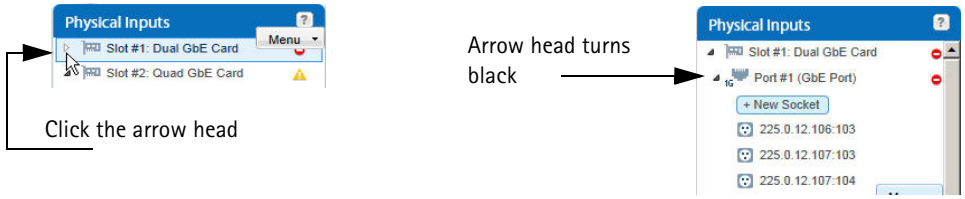
Physical Input Pane

The **Physical Input** section provides a general view of the input stream and you may drill down any physical input component, slot, card, port to view the components. The following picture shows drilled down physical inputs. The Physical Input section also indicates the slot number and type of mounted card.



To drill down a component:

- Click, the arrow head next to the required component.



The arrow head turns black and points towards the exposed components.

Logical Input Pane

The physical input pane shows the input streams that are carried by each port listed in the Physical Inputs pane. The streams in the Logical Inputs pane can be added to the TS programs in the Logical Outputs pane. There are three view options:

- Program View
- Table View

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- PID View

Each transport stream is represented in an expandable panel. The panel header shows:

- The TS name.
- The source IP address.
- The total bandwidth in Mbps.
- Alarm indicator when any element in the TS has an alarm state.

Expand each TS panel to view:

- Each program carried in the TS.
- The elementary streams in each program.
- The unreferenced PIDs.
- Alarm indicator for the individual ES and the program that carries it.

Customize the view to configure programs, tables, or PIDs. The default view is Program view. In any view you can right-click on any object to see the drop-down menu options as the following sections explain.

TS Extraction

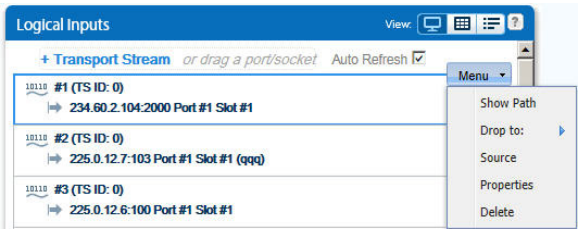
In the Logical Inputs pane, open the drop-down menu and select one of the following options:

- Show Path - the Physical Inputs pane is updated to show the path of the TS
- Drop to: - enables you to move to the required logical output
- Source - shows the input source in the Physical Inputs pane
- Properties - open the Properties page. See
- Delete - allow to delete the TS

Show Path

To show the path:

1. In the Logical Inputs pane, hover over the TS section until the Menu icon appears.
2. To open the menu, click the arrow-head and select Show Path.



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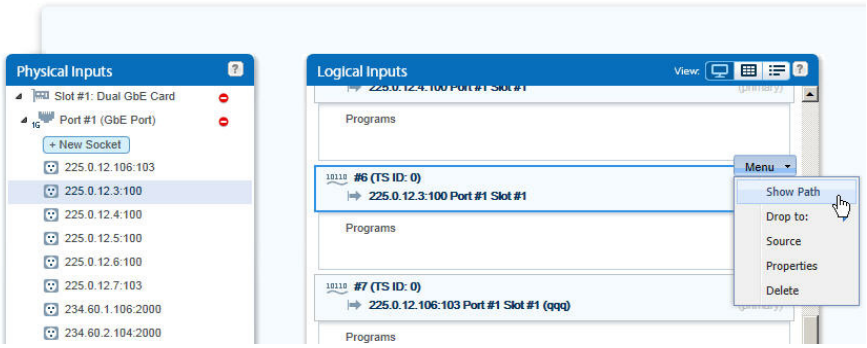
The Physical Input pane is updated to show the path of the TS:

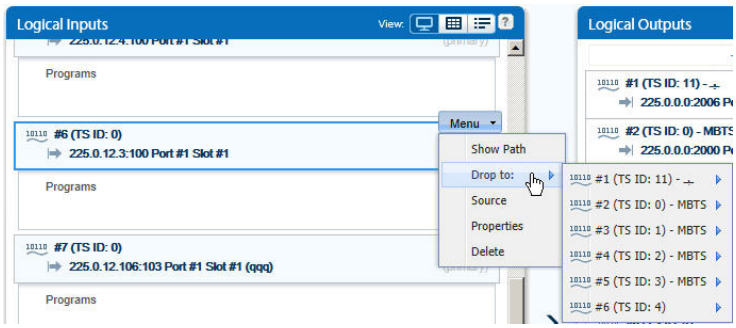


Moving the TS to an Output

To move the TS to an Output:

1. In the Logical Inputs pane, hover over the TS section until the Menu icon appears.
2. To open the menu, click the arrow-head and select **Drop To.**

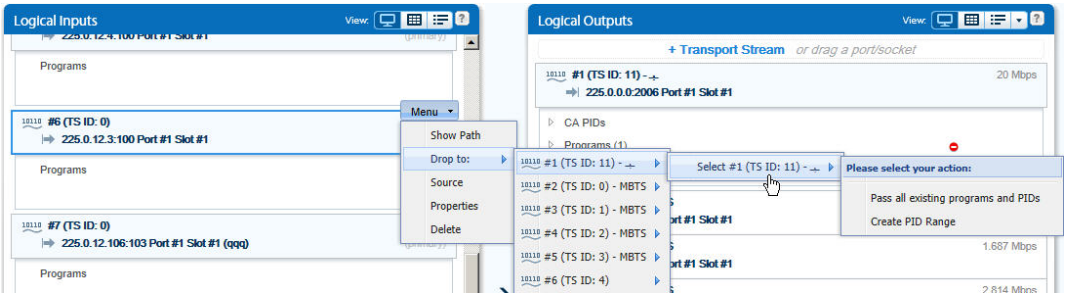
   A menu with the available logical output TSs appears:.



3. Select the required output TS.

   The Logical Output pane is updated to show the logical output TS. Once you select it, a menu appears and you can select either of the following:

   - Pass all Existing programs and PIDs
   - Create PID range



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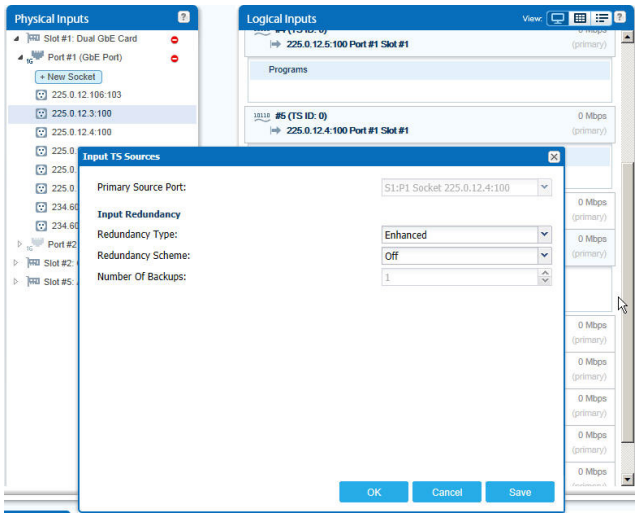
Source

To configure the source of the TS:

1. In the Logical Inputs pane, hover over the TS section until the Menu icon appears.
2. To open the menu, click the arrow-head and select **Source**.



- The Physical Inputs pane shows the physical input of the TS.
- The Input TS Sources dialog appears.

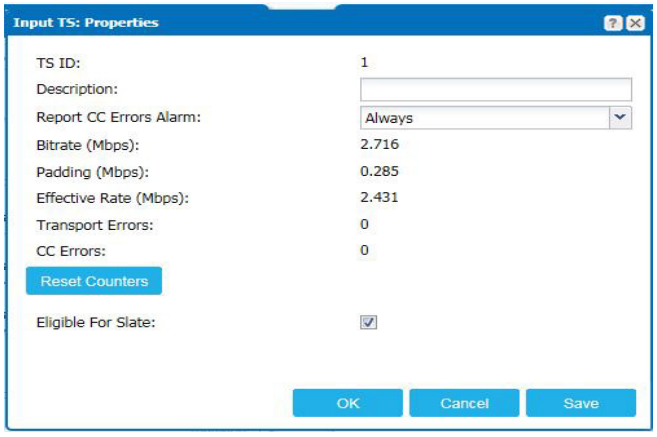
a. Primary Source Port - view the primary source port

b. Configure the input redundancy. See *Input TS Protection* on page 46.

TS Properties

To configure the transport stream properties:

1. In the Logical Inputs pane, hover over the TS section until the Menu icon appears.
2. To open the menu, click the arrow-head and select **Properties**.



3. TS ID - view the TS ID.
4. Description - enter a short description.

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5. Report CC Errors Alarm - Whether to show Continuity Counter errors, select one of the following options:
   Always
   Never
   Passed through PIDs
6. Bitrate - view the bitrate of the TS
7. CC Errors - view the number of CC errors
8. Click to reset counters.
9. Check the Eligible for Slate box to make a TS available for Slate configuration.

Program Extraction

To configure program extraction:

1. In the Logical Inputs pane, select the required program and open the drop-down menu.
2. Select one of the following options:

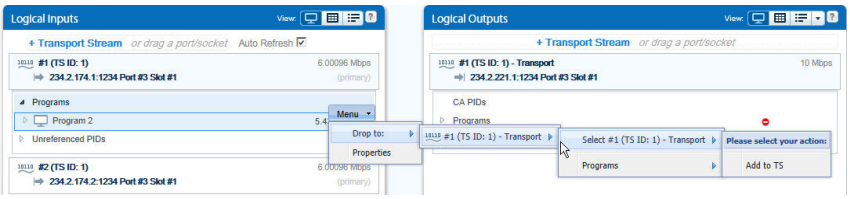
- Drop to: - enables you to move to the required program to logical output
- Properties - open the Properties page. See *Program Properties* on page 42.

Moving the Program to an Output

To move a program to an output:

1. In the Logical Inputs pane, hover over the required program section until the Menu icon appears.
2. To open the menu, click the arrow-head and select **Drop To.**

   A menu with the available logical output TSs appears:



3. Select either of the following:
   - **TS** > **Add to TS**. The program moves to the required output TS.
   - Programs > Select Programs > Either create a new output program or select an existing program > Create RSS (Reference program).

Program Properties

To view program properties:

1. In the Logical Inputs pane, hover over the required program section until the Menu icon appears.

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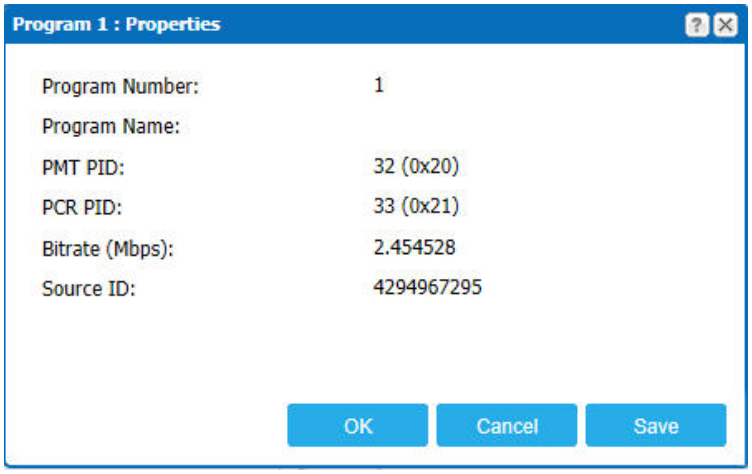
2. To open the menu, click the arrow-head and select **Properties**.



3. View the following:

Table 3–5: Program Extraction

Parameter	Explanation
Program Number	The program identification number.
Program Name	The program name as extracted from the Service Description Table (SDT).
PMT PID	The PID over which the service's PMT (Program Map Table) is transmitted.
PCR PID	The PID of the service's PCR (Program Clock Reference).
Bitrate (Mbps)	The program bitrate
Source ID	A PSIP parameter

PID Extraction

To configure PID Extraction:

1. In the Logical Inputs pane, select the required PID and open the drop-down menu.
2. Select one of the following options:

- Show Path - allows to view the input source of the PID
- Drop to: - allows you to move to the required program to logical output
- Properties - open the Properties page. See

Moving the PID to an Output

To move a PID to an output:

1. In the Logical Inputs pane, select the required PID until the Menu icon appears.
2. To open the menu, click the arrow-head and select **Drop To.**
3. Select TS > Add to TS. The PID moves to the required output TS.

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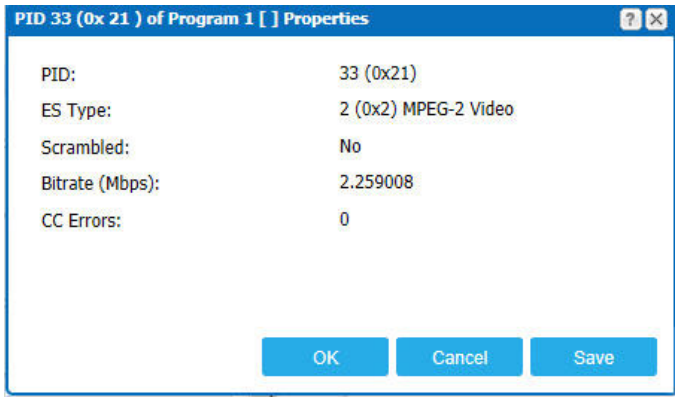
PID Properties

To view PID Properties:

1. In the Logical Inputs pane, select the required PID.
2. To open the menu, click the arrow-head and select **Properties**.



3. View the following:

Table 3–6: PID Extraction

Parameter	Explanation
PID	Indicates the PID number
ES Type	The type of data carried over a specific elementary stream This parameter does not apply to ghost PIDs or ECMs.
Language	Applies to audio PIDs. Indicates the language.
Scrambled	Indicates whether scrambled
Bitrate	Indicates the bitrate of the PID
CC Errors	Indicates the number of CC errors
CA System ID	Applies to ECMs. Indicates the 16 bit CAS vendor ID.

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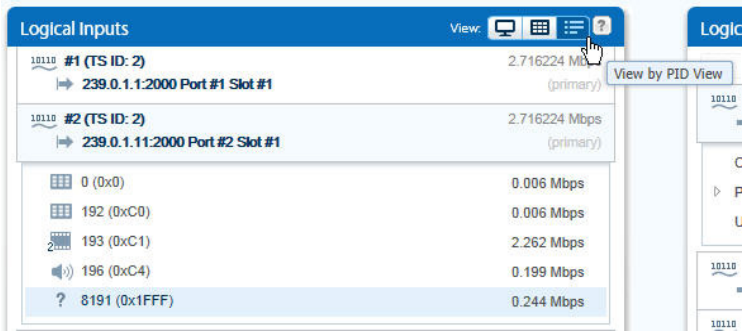
Working in PID View

You can view the PIDs associated with the TS by shifting to the PID view.



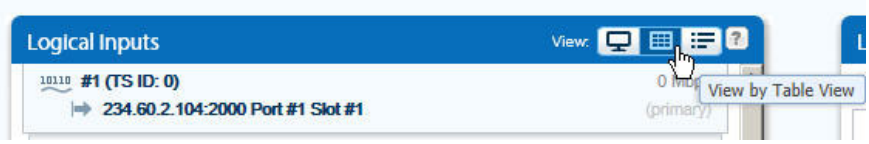
To shift to PID view:

1. In the Logical Inputs pane, shift to the PID view.
2. Select the required TS.

   The PIDs associated with the TS appear.

Tables Extraction

Table extraction is available via the Table view.



To view Table extraction:

1. In the Logical Inputs pane, shift to the Table view.
2. Select the required TS.

   The tables associated with the TS appear.

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3. Click the required table and view the following:

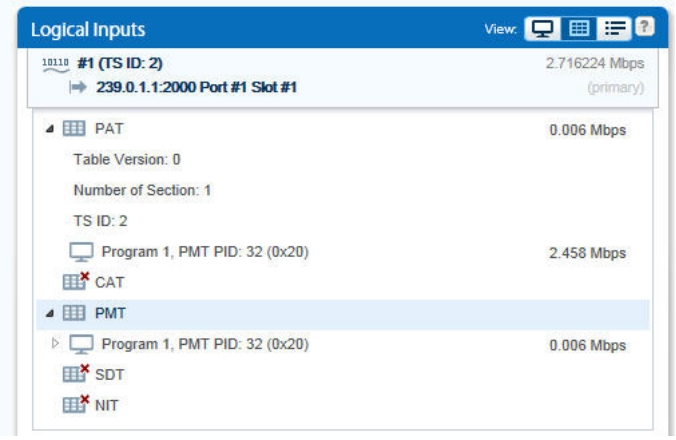

Table 3–7: Table Extraction

Parameter	Explanation
Table Version	Indicates the table version
Number of Section	Indicates the number of section
TS ID	Indicates the TS ID the table is associated with.
Program #, PMT PID #	Indicates the program number and PMT PID the PAT table is associated with

Input TS Protection

ProStream 9000 supports the following input TS protection:

- Enhanced TS protection - The input TS protection, allows any to any source redundancy. For any input, you can configure up to five backup TS or port sources across all input modules. For example, ASI port redundant to IP socket, ASI receiver redundant to IP socket, etc'.

  Backup sources are prioritized from 1 - highest to 5 - lowest. Upon redundancy switch the device always tries to switch to the highest priority source which is in order.
- Input GbE or socket protection. For input TS over a GbE port, socket redundancy is also available. If, TS protection is enabled, only TS protection is available and other internal platform redundancy types are not available.

Configuring TS protection includes the following stages:

- Configuring a primary and a backup source, TS (socket) or port.

  For Enhanced protection:
  Backup should have the same content as the primary TS.
  You can define a backup source on the same port as the primary if over IP, or on a different port and on a different IOM module.

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For socket:
You can define a backup source on the same port as the primary if over IP, or on a different port and on a different IOM module.

- Selecting the required redundancy mode.

The following table lists the available modes:

Table 3–8: Input TS Redundancy modes

Parameter	Explanation
Off	No redundancy is required
Manual	The redundancy switch is performed manually
Automatic	The redundancy switch is performed automatically according to the predefined triggers. The device automatically switches between primary and backup according to their activation status and backup priority. Switching from the active one to the none active occurs upon failure of the active one and while the none active is in order. Once primary source is fixed, the device does not revert to the primary as in Automatic Revert. Backup will remain active and it's redundant source will be the primary once it is fixed.
Manual Revert	The redundancy switch is performed automatically according to the predefined triggers. The device automatically switches between primary and backup according to backup activation status and backup priority. However, switching back to the primary, when fixed, is performed manually.
Automatic Revert	The redundancy switch is performed automatically according to the predefined triggers. However, the device automatically switches to the source with the higher priority when the source is stabilized and even though the source with lower priority is still in order. The baseline is that the higher priority and primary are preferred. For each trigger you can define the stabilized time. See *Table 3–10 on page 50*.

- Defining redundancy triggers per TS. When the source flows in over an 8VSBS, the triggers are limited to Source Not Active.
- In case you select **Automatic revert**, configure stabilization time per redundancy trigger.

NOTE: For related alarms, see *Troubleshooting* on page 202.

Configuring Redundancy for Input TS – Manual Mode

To configure redundancy for input transport streams in manual mode:

1. Open the device browser and login. See *Logging into the Device* on page 12.
2. Select the **Logical Input** pane.
3. From the TS **Menu** drop-down list select Source.
4. To set redundancy, focus on **Input Redundancy** section.

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5. For GbE inputs, do the following, otherwise proceed to Step 6. Open the **Redundancy Type** list and select one of the following:
   Enhanced Redundancy
   Socket redundancy
6. Open the **Redundancy Scheme** list and select **Manual**.
7. Open the **Number of Backups** list and select the required number of backups. You can select up to five backup sources. **Backups** section is updated according to the number of backups.
8. The **Active Port** list is currently populated with Primary only. Once you define backup sources, it is populated with these sources as well. Open it and select the required active port. You should use this option once the primary active port has failed.
9. Click **Apply**.

Configuring Redundancy - Automatic Mode

When selecting the Automatic mode, configure the triggers for the redundancy switch.

By default, the alarm *Source Not Active* is always a trigger. You can view the elapsed time between detecting a problem in the input port and raising the *Source Fail* alarm. To configure this threshold, see *Table 3–9* on page 49.

For other triggers, define whether to activate them as triggers for the redundancy switch and the threshold for the redundancy switch.

The Bitrate Underflow and the Scrambled A/V triggers raise an alarm only when they are enabled triggers.

To configure redundancy Automatic mode:

1. Open the device browser and login. See *Logging into the Device* on page 12.
2. Select the **Logical Input** pane.
3. From the TS **Menu** drop-down list select Source.
4. To set redundancy, focus on the **Input Redundancy** section.
5. For GbE inputs, do the following, otherwise, proceed to Step 6. Open the **Redundancy Type** list and select one of the following:
   Enhanced Redundancy
   Socket redundancy
6. Open the **Redundancy Scheme** list and select **Automatic**.
7. Open the **Number of Backups** list and select the required number of backups. You can select up to five backup sources. The **Backups** section is updated according to the number of backups.
8. The **Active Port** list is currently populated with Primary only. Once you define backup sources, it is populated with these sources as well. Open it and select the required active port.
9. **MPEG Sync Loss (Socket Failure)** is selected by default. Click **MPEG Sync Loss (Socket Failure)**. In **Event Duration (sec)**, enter the required threshold time in seconds.

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10. For each trigger, enable/disable it and if enabled, set the threshold time in seconds. The following table lists the available triggers and provides important information per trigger:

Table 3–9: TS Protection – Triggers for TS Redundancy

Trigger	Explanation
CC Err	Default threshold is 60 seconds and default number of errors is 4. For example, if during 60 seconds four counter errors occurred, a redundancy switch takes place.
PAT Missing	Default threshold is 2 seconds.
PMT Missing	This trigger requires also PAT missing as a trigger.
PIDs Bitrate Underflow	Default threshold is 5 seconds. If for five seconds, the bitrate is lower than the minimum expected bitrate, a redundancy switch will take place.
Scrambled A/V	Based on Scrambling Counter Bits for the routed A/V PIDs only.

11. Click **Apply**.

Configuring Redundancy – Manual Revert Mode

When selecting the Manual Revert mode, configure the triggers for the redundancy switch.

After a redundancy switch, if you wish to revert to the primary socket, change the mode to Manual and revert, as explained below.

To configure redundancy manual revert mode:

1. Open the device browser and login. See *Logging into the Device* on page 12.
2. Select the **Logical Input** pane.
3. From the TS **Menu** drop-down list select Source.
4. To set redundancy, focus on the **Input Redundancy** section.
5. For GbE inputs, do the following, otherwise proceed to Step 6.

   Open the **Redundancy Type** list and select one of the following:
   Enhanced Redundancy
   Socket redundancy
6. Open the **Redundancy Scheme** list and select **Manual Revert**.
7. Open the **Number of Backups** list and select the required number of backups. You can select up to five backup sources. **Backups** section is updated according to the number of backups.
8. The **Active Port** list is currently populated with Primary only. Once you define backup sources, it is populated with these sources as well. Open it and select the required active port.
9. **MPEG Sync Loss (Socket Failure)** is selected by default. Click **MPEG Sync Loss (Socket Failure)**. In **Event Duration (sec)**, enter the required threshold time in seconds.
10. For each trigger, enable/disable it. See *Table 3–9 on page 49*. If trigger is enabled, set the threshold time in seconds. See *Table 3–10* on page 50.
11. Click **Apply**.

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12. Following a redundancy switch, to revert back to primary, or any backup source, open the open the **Redundancy Scheme** list and select **Manual**.
13. Open the **Activate** list and select **Primary**.

Configuring Redundancy - Automatic Revert Mode

Define for each trigger whether to activate it as triggers for the redundancy switch and the threshold for the redundancy switch.

When selecting the Automatic Revert mode, you need also to configure stabilization time. The stabilization time should be bigger than the configured failover time.

To configure redundancy Automatic Revert mode:

1. Open the device browser and login. See *Logging into the Device* on page 12.
2. Select the **Logical Input** pane.
3. From the TS **Menu** drop-down list select Source.
4. To set redundancy, focus on **Input Redundancy** section.
5. For GbE inputs, do the following, otherwise proceed to Step 6. Open the **Redundancy Type** list and select one of the following:
   Enhanced Redundancy
   Socket redundancy
6. Open the **Redundancy Scheme** list and select **Automatic Revert**.
7. Open the **Number of Backups** list and select the required number of backups. You can select up to five backup sources. **Backups** section is updated according to the number of backups.
8. The **Active Port** list is currently populated with Primary only. Once you define backup sources, it is populated with these sources as well. Open it and select the required active port.
9. **MPEG Sync Loss (Socket Failure)** is selected by default. Click **MPEG Sync Loss (Socket Failure)**. In **Event Duration (sec)**, and do the following:
   a. In **Event Duration (sec)**, enter the required threshold time in seconds.
   b. In **Revert When Error Condition is Off for (sec)**, enter the required time for the error to be off and to revert to primary.
10. For each trigger, enable/disable it. See *Table 3–9 on page 49*. If trigger is enabled, set the threshold time in seconds. See *Table 3–10* on page 50.
11. For each trigger, if enabled, set the required time for the error to be off and to revert to primary (stabilization time) as the following table lists:

Table 3–10: TS Protection - Stabilization Time

Trigger	Parameter Name	Explanation
CC Err	CC Error Auto Revert	Default stabilization time is 2 seconds and default number of errors is 1. For example, if during 2 seconds 1 counter error did occur, automatic revert takes place.
PAT Missing	PAT/PMT Auto Revert	Default stabilization time is 2 seconds.
PMT Missing	PAT/PMT Auto Revert	

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Table 3–10: TS Protection – Stabilization Time

Trigger	Parameter Name	Explanation
PIDs Bitrate Underflow	Bitrate Auto Revert	Default stabilization time is 2 seconds.

12. Click **Apply**.

What's Next

Once you have completed the input configuration, move to *Output Configuration* on page 52.

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Chapter 4
Output Configuration

Configuring Output Ports and Provisioning the ProStream

The procedure of configuring the output ports and of provisioning the ProStream includes several stages. The order in which you perform these stages varies according to the output port. However, the essential stage is provisioning the device.

Defining Broadcasting Networks

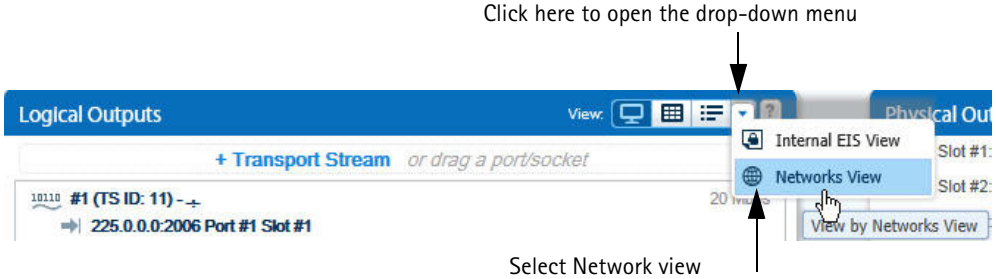
To organize the broadcasting devices, define the networks and later on associate TSs to the networks required. A network may include the following types of TSs:

Local TS - the TS is transmitted by the device you are currently configuring

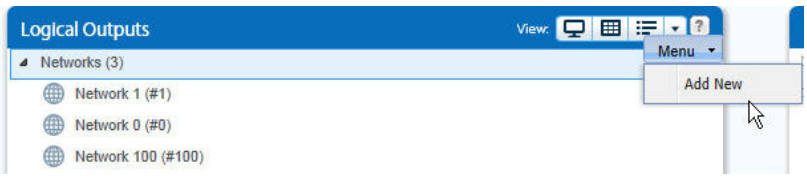
External TS - the TS is transmitted by another device, yet it belongs to one of the networks of your device. If a NIT table is generated for the network, the NIT also points to the external TSs.

To define networks:

1. Open the web client of the device.
2. Select the **Configuration** page.
3. Focus on the **Logical Outputs** pane.
4. Click the arrow-head in the title bar of the **Logical Outputs** pane to open a drop-down menu.



5. Select **Network View** and see that the **Logical Outputs** pane is updated to show all existing networks.
6. To add a network, select Network (#) and from the drop-down menu select Add New.



7. Select the required network from the drop-down menu.
8. Select either of the following:
   Properties - to configure the network properties
   Delete - to remove networks.

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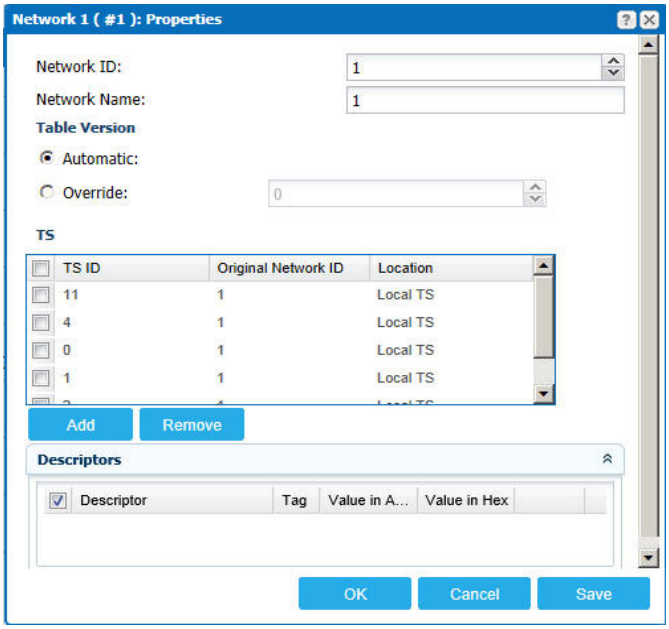
Configuring Network Properties

To configure network Properties:

1. Once you have selected **Properties** as instructed in step 7, the **Network# Properties** dialog appears.



2. In **Network ID**, enter the required Network ID. You can enter any available network ID as long as this value is not as another network ID.
3. In **Network Name**, enter the required name.
4. To overwrite the NIT version, tick **Overwrite NIT version**. The **NIT Version** box is enabled.
5. In **Override** enter the required NIT version. For NIT descriptors, see *Provisioning the Output TS* on page 61.

TIP: Local TSs are associated with the network when configuring the TSs.

6. To add external TSs, click **Add.**

NOTE: The local TSs are added while configuring the TS. See *Provisioning the Output TS* on page 61.

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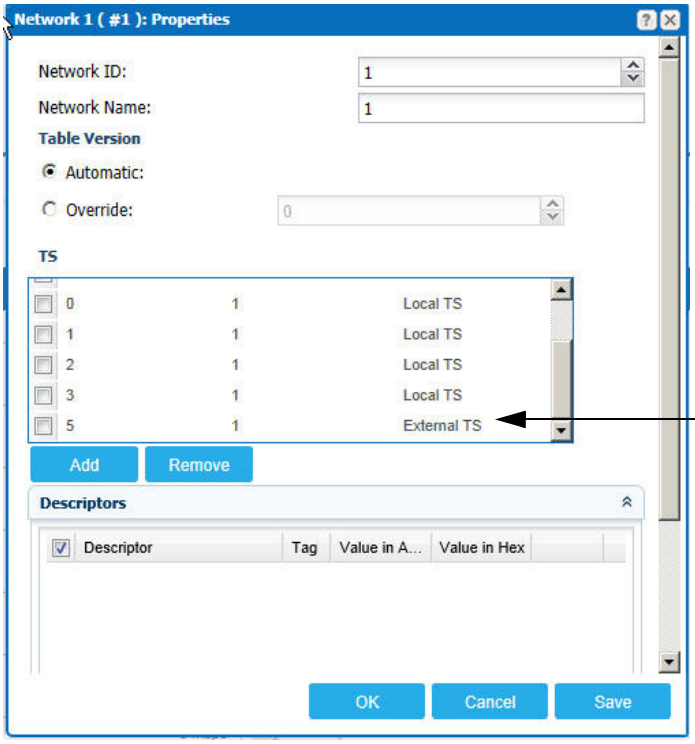

7. Enter the following information:

   TS ID - enter the required TS ID

   Original Network ID - enter the network ID of the originating delivery system.

   Location - view either of the following:

   - Local - the TS is transmitted by the device
   - External - the TS is transmitted by another device

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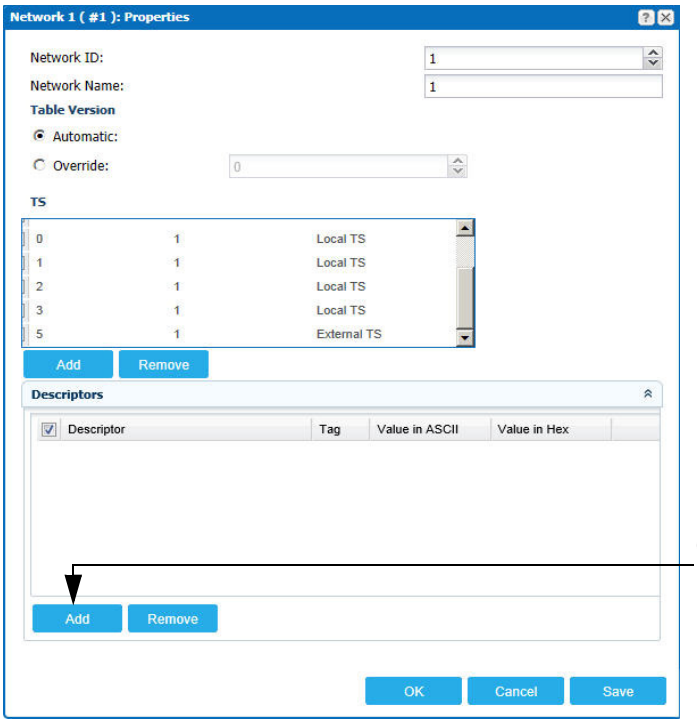
8. To add a network descriptor, click **Add** in the **Descriptor** section.



The **Edit Descriptor** dialog appears.

9. In the **Edit Descriptor** dialog Enter the following information:

   Descriptor - enter the descriptor type as defined by the DVB standard.

   Value in Hex- enter the value according to the SDV standard.

TIP: If the TS is transmitted with a NIT, the NIT points to both local and external TSs and the table includes all configured descriptors.

10. Click **OK**.

Configuring the Output Socket – GbE Output Port Only

To output streams via a GbE output port, configure the sockets first. A socket is a terminal for a TS. Each socket is defined by a unique combination of an IP address and UDP port.

You may add up to 128 sockets and add multiple sockets in one step. In addition, you may delete sockets at any time.

To add a socket:

1. In the **Physical Output** section, select a GbE port.

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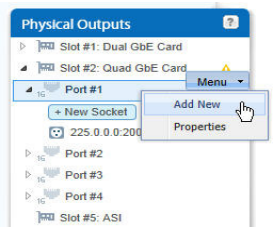
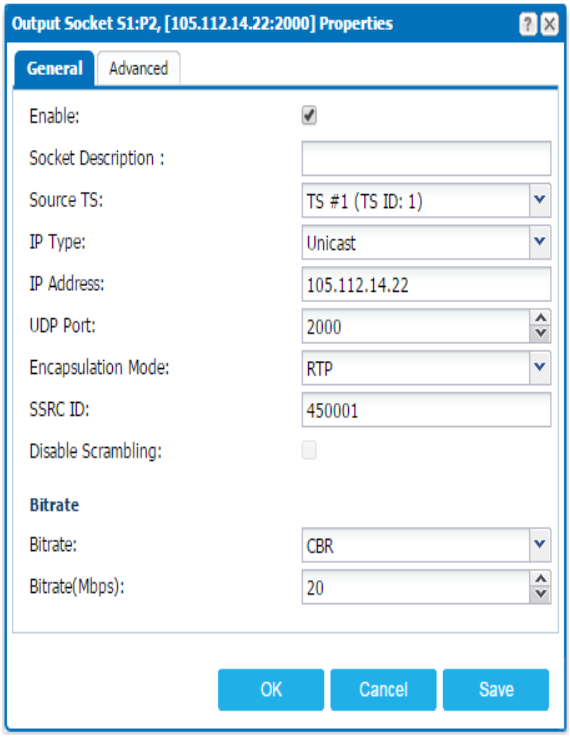
2. In the drop-down menu, select **Add New**.



A new socket is added to the port.

To configure a socket:

1. In the **Physical Output** section, select the required socket.
2. Select either of the following:
   - New socket - click the new socket to open the Socket Properties dialog.
   - Existing socket - In the drop-down menu, select **Properties**.



3. Configure the socket as follows:
   - **Enable** - select to enable the socket.
   - **Socket Description** - enter a short description that identify the socket.
   - **Source TS** - The list is populated with the incoming TSs. Select the required incoming TS.
   - **IP Type** - open the list and select whether the IP is Unicast or Multicast.
   - **IP Address** - the IP address of the socket. type in the destination IP address according to

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the following table:

Table 4–1: Destination IP Address

Type	Class	Available Range
Unicast	A	1.0.0.0 - 126.255.255.255
Unicast	B	128.0.0.0 - 191.255.255.255
Unicast	C	192.0.0.0 - 223.255.255.255
Multicast	D	224.0.0.0 - 239.255.255.255

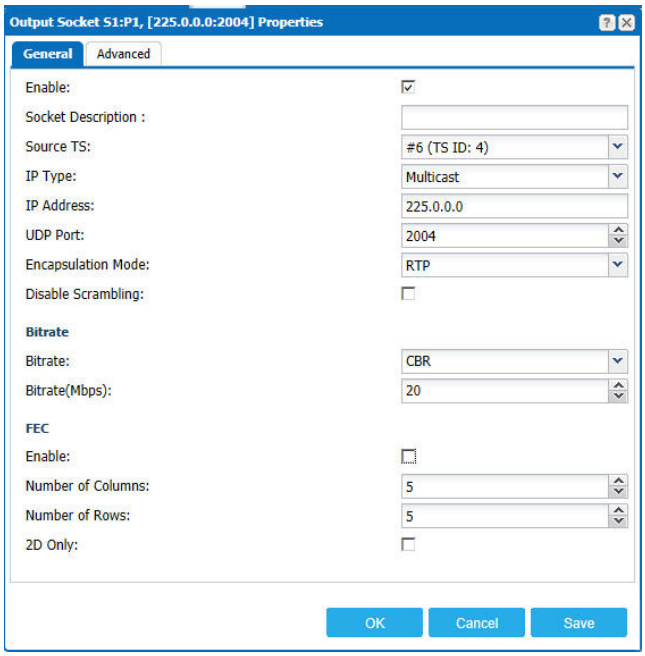
NOTE: The following reserved ranges should not be used:
reserved: 224.0.0.0 - 224.0.0.255,
reserved for administration: 239.0.0.0 - 239.255.255.255

- **UDP Port** - the UDP port to listen on. The available range is 1- 65535.

TIP: You can sort IP/UDP columns by double clicking the columns headings.

Encapsulation Mode - select either of the following:

- UDP - according to the transmitter/receiver
- RTP - according to the transmitter/receiver. If FEC is used, select RTP. The FEC section appears:



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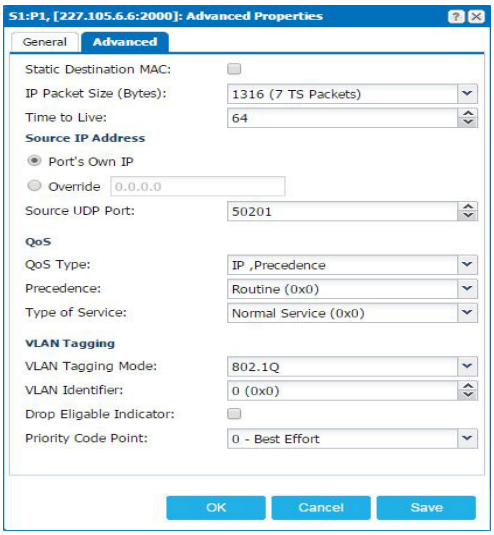
4. **Focus on the FEC** section. FEC (Forward Error Correction) requires extra data for detecting and correcting the errors. The extra data is sent on a separate socket(s) and includes the number of rows and columns to be calculated. Higher number of rows and columns, yields a higher overhead and a better error correction ability. Define the FEC parameters as follows:

Table 4-2: FEC Parameters

Parameter	Explanation
Enable	Select to apply FEC
Num of Col	Enter the number of columns to be calculated
Num of Row	Enter the number of rows to be calculated
2D Only	Select to enable the 2 dimensional Forward Error Correction option, that is the calculation includes columns only.

5. If RTP is used for the encapsulation mode, an **SSRC ID** between 0 and 4294967295 can be entered.
6. **Disable Scrambling** - generates a clear TS at the output.
7. Focus on the **Bitrate** section and configure the following:
   - Bitrate - The bitrate mode of the output TS. Options are:
     CBR
     VBR with No Null Padding - VBR without added null PIDs to maintain the bitrate
   - Bitrate (Mbps) - the required bitrate in Mbps of the output TS.
8. To configure advanced parameters, select the **Advanced** tab.



9. To configure, continue according to the following steps:
10. **Static Destination MAC** - select to use a static MAC address as the transport's primary destination. when Static Mode is enabled, enter the Static MAC of the destination port of the TS.

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11. **IP Packet Size (Bytes)** - Open the IP Packet Size and select the IP packet size ranging from 188 - 1316 bytes. The packet size is derived from the number of MPEG packets that are packed in a single IP packet, as indicated in the following table:

Table 4–3: IP Packet Size

IP Packet Size	MPEG Packet
1316	7
1128	6
940	5
752	4
564	3
376	2
188	1

NOTE: The larger the IP packet size is, the more MPEG packets it carries and the overhead is smaller.

12. **Time to Live** - select the TLL for this IP datagram.
13. Focus on **Source IP Address** and configure according to the following:
14. **Port's Own IP** - select to set the packet source (sender) IP address as the IP address of the port.
15. **Override** - select to set the packet source (sender) IP address to a different IP address. Once selected, enter the required IP address.
16. **Source UDP Port** - select the packet source (sender) UDP port.
17. Focus on the **QoS** (Quality of Service) and configure according to the following steps:
18. To define the method to mark and classify packets, open the **QoS Type** list and select one of the following:
    - IP Precedence - The original standard used to classify and prioritize types of traffic. Select the values to make up the TOS with IP Precedence octet. The structure is shown here:

Table 4–4: Structure

	Precedence	TOS	Not Used
Bits	3	4	1
Default Value	Normal Service (0x0)	Routine (0x0)	

NOTE: The implementation used by Harmonic is described in RFC 1349.

    - DiffServ - TOS with (DSCP) Differentiated Services Code Point is a 6-bit field allowing more combinations and more routing behavior possibilities, such as PHB (per-hop forwarding behavior). For Class/Drop Probability, the first 3 bits are the class selector and the next 3 bits are drop probability. For Assured Forwarding, select AF11 to AF43. For

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Expedited Forwarding, select EF. The structure is shown here:

Table 4–5: EF Structure

	DiffServ Point	Not Used
Bits	6	2
Default Value	000000	00

NOTE: For definitions of these behavior settings, see RFC 2474, RFC 2597, RFC 2598.

- Free Entry - Allows entry of any binary value into the TOS field octet. This is included to provide complete flexibility for TOS field definition, as needed. For example, it can be used for proprietary TOS definitions, or in case another TOS paradigm is introduced.

19. To define the precedence option, open the **Precedence** list and select one of the following:
    - Routine (0x0)
    - Priority (0x1)
    - Immediate (0x2)
    - Flash (0x3)
    - Flash Override (0x4)
    - Critical (0x5)
    - Internetwork Control (0x6)
    - Network Control (0x7)
20. To define the type of service option, open the **Type of Service** list and select one of the following:
    - Normal Service (0x0)
    - Minimize Monetary Cost (0x1)
    - Maximize Reliability (0x2)
    - Maximize Throughput (0x4)
    - Minimize Delay (0x8)
21. To enable **VLAN Tagging**, do the following:
    a. Set VLAN Tagging Mode to 802.1Q
    b. Enter **VLAN** Identifier
    c. Check **Drop Eligible Indicator** if required
    d. Select the **Priority Code Point** from the drop-down list:

Integer	Key
0	Best Effort (Default)
1	Background
2	Excellent Effort
3	Critical Applications
4	Video, <100 ms latency and jitter

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Integer	Key
5	Voice, <10 ms latency and jitter
6	Internetwork Control
7	Network Control

Provisioning the Output TS

Provisioning the Output TS comprises the following procedures:

- Configure TS Properties
- Associate the TS with a network ID
- Define whether to scramble with a fixed key
- Determine which tables to create in the TS level. Available tables vary according to the port type that outputs the TS. See *Adding Tables to TS* on page 62.
- Set time zones, if broadcasting time offset information (TOT) is important. See *Configuring TOT* on page 75
- Decide whether to mirror the TS. See *TS Mirroring* on page 79.

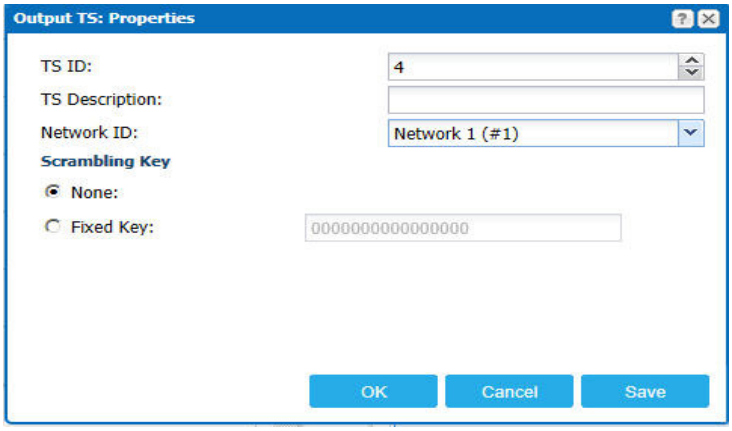
NOTE: The following instructions refer to TSs to be output over a GbE port or ASI port, unless indicated elsewhere.

- Add content to the TS. See *Adding Components to the TS* on page 62.

Configuring Output TS Properties

To configure output TS properties:

1. Select the required TS and from the drop-down menu select **Properties**.



2. In **TS ID**, enter the required ID number.
3. In **TS Description**, enter a short description of the TS.
4. To associate the TS with a network, open the **Network ID** list and select the network ID. The list is populated with the networks IDs defined during Network configuration. See *Defining Broadcasting Networks* on page 52.

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5. To enter a scrambling Key focus on **Scrambling Key**. The **Scrambling Key** section allows you to define whether you want to scramble the TS with a fixed key or not. You can select either of the following:

- None - No scrambling is required and the TS is output as a clear transport. In Fixed Key application, select this option on the Descrambler.
- Fixed Key - Select to allow scrambling each socket with a different key. It prevents mass de-scrambling by unauthorized viewers in the very rare cases that the keys are unveiled. In Fixed Key application, select this option on the Scrambler.

6. Click **OK**.

Adding Components to the TS

Prior to provisioning the TS, you can add the following:

- Program
- PID
- Injected EMM
- Injected ECM
- Passed EMM

You can also manage the table added to the TS. See *Adding Tables to TS* on page 62.

To add a component to the TS:

1. Select the required TS and from the drop-down menu select Add New.
2. Select one of the following:
   - Program - added under Program
   - PID - added under Unreferenced PIDs
   - Injected EMM - added under CA PIDs
   - Injected ECM - added under CA PIDs
   - Passed EMM - added under CA PIDs

See also *Adding Content to TS* on page 80.

Adding Tables to TS

To select the tables to configure for this transport:

1. In **Logical Outputs** pane, switch to Tables view.
2. Select the required TS and from the drop-down menu select **Properties**.

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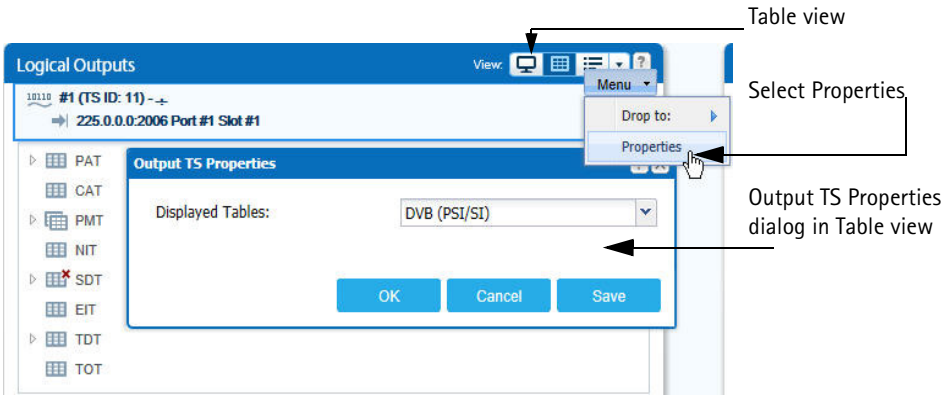
The **Output TS Properties** dialog appears:



3. Open the **Displayed Tables** list and select one of the following:
   - None - The device does not generate tables for this transport
   - MPEG (PSI) - PAT, CAT, and PMT tables
   - ATSC (PSIP) - Enables configuration of external PSIP table generation for this TS. (PAT, PMT, CAT, MGT, VCT, EIT and ETT). See
   - DVB (PSI/SI) - PAT, CAT, PMT, NIT, SDT, EIT, TDT and TOT.

The following table lists the tables, the tables available and references to step-by-step instructions:

Table 4–6: Table Reference Table

Table	Displayed Tables	Reference to Table Info.
PAT	■ MPEG (PSI) ■ ATSC (PSIP) ■ DVB (PSI/SI)	*Configuring PAT* on page 64
PMT	■ MPEG (PSI) ■ ATSC (PSIP) ■ DVB (PSI/SI)	*Configuring PMT* on page 64
CAT	■ MPEG (PSI) ■ ATSC (PSIP) ■ DVB (PSI/SI)	*Configuring CAT* on page 70
NIT	■ DVB (PSI/SI)	*Configuring NIT* on page 71
SDT	■ DVB (PSI/SI)	*Configuring SDT* on page 72
EIT	■ ATSC (PSIP) ■ DVB (PSI/SI)	*Configuring EIT* on page 74
TDT	■ DVB (PSI/SI)	*Configuring TDT* on page 75
TOT	■ DVB (PSI/SI)	*Configuring TOT* on page 75
MGT	■ ATSC (PSIP)	*Configuring MGT* on page 77
VCT	■ ATSC (PSIP)	*Configuring VCT* on page 77

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Table 4–6: Table Reference Table

Table	Displayed Tables	Reference to Table Info.
EIT	■ ATSC (PSIP)	*Configuring EIT in ASCT (PSIP) Mode* on page 78
ETT	■ ATSC (PSIP)	*Configuring ETT* on page 78

Configuring PAT

You can create a Program Associated Table that contains the PMT PIDs of all services included in the TS. The version control of the PAT is per TS.

To configure a PAT:

1. In **Output TS Properties** select one of the following:
   MPEG (PSI)
   ATSC (PSIP)
   DVB (PSI/SI)
2. To view PAT information, click the arrow-head next to the PAT and view the displayed information:

3. To configure the PAT, from the drop-down menu, select **Properties**.
4. Open the **PAT Mode** list and select one of the following options:
   None - Device does not generate PAT.
   Generate - Device generates PAT.¦
   Pass - Device passes the PAT without any changes.
5. Once you have selected Generate, configure the following:
   a. Repetition Rate (ms) - enter the required spooling rate.
   b. TS ID - select the TS ID
   c. Table Version - by default version control is automatically incremented upon changes to the table. However, once you tick **Override**, the table version is changed manually only and you should select the required table version, from 0 to 31. Version control is configured per TS.
   d. Reference NIT - tick to add to the PAT a pointer that the TS carries a NIT.
6. Once you have selected **Pass**, configure the following:
   a. Input TS - select the required input TS
   b. Input PID - select the required input PID

Configuring PMT

To configure PMT:

1. In **Output TS Properties** select one of the following:
   MPEG (PSI)
   ATSC (PSIP)
   DVB (PSI/SI)

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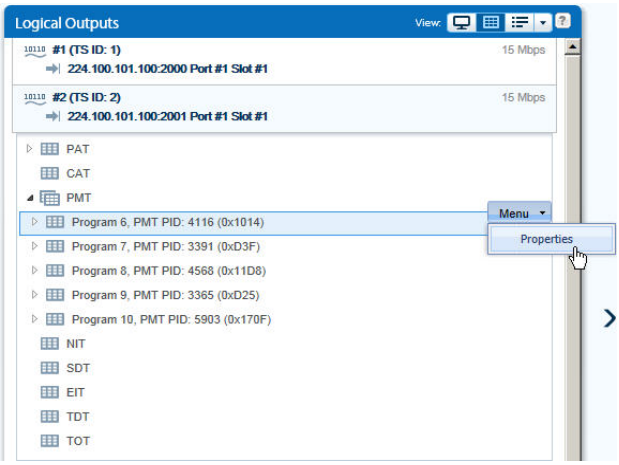
2. To view PMT information, click the arrow-head next to the PMT.

   A list of all the TS programs with their PMT PID appears:

3. To configure the PMT, select the required PMT PID and from the drop-down menu, select **Properties**.



4. Mode - open the **Mode** list and select one of the following:
   - None - the components of the service are streamed without any PMT.
   - Generate - the default option. The ProStream creates a new PMT for the service. See Step 5.
   - Pass - the ProStream transfers the Input PMT to an output stream without changing or manipulating it. The PAT includes a reference to this PMT. See Step 6
   - Regenerate - the device creates a PMT according to the program configuration and input descriptors. See Step 7.
   - Conditional PMT - the output program is configured as a dynamic program and you can select the input program ID for the reference PMT. When selected, PMT is generated at the output as long as the program flows into the device.
     If the input program disappears from the input PAT, the output PSI are updated according to the changes in corresponding input service:
     The service is removed from the output PAT
     The device does not stream out the PMT
     The device does not raise any alarm regarding this service.
     See Step 7.

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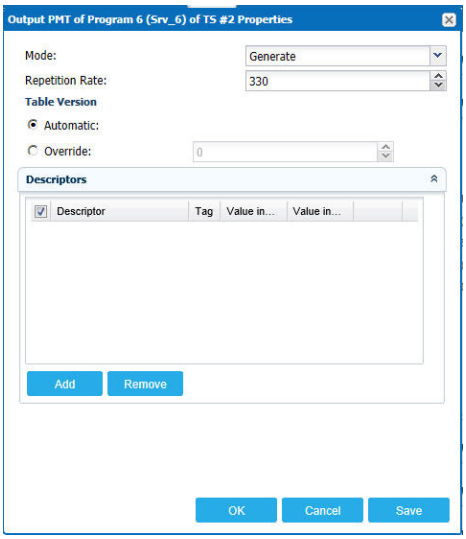
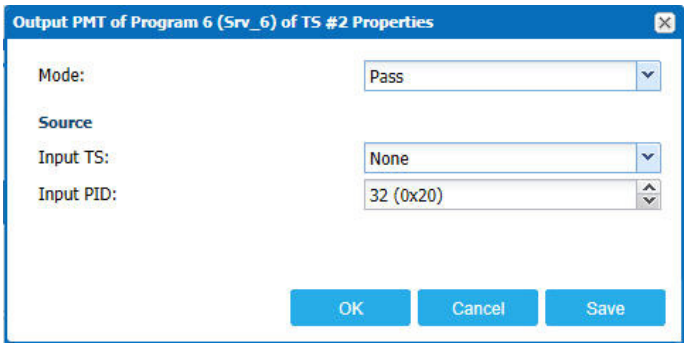
5. Once you have selected **Generate**, configure the following:



   a. Repetition Rate (ms) - enter the required spooling rate.
   b. Table Version - by default version control is automatically incremented upon changes to the table. However, once you tick **Override**, the table version is changed manually only and you should select the required table version, from 0 to 31. Version control is configured per TS.

6. Once you have selected **Pass**, configure the following:



   a. Input TS - select the required input TS
   b. Input PID - select the required input PID

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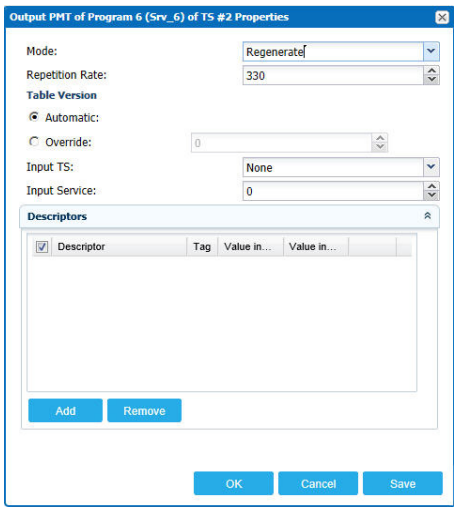
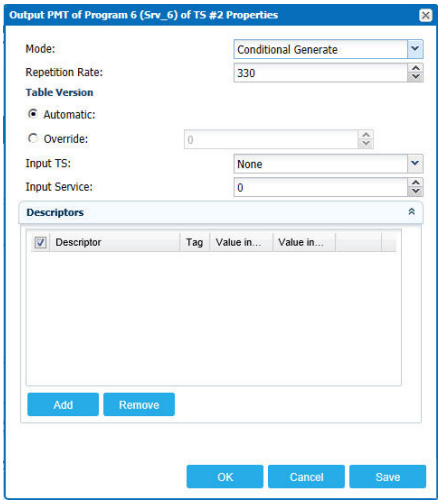
7. Once you have selected **Regenerate**, or **Conditional Generate**, configure the following:





a. Repetition Rate (ms) - enter the required spooling rate.

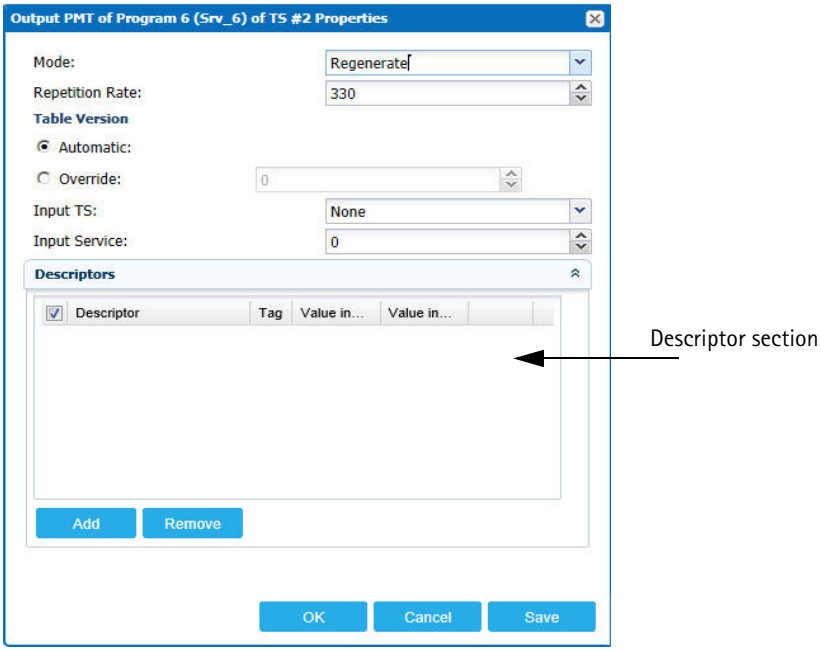
b. Table Version - by default version control is automatically incremented upon changes to the table. However, once you tick **Override**, the table version is changed manually only and you should select the required table version, from 0 to 31. Version control is configured per TS.

a. Input TS - select the required input TS

b. Input PID - select the required input PID

8. To add a descriptor to the PMT, do the following. Applies to **Generate**, **Regenerate** and **Conditional Generate** modes:

a. Focus on the **Descriptor** section.



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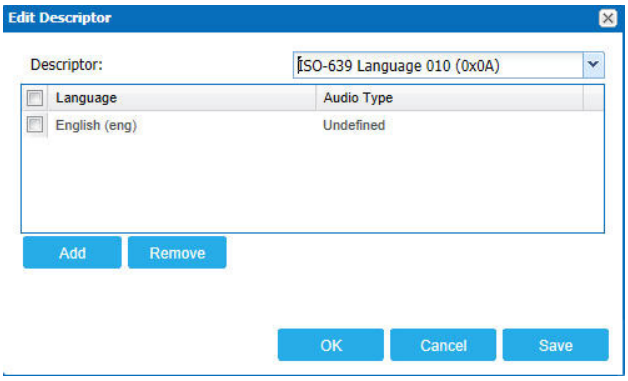
b. Click **Add.** The following dialog opens:



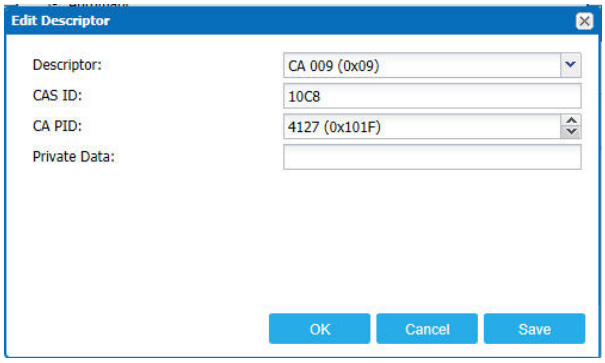
9. Open the **Descriptor** list and select the required descriptor. The list of descriptors is comprised of the following:

Table 4–7: Descriptors in Descriptor Tag List

Listed Descriptors	Explanation
Pre-defined descriptors	■ Registration descriptor ■ Language descriptor ■ Platform descriptor ■ Integrated signaling descriptor
User Defined Descriptors	This section includes descriptors that you need to define by entering the descriptor details in hexadecimal. See *Standard ES Types and Descriptors* on page 296.

10. Configure the descriptor as required. Typically, enter in **Value in Hex**, the required value.

    In case of a CA descriptor, configure the following:



- In **CAS ID (4 Digits)**, enter the required ID
- In **CAS PID**, select the required CAS PID
- In **Private Data**, enter a string of up to 100 bytes that is added to the CA descriptor. You can enter it either in ASCII or in Hex by selecting either **ASCII** or **HEX**.

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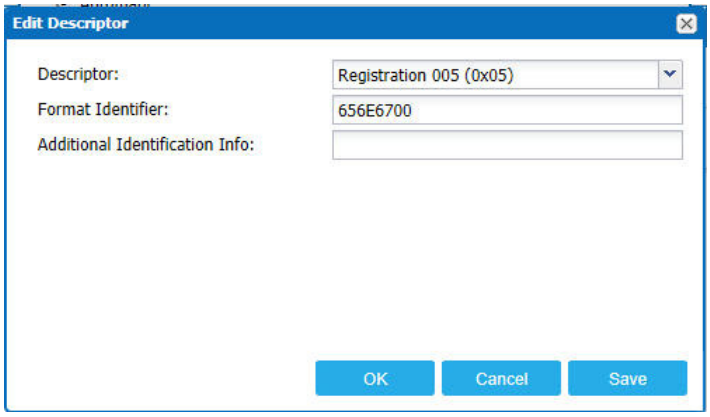
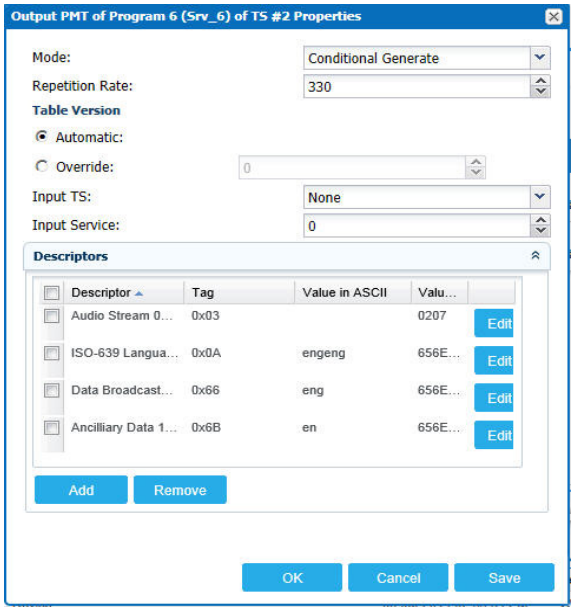
In case of a Registration descriptor, configure the following:



- In **Format Identifier**, enter the required format identifier
- In **Additional Identification Info:**, enter the additional information.

11. Click **OK**.

The descriptor is added to the list of descriptors. You can edit them by clicking Edit.



Filtering a Descriptor at a TS Level

You can remove input descriptors in TS level, resulting in removing the indicated input descriptors from all services of the output TS. To filter the input descriptors, enter in the **Stream Descriptors TAG Filters** box the descriptor TAGs you wish to remove from the output TS.

To filter a descriptor:

1. While in Table view, In **Output TS Properties** select one of the following:
   MPEG (PSI)
   ATSC (PSIP)
   DVB (PSI/SI)

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2. Select the PMT container and from the drop-down menu select **Properties**.

Select the PMT container

3. By default Descriptors is selected. Click **Add**.
4. Open the list of descriptors and select the required one.
5. Click **OK**.

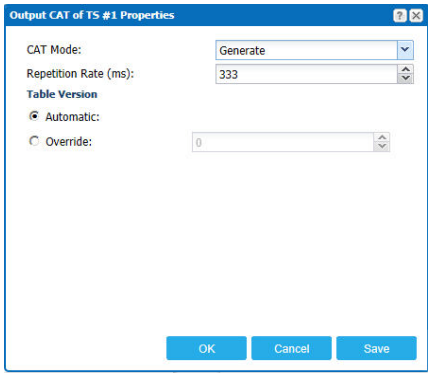
Configuring CAT

ProStream creates a Conditional Access Table. This table contains information that is used by an access device (such as a set top box with a smart card) to decode programs that are part of a Conditional Access System. See also *Allocating EMM PIDs* on page 190.

Version control is configured per TS.

To configure CAT:

1. In **Output TS Properties** select one of the following:
   - MPEG (PSI)
   - ATSC (PSIP)
   - DVB (PSI/SI)
2. From the drop-down menu, select **Properties**.
3. Open the **CAT Mode** list and select one of the following options:
   - None - Device does not generate CAT.
   - Generate - Device generates CAT.¦
   - Pass - Device passes the CAT without any changes.
4. Once you have selected **Generate**, configure the following:



   a. **Repetition Rate (ms)** - enter the required spooling rate.

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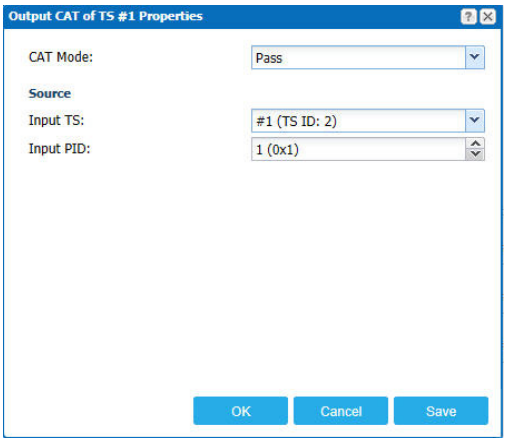
b. **Table Version** - by default version control is automatically incremented upon changes to the table. However, once you tick **Override**, the table version is changed manually only and you should select the required table version, from 0 to 31. Version control is configured per TS.

5. Once you have selected **Pass**, configure the following:



a. **Input TS** - select the required input TS

b. **Input PID** - select the required input PID

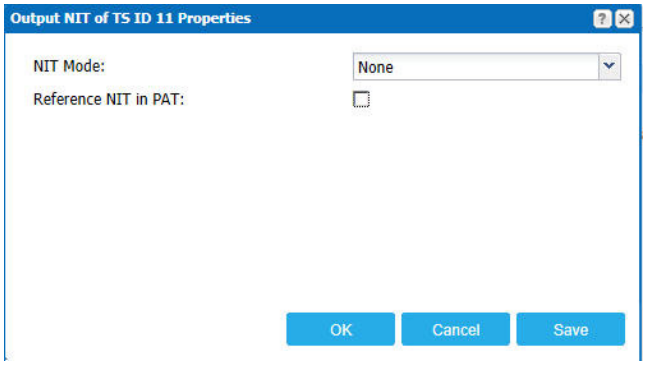
Configuring NIT

ProStream creates a (Network Information Table). Version control is per network.

To configure NIT:

1. In **Output TS Properties** select DVB (PSI/SI).
2. To configure the NIT, from the drop-down menu, select **Properties**.

   The **Output NIT of TS# Properties** appears.



3. Open the **NIT Mode** list and select one of the following options:
   - None - Device does not generate NIT.
   - Generate - Device generates NIT.
   - Pass - Device passes the NIT without any changes.
4. **Reference NIT in PAT** - tick to add to the PAT a pointer that the TS carries a NIT.
5. Depending on the NIT Mode selected, configure the following:

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For Generate:

a. **Repetition Rate (ms)** - enter the required spooling rate.

b. **Generate NIT Other** - tick to generate NIT tables to TSs with network IDs that are different than the selected TS. Namely, it allows to generate a NIT for other networks in addition to the actual network.

c. **Descriptors** - you can add or remove user defined NIT descriptors using the Add and Remove buttons. See *NIT Descriptors* on page 72.

d. To add a descriptor click **Add**.

e. To edit a descriptor, click **Edit**.

f. In **Descriptor**, select the required user-defined descriptor.

g. In **Value in HEX**, enter the required value.

For **Pass**:

a. **Input TS** - select the TS over which the NIT table streams into the device.

b. **Input PID** - select the PID over which the NIT table streams into the device.

NIT Descriptors

The NIT descriptors include the following descriptors:

Table 4–8: Descriptors in NIT Descriptor List

Sections of List	Explanation
Pre-defined descriptors	■ 0x43 Satellite delivery info ■ 0x44 Cable delivery info ■ 0x5a Terrestrial delivery info ■ 0x33 Logical channel number
Descriptors	Descriptors that you need to define by entering the descriptor details in hexadecimal.

Configuring SDT

ProStream creates a Service Description Table (SDT). This table contains data describing the services, e.g., the names of services, the service provider, etc. SDT relates to all services of the TS. You can also select **Generate SDT Other**. SDT other relates to all services of TSs that belong to the same network, that is that have the same network ID.

- SDT - version control is configured per TS
- SDT other - version control depends on SDT actual

To configure SDT:

1. In **Output TS Properties** select DVB (PSI/SI).
2. To configure the SDT, from the drop-down menu, select **Properties**.

   The **Output SDT of TS# Properties** appears.
3. Open the **SDT Mode** list and select one of the following options:
   - ❑ None - Device does not generate NIT.
   - ❑ Generate - Device generates NIT.

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- Pass - Device passes the NIT without any changes.

4. Depending on the SDT Mode selected, configure the following:

   For Generate:

   a. **Original Network ID** - select the ID of the originating delivery system.

   b. **Repetition Rate (ms)** - enter the required spooling rate.

   c. **Table Version** - by default version control is automatically incremented upon changes to the table. However, once you tick **Override**, the table version is changed manually only and you should select the required table version, from 0 to 31. Version control is configured per TS.

   d. **Generate SDT Other** - when selected, generates SDT also to all services of the TSs that belong to the same network, that is that have the same network ID.

   For Pass:

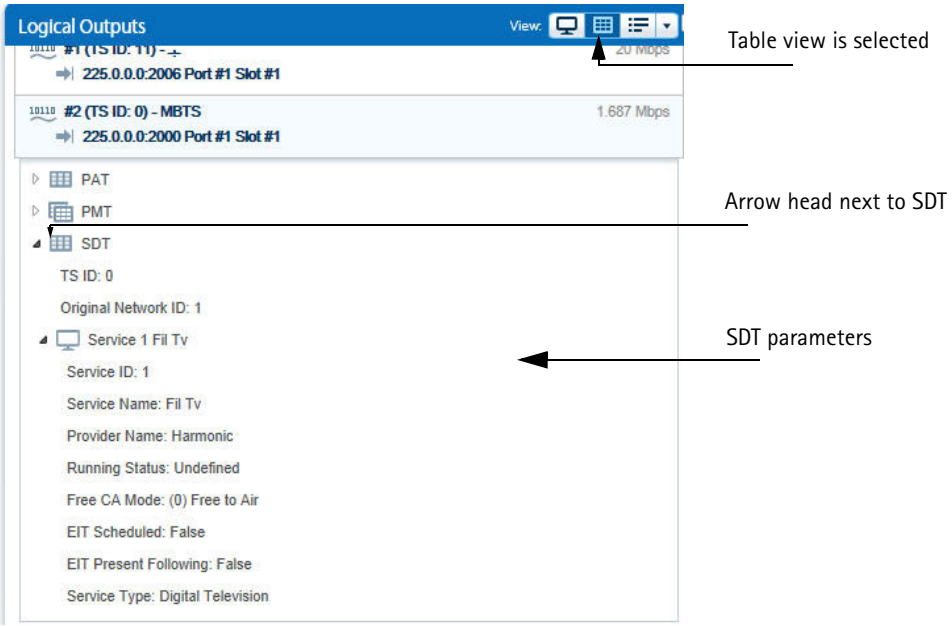
   a. **Input TS** - select the TS over which the SDT table streams into the device.

   b. **Input PID** - select the PID over which the SDT table streams into the device.

Viewing SDT Parameters

To view SDT parameters:

1. In Table view, click the arrow head next to the SDT table:



2. View the following:

Table 4–9: SDT Parameters

Parameter	Explanation
TS ID	The TS that to its programs the SDT table related to.
Original Network ID	The input network ID
Service ID	The ID of the program

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Table 4–9: SDT Parameters

Parameter	Explanation
Service Name	The name of the program
Provider Name	The name of the service provider as defined by the DVB standard.
Running Status	Running Status - indicates the status of the service: ■ undefined ■ not running ■ starts in a few seconds ■ pausing ■ running
Free CA Mode -	Indicates that at least one component of the service is scrambled.
EIT Scheduled	Indicates that EIT schedule information for the service is present in the current TS
EIT Present Following	Indicates that EIT schedule information/following for the service is present in the current TS.
Service Type	Indicates the type of the service as defined in the DVB standard. It allows the service provider to describe the nature of the service, such as, broadcast television, on-demand television, broadcast radio, data broadcast etc'.

Configuring EIT

ProStream 9000 may regenerate the Event Information Table (EIT) at the output. To regenerate, ProStream 9000 parses the EIT at the input and draws the relevant events according to the services included in the output TS.

Table 4–10: EIT Regeneration Specification

Specification	Explanation
EIT PID	0x12
Table ID	0x4E - for current/next events 0x50 - 0x5F - for scheduled events
Parsing	Up to 500 services Average of 165 events per service
Output	Up to 128 services
ProStream	ProStream 4.10 and up

To configure EIT:

1. In **Output TS Properties** select one of the following:
   - ❑ DVB (PSI/SI)
   - ❑ ATSC (PSIP) - see *Configuring EIT in ASCT (PSIP) Mode* on page 78.

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2. To view EIT parameters, click the arrow-head next to EIT. View the EIT PIDs of the TS;

3. To configure the EIT, from the drop-down menu, select **Properties**.
4. Open the **EIT Mode** list and select one of the following options:
   - None - Device does not generate EIT.
   - Re-Generate - Device re-generates EIT.
   - Pass - Device passes the EIT without any changes.
5. If you have selected Pass, configure the following:
   a. **Input TS** - select the TS over which the SDT table streams into the device.
   b. **Input PID** - select the PID over which the SDT table streams into the device.

Configuring TDT

ProStream creates a Time Date Table.

To configure a TDT:

1. In **Output TS Properties** select the following: DVB (PSI/SI)
2. To configure the TDT, from the drop-down menu, select **Properties**.

   The **Output TDT of TS# Properties** appears.
3. Open the **TDT Mode** list and select one of the following options:
   - None - Device does not generate TDT.
   - Generate - Device generates TDT.
   - Pass - Device passes the TDT without any changes.
4. If you selected **Pass**, configure:
   a. **Input TS** - select the TS over which the TDT table streams into the device.
   b. **Input PID** - select the PID over which the TDT table streams into the device.
   c. **Report if PID Missing**:
   - If no report should be issued, select None
   - If a report should be issued, Select Threshold (sec): and choose the time between 5 and 300 seconds for the delay before the report is issued.

Configuring TOT

ProStream creates a Time Offset Table.

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To configure a TOT:

1. Click the Create TOT link to configure the TOT time zones.
2. In **Output TS Properties** select the following: DVB (PSI/SI).
3. To configure the TOT, from the drop-down menu, select **Properties**.
4. Open the **TOT Mode** list and select one of the following options:
   - None - Device does not generate TOT.
   - Generate - Device generates TOT.
   - Pass - Device passes the TOT without any changes.
5. Depending on the TOT Mode you have selected, configure the following:

   For Generate:

   a. **Country Code** - open the list and select the required country code.
   b. **Country Region ID** - select the region ID.
   c. **Local Time Offset** - select the local time offset according to GMT.
   d. **Date to Change** - select the Day Light Saving date.
   e. **Time to Change** - type in Time to Change the required time according to the required format: hh:mm:ss PM/AM.
   f. **Next Time Offset** - select the local time according to GMT in which Day Light Saving is expected to change.

   For Pass:

   a. **Input TS** - select the TS over which the TOT table streams into the device.
   b. **Input PID** - select the PID over which the TOT table streams into the device
   c. **Report if PID Missing**:
   - If no report should be issued, select None
   - If a report should be issued, Select Threshold (sec): and choose the time between 5 and 300 seconds for the delay before the report is issued.

PSIP Tables

The Program and System Information Protocol (PSIP) standard, is an extension of the MPEG2 encoding standards. PSIP is a collection of tables designed to operate within every transport stream for terrestrial broadcast of digital television. The purpose of PSIP is to describe information at system and event levels for all services carried in a particular TS. Additionally, information for analog channels as well as digital channels from other TSs may be incorporated.

PSIP includes the following tables:

- STT (System Time Table) - provides time reference
- MGT (Master Guide Table) - lists the PIDs of each of the tables
- VCT - lists all virtual channels included in the TS. VCT may refer to either of the following:
- TVCT (Terrestrial Virtual Channel Table)
- CVCT (Cable Virtual Channel Table)
- EIT (Event Information Table) - provides information about events planned on the virtual channels
- ETT (Extended Text Table) Optional - detailed information about the planned events

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Configuring MGT

ProStream creates an MGT, PSIP Master Guide Table. This table lists the PIDs of each of the PSIP tables.

- In **Output TS Properties** select the following: ATSC (PSIP).

Configuring VCT

ProStream creates a VCT table. It lists all virtual channels included in the TS. VCT may refer to either of the following:

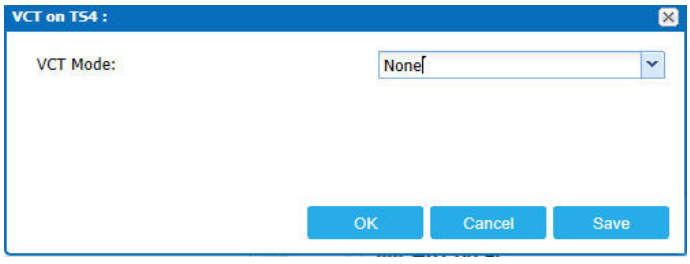
- TVCT (Terrestrial Virtual Channel Table)
- CVCT (Cable Virtual Channel Table)

To configure a VCT:

1. In **Output TS Properties** select one the following: ATSC (PSIP).
2. To view the VCT parameters, click the arrow-head next to the VCT table and view the TS it is associated with:

   - TS ID - view the TS ID that carries the VCT
   - Channel - click the channel to view its components.
     Major Channel Number - view the number of the major channel.
     Minor Channel Number - view the number of the minor channel
3. To configure the channel, in case the broadcast provider has changed the channel number, do the following:
   a. From the drop-down menu, select Properties.
   b. Service Name Override - tick to override the service name.
   c. To edit channel parameters, tick Enable override.
   d. In Major Channel Number, enter the required channel number
   e. In Minor Channel Number, enter the required channel number
4. To configure the VCT, from the drop-down menu, select **Properties**.

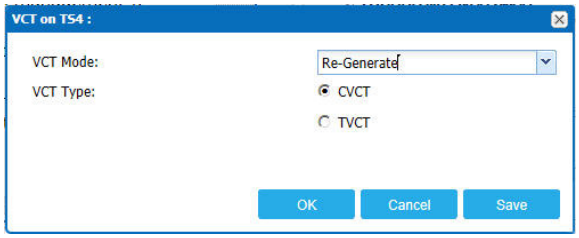
   The **Output VCT of TS# Properties** appears.



5. Open the **VCT Mode** list and select one of the following options:

- None - Device does not generate VCT.
- Re-generate - Device generates VCT.

6. If you selected **Re-Generate**, configure the following:



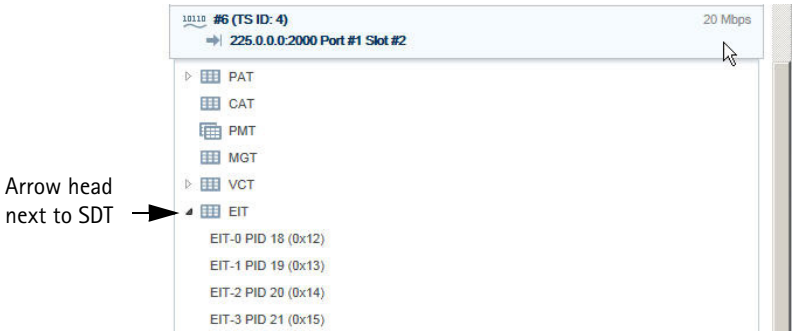
a. VCT Type - select either CVCT or TVCT.

Configuring EIT in ASCT (PSIP) Mode

For a short overview, see *Configuring EIT* on page 74.

To configure EIT in this mode:

1. In **Output TS Properties** select the following: ATSC (PSIP).
2. To configure the EIT, from the drop-down menu, select **Properties**.
3. Open the **EIT Mode** list and select one of the following options:
   - None - Device does not generate EIT.
   - Re-Generate - Device re-generates EIT.
4. In **EIT PID**, select the EIT PID.
5. To view EIT parameters, click the arrow-head next to EIT. View the EIT PIDs of the TS;



Configuring ETT

To configure ETT:

1. In **Output TS Properties** select the following: ASCT (PSIP).

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2. To view the ETT parameters, click the arrow-head next to ETT:

3. To configure the ETT, from the drop-down menu, select **Properties**.
4. ETT PID - select the required PID to outstream the ETT table.

Provisioning the TS

Once you have finished configuring the TS you can provision it.

To provision the TS:

1. Send the configuration to the device by clicking **Apply**.
2. Select the required TS and from the drop-down menu select Drop To.

TS Mirroring

This feature enables you to duplicate an output TS for monitoring purposes. The device duplicates and outputs a TS from any interface (IP, ASI) to any other TS over any interface. This feature supports all the functionality of the mirrored TS such as rate shaping, scrambling, RSS, tables generation, common PCR, PID range or DToIP. You can configure the mirrored TS to be always clear.

To enable mirroring:

1. Verify that the mirroring TS is clear of any configuration and provisioning.
2. In **Logical Output**, select the required TS.
3. Drag the TS and drop it to the required output in **Physical Output** pane.

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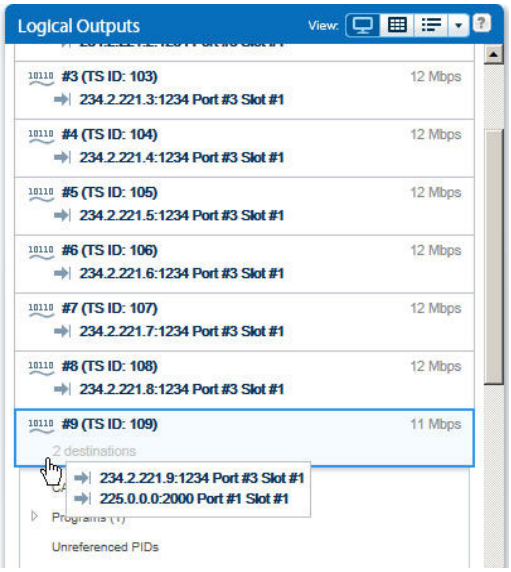
4. View the destinations of the TS in the **Logical Output** pane.



5. Click **Apply**.

Adding Content to TS

You can add the following to a TS:

- Program - add a program and configure it as explained in *Configuring Program Properties* on page 84.
- PID - a PID is added to the TS as an unreferenced PID. See *page 102*.
- Injected EMM - an EMM is added to the CA PID container. See *Adding and Configuring EMM PIDs to the TS* on page 105
- Injected ECM - an ECM is added to the CA PID container. *Adding and Configuring ECM PIDs to the TS* on page 103.
- Passed EMM - the passed EMM is added to the CA PID container. See *Adding and Configuring EMM PIDs to the TS* on page 105.

Provisioning/Multiplexing Stream Content

When provisioning/multiplexing, you route a specific input (service/PID) to a specific output (service/PID). You may use the Logical Inputs pane (when you read input information from the input ports) and move programs or PIDs from Inputs to the Logical Outputs pane and then provision them. On the other hand, you may use the Add New options to add new programs or/and PIDs and provision them. To provision a Reference Service, see *Reference Service (RSS)* on page 91.

You can add a program to a TS or to another program.

An input service is provisioned to an output transport stream only. An input PID is provisioned to an output service or transferred as an independent PID (ghost PID).

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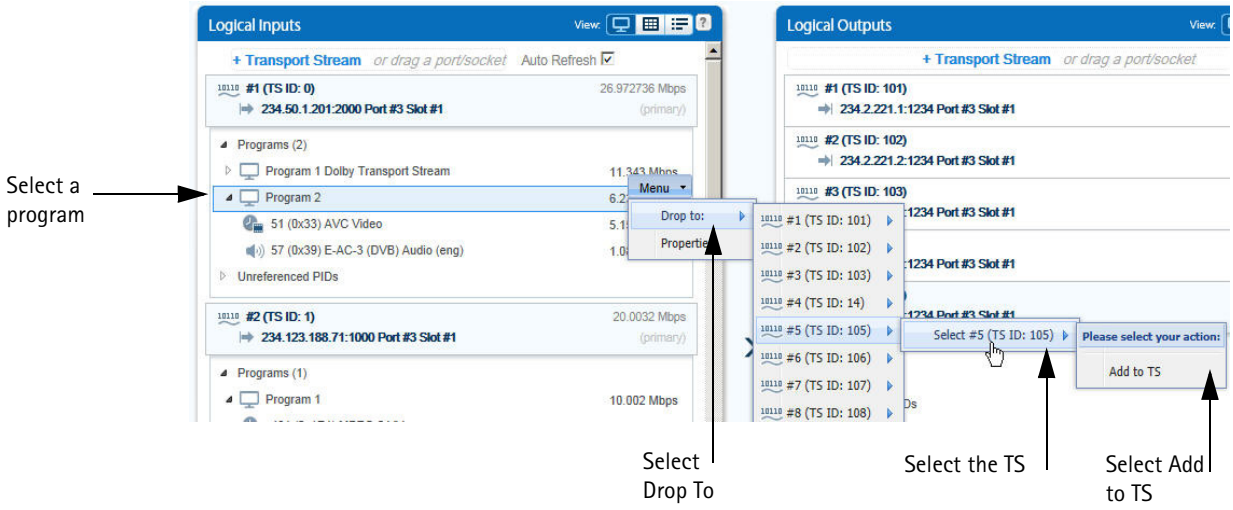
Provisioning/Multiplexing a Program

When provisioning a service, you may change its service ID, name, PMT PID and PCR PID. In addition, you may add to a service a Reference Service as explained *Reference Service (RSS)* on page 91.

Moving a program From Input to an Output TS

To move a program to an Output TS:

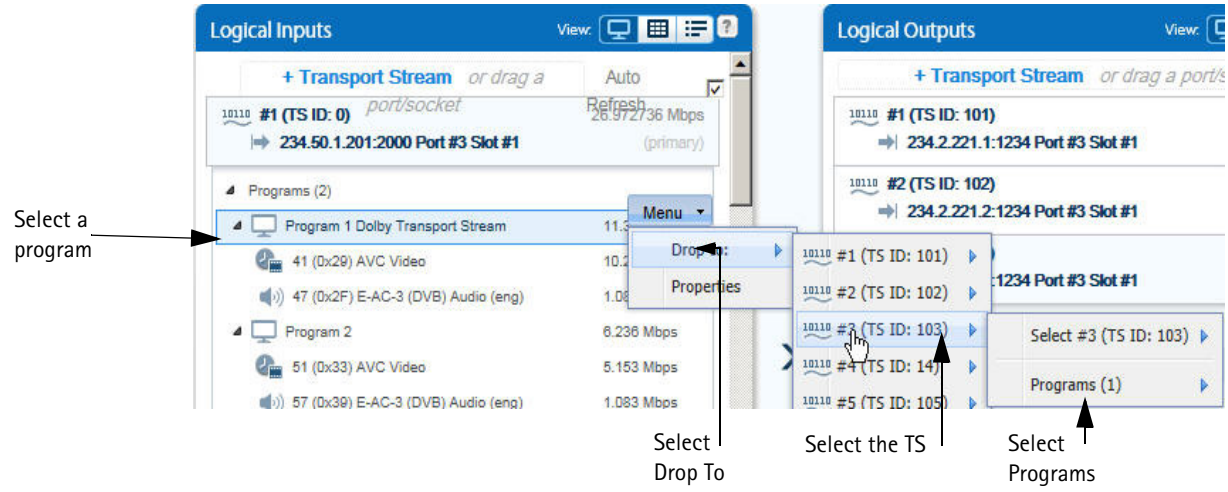
1. In the **Logical Inputs** section, select a program.
2. In the drop-down list, select **Drop To**. A list of all the available output TSs appears.
3. Select the required TS > **Add to TS**.



Moving a program from Input to Output Program

To move a program to an output program:

1. In the **Logical Inputs** section, select a program.
2. From the drop-down list, select **Drop To**. A list of all the available output TSs appears.
3. Select the TS.



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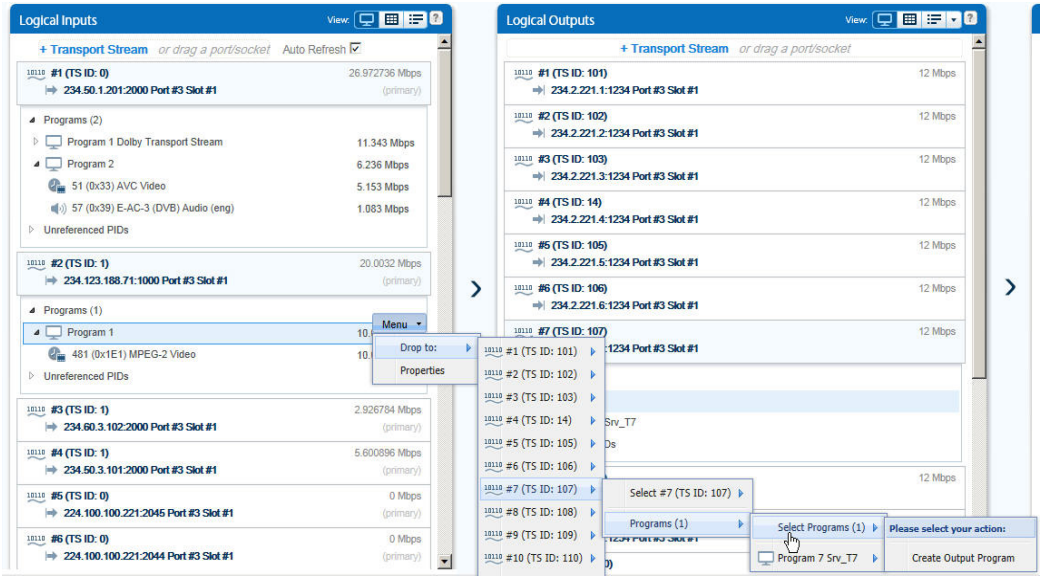
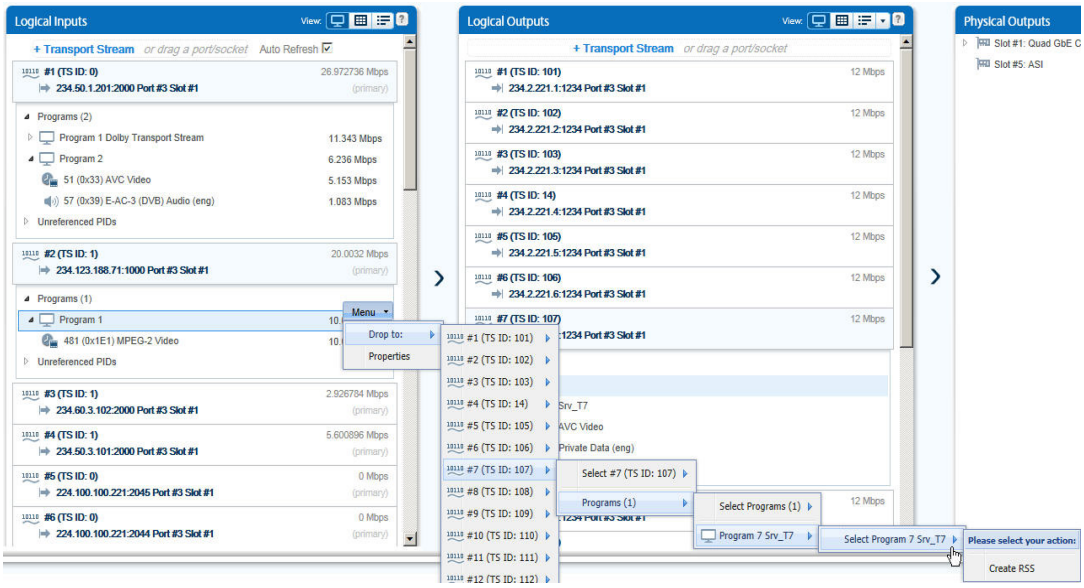
4. Do either of the following:
   - Select Programs > **Create Output Program**



Or

   - Select Programs > select an existing program > **Create RSS**:



Creating a New Output Program

You can create a program at the output by selecting a TS or the program menu in the required TS.

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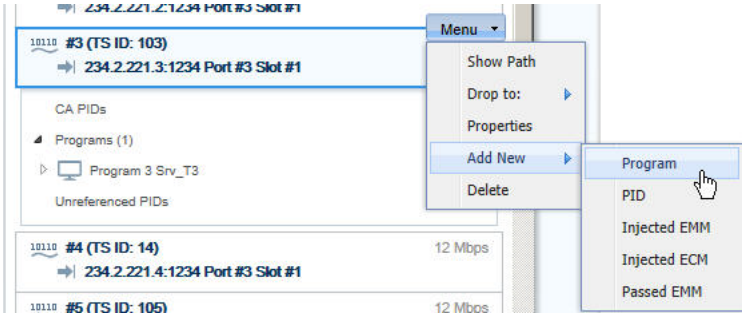
To add a new program at the TS level:

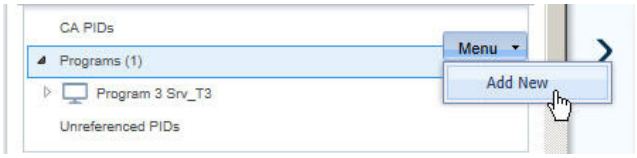
1. In **Logical Output**, select the required TS.
2. From the drop-down menu select **Add New** > **Program**.



To add a new program at the program level:

1. In **Logical Output**, select Programs node under the required TS.
2. From the drop-down menu select **Add New**

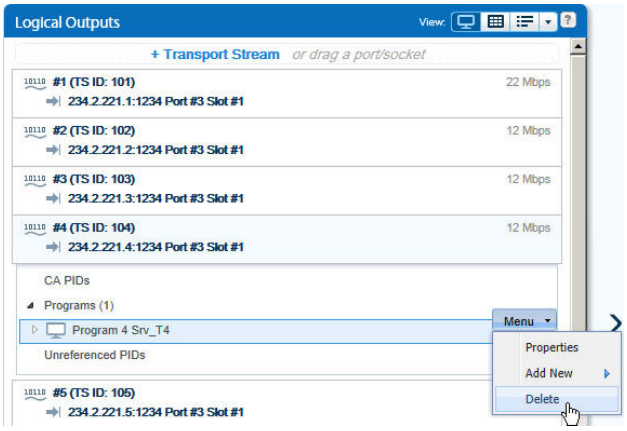
   A new program is added.



Removing a Program

To remove a program:

1. In **Logical Output**, select Programs node under the required TS.
2. From the drop-down menu select **Delete**.



The program is deleted.

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Configuring a Program

You can configure the following:

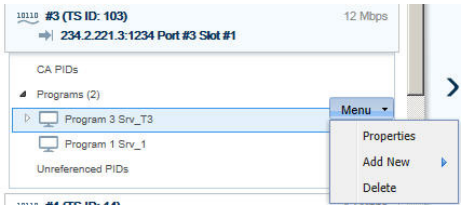
- Program properties
- Add new component

To remove a program, see *Removing a Program* on page 83.

To configure a program:

1. In the **Logical Output** section, select a program.

   From the drop-down menu select one of the following:



- Properties - to open the Properties dialog. See
- Add New - enables you to add new components:
  - ES - enables you to add a PID to the program. Once you have added, configure the PID as explained in *Defining PID Parameters* on page 96.
  - Pass PCR - see *PCR PID Carried Over Input PIDs* on page 87
  - Pass DPI - see *Configuring Spliceable Services & SCTE35 PID* on page 182.
  - Generate PCR - see *Configuring a PCR PID* on page 87
  - Generate DPI/Pass DPI - see *Configuring DPI PIDs* on page 107
  - Reference Program - see *Reference Service (RSS)* on page 91
  - Passed ECM - see *Configuring a Passed ECM PID* on page 107
- Delete - enables you to remove a program from the TS see, *Removing a Program* on page 83.

Configuring Program Properties

To configure program properties:

1. In the **Logical Output** section, select a program.

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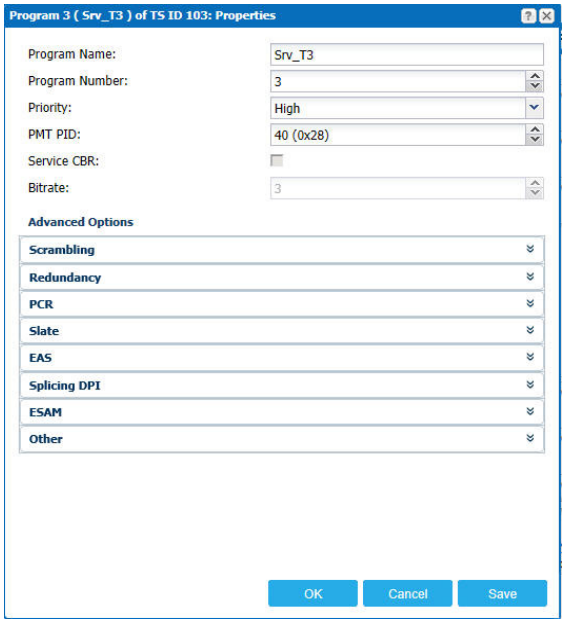
2. From the drop-down menu select **Properties**.



3. Type in the required information in the following fields:

   Program Name - type in the service name, for example CNN, NBA.

   Program Number - service identification number at output port.

   Priority - In Priority, define the priority for dropping services in case of overflow. Services defined as Low are the first ones to be dropped and services with High priority are the last ones to be dropped. The available priorities are as follows: High, Normal, Medium, Low.

   PMT PID - the PID over which the service's PMT (Program Map Table) is transmitted.

   Service CBR - Select it to set the bitrate to Constant Bitrate. This option is enabled if transcoding is enabled.

   Bitrate - Enabled if Service CBR is enabled. Enter the required bitrate of the program.

4. For advanced options, focus on the **Advanced Options** section.
5. Click each section you need to configure and follow the provided instructions:

Scrambling

To scramble a program:

1. Click **Scrambling**:
2. Configure as follows:

   CA Descriptor Location - Select one of the following:

   - Program
   - ES
   - Both

   Enable BISS Option - Enables BISS. The Control Word box is enabled.

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Control Word - A required Control Word with up to 12 hexadecimal characters (six bytes). The CW is required for decoding the scrambled transmission.

Defining Program Redundancy

Unlike other redundancy methods, Program redundancy is triggered by a program underflow and not by an alarm. The related alarms only indicate that a redundancy switch has taken place.

Configure the triggering condition by defining when to activate the redundancy switch:

- Program underflow
- Program PID underflow

To define redundancy parameters:

1. Click the **Redundancy** section.
2. Open the **Redundancy Mode** list and select one of the following options:
   - None - program redundancy is inactivated
   - Manual - the user initiates the program redundancy switch
   - Automatic - the program redundancy switch is performed automatically according to the predefined triggers. See following step.
   - Manual Revert - the program redundancy switch is performed automatically according to the predefined triggers. However, switching back to the primary-program, when fixed, is performed manually. See *Seamless Program Substitution* on page 86.
3. Set Number of Backups (1-3).
4. To define redundancy triggers, focus on **Triggers**.

   If Manual Revert is used, configure Active Source. See *Seamless Program Substitution* on page 86
5. To define a redundancy trigger, focus on **PID Missing** and select either of the following:
   - PCR Missing - the redundancy switch takes place if there is a PCR PID underflow
   - At Least One PID is Missing - the redundancy switch takes place upon the under flow of at least one of the program's PIDs.

Seamless Program Substitution

Seamless Program Substitution is a Service-level local programming feature. Manual, SCTE35 and SL10 modes are supported.

To set Seamless Program Substitution parameters:

1. Open the Menu for the required Program.
2. Scroll down to Seamless Program Substitution and click open the section.
3. Click the Enable checkbox. Seamless Program Substitution parameters appear.
4. Select the Mode from the drop-down list. The parameters available change with the mode selected.
5. If Manual is selected:
   a. Set Number of Alternatives (1-2).
   b. Define the active source as Primary, Alternative 1, or Alternative 2.
6. If SCTE35 is selected (Splice Insert command only):
   a. Define the Event Source Range Minimum and Maximum (0-15).
   b. Set Reference DPI to Remux by the relevant input.

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7. If SL10 is selected:
   a. Enter the SNMP Agent IP address.
   b. Enter the Contact number (1-10).
   c. Enter the Delay in milliseconds.

NOTE: After configuring SPS, configure alternative sources for each PID separately in PID Properties.

NOTE: Seamless Program Substitution cannot be used with Program Redundancy.

Reverting Manually

To engage Manual Revert:

1. Select the **Redundancy** section.
2. Open the **Redundancy Mode** list and select **Manual**.
3. Open the **Active Source** list and select **Primary**.
4. Click **OK** and **Apply**.

Configuring a PCR PID

Configure the PID over which the service's PCR (Program Clock Reference) is transmitted. A service may carry a PCR PID. A PCR PID can outflow according to one of the following options:

- Carried over one of the service's PIDs
- Carried over a reference service - only in case a reference service is configured
- Carried over any of the incoming PIDs
- Generated PCR - PCR PID generated by the device and no input indication is required. ProStream 9000 generates a PCR PID at the output regardless of the input PCR. As a result, each output service can have its own PCR PID with a new time baseline. You can configure a PCR PID as follows. In both options, the PCR PID is output as a separate PID or over one of the ESs of the service. Usually the PCR PID is out-streamed over the video PID:
  - Each service generates its own PCR PID
  - Common PCR - a single PCR PID is common to a few services
- No ES - the PCR PID is out flowing as an independent PID - See Pass PCR

To define PCR parameters:

1. Click the **PCR** section.
2. To generate a PCR PID at the output, select **Generate PCR**.
3. To set the PID to outflow the PCR PID, in **Insert PCR PID**, select one of the PIDs of the program. The **Insert PCR PID** list is populated with the PIDs of the program.

NOTE: When transcoding is required, the PCR should outflow over the video PID.

PCR PID Carried Over Input PIDs

When you pass a program from the input to the output, the PCR is usually carried over one of the PIDs of the program.

To have the PCR PID carried over another PID:

1. In the Logical Output pane, select the required program.

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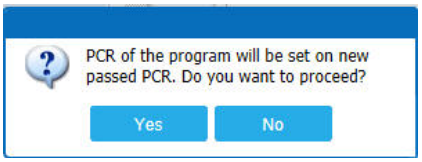
2. From the down-list menu, select **Pass PCR**.

   The following message appears:



3. Click Yes to change the Passed PCR.

   A PCR PID is added to the program in Logical Outputs.

4. Select the newly selected PCR PID and from the drop-down menu, select **Properties**.

Configuring Slate Parameters

When a broadcast of TV service is disrupted, the Slate (Static Apology Message) feature allows MSOs a quick way to rapidly inform their subscribers of their efforts to restore the service. The Slate feature allows configuring for any service an alternative or backup input feed or source that is enabled on the output upon disruption of the primary feed.

The following table lists the Slate specifications:

Table 4–11: Slate Specifications

Specification	Explanation
Total number of Slate feeds	Up to five per device
Video format of Slate feed	Any of the following presented in MPEG transport packets: ■ SD MPEG2 ■ SD AVC ■ HD MPEG2 ■ HD AVC ■ AC3 2.0 ■ AAC 2.0 iK Note: Format of slate feed should match primary feed
Bitrate of Slate feed	CBR only Note: The bit rate of the alternative feed is not greater than the bit rate of the primary feed(s)
Interface	Any input to any output
Slate activation modes	The following modes are supported: Manual - you initiate the switch from the primary feed to the slate feed Automatic - device initiates the switch based on predefined triggers
Slate Triggers	See *Configuring Slate Parameters* on page 88.

To configure the Slate feed:

1. In the **Logical Output** section, select a program.

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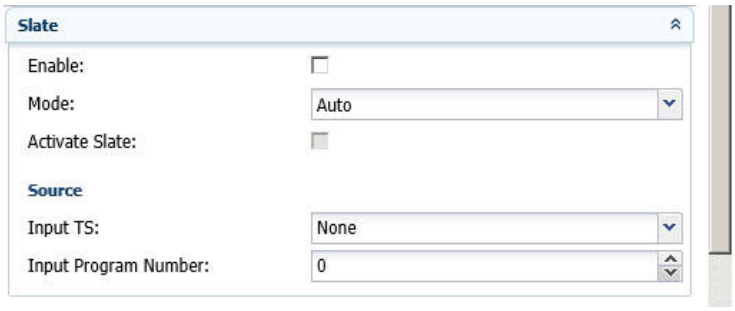
2. From the drop-down menu select **Properties**.
3. Select the Slate section:



4. To enable Slate, tick **Enable**.
5. Open the **Slate Mode** list and select one of the following:

Table 4–12: Slate Mode

Option	Explanation
Auto	The Slate switch is performed automatically according to pre-defined triggers: ■ Lost of the Video PID - the Video PID drops to Zero bit-rate ■ Lost of input on the Encoders - Harmonic encoders only. The encoder stops streaming video traffic upon loss of input signal (configurable for every video PID). ProStream9000 detects a zero bit-rate at the input video. When switching to the alternative feed, ProStream remaps the components of the alternative feeds PIDs (Video, Audio) to the main channel component PIDs to ensure signal continuity on the output.
Manual	The user initiates the Slate switch
Manual Revert	The user initiates the revert

6. Open the **Slate TS** list and select the input TS that includes the slate.
7. In **Service ID** enter the Slate service ID.

Configuring EAS Parameters

Configuring the EAS service to outflow comprises two parts:

- Enable EAS for the output program
- Select the EAS program to outflow instead of the provisioned output program

To configure the EAS feed:

1. In the **Logical Output** section, select a program.
2. From the drop-down menu select **Properties**.
3. Select the EAS section:
4. To enable the EAS for the service, select **Enable**.
5. To select the EAS service (channel) for this output service, open the list and select the required channel.

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Once this EAS is required, the EAS is streamed out instead of the provisioned output service. See also *Defining SNMP Parameters* on page 242.

Enabling DPI

The DPI section contains options for enabling Digital Program Insertion (DPI, or splicing) for a service. If all splicing engines are occupied, an alarm is raised upon clicking **Apply**. For setting up a DPI-enabled service, see *Configuring Spliceable Services & SCTE35 PID* on page 182.

To enable DPI parameters:

1. In the **Logical Output** section, select the required program.
2. In the drop-down menu, select **Properties**.
3. Check the **Spliceable** box. DPI options appear.
4. Select Program Name or SCTE30 Channel Name.
5. If SCTE30 Channel Name is selected, enter the channel name in the box below.
6. Select a Reference DPI option
   a. PID - if selected, enter the input PID
   b. ES Type - if selected, enter the Input Program Number
   c. Component ID - if selected, input the Component ID and Input Program Number
   d. None
7. Click Save to save the channel name, if any.

Event Signaling and Management (ESAM) Feature

For ESAM overview and general configuration, see *ESAM (Event Signaling and Management)* on page 268.

Configuring ESAM

To configure ESAM:

1. In the **Logical Output** section, select a program.
2. From the drop-down menu select **Properties**.
3. Select the ESAM section:
4. To select the whether the device functions as an LSS or LSP, open the **ESAM Mode** list and select one of the following:
   - None - ESAM feature is not applied
   - LSS - the device is located at the edge of the network and is responsible for switching to and from an alternative feed, based on BMS commands.
   - LSP - the device is located in the Central Headend.
5. If **ESAM Mode** is **LSS or LSP**, configure the following:
   a. **ESAM Server** - open the BMS Server list and select the required server that manages the blackout system. The list is populated with the ESAM servers configured in Platform > ESAM. See *ESAM (Event Signaling and Management)* on page 268.
   b. **Acquisition Point Identifier** - enter the unique identifier of the program. This identifier is unique for each blackout zone.
   c. **Zone Identifier** - enter the identifier of the blackout zone of the program. The zone identifier and Acquisition Point Identifier together create a unique program identifier.

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d. **Output DPI PID** - In LSS mode, check this option to include the DPI PID. By default the LSS does not stream the DPI PID containing the ESAM information. When this option is selected, the LSS streams the DPI PID.

e. **Timestamp Descriptor** - In LSP mode, check this option to include a timestamp descriptor.

f. **Remux by** - Read only. For ESAM purposes the DPI PID from the input is carried by PID only.

g. **Input DPI PID** - select the input PID that carries the DPI PID.

h. **Stamp Splice Time** - check the box in order to enable.

i. **Splice Insert** - select the option required for SCTE35 operations for the service:
Always pass
Always discard
POIS (Fallback: Discard)
POIS (Fallback: Pass)

j. **Time Signal** - select the operation required for SCTE35 operations for the service:
Always pass
Always discard
POIS (Fallback: Discard)
POIS (Fallback: Pass)

6. Click **OK**.

Emergency Switch to Main

The main service can be reinstated manually by clicking on Emergency Switch to Main in the ESAM section. This button can be used in the event of a switching failure as well as under normal operating conditions.

NOTE: The Emergency Switch to Main button can also be found at Platform>ESAM>Emergency Switch

Configuring Other Program Parameters

The Other section allows the following:

To select whether the PAT table include a reference to the PMT table.

To configure a reference in the PAT:

1. In the **Logical Output** section, select a program.
2. From the drop-down menu select **Properties**.
3. Select the **Other** section:
4. Open the **Reference Program in PAT** list and select either of the following:
Always
If Referenced in Input
5. When If Referenced in Input is selected, select the following:
Input TS (by TS ID)
Input Service

Reference Service (RSS)

The Reference Service feature allows an output service to automatically update according to changes detected on a specific input service. The input service is called “Reference Service”.

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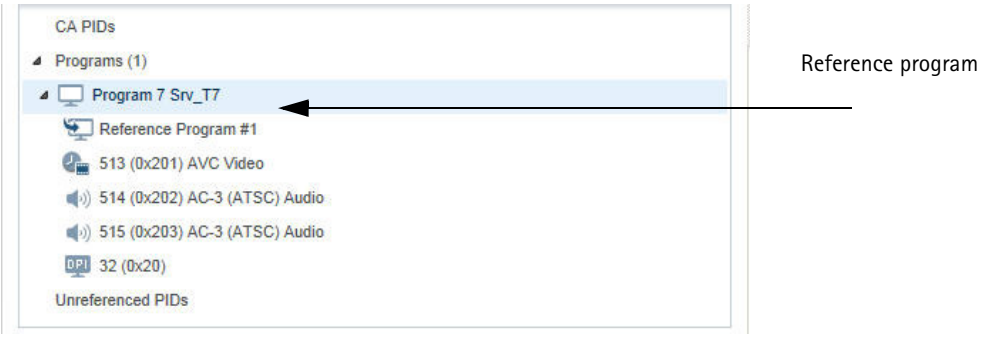
The Reference Service option allows ProStream to support two main applications:

- MHP - (Multi media Home Platform). This standard allows streaming data for interactive TV application.
- ASM (Automatic Service Mode) - You may choose to pass a service from the input to the output without specifying the exact PIDs of this service.

You can add a new reference service only to a service. The service becomes a parent service as the following picture shows:



ProStream dynamically aggregates the PIDs and descriptors of multimedia (audio/video) services with the data PIDs and descriptors of one or more MHP Services which are received from an MHP server that plays them out.

Any changes in the MHP services do not affect the stable streaming of the content of the parent service.

A service that includes reference services may also include explicitly defined ESs, just like any regular service. The PCR of such a service may be carried on an explicitly-defined ES, or on an ES that is part of the reference service. In the latter case, the reference service that includes the PCR stream is marked as Carry PCR. See also *Configuring a PCR PID* on page 87.

To provision a New Reference Service:

1. In the **Logical Output** section, select a program.
2. From the drop-down menu select **Add New > Reference Program**.

   A reference program is added.

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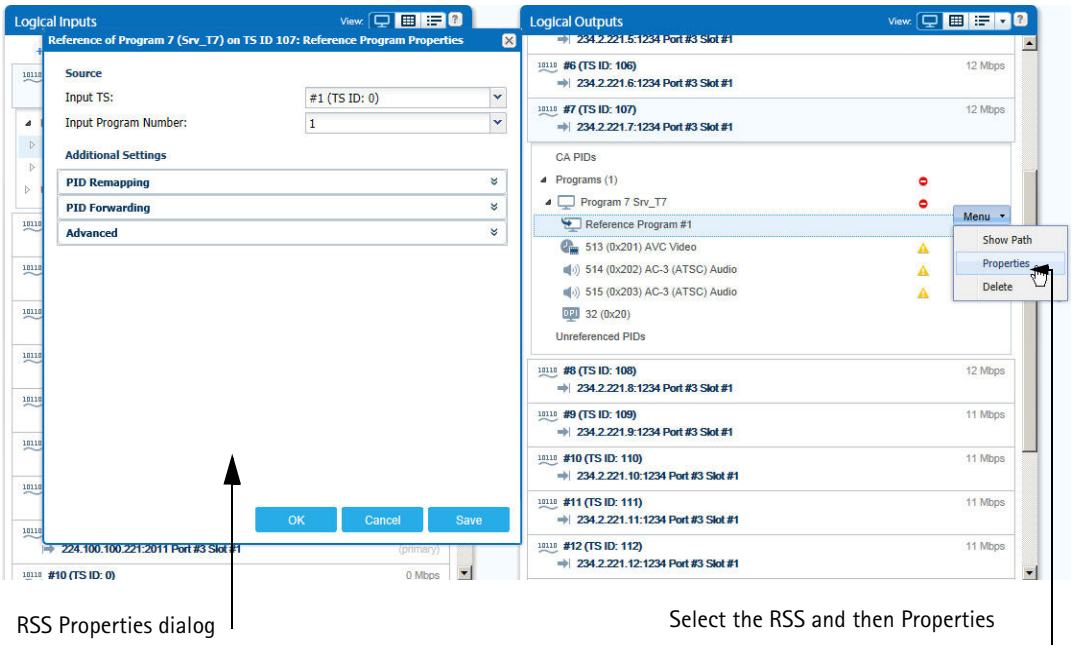
3. To configure the RSS, select the RSS and from the drop-down menu select **Properties**.

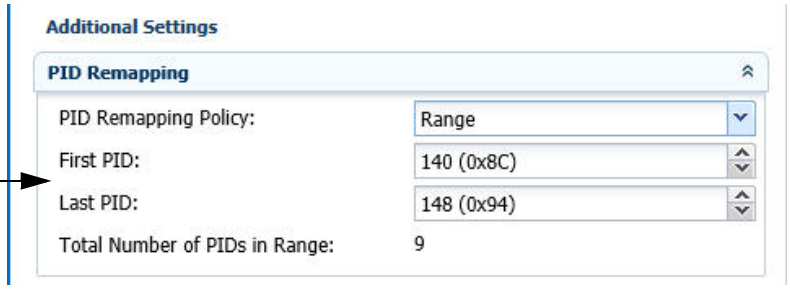


4. Open the **Input** list and select the required input port. This is the port through which the reference service is streamed into the device.
5. In **Input Program Number**, type the ID of the required input program. This is the ID of the reference service.
6. PID Remapping - PID remapping allows to remap the PIDs of the reference service and to set the PID range. You can select either of the following:

   Range - Once you have selected **Range,** in **First PID** and **Last PID**, enter the first and last PID of the PIDs range, respectively.

   In Total number of PIDs in Range, view the number of PIDs included in the range.

Remap PIDs option is enabled and Range Start and Range End boxes appear



- Preserve - To maintain the PIDs as in the input, disable the Remap PID option.
- **PID Filtering** - it applies to EDU only. When the device functions as an EDU, in **PID Filtering** enter the component descriptor that should be ignored. You can indicate up to

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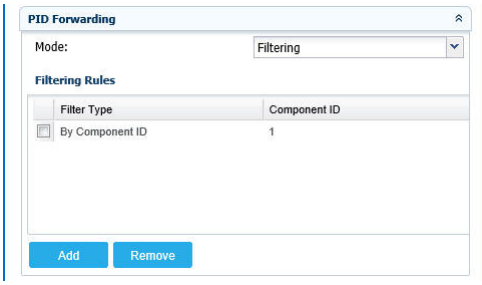
five components to be ignored.



7. **PID Priority** - define the priority for dropping PIDs in case of overflow. PIDs defined as Low are the first ones to be dropped and PIDs with High priority are the last ones to be dropped. The available priorities are as follows:
   As Parent
   High
   Normal
   Medium
   Low

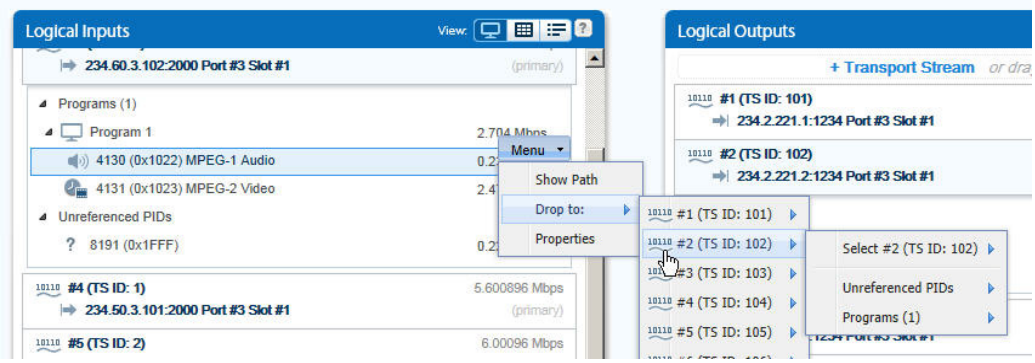
Provisioning/Multiplexing PIDs

This section instructs you on how to provision PIDs. You can add a single PID or a range of PIDs. You can add a PID to a program or in case of a ghost PID, select a TS.

To add an Input PIDs to an Output TS (Ghost PIDs):

1. In **Logical Input**, select the PID you wish to move.
2. From the drop-down list, select Drop To.

   A list of available output TSs appear.



3. Select the required TS.
4. Select one of the following options:
   - Select TS number > Add to TS
   - Unreferenced PIDS > Add to TS

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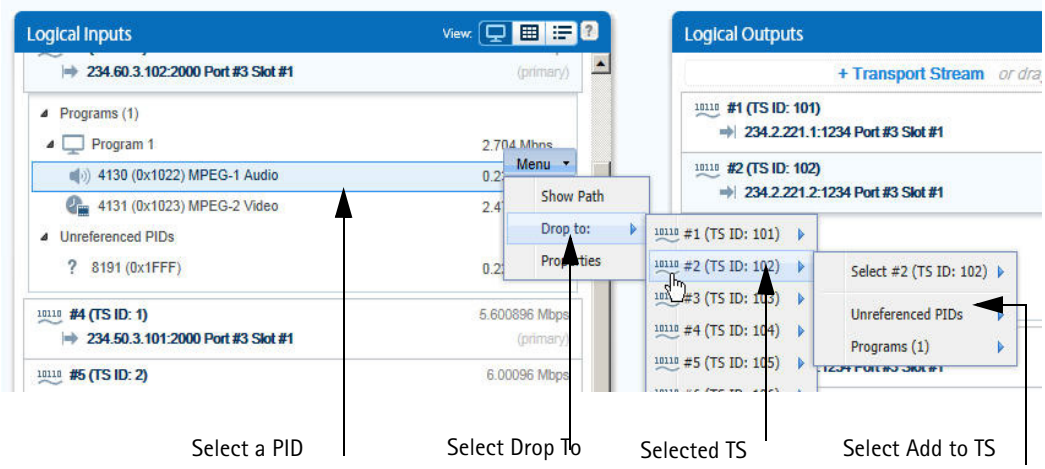
- Program # > Add to Program

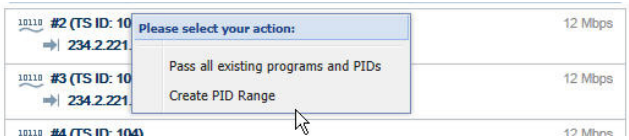


The PID is added according to your choices.

Creating a Range of PIDs

To create a range of PIDs:

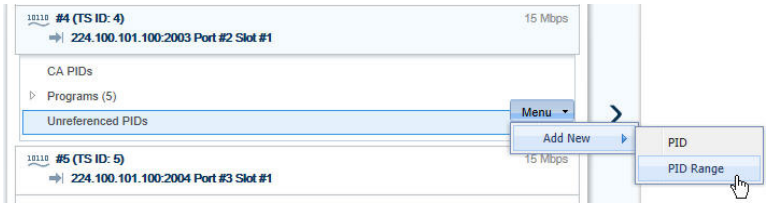
1. Create the PID range logically through one of the two following methods:
   a. In Logical Input, select the required TS and drag it to the Logical Output. The following options appear:



   b. Select **Create PID Range**. A PID range is added to the Unreferenced section of the selected output TS.

   Or

   a. In Logical Output, select **Unreferenced PIDs** > **Add New** > **PID Range**.



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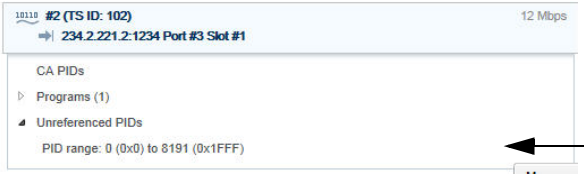
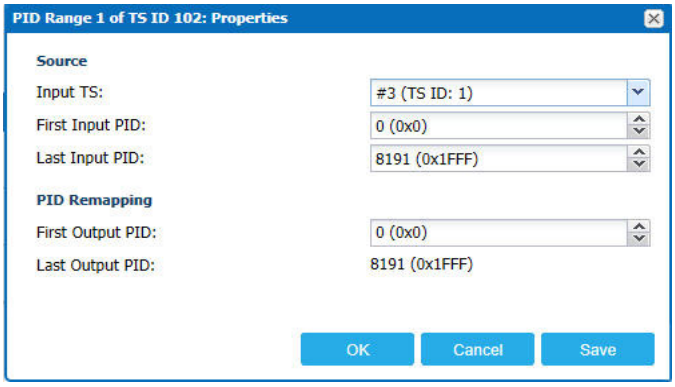
A new PID range appears in the Output section with a default value:0x0 - 0x1FFF.



This value indicates a range that includes all the PIDs of the input TS. If you intend to provision all of the PIDs, verify that under TS > **Tables**, none of the tables are selected to prevent table override. However, you can configure the required PID range as instructed below.

2. Select the PID Range and from the drop-down list select **Properties**.



3. In **Input**, select the required Input port and socket.
4. To define the PID range, enter in **First Input PID** and in **Last Input PID** the first PID of the range and the last PID, respectively.
5. To remap, enter in **First Output PID** the first PID. The last remap PID is automatically calculated once you click out of the **First Output PID** box.

Defining PID Parameters

To define PID parameters:

1. Select the required output PID.
2. From the drop-down list, select **Properties**.
3. In **Output PID**, enter the ID of the output PID.
4. In **ES Type,** enter the ES type of the output PID
5. In **Transcoding**, select to enable transcoding. The Transcoding Configuration appears in the dialog. See
6. In **Remux Mode**, select one of the following options:
   - PID - allows to multiplex a PID that is identified according to the input TS, service and PID. (see picture above)
   - Component - allows to multiplex a PID that is identified according to the input TS, service and component. That is, one of the component descriptors has the indicated component ID.
   - ES Type - allows to multiplex a PID that is identified according to the input TS, service and

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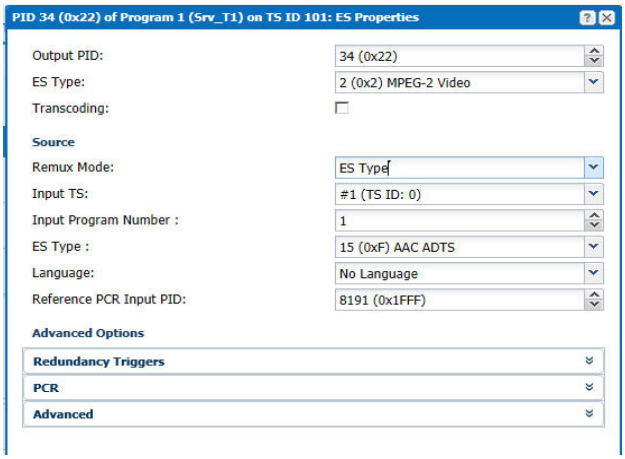
ES type. If the ES is an audio PID, you may select the required language.



7. In **Input TS,** open the TS list and select the required TS.
8. In **Input Program Number,** select the required input program number.
9. Continue according to the Remux Mode as listed in the following table:

Table 4–13: Remux Mode Parameters

Remux Mode	Configuration
PID	In PID, enter the required input PID
Component	Component ID, enter the required component ID
ES Type	In ES Type, enter the required ES type. If it is an audio PID, select in Language the required language.

10. **Reference PCR Input PID** - Select the required PCR PID. The latter is a baseline for the generation of the PCR at the output.
11. For advance configuration, see the following section.

PID Advanced Options

To define PID advanced options:

1. In the **PID Properties** dialog, focus on the **Advanced Options** section.

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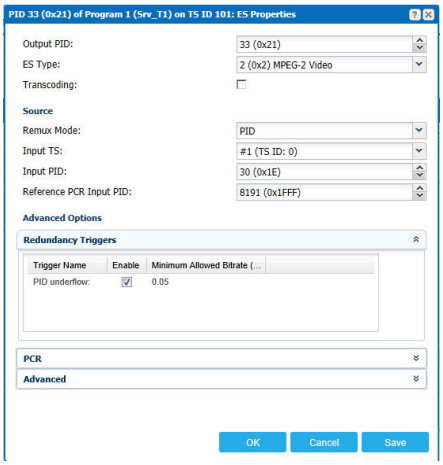
2. To configure Redundancy Triggers, click **Redundancy Triggers**.



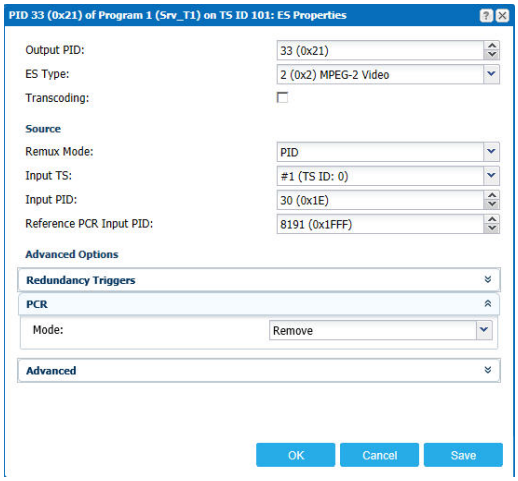
The default trigger is PID underflow. You can configure each routed PID (ghost, EMM, ECM, ES and PCR not of ES) to be monitored for PID underflow.

NOTE: PID underflow does not apply to DPI PID and for re-generated tables and PID range.

a. To enable PID Underflow as a trigger, check the **Enable** box.

b. **Minimum Bitrate Allowed (Mbps)** - Select the minimum allowed bitrate. If the bitrate goes below this threshold, a redundancy switch takes place. The default is 0.05 Mbps.

3. To configure PCR, click the **PCR** section.



a. Open the Mode list and select one of the following:
Follow the Input - PCR configuration follows the input
Remove - PCR is removed from the PID
Insert - Under service, **Generation Mode** is enabled and you can configure the PID to carry the PCR

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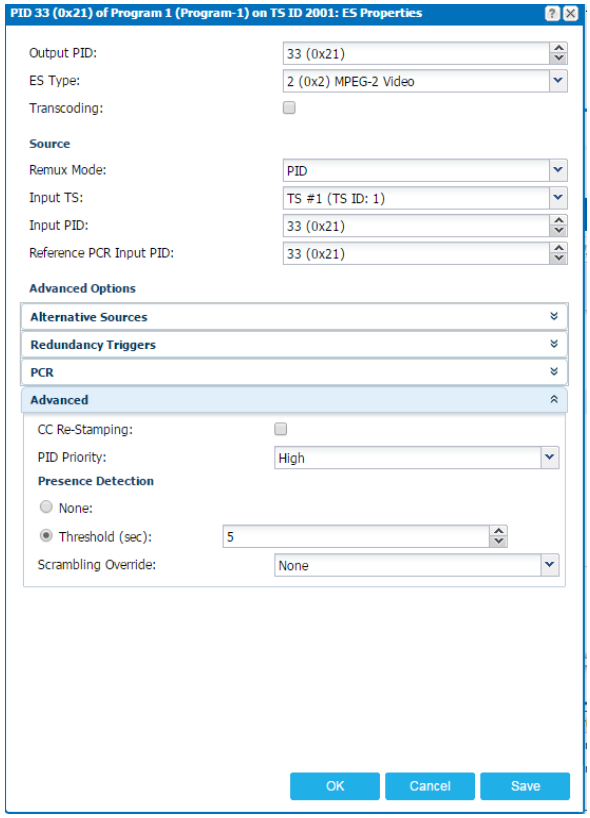
4. To configure advanced PID parameters, click on the **Advanced** section.



   a. **CC Restamping** - select the CC Restamping box to enable this option.

   b. **PID Priority** - PID Priority - define the priority for dropping PIDs in case of overflow. PIDs defined as Low are the first ones to be dropped and PIDs with High priority are the last ones to be dropped. The available priorities are as follows:
   As Parent - either TS or service, according to the parent stream.
   High
   Normal
   Medium
   Low

   c. **Presence Detection**- when selected, the alarm *PID Missing* is raised. By default this box is checked.

   d. **Scrambling Override** - open the list and select one of the following options:
   None - follows the scrambling configuration of the TS or service
   Always Scramble - even if TS or service are not scrambled, the PID is scrambled as long as a fixed key or a CW is provided. For future use only.
   Always Clear- even if TS or service are scrambled, the PID is always clear.

5. For a video PID in a transcoded service, select the Transcoding tab. See *PCR and Video Transcoding* on page 129.

6. For an ECM PID, click **CA PIDs** > select the required ECM PID.

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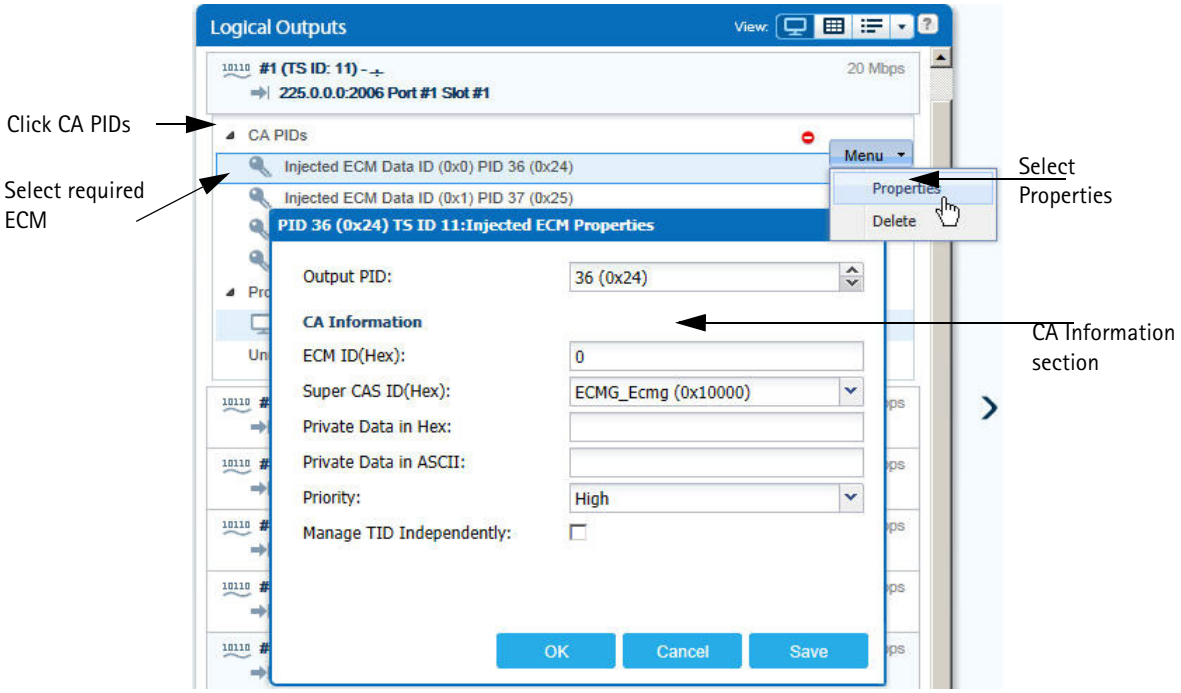
7. From the drop-down menu, select **Properties**.



8. Output PID - select the required PID number.
9. To configure CA related parameters, focus on **CA Information** section.
   a. **ECM ID (Hex)** - type in the ECM ID as provided by your CAS vendor. The ECM ID is a unique headend ID.
   b. In **Super CAS ID (4 Digits)**, enter the required ID. It is a 32-bit identifier that contains the CAS ID and ECMG ID. The CAS vendor provides this value.
   c. In **Private Data**, enter a string of up to 100 bytes that is added to the CA descriptor. You can enter it either in ASCII or in Hex by selecting either **ASCII** or **HEX**.
   d. In **Priority**, configure the ECM PID priority in case of overflow. Priority values range from High to Low.
   e. **Manage TID Independently** - when selected, ProStream 9000 manages the ECM table ID independent of the CP (Control Period).

NOTE: A CA descriptor is automatically added.

10. For advanced configuration, click **Advanced Configuration**.

Configuring PID Descriptors

Configuring PID descriptors comprises two steps:

- Tracking input descriptors - allows to track changes in input of the descriptor and to allow moving the descriptor from input to output. Once you select this option, you can select PIDs to be filtered. See *Tracking Input Descriptors at the PID Level* on page 101
- Assigning descriptors to the PID. See *Adding PID Descriptors* on page 102

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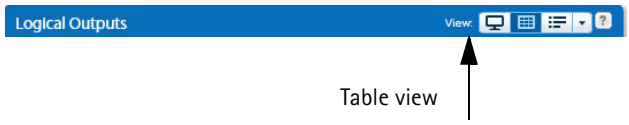
Tracking Input Descriptors at the PID Level

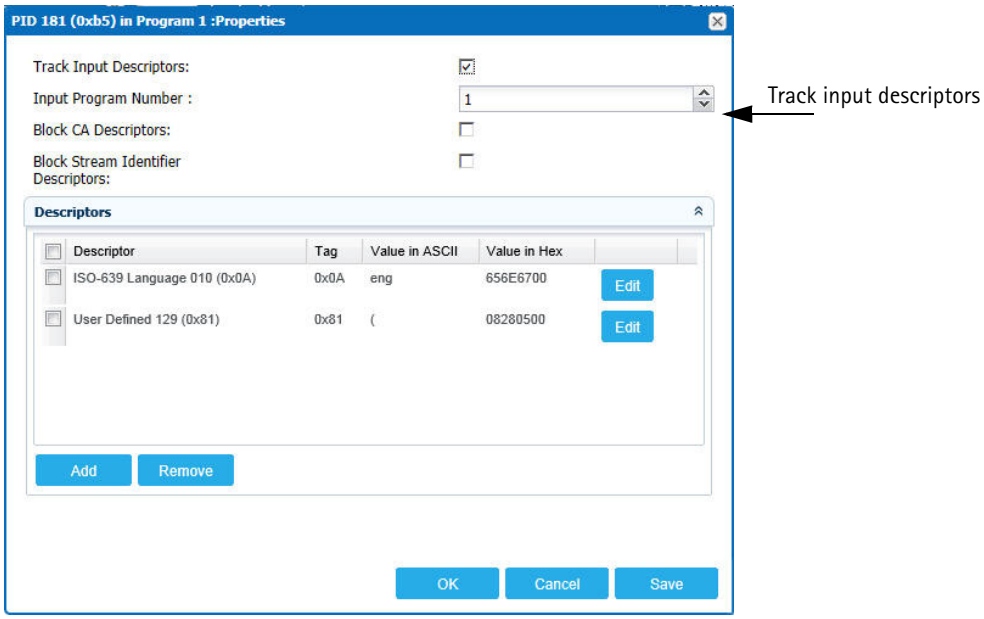
To track input descriptors at the PID level:

1. In Logical Output switch to Table view.



2. Drill down to the required PID and from the drop-down menu select **Properties**.
3. To track input descriptors, select **Track Input Descriptors**. You can track changes in input of the descriptor and to allow moving the descriptor from input to output. Once you select this option, you can select PIDs to be filtered.

   The dialog is updated with the options of track input descriptors:



4. In Tracking Input Descriptors section, do the following:
   a. **Input Program Number** - enter the input service ID that carries the PID you wish to enable tracking and/or filter its descriptors.
   b. **Block CA Descriptor** - select to remove the input CA descriptor from the output PID of the service.
   c. **Block Stream Identifier Descriptor** - select to remove the input Stream ID descriptor from the output PID of the service.

   To filter descriptors at the TS level, see *page 69*.

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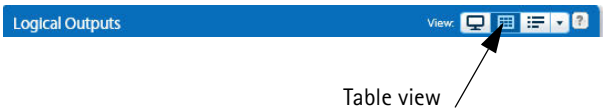
Adding PID Descriptors

To add PID Descriptors:

1. In Logical Output switch to Table view.



2. Drill down to the required PID and from the drop-down menu select **Properties**.
3. To add a descriptor to the original PID, click **Add**.
4. Open the **Descriptor** list and select the required descriptor. The list of descriptors is comprised of the following:

Table 4–14: Descriptors in Descriptor Tag List

Listed Descriptors	Explanation
Pre-defined descriptors	■ Registration descriptor ■ Language descriptor ■ Platform descriptor ■ Integrated signaling descriptor
User Defined Descriptors	This section includes descriptors that you need to define by entering the descriptor details in hexadecimal. See *Standard ES Types and Descriptors* on page 296.

5. Configure the descriptor as required. Typically, enter in **Value in Hex**, the required value.

   Depending on the descriptor, configure the following:

   CA descriptor:

   - In **CAS ID (4 Digits)**, enter the required ID
   - In **CAS PID**, select the required CAS PID
   - In **Private Data**, enter a string of up to 100 bytes that is added to the CA descriptor. You can enter it either in ASCII or in Hex by selecting either **ASCII** or **HEX**.

   Registration descriptor:

   - In **Format Identifier**, enter the required format identifier
   - In **Additional Identification Info:**, enter the additional information.

6. Click **OK**. The descriptor is added to the list in the **PID Properties** dialog.

NOTE: The configured CA descriptors is automatically added when creating an ECM PID.

Adding Ghost PIDs to the TS

Ghost PIDs are independent Elementary Streams (ES) that are not associated with any service. The ghost PID configuration allows you to transfer and remap PIDs as well as relocate their destination. You may also remap Ghost PIDs to new PIDs as long as they do not conflict with previously configured components.

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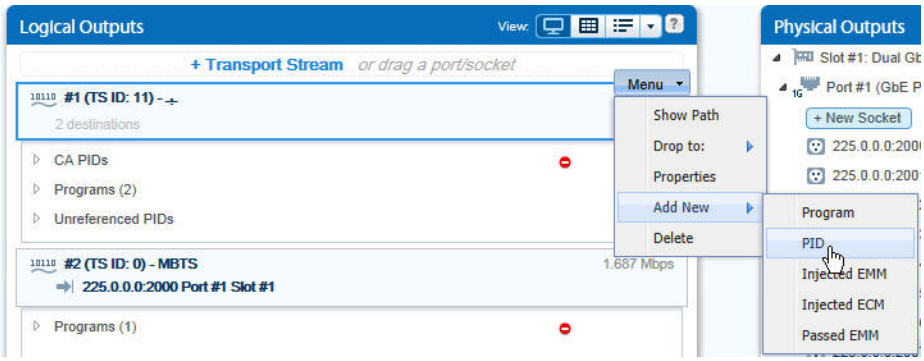
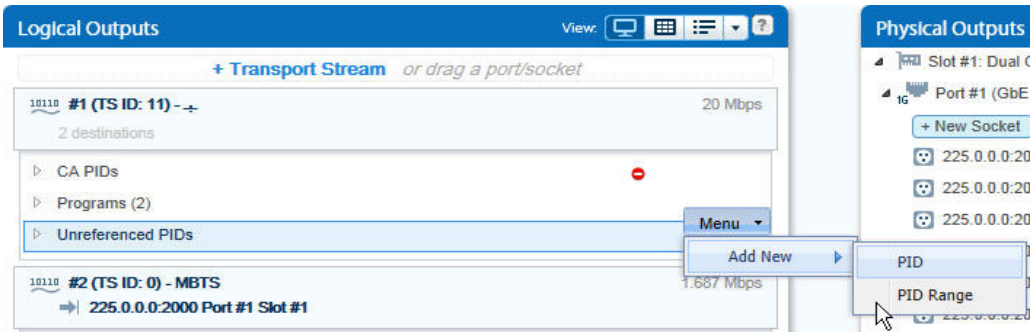
To add ghost PIDs to the TS:

1. In Logical Output, select an Output TS.
2. Do either of the following:
   - From the drop down menu of the TS, select Add PID, or



3. Click the TS and select the unreferenced PIDs and from the drop down menu select either add PID or add PID Range.



4. Select the PID or PID Range and from the drop down menu select **Properties**.
5. Configure as explained in *Creating a Range of PIDs* on page 95 and in *Defining PID Parameters* on page 96.

Adding and Configuring ECM PIDs to the TS

To add and configure ECM PIDs to the transport stream:

1. In Logical Output, select an Output TS.
2. Do either of the following:
   - From the TS drop-down menu select **Add NEW > Injected ECM**
   - From the drop-down menu of the **CA PIDs** select **Add New > Injected ECM**

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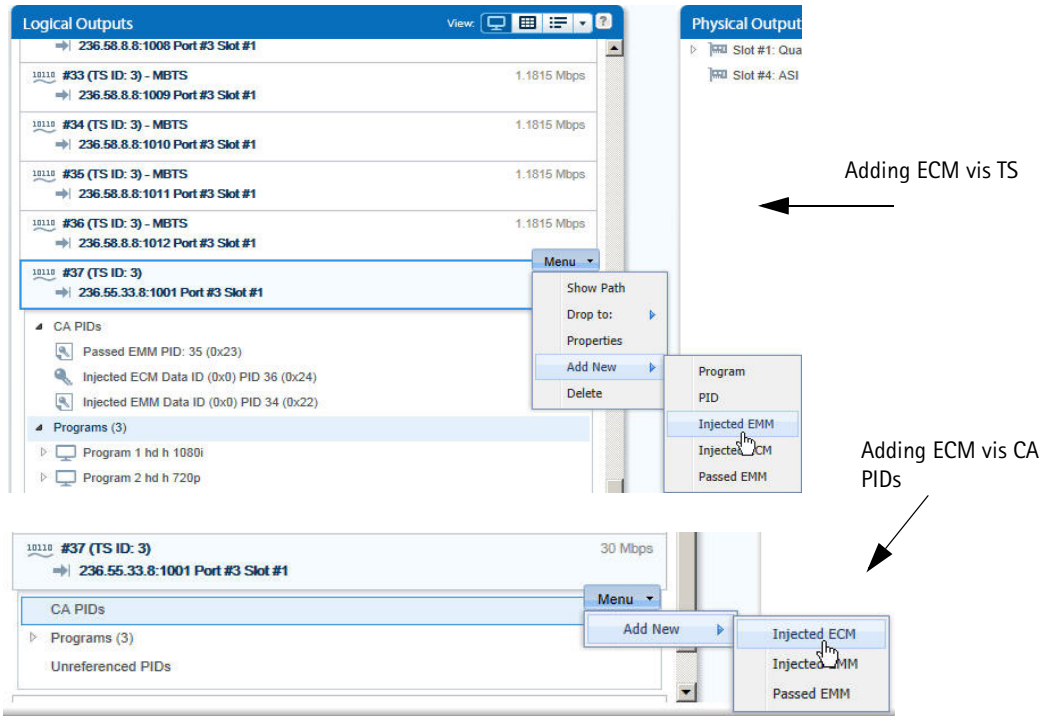
- From the drop down menu of the TS, select Injected ECM



The newly added ECM PID appears under CA PIDs.

3. To allocate the ECM PID, configure the CA information. Click **CA PIDs** > select the required ECM PID.

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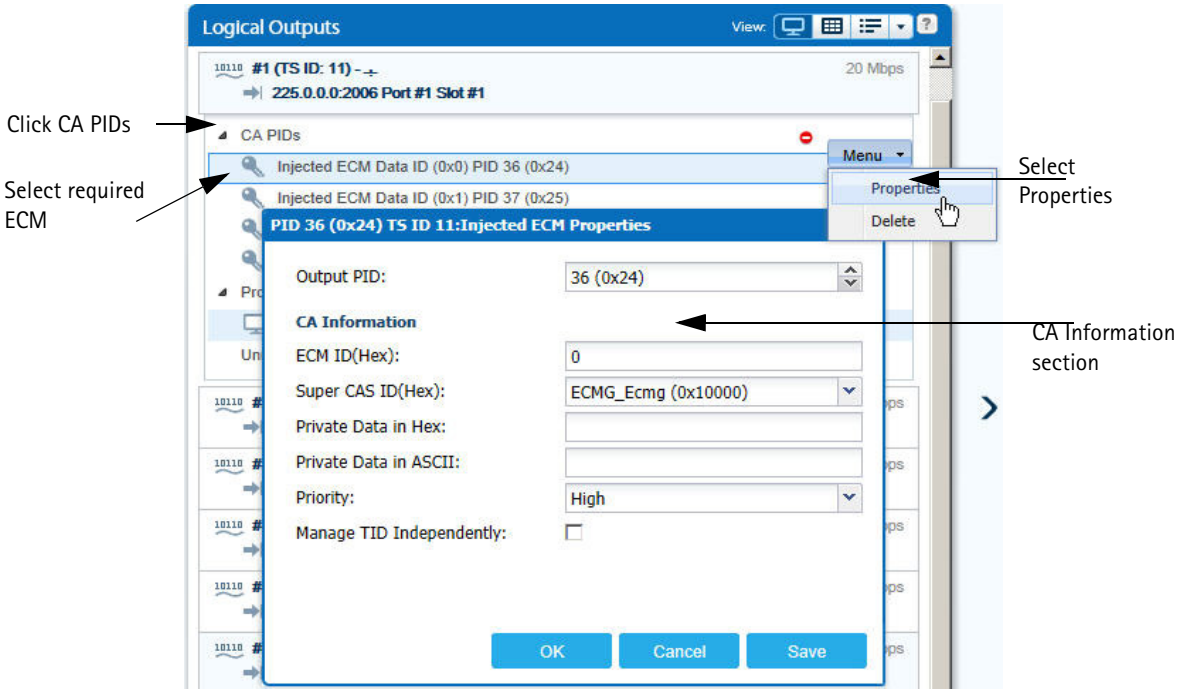
4. From the drop-down menu, select **Properties**.



5. Output PID - select the required PID number.
6. To configure CA related parameters, focus on **CA Information** section.
   a. ECM ID (Hex) - type in the ECM ID as provided by your CAS vendor. The ECM ID is a unique headend ID.
   b. In **Super CAS ID (4 Digits)**, enter the required ID. It is a 32-bit identifier that contains the CAS ID and ECMG ID. The CAS vendor provides this value.
   c. In **Private Data**, enter a string of up to 100 bytes that is added to the CA descriptor. You can enter it either in ASCII or in Hex by selecting either **ASCII** or **HEX**.
   d. In Priority, configure the ECM PID priority in case of overflow. Priority values range from High to Low.
   e. Manage TID Independently - when selected, ProStream 9000 manages the ECM table ID independent of the CP (Control Period).

NOTE: A CA descriptor is automatically added.

Adding and Configuring EMM PIDs to the TS

You can add EMM at the output or pass an EMM from the input.

To define EMM PID parameters:

1. In Logical Output, select an Output TS.
2. Do either of the following:
   - From the drop-down menu of the **CA PIDs** select **Add New** > **Injected EMM**

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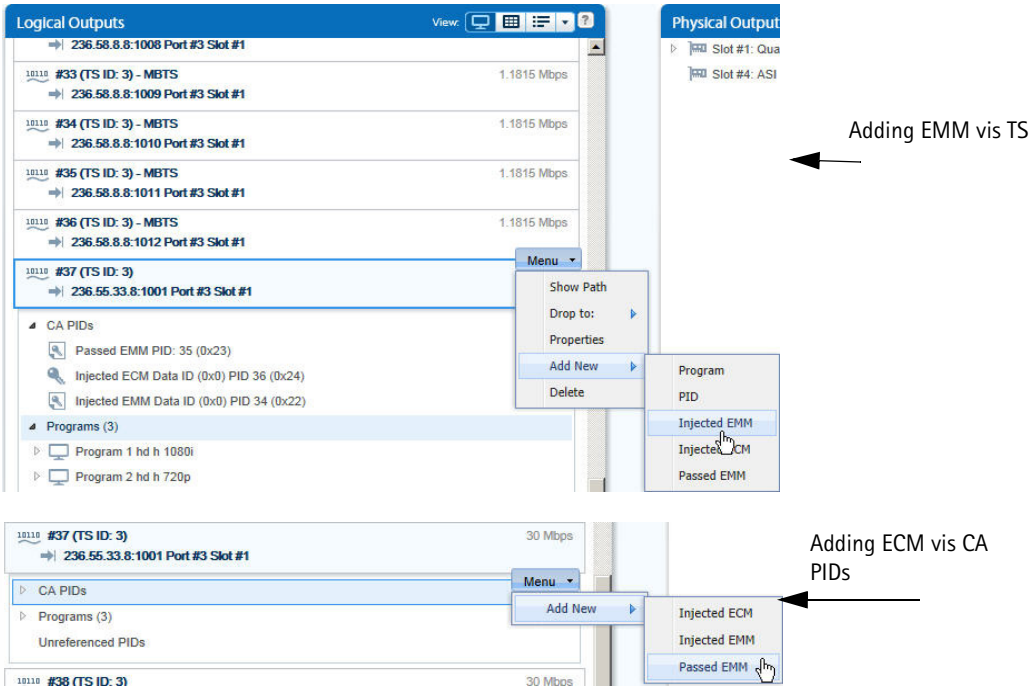
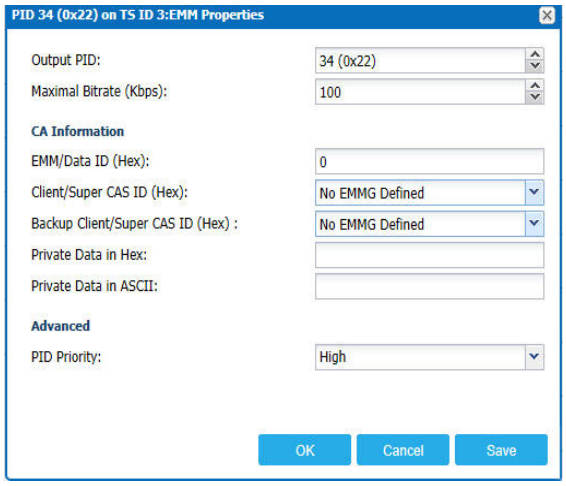
- From the drop down menu of the TS, select **Injected EMM** or **Passed EMM**

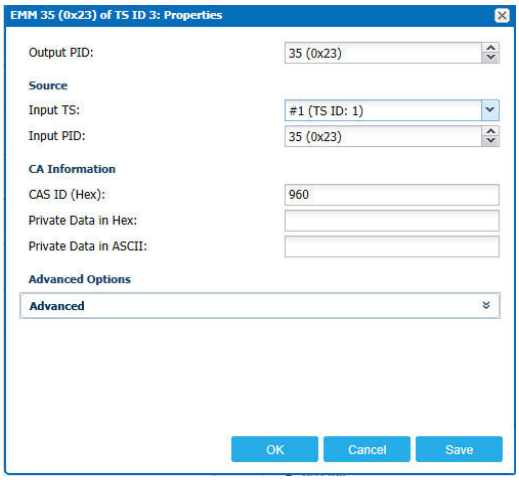


The newly added EMM PID appears under CA PIDs.

3. To allocate the EMM PID, configure it. Select it and from the drop-down menu, select **Properties**.



Injected EMM



Passed EMM

Configuring an Injected ECM PID

To configure an injected ECM PID:

1. Configure the Output PID of the EMM PID. Define the PID you allocate for the EMM, in other words the PID that carries the EMM.

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2. **Maximal Bitrate** - Applies to injected EMM only. Define the maximum bitrate for the EMM PID.
3. Configure the CA parameters:
   a. Client/Super CAS ID - a four-byte integer that contains the CAS ID and EMMG identifier. The CAS vendor provides this value.
   b. Backup Client/Super CAS ID- a four-byte integer that contains the CAS ID and EMMG identifier. The CAS vendor provides this value.
   c. Private Data (Hex) - a string of up to 100 bytes that is added to the CA descriptor. The Private Data in ASCII is updated.
4. In **PID Priority**, configure the ECM PID priority in case of overflow. Priority values range from High to Low.

To stop sending EMM with the output stream, delete the EMM PID via the Stream Config page. Deleting EMMGs only (via the EMMG page) does not stop the EMMs from flowing with the output stream.

Configuring a Passed ECM PID

To configure a passed ECM PID:

1. **Output PID** - configure the output PID of the EMM PID. Define the PID you allocate for the EMM, in other words the PID that carries the EMM.
2. Under **Source** configure the following:
   a. Input TS - Select the input TS
   b. Input PID - Select the input PID
3. Configure the CA parameters:
   a. CAS ID - enter a16 bit CAS vendor ID.
   b. Private Data (Hex) - a string of up to 100 bytes that is added to the CA descriptor. The Private Data in ASCII is updated.
4. Click **Advanced** and configure the following:
   a. **PID Priority**, configure the EMM PID priority in case of overflow. Priority values range from High to Low
   b. **Presence Detection**- when selected, the alarm *PID Missing* is raised. By default this box is checked.

Configuring DPI PIDs

You can configure either of the following DPI PIDs:

- Passed DPI PID - in case a DPI PID is streamed into the device. See *Configuring a Passed DPI* on page 107.
- Generate DPI PID - when ProStream receives a trap/analog CUE tome it can generate SCTE35 CUE with a splice insert message and inject it to the output stream. See *Configuring Generate DPI PID* on page 109.

Configuring a Passed DPI

To configure a passed DPI:

1. In the web client, in Logical Output, select the required program.

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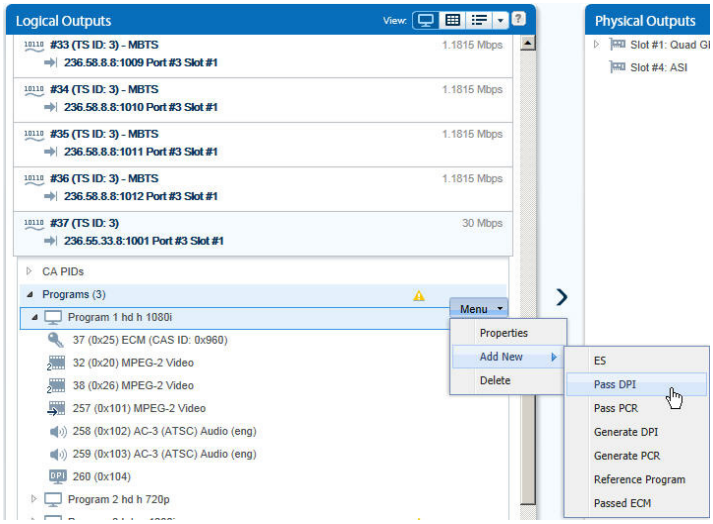
2. From the drop-down menu select Add New > **Passed DPI**.



A DPI PID is added to the program.

3. Select the Passed DPI PID from the drop-down menu select **Properties**.
4. Fill in the following:
   a. **Output PID** - enter the output PID number.
   b. **ES Type** - view the ES type of the DPI PID. Typically it is 0x86, SCTE35.
   c. **Reference PCR Input PID** - select the required PCR input PID.
   d. **Remux Mode** - contains the following options:
   None - Do not register to receive any SCTE35 messages
   PID - Identify and register the DPI PID according to its PID ID. Once you select PID, the PID box appears. In the PID box, enter the required PID number.
   ES Type - Identify and register the DPI PID according to its ES Type. Usually **the** SCTE35 PID is type 0x86.
   Component - Identify and register the DPI PID according to the required component parameters. Once you select Component, the **Service** and the **Component** boxes appear. Enter the required service details and the required component ID
5. **Input PID** - select the input PID
6. In **Advanced** Options, configure how to coordinate between network PIDs and AD server PIDs, open the **Ad PID Selection Policy** list and select one of the following options:
   - **Replace (Fallback: Block)** - Try to match Ad PID to network PID. If a matching PID is not found, block the network PID.
   - **Replace (Fallback: Play)** - Try to match Ad PID to network PID. If a matching PID is not found, play the network PID.
   - **Always Play Network PID** - Do not try to match Ad PID to network PID, always play the network PID
   - **Block PID During Ad** - Do not try to match Ad PID to network PID, always block the network PID
7. In **Advanced**, configure as follows:
   a. **C Restamping** - select the CC Restamping box to enable this option.

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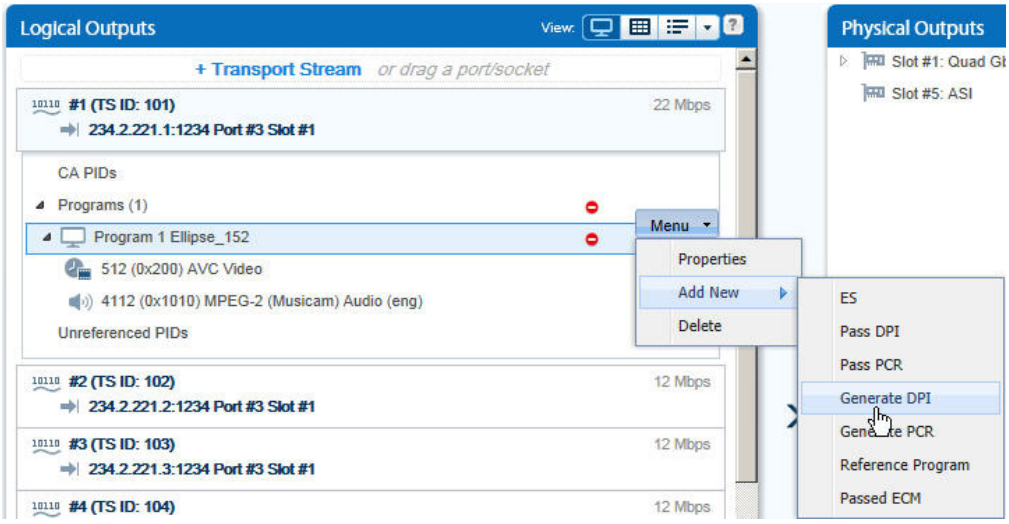
b. **PID Priority** - PID Priority - define the priority for dropping PIDs in case of overflow. PIDs defined as Low are the first ones to be dropped and PIDs with High priority are the last ones to be dropped. The available priorities are as follows:
As Parent - either TS or service, according to the parent stream.
High
Normal
Medium
Low

c. **Scrambling Override** - open the list and select one of the following options:
None - follows the scrambling configuration of the TS or service
Always Scramble - even if TS or service are not scrambled, the PID is scrambled as long as a fixed key or a CW is provided. For future use only.
Always Clear- even if TS or service are scrambled, the PID is always clear.

Configuring Generate DPI PID

To configure or generate a DPI PID:

1. In the web client, in Logical Output, select the required program.
2. From the drop-down menu select **Add New** > **Generate DPI**.



A DPI PID is added to the program.

3. Select the generated/Passed DPI PID and from the drop-down menu select Properties.
4. **Output PID** - enter the output PID number.
5. **ES Type** - view the ES type of the DPI PID. Typically it is 0x86, SCTE35.
6. **SL 10 SNMP Agent IP** - select the IP address of the agent to generate splicing requests.
7. **SL 10 Contact Number** - select the required contact number.
8. **DPI Delay** - select a delay for the DPI PID.
9. **Splice Return Mode** - SCTE35 may indicate splice duration time:
Enable Duration
No Duration

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10. **Command** - SCTE35 may indicate splice time:
    Not immediate
    Immediate
11. **Avail Duration** - it is enabled if Enable Duration is selected in Splice Return Mode. Select the time slot for inserting content into the network feed.
12. **Avail** - indicates the avail time

What's Next...

Once provisioning/multiplexing is complete, configure the Output ports as explained in the following section.

Configuring the Output Port

The available output ports are as follows:

- ASI - outputs one TS.
- GbE - outputs up to 128 TSs.

Each output port has its own unique configuration parameters. The following section guides you on how to configure each output port.

Configuring an ASI Output Port

The ASI output port requires you to set the required bit rate and to enable the output port.

To configure an ASI output port:

1. In the Physical Outputs pane, select the required ASI out port.
2. From the drop down menu, select **Properties**.:
3. Check the **Enable** box to enable the ASI port.
4. In **Port Description**, enter a short description.
5. In **Source TS,** enter the source TS.
6. In **Bitrate (bps)**, type in the required bit rate (bits per second) of the TS.
7. To define packet size, select **Packet Size**:
   188 - default
   204
   Auto - the device automatically detects the packet size.
8. **Select Disable Scrambling** to enable clear streaming on this port.
9. Check the **Shutdown Port when Input is Missing** box to enable the feature on this port.

NOTE: If you use scrambling over ASI, you may only select 188 (default) and 204 for the output packet size.

Configuring a GbE Output Port

Configuring a GbE Output port requires setting the port mode at the card level as well as properties at the port level itself.

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To set configure a GbE Output Port:

1. In the **Physical Outputs** pane, right-click the slot with the required GbE card and select **Properties**.
2. Pairs of ports (1&2 and 3&4, if available) can work independently or in one of four redundancy schemes. The ports are configured as follows:
   a. Open the appropriate **Redundancy** list and select the output mode required. The redundancy schemes are listed in table *Table 4–15* on page 111. You can select either of the following:
   b. If Manual redundancy is used, select the port to be Primary or Backup.
   Off (Independent)
   Hot-Standby
   c. If **Manual** redundancy is used, select the port to be Primary or Backup.
   d. In the **Advanced** section, select the **Card Ports Mode.** You can select either of the following:
   Port 1 + 2: 1 Gbps
   Port 2: 10 Gbps (if available)

   Note the following regarding port redundancy:
   - Port redundancy is disabled for Ports 1&2 when Port 2 is in 10Gbps mode.
   - By default, Port 1 is the primary port and Port 2 of the same IOM module is the backup port.
   - Triggers for a port redundancy switch include: *Missing PID*, *Zero Bitrate* (*Cable Disconnect*, *Socket Loss), PAT/PNT Missing, CC Error*.
3. Click **Save** to send the configuration to the device.
4. Click **OK** to close the box.
5. Click on the tree icon on the left of the slot to display the ports available.
6. Right-click on the port required to display the port's Properties box.
7. Check the **Enable** box to enable the port.
8. In **Description**, enter a short description.
9. Check **Autonegotiation** to enable the feature on this port.
10. Check **Shutdown Port when Input is Missing** to enable the feature on this port.
11. Check **Loopback** to enable this feature.
12. Click **OK** to save the configuration

The following table lists the redundancy modes supported:

Table 4–15: GbE Output Redundancy scheme

Parameter	Explanation
Manual	The redundancy switch is performed manually. The **Active Port** parameter appears and you can set the active port.
Automatic	The redundancy switch is performed automatically upon port failure. Once the primary is faulty, the device automatically switches to the backup port and continues transmitting content over this port unless it is faulty. The device switches to the primary port only when the backup fails.

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Table 4–15: GbE Output Redundancy scheme

Parameter	Explanation
Manual Revert	The redundancy switch occurs automatically upon port failure. However, switching back to primary, when fixed, is performed manually. To revert back to the primary port, change Port Usage to Automatic. Once the primary port is active, change Port Usage to Manual Revert.
Automatic Revert	The redundancy switch occurs automatically upon port failure. However, the device automatically switches to primary when the primary has stabilized and even though the backup is still in order. The baseline is that the primary is preferred.

8VSB Modulation

ProStream supports 8VSB modulation cards that enable reception of ATSC terrestrial TV. See *Viewing/Setting Card Parameters* on page 24.

The following table lists the specifications of the 8VSB module:

Table 4–16: 8VSB Specifications

Parameter	Specifications
8VSB input card	Up to four per device
ATSC receiver modules (tuner)	Up to four per 8VSB input card
Capacity of input port	1 x MPTS
TS frequency	Up to 19.39Mbps
Packet size	188 bytes
Channels of ATSC receiver modules	2-59
Packet Error Rate threshold	0-12,892 packets per seconds
Signal Quality threshold	0.0-27.0dB

ProStream 9000 supports the following applications with 8VSB modules:

- 8SVB input streams transcoded and output over ASI/GbE output ports. See *Video Transcoding* on page 113.
- 8SVB input streams multiplexed and output over ASI or GbE output ports with PCR generation at the output. See *Configuring a PCR PID* on page 87.

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Chapter 5
Broadcast Transcoding

Overview

This version of ProStream 9000 with ACE™ (Agile Compression Engine) enables you to transcode video and audio PIDs. This version of ProStream 9000 supports both broadcast and multiscreen output streams simultaneously.

Video Transcoding

This version of ProStream 9000 allows to transcode up to 20 HD or up to 60 SD services. The device transcodes services as follows:

- High Definition (HD) MPEG2/H.264 services to HD MPEG2/H.264 services
- Standard Definition (SD) MPEG2/H.264 services to SD MPEG2/H.264 services
- Downconversion HD MPEG2/H.264 services to SD MPEG2/H264 services
- Microsoft Picture in Picture (PIP) - HD/SD MPEG2/H.264 services to PIP H.264 services. Microsoft PIP is a low resolution service that complies with Microsoft PIP specifications.

The following table lists the transcoding specifications. For PIP transcoding specifications, see *Table 5–3 on page 115*:

Table 5–1: Transcoding Specifications

Specification	Explanation
Density	■ Density - four cards per unit
Services	■ HD to HD ❑ up to 5 services per transcoding card ❑ up to 20 services per unit ■ SD to SD ❑ up to 15 services per transcoding card ❑ up to 60 services per unit *Note:* Supports any combination of SD and HD services, where 1 HD service consumes the resources of 3 SD services. See *Table 5–2 on page 114*. ■ HD to SD ❑ up to 5 services per transcoding card ❑ up to 20 services per unit ■ Microsoft PIP services ❑ HD to PIP Up to 5 main services + up to 5PIP services per transcoding card Up to 20 main services + up to 20PIP services per unit ❑ SD to PIP Up to 10 main services + up to 10PIP services per transcoding card Up to 40 main services + up to 40PIP services per unit
Video Format	Input - H.264/MPEG2 Output - H.264/MPEG2

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Table 5–1: Transcoding Specifications

Specification	Explanation
Bit rate	■ Input - VBR/CBR ■ Output - VBR/CBR ❑ VBR - VBR is in a pool only. For HD, up to 3 services per pool for best performances. **Note**: Currently mixed pools (HD/SD, MPEG2/AVC) are not supported. ❑ CBR - CBR with stream control level ❑ CBR - CBR with service control level
Resolution	Horizontal Resolution: ■ HD ❑ 720p - supports 1280x720, 960x720 Converts any to any of the supported types. ❑ 1080i - supports 1920x1080, 1440x1080, 1280x1080 Converts any to any of the supported types Horizontal Resolution for both 50 and 60 Hz Vertical Resolution - no conversion, follow the input ■ SD ❑ PAL 50Hz - supports 720/704/640/544/528/480/352 X 576 Converts any to any of the supported types ❑ NTSC 60Hz - supports 720/704/640/544/528/480/352 X480 Converts any to any of the supported types For downconversion, see *Table 5–4 on page 116*.
Frame Rate	50/60Hz All services in a single ProStream 9000 device are either 50 or 60Hz.
Audio PIDs	Passthrough with required delay
PIDs per Service	Up to 32 PIDs per transcoded service
Stream conditioning	Optimizes in/out splicing points for downstream splicing. Applies to broadcast in CBR only.

Table 5–2: Possible Combinations of HD and SD Services per Transcoding Card

SD	HD/Downconversion (HD to SD)
15 services	None
12 services	1 service
9 services	2 services
6 services	3 services
3 services	4 services
None	5 services

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Table 5–3: PIP Transcoding Specifications

Specification	Explanation
Services	See *Table 5–1 on page 113*.
PIP Service	PIP service is always coupled with main service. PIP Service without Main service is not allowed: ■ PIP Service ❑ points to its main service ■ Main Service ❑ up to one coupled PIP service. ❑ video format - input MPEG2/H.264 to H.264 ❑ output SD/HD, H.264 CBR/VBR ■ Main and PIP services ❑ have the same video input ❑ have different H.264 video output ❑ may outflow on a different TS out or on the same one ❑ may have different number of Audio/Data PIDs
Video Format	■ Main Service ❑ Input - HD/SD ❑ Output - HD/SD ■ PIP Service ❑ Input - HD/SD ❑ Output - PIP
Stream Type	■ Main Service ❑ Input - H.264/MPEG2 ❑ Output - H.264 ■ PIP Service ❑ Input - H.264/MPEG2 ❑ Output - H.264
Bit rate	■ Main Service ❑ Input - CBR/VBR ❑ Output - CBR/VBR ■ PIP Service ❑ Input - CBR/VBR ❑ Output - CBR, for range see *Table 5–16 on page 129*.
Resolution	Horizontal Resolution: ■ Main Service HD ❑ See *Table 5–1 on page 113* ■ Main Service SD ❑ See *Table 5–1 on page 113* ■ HD PIP - PIP is coupled with an HD output service ❑ Supports 128x96 and 192x192 ■ SD PIP - PIP is coupled with an SD output service ❑ Supports 96x96, 192x192 and 192x144

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Table 5–3: PIP Transcoding Specifications

Specification	Explanation
Miscellaneous Parameters	■ The PIP service follows the Main service configuration of the following parameters: ❑ GOP ❑ Aspect Ratio ❑ Mctf ■ The PIP service enforces the following configuration for the listed parameters: ❑ AFD - Discard ❑ Closed Captions - Discard ❑ Other data - Discard ❑ Adaptation Field Data - Disabled

Video Transcoding Procedure

You can transcode either of the following:

- an HD/SD service
- a PIP service

Transcoding an HD/SD Service

The following section instructs you on how to transcode an HD/SD service using the web client of the ProStream 9000 transcoder. The following table lists the required configuration to allow the transcoding of the video PID of a service:

Table 5–4: Transcoding Required Configuration

Feature	Input Stream	Output Stream	Explanation
Video Format	HD/SD	HD/SD	Supports: ■ High Definition (HD) ■ Standard Definition (SD) ■ Downconversion from HD to SD
Stream Type	H.264/ MPEG2	H.264/MPEG2	Inputs H.264/MPEG2 and transcodes to H.264/MPEG2 In downconversion, output is MPEG2 only.

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Table 5–4: Transcoding Required Configuration

Feature	Input Stream	Output Stream	Explanation
Resolution	N/A	Horizontal Resolution: ■ HD ❑ 720p - supports 1280x720, 960x720 Coverts any to any of the supported types. ❑ 1080i - supports 1920x1080, 1440x1080, 1280x1080 Converts any to any of the supported types Horizontal Resolution supports both 50 and 60Hz Vertical Resolution - no conversion, follow the input ■ SD ❑ PAL 50Hz - supports 720/704/640/544/ 528/480/352 X 576 Converts any to any of the supported types ❑ NTSC 60Hz - supports 720/704/640/544/ 528/480/352 X480 Converts any to any of the supported types	■ HR - if input is 720p, transcodes any 720p supported type to any 720p supported. If input is 1080i, transcodes any 1080i supported type to any 1080i supported type. ■ If input resolution changes, and: ❑ Output resolution is Follow the Input, the output resolution changes accordingly without service interruption assuming that no gaps are created at the input. ❑ Output resolution is configured to a certain resolution, the output resolution remain as output configured resolution. ■ Downconversion - any supported input HD resolution to any supported SD output resolution. Default output resolution: 720p. ■ VR - Follow input only. Unsupported VR conversion. Note: Downconversion - Output Vertical resolution is automatically set according to the input frame rate: 480 - In 60hz 576 - In 50hz
Aspect Ratio	N/A	Follow input 16:9 4:3	Allows to match picture to type of screen, standard or wide screen. See *Table 5–8 on page 121*.
Bit rate	N/A	CBR VBR	See *Defining Output Bitrate of a Transcoded Service* on page 129.
User Data	N/A	AFD Closed caption Other data	Allows to select which user data to output with the video PID In Downconversion, defines Video Scaling.
GOP	N/A	GOP	Allows to define GOP related parameters
PCR PID	Any PID	Video PID	Input - Any PID may input the PCR PID. Output - Only video PID may transmit the PCR PID

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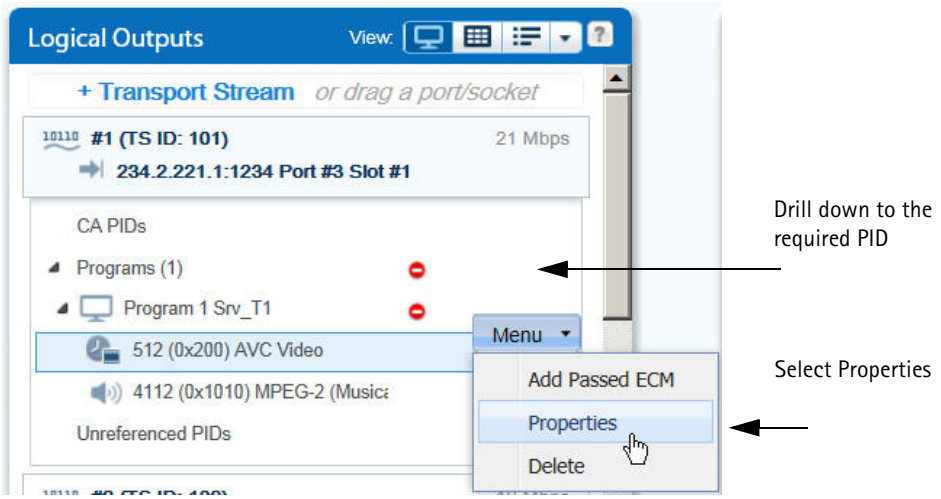
The transcoding parameters are grouped in the **Video Transcoding** tab as explained below. For PCR configuration, see *Configuring a PCR PID* on page 87.

To transcode a Video PID:

1. Log into the device.
2. In the **Logical Output** pane, drill down to the required program.



3. Double-click the program node to view its PIDs.
4. To transcode its video PID, select the PID and from the drop down menu select **Properties**.
5. Check the **Transcoding** box. to show transcoding-related sections.
6. Continue according to the instructions in the following sections.

Configuring Transcoding Basic Parameters

To configure basic transcoding parameters:

1. Focus on **Transcoding Configuration** > **Basic**.
2. **Resolution Conversion** - open the list and select one of the following:
   - SD to SD
   - HD to HD
   - HD to SD
   - Any to PIP. See *Transcoding a PIP Service* on page 126.
3. To select the input stream type, open the **Original Coding Format** list and select the required type: H.264 or MPEG2.
4. To select the output stream type, open the **Coding Format** list and select the required type: H.264 or MPEG2.

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5. To define the output resolution, open the **Resolution** list and select one of the following:

Table 5–5: Output Resolution

Output Video Format	Output Resolution
N/A	Follow the input
HD	■ 720p - supports 1280x720, 960x720 for both 50 and 60 Hz ■ 1080i - supports 1920x1080, 1440x1080, 1280x1080 for both 50 and 60Hz
SD	■ PAL 50Hz - supports 720/704/640/544/528/480/352 X 576 ■ NTSC 60Hz - supports 720/704/640/544/528/480/352 X480

6. **Profile –** Read only. View one of the following according to table:

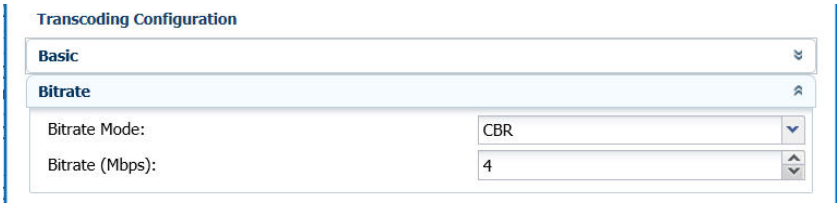
Table 5–6: Profile Configuration

Format	SD	HD
MPEG2	main	high
H.264	main/high	main/high

Configuring Transcoding Bitrate Parameters

To define the required output bit rate of the stream:

1. Click the **Bitrate** section.



2. Open the **Mode** list and select either CBR or VBR and configure according to the following table:

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.

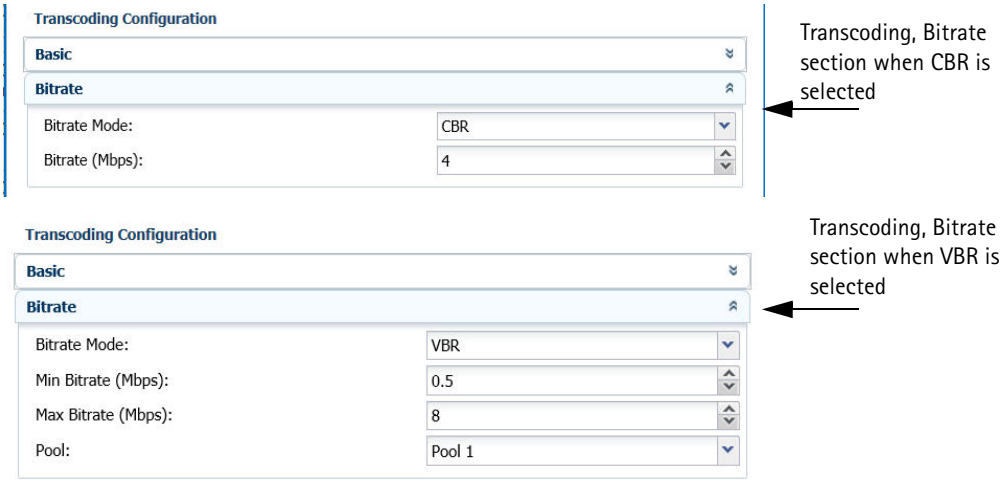

Table 5–7: CBR and VBR Configuration

CBR Configuration	VBR Configuration
■ In **Rate (bps)**, enter the required output bit rate. See *Table 5–16* on page 129.	1. Open the **Pool** list and select the required pool. To create a pool, see *Creating a Pool* on page 131. *Note:*Currently mixed pools (HD/SD, MPEG2/AVC) are not supported. See *Creating a Pool* on page 131.
	2. In **Min Rate**, enter the minimum rate of the video PID. *Note:*Total sum of minimum rates of streams in the pool should be smaller than pool rate. See *Table 5–15, "Bitrate of a VBR Output Service," on page 129*.
	3. In **Max Rate**, enter the maximum rate of the video PID. See *Table 5–15, "Bitrate of a VBR Output Service," on page 129*.

NOTE: You can configure the bitrate of the transcoded stream at service level. See *Configuring Bitrate of Transcoded Stream at Service Level* on page 134.

Configuring Transcoding Aspect Ratio Parameters

To configure the aspect ratio:

1. Click on the **Aspect Ratio** section:
2. Open the **Aspect Ratio** list and select one of the following options according to the video format. For further information, see *Table 5–8* on page 121:
   - ❑ Follow the input - no changes to the aspect ratio.
   - ❑ 16:9 - (Letter Box) the international standard format of HDTV, non-HD digital television and analog wide screen television.
   - ❑ 4:3 - (Center Cut) select for standard TV.

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Table 5–8: Aspect Ratios and Video Format

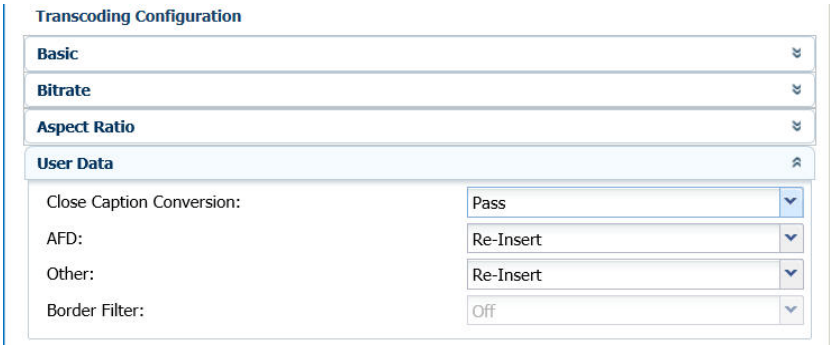
Video Format	Available Aspect Ratios Option	Explanation
HD to HD	Follow the Input	Follow the Input
SD to SD	Follow the Input 4:3 16:9	Follow the Input 4:3 16:9
HD to SD	4:3 16:9	4:3 16:9

3. **Video Scaling** applies to downconversion, HD to SD only. In case of HD to SD, open the **Video Scaling** list and select one of the following options:
   - Force letter-box
   - Force center-cut
   - Follow AFD (fallback to letter-box) - default value
   - Follow AFD (fallback to center-cut)
   - Squeeze to Anamorphic - only in case the aspect Ratio is 16:9

Configuring Transcoding User Data Parameters

To manage user data at the output:

1. Click the **User Data** section and do the following:



2. Open the **Closed Caption Conversion** list and select one of the following options:

Table 5–9: Closed Caption Conversion Options:

Closed Caption Option	Explanation
Pass	Passthrough any closed caption data present in the input stream
Discard	Remove any closed caption data present in the input stream

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Closed Caption Option	Explanation
SCTE-20 ATSC A/53 SCTE-20 + ATSC A/53 ATSC A/72 NADBS	Closed caption data outflows in formats including dual-caption SCTE-20 + ATSC A/53. The closed caption data format depends on Video Format and Stream Type.

3. **AFD** (Active Format Definition) - open the list and select either of the following:
   - Re-Insert - to re-insert data related to the aspect ratio of the image.
   - Discard - to discard data related to the aspect
4. **Generate AFD if Input Missing** - open the list and select one of the following as shown in the table below:

Table 5–10: AFD Generation Options

Definition	Integer	Aspect Ratio
SD-> SD	1	4:3 full frame (1000)
	2	4:3 full frame (1001)
	3	16:9 letterbox, vertically centered (1010)
	4	14:9 letterbox, vertically centered (1011)
	5	4:3 full frame, alternative 14:9 center (1101)
	6	16:9 letterbox, alternative 14:9 center (1110)
	7	16:9 letterbox, alternative 4:3 center (1111)
HD-> HD	11	16:9 full frame (1000)
	12	4:3 pillarbox (1001)
	13	16:9 full frame (1010)
	14	14:9 pillarbox (1011)
	15	4:3 pillarbox, alternative 14:9 center (1101)
	16	16:9 full frame, alternative 14:9 center (1110)
	17	16:9 full frame, alternative 4:3 center (1111)

5. **Other –** open the list and select one of the following:
   - Re-Insert - to re-insert data related to the aspect ratio of the image.
   - Discard - to discard all user data except AFD and closed caption data.
6. **Border Filter** applies to broadcast transcoding of SD to SD only. To enable, open the **Border Filter** list and select **On**. The transcoding engine removes the following VBI data in the video signal:

   If input is 480i (NTSC), AMOL (Automated Measurement of Lineups) data is removed.

   If input is 576i (PAL), WSS (Wide Screen Signaling) data is removed

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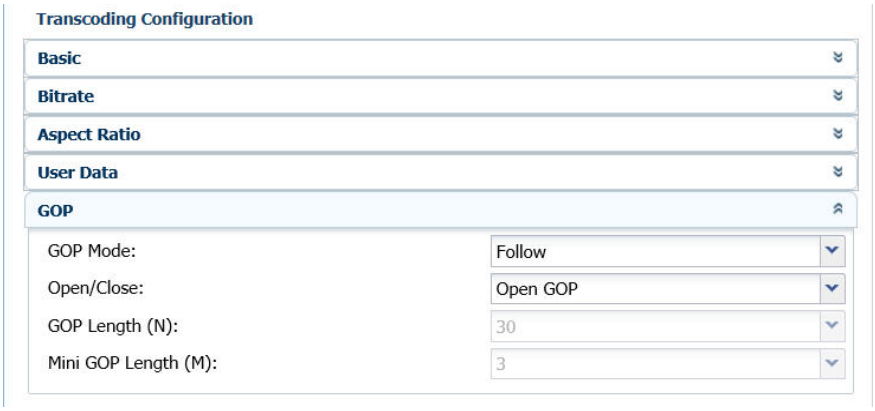
In both cases, the VBI data occupies the first active line of video per video field. The line suppressing functionality will copy the video data from the second line of video (per field) into the first line of video (per field).

NOTE: Border Filter is not supported if Adaptive Passthrough is selected.

Configuring Transcoding GOP Parameters

To configure GOP related parameters:

1. Click the **GOP** section.



2. To select the output GOP structure, open the **GOP Mode** list and select one of the following options for the out:

Table 5–11: GOP Mode

Mode	Explanation
Follow the Input	Default. The GOP mode is as in the input
Fixed GOP	The number of frames for inserting the I frame and for inserting the reference frame (P frame) is fixed.
Variable	The number of frames for inserting the I frame changes. First it is as in the input but may change as required.
Capped	Defines the maximum number of frames for inserting the I frame. The number of frames should never exceed the value defined in **N frames**.
Fixed M	Defines a fixed number of frames for inserting a reference frame (P frame) no matter when the I frame is inserted.

3. Open the **Open/closed GOP** list and select either of the following:
   - Follow Input GOP - default option
   - Closed GOP - frames from current GOP cannot reference I frames from previous GOP.
   - Open GOP - frames from current GOP can reference I frames from a previous GOP.

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4. To define the number of frames for inserting a P frame, in **M Frames**, select the required value. The following table lists the valid M frame values:

Table 5–12: Values of M Frame

Output Stream	M Valid Values	M Default Values
MPEG2 (HD/SD)	1,2,3	3
H.264 SD H.264 HD1080i,	1,2,4	4
H.264 HD 720p	1,2,4,8	8

5. To define the maximum number of frames in the outgoing GOP, in **N frames**, enter the maximum number of frames for inserting the I frame in a range of 6-90.

NOTE: N should be a multiple of M.

Configuring Transcoding DPI Parameters

DPI section allows to splice a transcoded VBR video stream following an SCTE35 request. This feature is enabled, only is a DPI PID is provisioned.

NOTE: DPI is disabled for Any to PIP.

To configure DPI related parameters:

1. Click the **DPI** section.
2. Select **Transcode as CBR During Ad** to enable this option. Transcode as CBR During Ad allows to splice a transcoded VBR video stream following an SCTE35 request. Once you enable this feature, configure the CBR bitrate for the stream and a timeout period. This feature is enabled only if a DPI PID is provisioned.
3. **Bitrate (Mbps)** - Appears only if **Transcode as CBR During Ad** is enabled. Select the required CBR for the video stream that applies during the splicing.
4. **Timeout (seconds)** - Appears only if **Transcode as CBR During Ad** is enabled. Select the period of time after which splicing is stopped and the video stream switches back to VBR. This parameter is used in case the avail is not indicated.

OSD Subtitles (On Screen Display)

ProStream 9000 supports DVB Subtitle Burn-in for Broadcast transcoded streams.

NOTE: This feature does not apply to Multiscreen or PIP transcoding.

Table 5-13 below shows OSD specifications.

Table 5–13: OSD Specifications

Specification	Explanation
Video format	Any: SD/SD, HD/HD and HD/SD
Transcoded service	Enable the feature independently

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Table 5–13: OSD Specifications

Specification	Explanation
Language	Single language per service Single language per PID
Burn-in object	Graphical objects only

NOTE: MPEG-2 to MPEG-2 Adaptive Pass-through cannot be used with DVB Subtitle Burn-in.

To configure OSD Subtitles related parameters:

1. Click the **OSD Subtitles** section.
2. To enable OSD subtitles, select **Enable DVB Subtitles**.
3. - Select one of the **Source Selection** options:
   - By PID - configure Input PID
   - By Component - configure Input Program Number and Component ID
   - By Language
4. **Input PID** - Applies if By PID is selected in Source Selection. Select the input PID.
5. **Input Program Number** - Applies if By Component or By Language is selected in Source Selection. Select the input program number.
6. **Component ID** - Applies if By Component is selected in Source Selection. Select the required component ID.
7. **Language** - Applies if By Language is selected in Source Selection. Select the required language.
8. **Sync Compensation (ms)** - Allows to synchronize between the video stream and the subtitles in case of synchronization problem at the source. You can select the required synchronized compensation in milliseconds. The allowed range is between -1500 to 3000 ms.
9. Page Timeout (sec) - To avoid displaying obsolete subtitles, enter in Page Timeout the required period of time for displaying a subtitles page.

Configuring Transcoding Advanced Parameters

To configure Advanced related parameters:

1. Click the **Advanced** section.

1. **Mctf** (Motion-Compensated Temporal Filtering) - by default it is off. Mctf affects the video quality and reduces noises. If the service bit rate is low it is recommended to use strong Mctf. However, strong Mctf affects the sharpness of the picture.
   To select the required Mctf, open the **Mctf** list and select the required level ranging from very weak to very strong.
2. **Adaption Filed Insertion** - you may add data about the stream. You cannot select the content of data, only whether to add data.
3. **PES Insert Rate** - This parameters is required for H264 set-top-boxes and it applies to H264 output streams. Open the **PES Insert Rate** and select either of the following:
   - Every Picture - the default option. PES packets are inserted per field.
   - Alternate - PES packets are inserted per frame.
     When output resolution is 720p, always use PES per frame.

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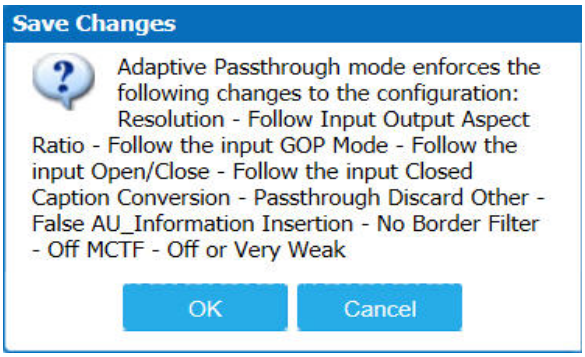
4. **MP2 Adaptive-PT** - applies to PEG2-to-MPEG2 SD, HD, 50/60Hz, CBR/VBR input and output. When you wish to enable adaptive passthrough, the device automatically enforces the required configuration. See also *Video Quality Enhancement* on page 133.
   To enable adaptive passthrough, do the following:
   a. In **MP2 Adaptive-PT**, select Enable. The following message appears:



   b. Click **OK**. The device automatically applies adaptive passthrough.

NOTE: When disabling MP2 Adaptive-PT, the enforced configuration is maintained, but the parameters are enabled and you need to change their values as required.

5. **Premium Channel** - Applies to SD format only. Select this option to allocate an entire transcoding engine for a single broadcast SD program. The allocation ensures that the program does not affect and is not affected by any other program in case of problematic input.
6. **Frame Rate Auto Detection** - Select this option to allow auto-detection of the frame rate. This option is enabled as follows:
   - Resolution Conversion is HD to HD or HD to SD
   - Resolution Conversion is SD to SD and Premium Channel is enabled

Transcoding a PIP Service

The following section instructs you on how to transcode a PIP service using the web client of the ProStream 9000 transcoder. The following table lists the required configuration to allow the transcoding of the video PID of a PIP service:

Table 5–14: Required Configuration for Transcoding a PIP Service

Parameter	Specification	Explanation
Enabling PIP	Enable PIP	PIP configuration is allowed on the device
Output Codec	H.264	
Output Resolution	96 × 96 92 × 192 128 × 96 192 × 192 192x144	
Video Bitrate	100 to 550 Kbps CBR only	

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Table 5–14: Required Configuration for Transcoding a PIP Service

Parameter	Specification	Explanation
Frame Rate	50/60Hz	

Service effecting operations for both the main and PIP coupled services:

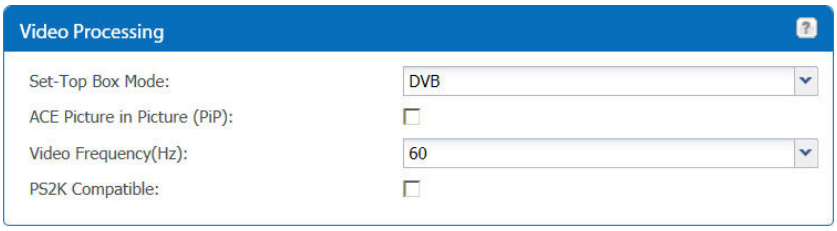
- Adding/Removing PIP from the main Service
- Recovery from any error condition in main/PIP might result in service interruption to main/PIP.

NOTE: You cannot delete, disable and untranscode-transcode a main service when a PIP service is coupled with it.

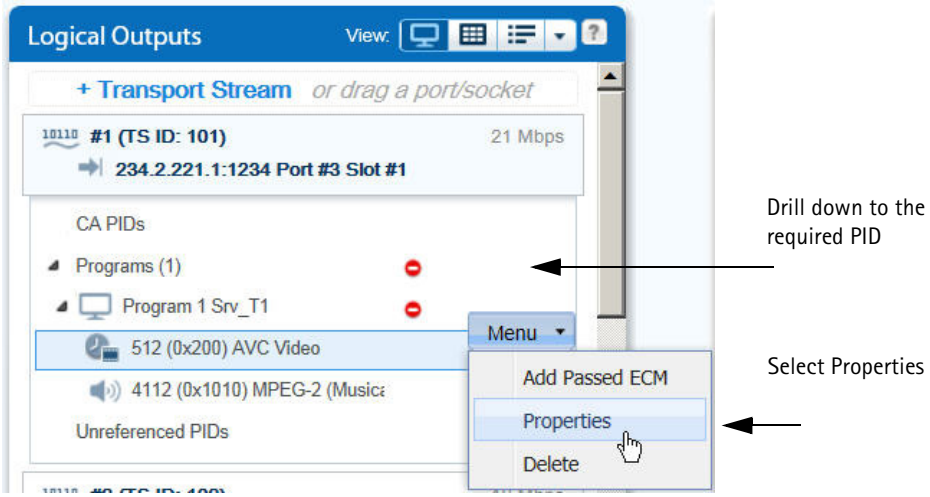
The transcoding parameters are grouped in the **Transcoding** tab as explained below. For PCR configuration, see *Configuring a PCR PID* on page 87.

To enable and transcode PIP services:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. To enable PIP services on the device, select **Administration** > **Video Procession**.



3. Select the **ACE Picture in Picture (PIP)**.
4. Click **Apply**.
5. Log into the device.
6. In the **Logical Output** pane, drill down to the required program.



7. Double-click the program node to view its PIDs.

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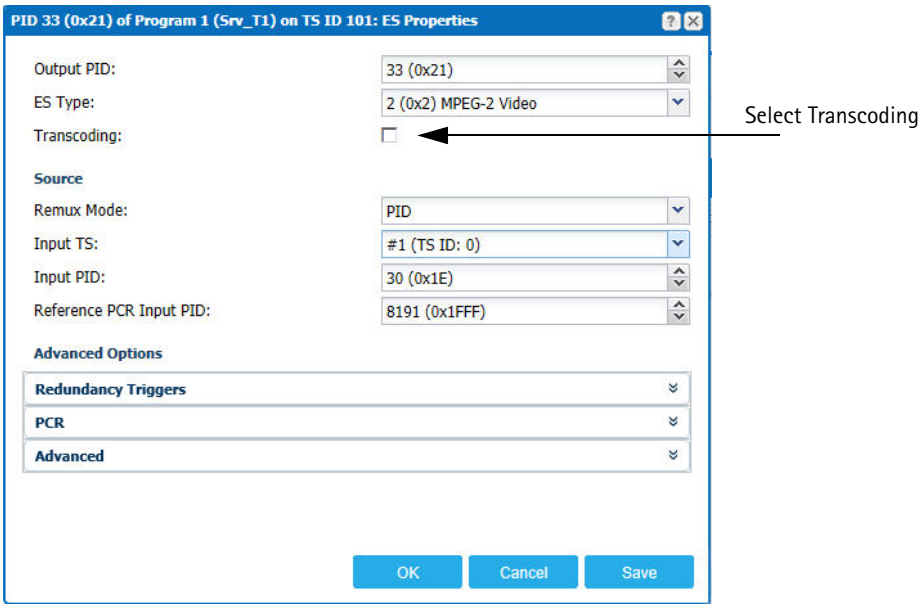
8. To transcode its video PID, select the PID and from the drop down menu select **Properties**.



9. To select the video format, open the **Resolution Conversion** list and select **Any to PIP.**
10. To define the output resolution, open the **Output Resolution** list and select one of the following:
    - 96 × 96
    - 92 × 192
    - 128 × 96
    - 192x144
    - 192 × 192
11. To define the profile, open the **Main** list and select either **Main** or **Baseline**.
12. To define the main service focus on the PIP section.
    - Open the **Main Service** list and select services that may be coupled with PIP services

NOTE: Main and PIP services have the same input. Any input problem, ensues an alarm on the main service.

13. To define the required output bit rate of the service, click the **Bitrate** section and do the following:
    - In **Rate**, enter the required output bitrate in bps of the video PID. See *Table 5–16* on page 129

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Defining Output Bitrate of a Transcoded Service

In case the output service is a VBR service in a pool, configure it according to the following table:

Table 5–15: Bitrate of a VBR Output Service

VBR Output Service Type	Min Rate (Mbps)	Max Rate (Mbps)
SD MPEG2	0.5	8
HD MPEG2	2	18
SD H.264	0.5	8
HD H.264	1	18

If the output service is a CBR service, configure it according to the following table:

Table 5–16: Bitrate of a CBR Output Service

CBR Output Service Type	Min Rate (Mbps)	Max Rate (Mbps)
SD MPEG2	2	8
HD MPEG2	6	20
SD H.264	1	8
HD H.264	3	18
HD/SD PIP	0.1	0.55

PCR and Video Transcoding

- The PCR PID should outflow over the video PID. To configure it, see *Configuring a PCR PID* on page 87.
- Reference PCR value is indicated for all PIDs of the service. Reference PCR indicates the PCR PID in the input. If, the input PCR PID changes, you need to manually change the Reference PCR PID for every PID of the transcoded service. Select the PID > **PID Properties** page:

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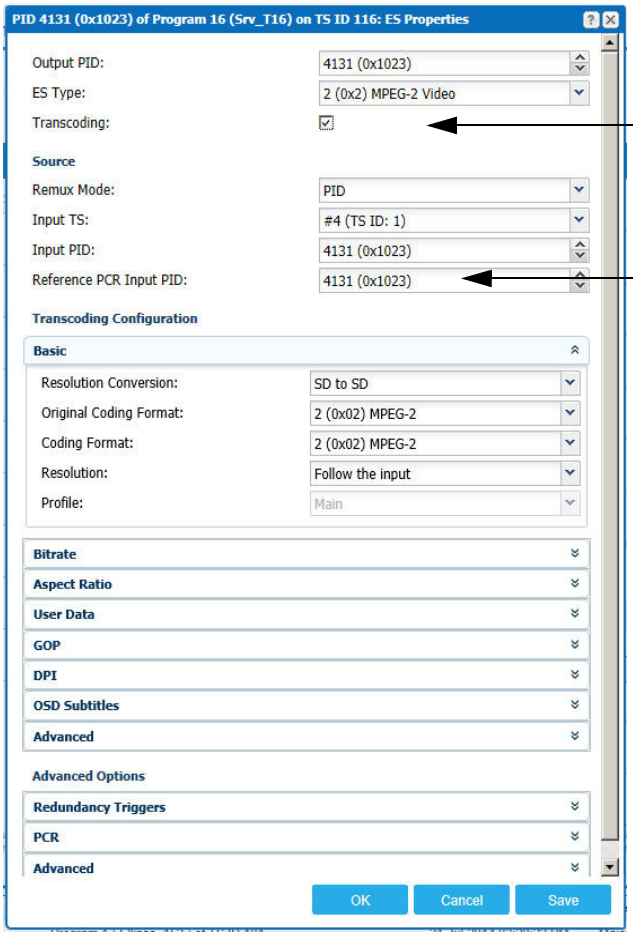

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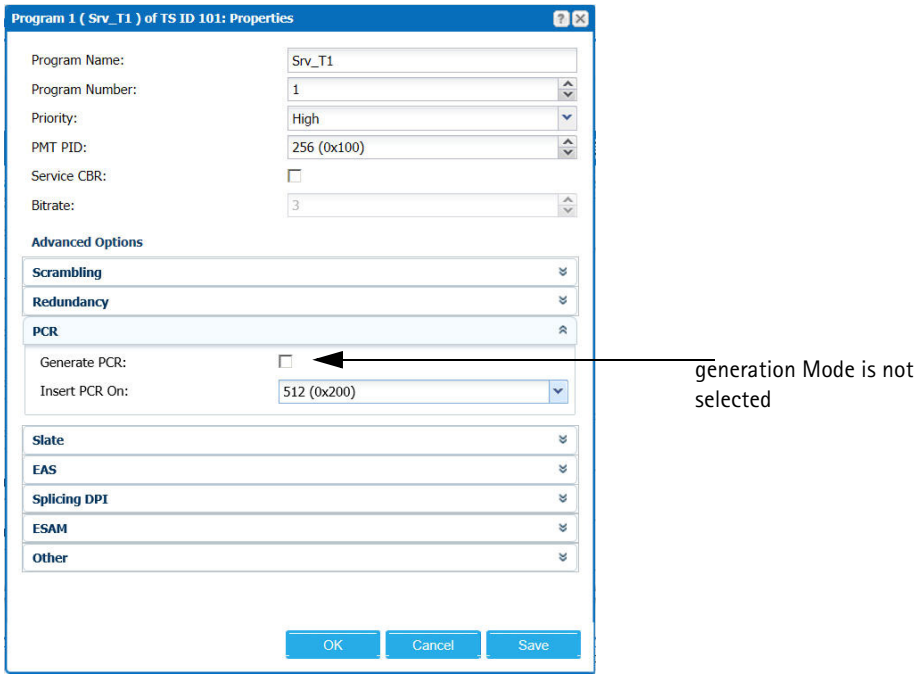
- When transcoding a service, PCR Generation Mode is not selected in Service > **PCR** table, **Generation Mode**:.



Transcoding Conventions

Table 5–17: Transcoding Conventions

Icon	Explanation
	Transcoded Video PID
	Transcoded Audio PID
	Pool

For transcoding conventions, see *Stream Config Page Conventions* on page 28.

Creating a Pool

To create a pool:

1. Log into the device as explained in *Logging into the Device* on page 12.

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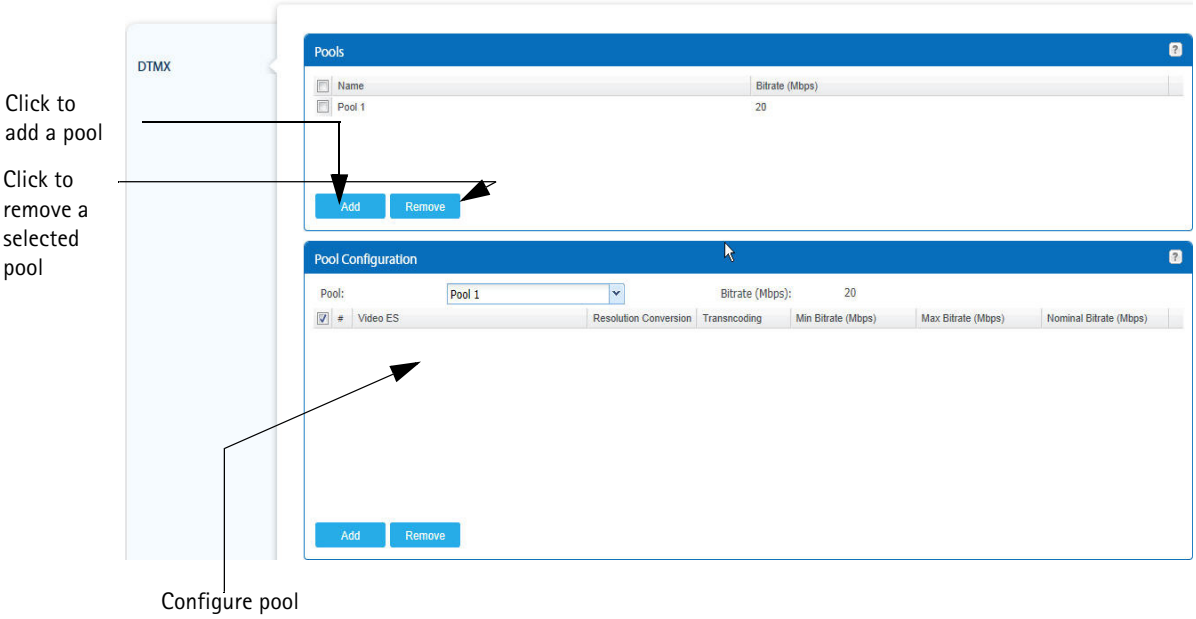
2. Select **DiviTrack** > **DTMX**:.



3. In **Pools**, to add a pool, click **Add Pool**.
   - In **Pools**, configure the name of the pool and its bitrate. The default pool rate is 20bps. Enter the required pool rate in bps.

NOTE: The bitrate of the pool should consider the transport bitrate and allow enough bitrate for additional PIDs that are included in the TS.

4. In **Pool Configuration**, select the required pool.
5. To associate a pool with a PID, click **Add**.
6. Click OK. The PID is added to the pool.
7. View the following information:
   - Pool Bitrate - the configured bitrate of the pool.
   - A table that lists and shows the following parameters of pool streams:

Table 5–18: Parameters of Streams in a Pool

Parameter	Explanation
#	Sequential number of the stream
Video ES	The PID, its program, and its output TS number
Resolution Conversion	Input - HD/SD Output - HD/SD
Transcoding	Transcoding Type: H-M - input H.264 to MPEG2 output M-M - input MPEG2 to MPEG2 output H-H - input H.264 to H.264 output

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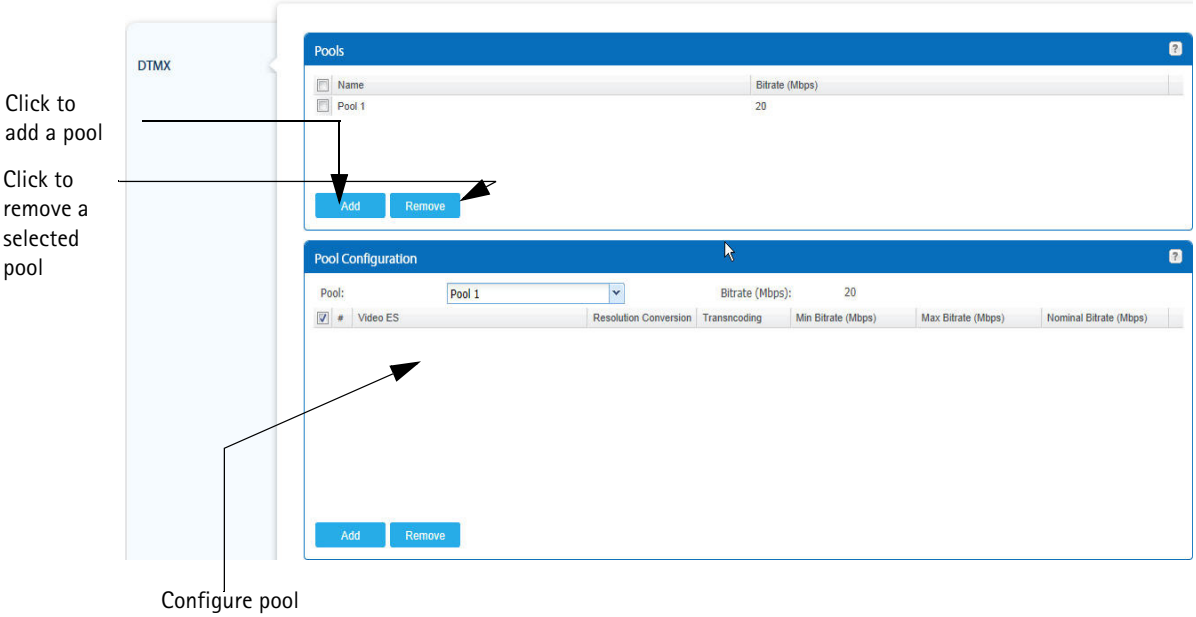
Table 5–18: Parameters of Streams in a Pool

Parameter	Explanation
Min. Bitrate	The minimum rate of the stream
Max. Bitrate	The maximum rate of the stream
Nominal Bitrate (Mbps)	The required bitrate

Removing a Pool

To remove a pool:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **DiviTrack** > **DTMX**:.



3. In **Pool**, select the required pool.
4. Click **Remove**.

Video Quality Enhancement

To improve the Video Quality (VQ), ProStream 9000 supports Adaptive Passthrough processing. This type of processing adoptively selects between the following modes, to get better VQ:

- Full rate shaping
- Full pass-through - where input is passed as is without transcoding. When the output stream bitrate is higher than the input stream bitrate, the device will mostly operate in full pass-through (very low input, VBV, may disable pass-through for a short period)
- Partial pass-through - where B-frames only are rate shaped. Partial pass-through tends to kick-in when output bitrate is slightly lower than input bitrate (i.e. small rate reduction ratios).

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NOTE: Adaptive passthrough processing triggers-in when applicable and you cannot configure it.

Adaptive passthrough applies to the following:

- Video format - SD, HD
- Stream type - MPEG2-to-MPEG2
- Horizontal resolution - 50/60Hz
- Bitrate - CBR/VBR input and output

When adaptive pass-through is enabled, the following configuration is enforced:

- All applicable user configurations (Output Resolution, Aspect Ratio, GOP Mode, Open/Close GOP) are set to *Follow the input*
- User Data - Closed Caption is set to *Pass*
  Discard AFD is grayed out
  Discard Other is grated out
- AF Data is set to *No*
- MCTF is set to *Off* or *Very Weak*
- Set-top box mode is set to *DVB*.

NOTE: When input bitrate is high, the adaptive passthrough feature might be disabled.

NOTE: Stream Conditioning is automatically applied. Stream Conditioning optimizes the splice in/out points for downstream splicing. Stream conditioning, namely, GOP manipulation and VBV management, on video stream is based on SCTE35 triggers.

Configuring Bitrate of Transcoded Stream at Service Level

ProStream with ACE 5.2 controls the output bitrate at Service level. The transcoded video bitrate is controlled, to maintain overall constant bitrate for the whole service while maintaining video quality. When audio or data PIDs are not transferred, the bitrate is utilized for the video stream. The video bitrate is maximized to the overall bitrate of the service.

NOTE: To allow CBR with service bitrate control, the video stream should be transcoded.

To configure a transcoded stream at the service level:

1. In the Logical Output section, select the required program. Its video PID should be transcoded.

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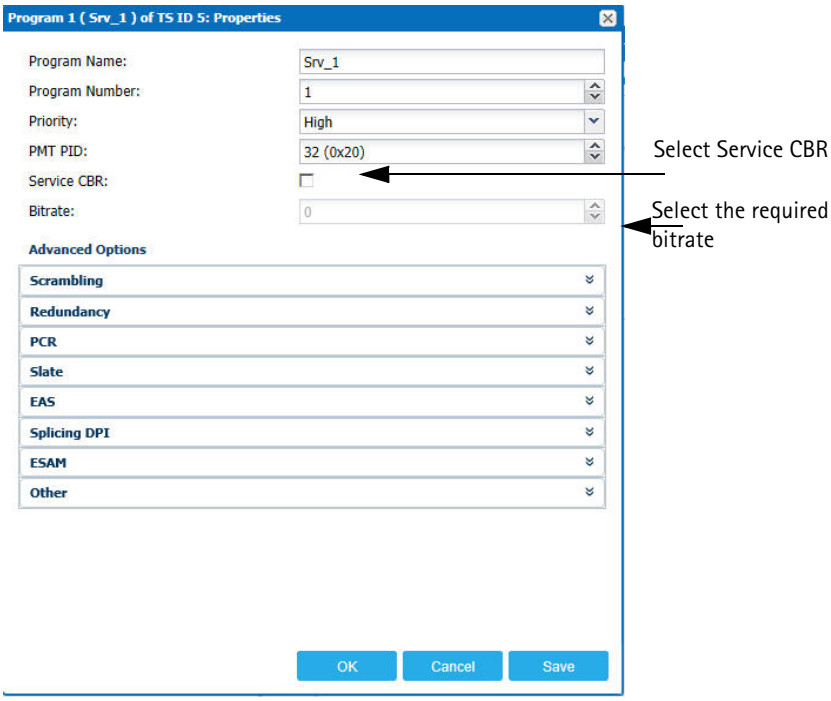
2. From the program drop-down menu, select **Properties**.



3. To enable the feature, select **Service CBR**. The **Bitrate** box is enabled.
4. In **Bitrate**, enter the required service bitrate. This bitrate is maintained as the overall constant bitrate for the whole service while ensuring video quality. In the PID Properties dialog, in Service Bitrate, the bitrate is read only.

Alarm Related to Bitrate Control at Service Level

- In case the bitrate allocated for the video stream is too low, the alarm *Service CBR Bitrate Too Low* is raised by the service.
- In case the overall bitrate of non-video streams exceeds the configured service bitrate, the alarm *Service CBR Overflow* is raised by the service.

Audio Transcoding

This version of ProStream 9000 enables transcoding of audio PIDs as well as video PIDs. The density varies according to the input/output stream type and input/output codecs. See *Audio Transcoding Options and Density* on page 138

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Audio Transcoding Glossary

Table 5–19: Audio Transcoding Glossary

Term	Explanation
AC3	Dolby
E-AC3	Enhanced Dolby
AAC	Advanced Audio Coding
ALA	Audio Level Adjustment
HE-AAC	High-Efficiency Advanced Audio Coding
HE-AAC v1	High-Efficiency Advanced Audio Coding version 1
HE-AAC v2	High-Efficiency Advanced Audio Coding version 2
MC	Multichannel (5.0/5.1)
MP1L2	MPEG1 Layer II
ST	Stereo (2/0), Joint Stereo, Mono (left or right channel), Dual Mono
LFE	Low Frequency Effects channel

Audio Transcoding Specifications

The following table presents the audio transcoding specifications:

Table 5–20: Audio Transcoding Specifications

Specification	Explanation
Stream Type	See table *Table 5–23* on page 138.
Density	■ To view the number of transcoded PIDs per card, see *Table 5–24 on page 139* and *Table 5–25 on page 140*. ■ To view the required processing units, per input/output transcoding option, see *Table 5–26* on page 140.
Number of audio PIDs per transcoded service	Up to 32
Coding Modes	■ Stereo(2/0) / Joint Stereo / Single Channel (left or right) / Dual Mono ■ Multi channel ❑ 3/2 + LFE, namely 5.1 ❑ 3/2, namely 5.0 ■ Follow the Input
Sampling Rate	Always follows the input sampling rate: 48KHz

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Table 5–20: Audio Transcoding Specifications

Specification	Explanation
Bit rate	■ Supported bit rates according to Codec (MP1L2/AAC/AC3) and Coding Mode (stereo/multichannel), see *Table 5–27* on page 141. ■ CBR output only
Copyright Processing	■ Copyright - Original ■ Copyright - Copy ■ Not Copyright - Original ■ Not Copyright - Copy ■ Follow the input.
Audio Level Adjustment	■ According to Junger Level Magic™. Adjusts the audio level from any source at any time to a given reference level. **CAUTION:** Fixed gain - if ALA is not used, you can configure Fixed Gain adjustments.
Error Handling	Full support of Silence Mode. If enabled, silence is inserted in cases of corrupt/missing audio input.
Output PCR	Supports PCR on audio PIDs.
PES per Frame	One to six frames per PES.
Audio Descriptors	The device generates and adds the required descriptors to the transcoded audio PID according to the transcoding output configuration.
Synchronization Compensation	Allows adjustment of audio delay (PTS) to compensate for input with A/V synchronization problems.

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Specific Codec Specifications

MPEG1 Layer 2

Table 5–21: MPEG1L2 Specifications

Parameter	Specification
Error Protection	Supports error protection

AAC

Table 5–22: AAC Specifications

Parameter	Specification
AAC Coding Extensions	Supports the following: ■ MPEG-4 AAC (LC) ■ MPEG-4 HE AAC ■ MPEG-4 HE AAC v2 ■ MPEG-2 AAC (LC) ■ MPEG-2 HE AAC ■ MPEG-2 HE AAC v2
Transport Format	■ ADTS ■ LATM
TNS	Supports Temporal Noise Shaping
PNS	Supports Perceptual Noise Substitution

Dolby®

Supports Dolby specifications for AC-3 and E-AC-3. For Dolby supported parameters, see table *Table 5–28* on page 142.

Audio Transcoding Options and Density

The device transcodes audio PIDs as listed in table *Table 5–23 on page 138*.

NOTE: All options that are marked with a "V" are fully tested. Other options are not tested, but are available for configuration.

Table 5–23: Audio Transcoding Options

Output / Input		MP-1l2	AAC					Dolby			
			AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
		ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2	ST	V	V	V	V	V	V	V	V	V	V

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Table 5–23: Audio Transcoding Options

			MP-1l2	AAC					Dolby			
				AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
			ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
AAC	AAC LC	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V
	HE-AAC V1	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V
	HE-AAC V2	ST	V	V	V	V	V	V	V	V	V	V
Dolby	AC3	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V
	E-AC3	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V

The following table lists the possible combinations of audio transcoding per transcoding card.

In Table 5–24, the numbers do not include ALA processing.

In Table 5–25, the numbers include ALA processing.

To define audio transcoding combinations, also use table *Table 5–26* on page 140.

Table 5–24: Audio Transcoding Density without ALA

Output / Input		MP1L2	AAC					Dolby			
			AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
		ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2	ST	60	48	23	33	14	38	18	12	12	6
AAC (all flavors)	ST	46	38	20	28	13	31	16	11	12	6
	MC	27	24	16	20	11	21	13	10	10	5
Dolby ACE	ST/MC	33	29	18	23	12	25	14	10	10	5
Dolby E-AC3	ST/MC	22	20	14	17	10	18	12	9	9	5

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Table 5–25: Audio Transcoding Density with ALA

Output / Input		MP1-L2	AAC					Dolby			
			AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
		ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2	ST	30	27	14	21	10	23	14	9	10	5
AAC (all flavors)	ST	26	23	13	19	9	20	13	8	10	5
	MC	18	17	11	15	8	16	11	7	8	4
Dolby AC3	ST/ MC	21	19	12	16	9	17	11	8	9	5
Dolby E-AC3	ST/ MC	16	15	10	13	8	14	10	7	8	4

The following table, Table 5–26, lists the required processing units, per input/output transcoding option. Use this table for defining maximum capacity, per card, of any stream combination.

NOTE: A single card has total of 3750 processing units.

ALA requires more processing units:

- ALA ST (2.0) requires additional 61 processing units
- ALA MC (5.0/5.1) requires additional 104 processing units

For example:

MP1L2 to MP1L2 (Stereo) without ALA: requires 63 processing units

MP1L2 to MP1L2 (Stereo) with ALA: 63+61 = 123 processing units:

Table 5–26: Audio Transcoding Required Processing Units

Output / Input		MP1-L2	AAC					Dolby			
			AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
		ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2	ST	63	79	164	114	268	99	209	313	313	625
AAC (all flavors)	ST	82	99	188	134	289	121	235	341	313	625
	MC	139	157	235	188	341	179	289	375	375	750
Dolby AC3	ST/ MC	114	129	208	163	306	150	255	348	342	627
Dolby E-AC3	ST/ MC	168	184	263	218	360	205	310	403	397	681

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Audio Transcoding Bitrate

The following table lists the audio ES bitrate in Kbps. The allowed bitrate values are according to input/output stream type - MP1L2/AAC/AC3 and Coding Mode - single/stereo/multi channel.

Bitrate default values:

- 192kbps - for Single/Stereo channel
- 384kbps - for Multi channel

Table 5–27: Audio Transcoding – Output Bitrate

Output Audio Codec	ES Bitrate (Kbps)
MP1L2 stereo (2.0)	32 - 384
AAC stereo (2.0)	32 - 384
AAC multi-channel (5.1)	224 - 640
HE AACv1 stereo (2.0)	32 - 128
HE AAC v1 multi-channel (5.1)	96 - 192
HE AAC V2 stereo (2.0)	32 -64
Dolby Digital (AC-3) stereo (2.0)	96 - 640
Dolby Digital (AC-3) multi-channel (5.1)	32 - 640
E-Dolby Digital (E-AC3) stereo/multi-channel	32-1024

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Dolby® Supported Parameters

Table 5–28: Dolby Supported Parameters

Topic	Parameter
Bitstream Information (BSI)	Bit Stream Mode
	Dialog Normalization
	Production Information (mix level and room type)
BSI Extension	Stereo Downmix Preference
	Mix Levels
	Surround EX Mode
	Head Phone Mode
	A/D Converter Type
	Alternate BSI Syntax
E-AC3 additional configuration	Source Sample Rate
	Stream Type
	Sub Stream ID
Processing	DC High Pass Filter
	Bandwidth Low Pass Filter
	Digital De-emphasize
	Dynamic Range Compression
Multichannel Processing	LFE Low Pass Filter
	90 Degree Phase Shift
	3 dB Attenuation

Audio Transcoding Procedure

To transcode an audio PID:

1. Log into the device.
2. In the **Logical Output** section, select the required program.

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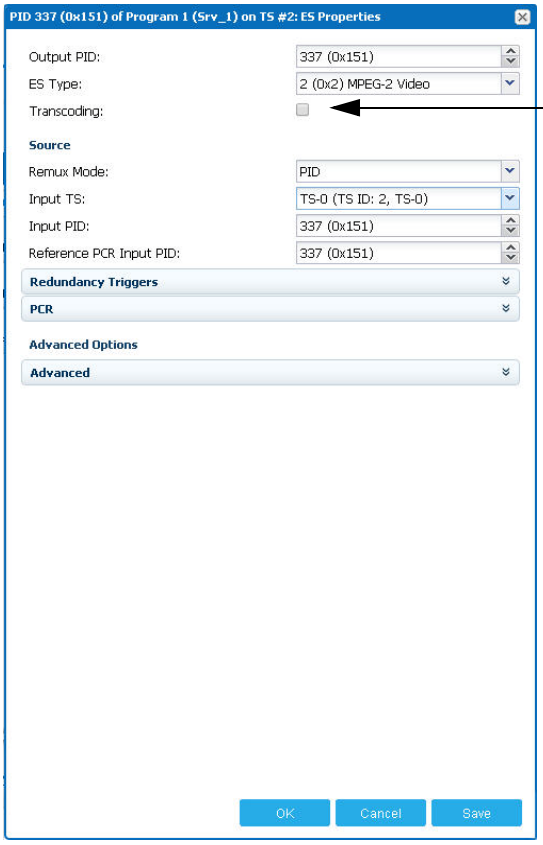
3. Right click the required audio PID and select Properties.



4. In **Output PID**, select the required output PID.
5. In **ES Type**, select the required type of the output audio PID.
6. To enable transcoding, select T**ranscoding**.
7. To configure the transcoding related parameters, focus on the Transcoding Configuration section.

   For basic, see

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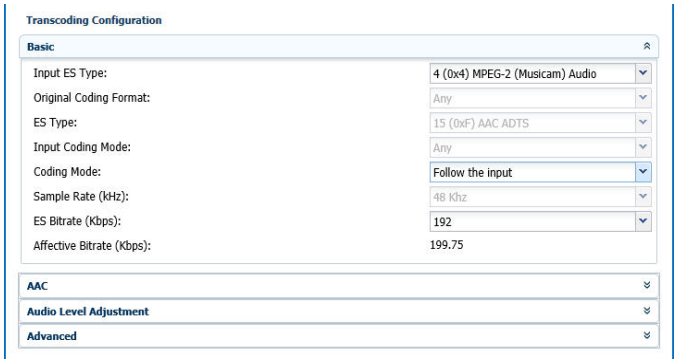
Configuring Basic Transcoding

To configure basic transcoding:

1. Focus on the Transcoding Configuration > Basic section.



2. To select the input stream type, open the **Input ES Type** list and select one of the following:
   - 3 (0x3) MPEG-1 Audio
   - 4 (0x4) MPEG-2 (Musicam) Audio
   - 6 (0x6) E-AC-3 (DVB) Audio
   - 6 (0x6) AC-3 (DVB) Audio
   - 15 (0xF) ACC ADTS
   - 17 (0x11) ACC LATM
   - 129 (0x81) AC-3 (ATSC) Audio
   - 135 (0x87) E-AC-3 (ATSC) Audio
3. Original Coding Format - the options depend on the selected input stream type as seen in the following table:.

Table 5–29: Input Coding Format Options according to Input Stream

Input Stream Type	Decoding Format Options
MPEG1 Layer II	Any decoding format. Not configurable
AC-3 ATSC	
E-AC-3 ATSC	
AC-3/E-AC-3 DVB	Any
	AC-3 (default)
	E-AC-3
AAC	Any input decoding format
	AAC LC
	ACC HE

If the coding format of the input stream is unknown, select Any. If a low MHz decoder (AAC LC / AC3) is selected and the actual decoding format is a high MHz decoder (AAC HE / E-AC3), an alarm is raised.

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4. ES Type - Read only. Indicates the output stream type. To select the Output stream type, focus on **ES Type** list at the top of the dialog.
5. Original Coding Mode - allows to allocate transcoding resources. If the coding of the input stream is unknown, whether ST - less resources, or MC - more resources, select **Any**. If ST is selected and the input coding is MC, an alarm is raised.
   To select the input coding mode, open the **Input Coding Mode** list and select the required coding mode. Coding mode options depend on the selected input stream type as the following table lists:

Table 5–30: Input Coding Options according to Input Stream Type

Input Stream Type	Input Coding Options
(0x3) MPEG-1 Audio	Any input coding. Not configurable
AC-3/E-AC-3 all flavors ACC	Any
	Stereo/Mono
	Multichannel

6. To select the output coding mode, open the **Output Coding Mode** list and select the required coding mode. Coding mode options depend on the selected output stream type as the following table lists:

Table 5–31: Output Coding Options according to Output Stream Type

Output Coding Options	MPEG1L2	AAC	HE AAC V1	HE AAC V2	AC3/E-AC3
Follow the input	V	V	V		V
Stereo (2/0)	V	V	V	V	V
Single channel left (1/0)	V	V	V		V
Single channel right (1/0)	V	V	V		V
Dual Mono (1+)	V	V	V		V
Joint Stereo (2/0)	V				
Multi Channel (3/2)		V	V		V
Multi Channel (3/2 LFE)		V	V		V

NOTE: Any changes to input/output Codec, input/output Coding Mode and output AAC is service affecting.

7. Sampling rate is 48 kHz and it is not converted.
8. To define the ES bitrate in kbps, open the **ES Bitrate** list and select the required output ES bitrate. The bitrate list is updated according to the output stream type and the selected output codec. See *Table 5–27* on page 141.

   TS Bitrate is updated to display the total TS bitrate. View TS bitrate in **TS Bitrate** box.
9. Affective Bitrate (Kbps) - Read only. View the current ES bitrate.

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Advanced Transcoding Configuration

To configure advanced transcoding operations:

1. Focus on **Transcoding Configuration** > **Advanced**.

2. To select the required copyright mode, open the **Copyright** list and select one of the following
   - Copyright - Original: indicates that the audio stream is copyright protected by the original copyright bitstream
   - Copyright - Copy: indicates that the audio stream is copyright protected by a copy of the copyright bitstream
   - Not Copyright: Original - the original audio stream is not copyright protected
   - Not Copyright: Copy - the copy of the audio stream is not copyright protected
   - Follow the input
3. **Frames per PES** - to control the number of Audio frames that are packed in a single PES (Packetized Elementary Stream), open the **Frames per PES** list and select the required number between one to six. Six is the default.
4. **Static Level Adjustment** - If ALA is not used, you may configure a fixed gain adjustment for the output audio stream. It increases/decreases the audio volume by a fixed dB value. The valid range is (-20) to 0 dB and the default value is 0. See *Configuring Audio Level Adjustment* on page 153.
5. **Delay Adjustment (msec)** - to adjust audio delay (PTS) to compensate for input with A/V synchronization problems, enter the required value, between (-500) to 500ms. The default value is 0.
6. Force Decoder as Dual Mono - check this box to output one channel of a stereo pair instead of down-mixing both channels into a single channel.

Logo Insertion

The Logo Insertion feature places a small user-provided logo image over the input video. The image is static (non-animated) and it can have transparent and translucent regions.

To insert a logo:

1. From the Logo Name box, select the.png file needed. To upload a.png file for a logo, see *Uploading Logo Insertion Files* on page 177
2. Focus on **Transcoding Configuration** > **Logo Insertion**

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3. Check the **Enable Logo Insertion** check box to insert the logo.
4. Use **Vertical Offset** and **Horizontal Offset** to offset the position by a number of pixels from a reference point. Reference positions are top left corner, top right corner, bottom left corner and bottom right corner.
5. **Transparency** is adjusted on a scale from 0-100, with 0 = opaque, and 100 = invisible.

Configuration Following the Output Stream Type

Transcoding Configuration section is updated according to the output stream type and it allows configuration specific to this stream type.

Specific MPEG-1L2 Configuration

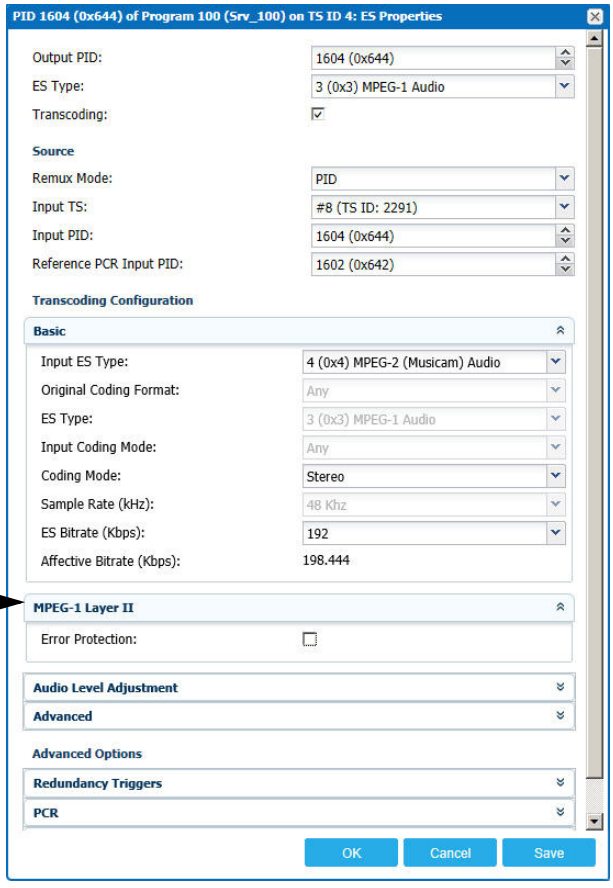
The instructions below assume that the output stream type is **3 (0x3) MPEG-1 Audio**, or **4 (0x4) MPEG-2 (Musicam) Audio**.

To configure a specific MPEG-1 or MPEG-2 output stream:

1. Focus on **Transcoding Configuration** > **MPEG-Layer II**

The **MP1L2** menu appears

MPEG-1 Layer II menu appears



2. To configure, click **MPEG-1 Layer II**.
3. To enable error protection, select the **Error Protection** box.

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Specific AAC Configuration

AAC and HE AAC can be encapsulated in the output transport stream in either of the following methods:

- ADTS (Audio Data Transport Stream) is the encapsulation method used if you select MPEG-2 HE AAC as the coding mode extension. ADTS is assigned a stream type value of 0x0F.
- LATM (Low-overhead Audio Transport Multiplex) is the default encapsulation method used if you select MPEG-4 HE AAC as the coding mode extension. LATM is assigned a stream type value of 0x11.

To define a specific AAC configuration:

The instructions below assume that the output stream type is **AAC** or **HE AAC**.

1. Focus on **Transcoding Configuration** > **ACC.** T.
2. To select a coding extension, open the **Coding Mode** list and select one of the following:
   - MPEG-4 AAC
   - MPEG-4 HE AAC
   - MPEG-4 HE AAC v2
   - MPEG-2 AAC
   - MPEG-2 HE AAC
   - MPEG-2 HE AAC v2
3. To enable error protection, select **Error Protection**.
4. To enable Temporal Noise Shaping (TNS), select **TNS**.
5. To enable Perceptual Noise Substitution (PNS), select **PNS**. When **Coding Mode** is **MPEG-2**, PNS is selected not configurable. When **Coding Mode** is **MPEG-4**, PNS is selected and is configurable.

Specific Dolby ® AC-3™/E-AC-3™ Configuration

The instructions below assume that the output stream type is AC-3 all flavors.

To configure AC-3/E-AC-3:

1. Focus on **Transcoding Configuration** > **AC-3.** Click the **AC-3/E-AC-3** menu.
2. The bitstream mode describes the audio service contained within the Dolby Digital bitstream. The stream can carry a main audio service or an associated service. The default bit stream mode is Complete Main. Open the **Bit Stream Mode** list and select one of the following modes:
   - Follow the input
   - Main audio: Complete Main - A complete audio service that includes dialog, music, and effects. You can supplement a complete audio service with visually impaired, hearing impaired, commentary, emergency, and karaoke/voice-over associated services.
   - Main Audio: Music and Effects - An associated service with music and effects but no dialog for the program. You can add the dialog by providing a dialog-associated service.
   - Associated: Visually Impaired - An associated service with a narrative description of the program's visual content. Audio service for the visually impaired allows the viewer to enjoy the audio aspects with a commentary of the visual aspects of the program.
   - Associated: Hearing Impaired - An associated service with a single channel of dialog but no music or effects. For the hearing-impaired viewer, the dialog is easier to understand without the combination of music and sound effects in the audio stream.

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- Associated: Dialogue - An associated service with multiple channels for several different languages.
- Associated: Commentary - An associated service similar to the dialog-associated service that provides optional program commentary, not the primary dialog for the program. Used for added commentary during sporting events or educational programming.
- Associated: Emergency - An associated service with audio tones that accompany emergency announcements. The tones replace the main audio of a program.
- Main/Associated: Karaoke/Voice-Over - An associated service similar to the emergency-associated service, but karaoke audio tones do not replace the main audio of a program.

3. **Dialog Level (dialnorm)** - To select the required value, open the **Dialog Level (dialnorm)** and select either of the following values: Follow the Input, or a value between -1 to -31(dBFS). This option is the single most important Dolby Digital metadata parameter. Its setting represents the average loudness of dialog in a presentation, and is defined in terms of decibels below 0 dBFS.

   When received at the consumer's Dolby Digital decoder, this parameter setting determines the level shift in the decoder that sets, or normalizes, the average audio output of the decoder to a preset level. This aids in matching audio volume between program sources. A dialnorm value of –31 results in no level shift, a value of –1 results in maximum level shift.

   The proper setting of the dialog level parameter enables the Dynamic Range Control profiles chosen by the content producer to work as intended in less-than-optimal listening environments.

4. Dolby Surround Mode - indicates whether the two-channel Dolby Digital (AC-3) stream contains a Dolby Surround (Lt/Rt) program that requires Dolby Pro Logic^{R} decoding. Open the **Dolby Surround Mode** list and select one of the following modes:
   - Follow the input
   - No indication
   - Not Encoded in Dolby Surround - The bitstream contains information not encoded in Dolby Surround.
   - Encoded in Dolby Surround - The bitstream contains information encoded in Dolby Surround.
5. Center Downmix Level - applies to Encoding Format AC-3 only. It indicates the level shift applied to the C channel when adding to the L and R outputs as a result of downmixing to an Lt/Rt output. Open the **AC-3 Center Mix Level (dB)** list and select one of the following:
   - Follow the Input
   - -3
   - -4.5
   - -6
6. AC-3 Surround Mix Level (dB) - applies t to Encoding Format AC-3 only. indicates the level shift applied to the surround channels when downmixing to an Lt/Rt output. Open the **Surround Downmix Level (dB)** list and select one of the following:
   - Follow the Input
   - -3
   - -6
   - ∞

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7. To configure, focus on the required menu and define parameters as explained in the following sections:

   Multichannel, see *AC-3 All Flavors Multichannel Menu* on page 150

   BSI Extension, see *AC-3 All Flavors BSI Extension Menu* on page 150

   Advanced see *AC-3 All Flavors Advanced Menu* on page 151

AC-3 All Flavors Multichannel Menu

This menu is available for Dolby AC-3 audio streams when Multichannel coding mode is selected.

To configure items in this menu:

1. Focus on the **Multichannel** menu.

NOTE: Output Coding Mode should be Follow the input or Multichannel.3/2 and 3/2+LFE

2. LFE LowPass Filter - must be provided only if the LFE channel is enabled. Select the **LFE LowPass Filter** box to turn on low-pass filter for low-frequency effects.
3. The following fields allow you to enable processing options for the surround audio channel:
   - **Surround Phase Shift** - Select to modulate the phase of the reference signal by 90 degrees.
   - **Surround 3 dB attenuation** - Select to enable 3 dB attenuation of the surround audio.

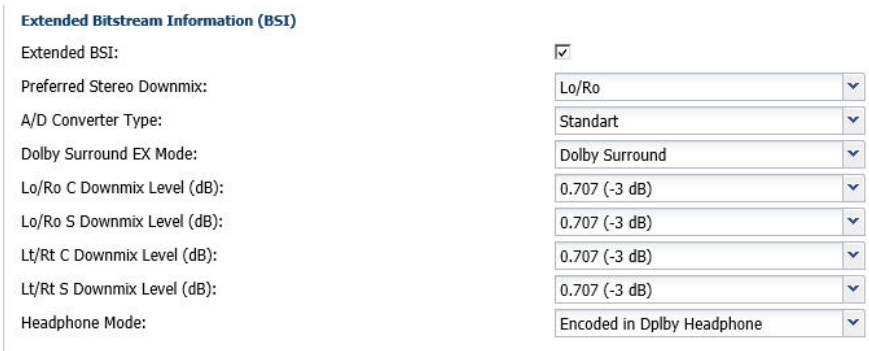
AC-3 All Flavors BSI Extension Menu

Bitstream extended information is additional information to be carried about the audio program and also more choices for stereo downmixing. When the metadata parameters carried in Dolby Digital were first described, they were generically called bitstream information, or BSI. The additional parameter definitions are called extended BSI.

To configure the BSI Extension menu:

1. Focus on the **BSI Extension** menu.

NOTE: Output Coding Mode should be Follow the input or Multichannel.3/2 and 3/2+LFE



2. **Extended BSI** - Select to enable the following BSI extension parameters.
3. **Stereo Downmix Preference** - Indicates whether the preferred stereo downmix is one of the following:
   - Not Indicated
   - Lt/Rt Downmix Preferred - left total/right total

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- Lo/Ro Downmix Preferred - stereo left only/stereo right only

4. **A/D Converter Type** - Select the type of analog-to-digital converter: Standard or HDCD Encoded.
5. **Surround EX Mode** - indicates whether the audio is encoded for Dolby ® Digital Surround EX™. Select one of the following:
   - Not Indicated
   - Not Encoded in Dolby Surround EX
   - Encoded in Dolby Surround EX
6. **Lo/Ro Center Mix Level** - select the center mix level for left only/stereo right only downmixing.
7. **Lo/Ro Surround Mix Level** - select the surround mix level for left only/stereo right only downmixing
8. **Lt/Rt Center Mix Level** - select the center mix level for left total/right total downmixing.
9. **Lt/Rt Surround Mix Level** - select the surround mix level for left total/right total downmixing.
10. **Head Phone Mode** - select one of the following:
    - Not Indicated
    - Not Encoded in Dolby Headphone
    - Encoded in Dolby Headphone

AC-3 All Flavors Advanced Menu

To configure items in the Advanced menu:

1. Focus on the **Advanced** section:

2. **Mixing Level (dB SPL)** - describes the peak sound pressure level (SPL) used during the final mixing session at the studio or on the dubbing stage. Open the **Mixing Level (dB SPL)** list and select one of the following:
   - Follow the input
   - A value between 80 to 111dB, in 1 dB increments
3. **Room Type** - describes the equalization used during the final mixing session at the studio or on the dubbing stage. A large room is a dubbing stage with the industry standard X-curve equalization; a small room has flat equalization. This parameter allows an amplifier to be set to the same equalization as heard in the final mixing environment. Open the **Room Type** list and select one of the following:
   - Follow the input
   - Not indicated - The room type is not identified in the stream
   - Large room, X curve monitor - Film-style dubbing stage, x-curve monitoring
   - Small room, flat monitor - Typical recording studio, flat monitoring

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4. **DC Filter** - by default this filter is enabled. If selected, activates a 3-Hz direct current (DC) filter for all input channels. The DC filter removes any inaudible low frequency signals and also any DC bias in the input signal.
5. **LowPass Filter** - select to enable this filter. If selected, activates a bandwidth low pass filter with a cut-off close to the audio bit rate you specified.
6. **Digital De-emphasize** - Specifies whether de-emphasis is on or off. In some cases, an audio signal may be scaled with a 50/15 microsecond pre-emphasis prior to its transmission.
7. **Dynamic Range Compression (DRC)** - Different home listening environments present a wide range of requirements regarding dynamic range. Rather than simply compressing the audio program to work well in the poorest listening environments, Dolby Digital encoders can calculate Dynamic Range Control (DRC) information and send it via the Line Mode and RF Mode metadata parameters to the consumer decoder. This metadata can then be applied to the audio signal by the decoder to reduce its dynamic range.

   Through the proper setting of DRC profiles during content creation, the producer can provide the best possible presentation of program content in virtually any listening environment, regardless of the quality of the equipment, number of channels, or ambient noise level in the consumer's home.

   Six preset DRC profiles are available to content producers: Film Light, Film Standard, Music Light, Music Standard, Speech, and None. Each is applied with the values shown below.

   To set the required **Dynamic Range Compression**, open the DRC list and select the profile that represents the acceptable range for the program type as explained below. You can select:

   - None
   - Film Standard and Film Light - In most movies, the dialog is the softest audible part of the sound track. Anything softer in volume than the dialog may not be heard in a typical movie theatre. Therefore, movie sound tracks require only a small amount of volume boost for low levels. Too much boost of low-level audio may reveal unintended sounds in the audio sound track, such as camera reels and background traffic noise that were recorded during production. Dolby recommends setting Film Standard for most program material.
   - Music Standard and Music Light - The acceptable volume range is determined by the music type. Most music has a limited variation in volume range, but you must set an acceptable level so the sound is not too far above other programming.
   - Speech - Most speech sources have limited dynamic range of audio fluctuation. However, some speech sources can have moments that are abnormally loud or soft. The Speech profile uses a 10 dB acceptable range for average speech. If the speech source contains a heavy amount of background noise, use Film Standard or Film Light so the background noise is not audible during gaps in the speech content.

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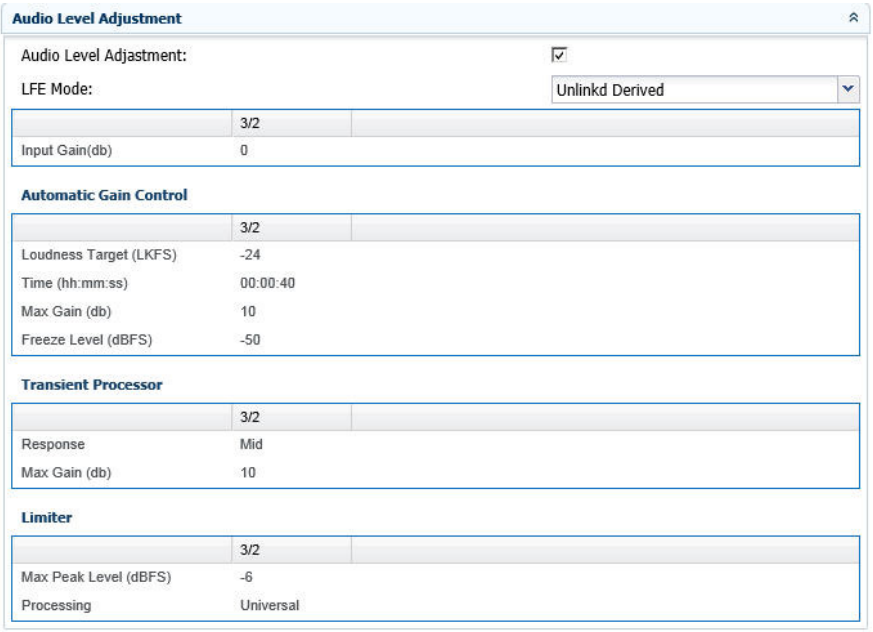
Configuring Audio Level Adjustment

To configure the audio level adjustment:

1. Focus on **Transcoding Configuration** > **Audio Level Adjustment**.



2. Under General, configure the following parameters:
   - **Audio Level Adjustment** - enables the ALA according to Level Magic LM™ - an adaptive level control algorithm capable of adjusting audio level from any source at any time to a given reference level.

     Enable when incoming source levels vary widely between channels (Service A seems twice as loud as Service B), or when transient audio level changes within the same channel during commercial break, explosions or loud music Vs. dialogs.

     Once you select this option LFE Mode and Input Gain are enabled and additional menus appear:

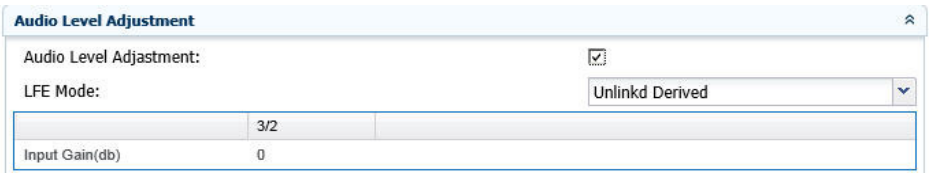
     Automatic Gain Control - see *Automatic Gain Control (AGC)* on page 154

     Transient Processor - see *Transient Processor* on page 154

     Limiter - see *Limiter* on page 155
   - **LFE Mode** - use for multichannel (5.1) streams. There are two options for LFE control:

     Unlinked Derived - Default. LFE follows the Input Gain (dB) configuration of 3/2.

     Unlinked Adjustable - LFE may have different Input Gain (dB) configuration than 3/2. Once you select this option, Input Gain (dB) box appears also for LFE



   - **Input Gain (dB)** - Allows to configure the input signal level towards the target loudness

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level that streams into the ALA module. You may configure this parameter in case the input loudness level is received distorted and you need to fix the audio level before the ALA processing module. Enter the required value between -20 to +20dB in steps of 0.1dB

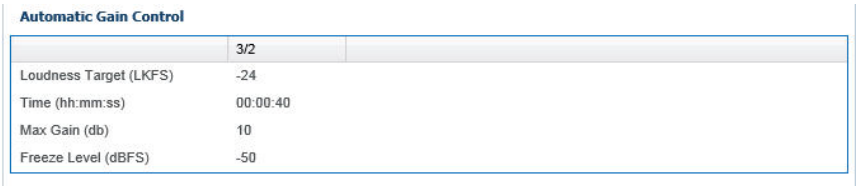
When ALA Enable is selected, additional menus appear. The following sections describe these menus.

Automatic Gain Control (AGC)

Use the AGC to adjust the output level by performing slow gain changes.

To configure AGC:

1. Focus on the **Automatic Gain Control** menu.



2. Configure the parameters as explained below for 3/2 and LFE:

TIP: Loudness Target (LKFS) is the main parameter when configuring the ALA processing module.

- **Loudness Target (LKFS)** - Allows to configure the desired output loudness level in LKFS (Loudness, K-weighted, relative to Full Scale). A unit of LKFS is equivalent to a decibel. The default is 24.
- **Time** - The amount of time the ALA module takes to scale incoming audio with loudness levels not at target. The time range is from 1 second to 9000 seconds.
- **Max. Gain** - Limits the maximum amplification allowed by the AGC module.The range available is 0 to 20dB in steps of 0.1 dB.
- **Freeze Level** - Allows avoiding the undesired gain increase during signal breaks and overshoots by following signal attack. If the input signal level decreases and reaches the freeze level, all the states of AGC (leveler) and transient processor are frozen and kept unchanged until the input signal level rises again. The range available is 0 to-70 in steps of 0.1dB.

Transient Processor

Use the Transient processor to adjust the output level by performing fast gain changes.

To configure Transient Processor:

1. Focus on the **Transient Processor** menu.

2. Configure the parameters as explained below for 3/2 and LFE:
   - **Response** - Indicates the characteristic of gain change by the transient processor. Response value depends on your program genre. Three values are available: soft, mid (default) and hard.

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Soft - select, in case there are just a few level changes or if you want to keep the original dynamic range best (e.g. classical music)
Mid - select for mixed program
Hard - select for live venues (sport etc.) with frequent unexpected level changes

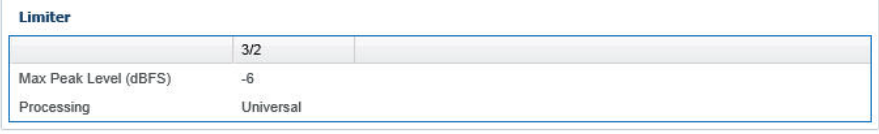
- **Max. Gain** - Limits the maximum amplification allowed by the Transient processor module. The range available is 0 to 20 dB in steps of 0.1 dB.

Limiter

The Audio brick wall limiter guarantees precise peak limiting without any distortion.

To configure the Limiter:

1. Focus on the **Limiter** menu.



2. Configure the parameters as explained below for 3/2 and LFE:
   - **Max. Peak Level (dBFS)** - The maximum loudness level. Dynamic audio level adjustment processing will ensure that audio loudness is below Max Peak Level. The default is –6.
   - **Processing** - Allows to define the behavior of the limiter, mostly affecting the release of the limiter audio level reduction. Several processing modes are available: Live, Speech, Universal (default) and Classic.

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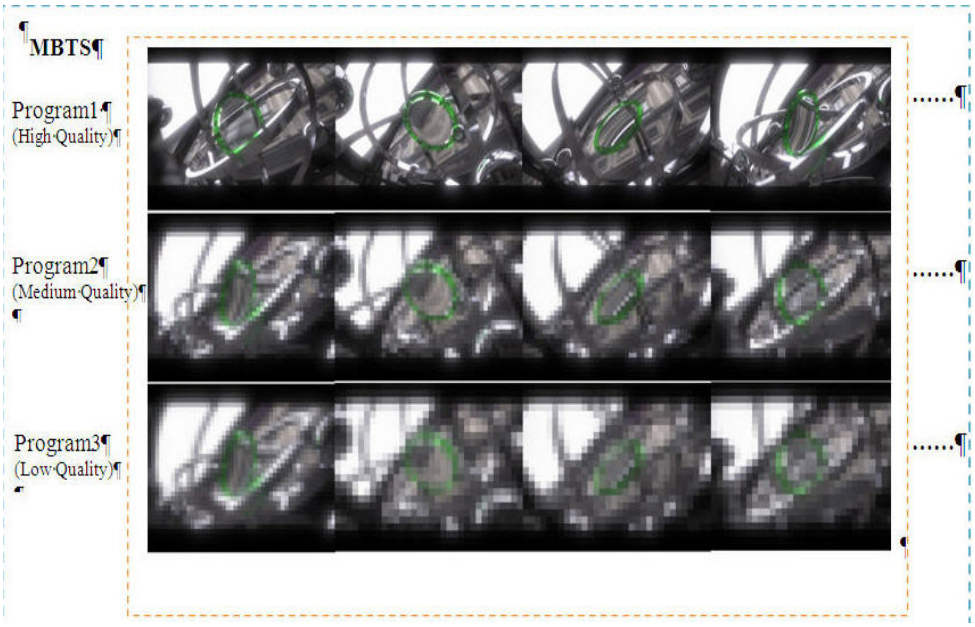
Chapter 6
Multiscreen Transcoding

Overview

This version of ProStream 9000 transcodes services and may output them also as multiscreen compliant services. ProStream 9000 produces a valid output for mobile web devices that support multi-bitrate switching such as Apple iPhone, Microsoft Silverlight Smoothing Streaming Player, Adobe Flash Player.

NOTE: ProStream 9000 may simultaneously transcode broadcast streams and multiscreen compliant streams.

To comply with multiscreen specifications, ProStream 9000 outputs an MBTS (Multi Bitrate Transport Stream). MBTS is composed of SPTSs (Single Program Transport Streams), or several profiles that output the same service data in different quality levels. The following illustration shows a typical MBTS with three profiles:



Glossary

The following table lists transcoding multiscreen common terminology:

Table 6–1: Transcoding Multiscreen Terminology

Item	Explanation
ABR	Average Bitrate
CBR	Constant Bitrate
HD	High Definition video format

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Table 6–1: Transcoding Multiscreen Terminology

Item	Explanation
MBTS	Multi Bitrate Transport Stream
PTS	Presentation Time Stamp
SAR	Sample Aspect Ratio
SPTS	Single Program Transport Stream
SD	Standard Definition video format
Sub-SD	This video format includes all resolutions that are below the resolutions supported by SD.
VBR	Variable Bitrate

The following table lists the transcoding multiscreen specifications:

Table 6–2: Transcoding Multiscreen Specifications

Specification	Explanation
Density	■ Density - four ACE cards per unit
Services	■ Video Each transcoding engine - per single input: ❑ Up to 2 HD output profiles ❑ Up to 4 SD output profiles ❑ Up to 1 HD and 2 SD output profiles ❑ Up to 1 HD and 3 Sub SD output profiles ❑ Up to 1 1280x720p 50/60Hz - available only on the last two transcoding engines of each ACE card ❑ Up to 1 1920x1080p 25/30Hz - available on all transcoding engines The number of supported services depends on the mix of profile resolutions. For example, in 50Hz, SD low resolution supports 1 HD and 3 SD. For exact density per use case, refer to product spec and/or call to customer support. Fully populated platform - 4 ACE cards: ❑ 20 Input services that outflow in MBTS that includes 1-4 output profiles ❑ 10 Input services that outflow in MBTS that includes 5-8 output profiles ❑ 6 Input services that outflow in MBTS that includes 9-12 output profiles ❑ any of the above mentioned combinations with total of 80 profiles per device ■ Audio Density of audio streams is according to ACE Audio transcoding spec.
Video Format	Input - H.264/MPEG2 Output - H.264

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Table 6–2: Transcoding Multiscreen Specifications

Specification	Explanation
Bitrate	Input - VBR/CBR Output - CBR/ABR. Available output bitrate range depends on the input video format. For available output bitrate ranges, see: ■ HD - *Table 6–3* on page 159 ■ SD *Table 6–4* on page 160 ■ Sub SD *Table 6–5* on page 161
Output Resolution	Depends on the input video format. For available resolutions, see: ■ HD - *Table 6–3* on page 159 ■ SD *Table 6–4* on page 160 ■ Sub SD *Table 6–5* on page 161
H.264 Profiles and levels	■ Profiles ❑ Supported profiles for HD, SD and Sub SD: High, Main and Baseline. ■ Supported Levels: ❑ HD - 3.1 ❑ SD - 3.0 ❑ Sub-SD - 1.2, 1.3, 2.1 and 3.0
Output Frame Rate	■ Full frame rate: ❑ 29.97 fps for 60Hz (default) ❑ 25 fps for 50Hz (default) ■ Half frame rate: ❑ 14.985 fps for 60Hz ❑ 12.5 fps for 50 Hz
Output Scan Rate	Progressive
MBTS (Multi Bitrate Transport Stream)	■ Up to 12 profiles per MBTS ■ Each MBTS may include up to 25 PIDs in according to the following: ❑ Video PID - mandatory one transcoded video PID. ❑ Audio PIDs. ❑ Data/Passthrough PIDs ■ Adding/removing multiscreen output video PID to a profile is service affecting for all PIDs in the profile (temporary interruption - up to 10 sec)
Video Frequency	Configured at device level and applies to all video PIDs. The default is 60 Hz. In case of mismatch between the configured frequency and actual PID frequency the following takes place: ■ The alarm *Unsupported Frame Rate* is raised on the PID ■ The video PID is not transmitted Changes to the frequency of the video PID ensue the reset of the transcoding engine. Video PID frequency may change due to the upstream source, or at device level.
IDR Alignment	IDR frames inserted across all video streams in the MBTS should have identical Presentation Time Stamp (PTS).

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Table 6–2: Transcoding Multiscreen Specifications

Specification	Explanation
Input / Output interfaces	Input - GbE / ASI / 8VSB Output - GbE
PMT	PID Sorting - all programs in a specific MBTS have the same PMT ordering.
Audio Spec.	■ Input ❑ Codecs - any (MP1L2, AC3/E-AC3, AAC) ❑ Coding Modes - Multichannel, Stereo, Mono ■ Output ❑ Codecs - any (MP1L2, AC3/E-AC3, AAC - default) ❑ Coding Modes - Multichannel, Stereo (default), Mono ■ Bitrates - 96k (default) and all other supported bitrates ■ Audio configuration - according to ACE Audio transcoding spec.
Data PIDs	Passthrough with proper delay to match multiscreen system delay
System interop	Integrated with the following “Packager” platforms: ■ Harmonic ProMediaRT ■ Envivio ■ Anevia ■ Wowza
System Delay	5.2 seconds
EBP Signaling	Supports Encoder Boundary Point (EBP) standard, according to Comcast Specifications.

HD/SD/Sub-SD Specifications

ACE 5.1 and higher supports a wide range of resolutions to allow flexibility.

The following table shows the supported resolutions.

NOTE: HD output - any output resolution that is greater than 720W or 576H.

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Table 6–3: HD Output Specifications

Resolution	Input Format	Bitrate (kbps)	Default Bitrate (kbps)
1920x1080	HD	3000-8000	6000
1280x720 59.94/50 fps	HD	3000-8000	6000
1280x720	HD	1750-6000	3500
1152x648	HD	1750-6000	3500
1024x768	HD	1750-6000	3500

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Table 6–3: HD Output Specifications

Resolution	Input Format	Bitrate (kbps)	Default Bitrate (kbps)
1024x720	HD	1750-6000	3500
1024x576	HD	1750-6000	2000
960x720	HD	1400-6000	2000
960x640	HD	1400-6000	2000
960x540	HD	1400-6000	2000
920x720	HD	1400-6000	2000
912x512	HD	1400-6000	2000
864x486	HD	1400-6000	2000
854x480	HD	1400-6000	2000
852x480	HD	1400-6000	2000
848x480	HD	1400-6000	2000
840x486	HD	1400-6000	2000
832x464	HD	1400-6000	2000
800x480	HD	1400-6000	2000
800x450	HD	1400-6000	2000
768x432	HD	1400-6000	2000
750x576	HD	1400-6000	2000
720x578	HD	1400-6000	2000

NOTE: For 1024x768 - If the input is 720p, force output to be equal to input Vertical resolution (1024x720) and *Input Vertical Resolution Mismatch* alarm is raised.
Up conversion (SD to HD) is not supported.

Table 6–4: SD Output Specifications

Resolution	Input Format	Bitrate (kbps)	Default Bitrate (kbps)
720x576	SD/HD	500-2500	1500
720x528	SD/HD	500-2500	1500
720x480	SD/HD	500-2500	1500
720x432	SD/HD	500-2500	1500
720x404	SD/HD	500-2500	1500

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Table 6–4: SD Output Specifications

Resolution	Input Format	Bitrate (kbps)	Default Bitrate (kbps)
720x400	SD/HD	500-2500	1500
720x384	SD/HD	500-2500	1500
704x576	SD/HD	500-2500	1500
704x528	SD/HD	500-2500	1500
704x396	SD/HD	500-2500	1500
656x368	SD/HD	500-2500	1500
640x576	SD/HD	500-2500	1500
640x480	SD/HD	500-2500	1500
640x380	SD/HD	500-2500	1500
640x360	SD/HD	500-2500	1500
640x320	SD/HD	500-2500	1500
640x240	SD/HD	500-2500	1500
576x464	SD/HD	500-2500	1500
576x432	SD/HD	500-2500	1500
576x352	SD/HD	500-2500	1500
576x324	SD/HD	500-2500	1500
568x320	SD/HD	500-2500	1500
544x304	SD/HD	500-2500	1500
528x480	SD/HD	500-2500	1500
528x400	SD/HD	500-2500	1500

Table 6–5: Sub-SD Output Specifications

Resolution	Input Format	Bitrate (kbps)	Default Bitrate (kbps)
524x240	SD/HD	500-2500	1500
512x384	SD/HD	500-2500	1500
512x288	SD/HD	500-1000	1500
480x360	SD/HD	500-1000	750
480x352	SD/HD	500-1000	750
480x320	SD/HD	500-1000	750

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Table 6–5: Sub-SD Output Specifications

Resolution	Input Format	Bitrate (kbps)	Default Bitrate (kbps)
480x272	SD/HD	500-1000	750
480x270	SD/HD	500-1000	750
464x368	SD/HD	500-1000	750
448x336	SD/HD	500-1000	750
448x256	SD/HD	500-1000	750
448x252	SD/HD	500-1000	750
444x250	SD/HD	500-1000	750
432x240	SD/HD	500-1000	750
426x240	SD/HD	500-1000	750
416x240	SD/HD	384-800	500
400x304	SD/HD	300-800	500
400x300	SD/HD	300-800	500
400x240	SD/HD	300-800	500
400x224	SD/HD	300-800	500
384x304	SD/HD	300-800	500
384x288	SD/HD	300-800	500
384x216	SD/HD	90-800	500
378x288	SD/HD	90-800	500
352x576	SD/HD	90-800	500
352x480	SD/HD	90-800	500
352x288	SD/HD	90-800	500
352x240	SD/HD	90-800	500
336x192	SD/HD	90-800	500
320x240	SD/HD	90-800	450
320x180	SD/HD	90-800	450
320x128	SD/HD	90-800	450
304x240	SD/HD	90-800	450
304x224	SD/HD	90-800	450
288x162	SD/HD	90-800	350

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Table 6–5: Sub-SD Output Specifications

Resolution	Input Format	Bitrate (kbps)	Default Bitrate (kbps)
256x192	SD/HD	90-800	350
256x144	SD/HD	90-800	350
240x240	SD/HD	90-800	350
240x192	SD/HD	90-800	350
240x180	SD/HD	90-800	350
240x176	SD/HD	90-800	350
240x160	SD/HD	90-800	350
240x136	SD/HD	90-800	350
230x180	SD/HD	90-800	350
224x128	SD/HD	90-800	350
216x120	SD/HD	90-800	350
192x192	SD/HD	90-800	350
192x144	SD/HD	90-800	350
176x144	SD/HD	90-800	350
160x120	SD/HD	90-800	350
128x96	SD/HD	90-800	350
128x80	SD/HD	90-800	350

Processing Multiscreen Streams

The multiscreen streams outflow the device in MBTSs. Each MBTS includes up to 12 SPTSs, or profiles. The provisioning includes the following stages:

- Defining the required device frequency. See *Setting Device Frequency* on page 165
- Selecting the required input service and output port
  - Input service - the service flows into the device over a GbE port
  - Output Port - multiscreen services outflow over a GbE port. You need to define a multicast IP to outflow the MBTS.

  For more information, see *Creating an MBTS Stream* on page 165.
- Configuring the multiscreen parameters - Configuration is done via the Multiscreen page and its tabs:
- **MBTSs**
- **MBTS Configuration**
- **Profile Configuration**
- **Image Processing**

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See *Creating an MBTS Stream* on page 165.

Configuration includes:

- Setting unique stream parameters as explained in the following instructions.
- Setting parameters common to all streams in an MBTS as explained in the following instructions.

NOTE: Once you configure a transcoded video stream as an multiscreen stream, you cannot configure the video stream via the **Video Transcoding** tab.
You can configure the transcoded audio stream via the **Audio Transcoding** tab and all changes apply to all audio streams in a profile.

Cropping

Cropping is performed on the input stream, before the stream is encoded to other output profiles. You can configure cropping parameter for top/bottom/left/right.

The cropping range is 0 to 100 pixels for SD or HD input streams. Only even numbers are supported. The default value is zero. You can change the cropping parameters on the fly.

Cropping parameters are specified with respect to full resolution. If the input horizontal resolution is not full-resolution, the cropping parameter are scaled and rounded up to the next even number. For vertical resolution, it is always full resolution. Thus, no scaling of cropping is necessary for top and bottom.

Logo Insertion

The Logo Insertion feature places a small user-provided logo image over the input video. The image is static (non-animated) and it can have transparent and semi-transparent regions.

Table 6–6: Logo Insertion Specifications

Specification	Explanation
Insertion location and logo resolution	■ Location - insertion is performed on the input stream, before it is encoded to other output profiles ■ Resolution - it is assumed that the Logo size matches the full resolution of the input stream. Any changes to input resolution cause the logo to resize proportionally.
Logo insertion file	Logo insertion file should be loaded to the device and meet the following specifications: (For loading the file, see *Uploading Logo Insertion Files* on page 177. ■ Type - PNG file ■ Size - Not larger than 512Kb ■ Resolution - Not smaller than 16x16 and not larger than 1/8 of the maximum source pixels (HD 1080i: 1920x1080/8= 259200, HD 72P: 1280x720/ 8=115200, NTSC: 720x480/8=43200 and PAL: 720x576/8=51800). ■ When one of the output profiles is 1080p, the maximum logo resolution cannot exceed 1/16 of the source pixels (HD 1080p: 1920x1080/16= 129600).

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Table 6–6: Logo Insertion Specifications

Specification	Explanation
Position	User configurable. You may select a reference position that is based on the active video region and indicates a horizontal offset and vertical offset, which are based on the input full resolution, from that reference position. Reference positions are: top left corner, top right corner, bottom left corner and bottom right corner.
Position Offset	User configurable in pixels. Offset indicates the distance of the logo from the corner's edges *Note:* If a portion of the logo is outside of the active display region, the alarm *Logo Display Error* is raised.
Transparency	User configurable. From 0 to 100% (0 = Opaque, 100 = Invisible).
On the fly configuration	You can change configuration on the fly. Changes may cause the logo to disappear for a few seconds.

Setting Device Frequency

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Administration** > **Video Processing** section.
3. Open the **Video Frequency (Hz)** list and select either 50 or 60 Hz.

Creating an MBTS Stream

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Click the **MBTSs** page. Use this page to define the input service and the output GbE port for the multiscreen stream.
3. Click **Add**.
4. **Input TS** - to create a multiscreen steam you must configure the input TS. Open the Input TS list and select the required input.
5. **Output TS** - to create a multiscreen stream you must configure the output port. Open the Output Port and select the required output.
6. **# of Profiles** - select the number of profiles for the multiscreen stream. MBTS is composed of SPTSs (Single Program Transport Streams), or several profiles that output the same service data in different quality levels.
7. **Original Video Resolution** - select the input video format, either HD or SD. The Output bitrate ranges and resolution depend on the input video format. Select the input video resolution.
8. **Original Coding Format** - view the input coding format.
9. In **Destination IP Address**, enter a multicast IP address to outflow the MBTS. This multicast IP address with a UDP port specific for each multiscreen profile, define the SPTS included in the MBTS.
10. Click **OK**.

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The MBTS appears in the MBTS dialog. You can remove it with the **Remove** button or press the **Edit** button to edit the MBTS.

MBTS Properties

This section enables you to view the properties of each MBTS and to configure its name and input video format. Each changes done via this section, is automatically updated in the **MBTS # Properties** dialog.

1. Focus on the MBTS **Properties** section.
2. Open the **MBTS** list and select the required MBTS.
3. In **Program Name**, enter a the name of the MBS.
4. **# of Profiles** - Read only. view the number of profiles for the multiscreen stream. MBTS is composed of SPTSs (Single Program Transport Streams), or several profiles that output the same service data in different quality levels.
5. **Input TS** - Read only. View the Input TS.
6. **Output TS** - Read only. View the output TS.
7. **Output Port** - Read only. View the output port.
8. **Original Video Resolution** - select the input video format, either HD or SD. The Output bitrate ranges and resolution depend on the input video format. Select the input video resolution.
9. **Original Coding Format** - Read only. View the input coding format.
10. In **Destination IP Address**, Read only. View the multicast IP address to outflow the MBTS.
11. To define the output, focus on **IP Properties** section and do the following:
    a. In **Destination IP Address**, enter a multicast IP address to outflow the MBTS. This multicast IP address with a UDP port specific for each multiscreen profile, define the SPTS included in the MBTS. For UDP definition, see step 7.2.
    b. In **PMT PID**, enter the PMT PID of all programs included in the profile.
12. Output bitrate ranges and resolution depend on the input video format. Prior to the profile configuration, you should define the input video format. To define the input video format, focus on the **Input Properties** section. Open the **Input Video Format** list and select either **HD** or **SD**.

    The **New** button is enabled and the **Multiscreen Profiles** section is updated according to the selected input video format. Once you select an input, the **Select Input** option is removed.

Configuring MBTS Profile

To configure an MBTS profile:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Multiscreen** > **MBTS Configuration**:

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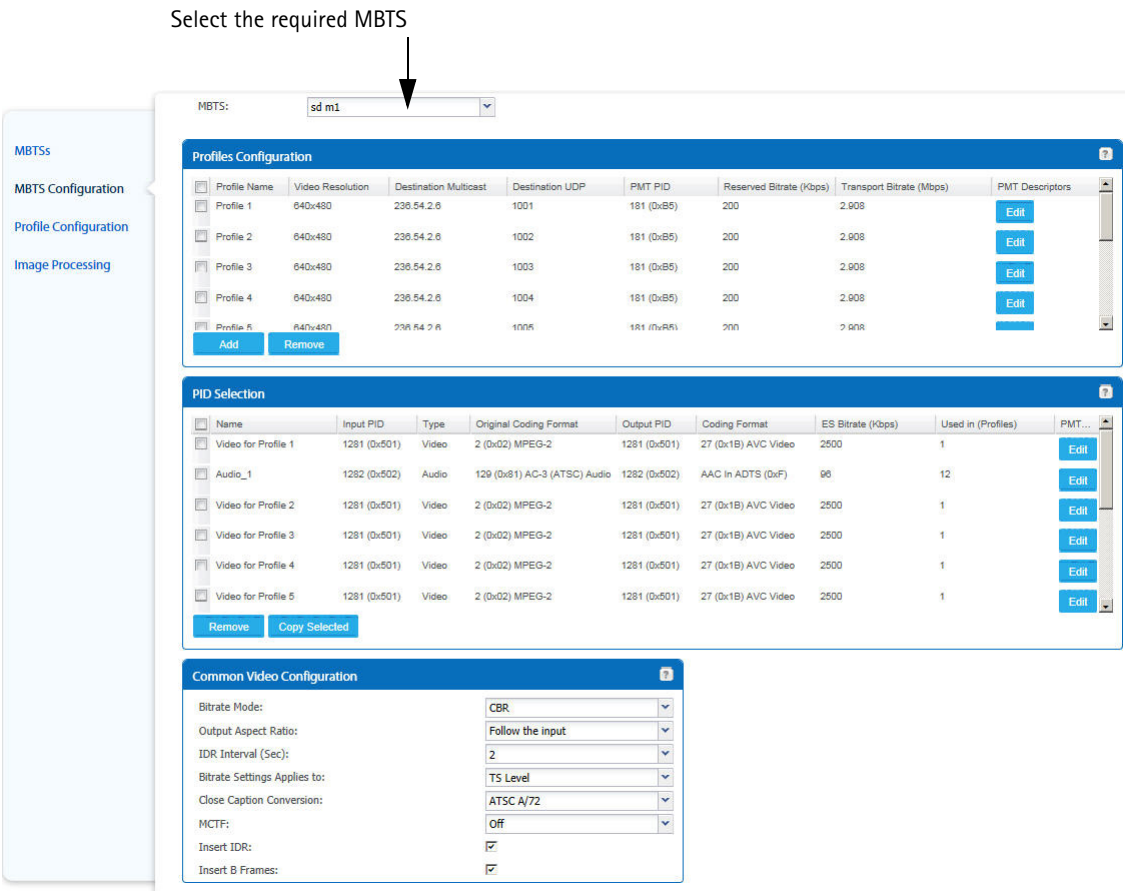
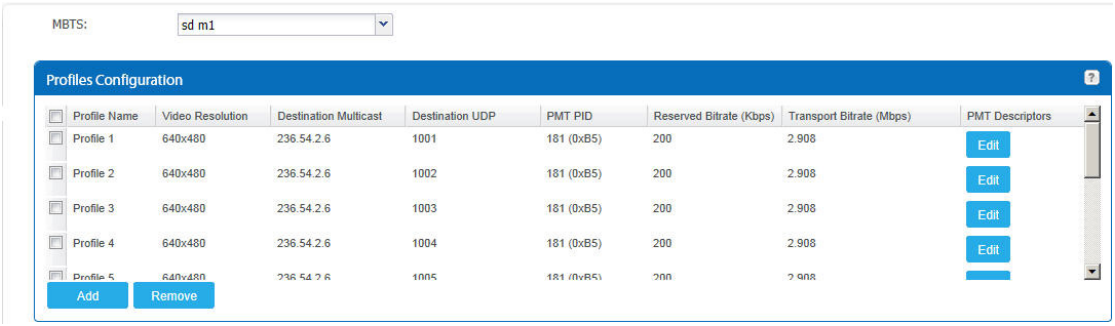
NOTE: This page appears only if MBTSs are configured.



3. Open the **MBTS** list and select the require MBTS.
4. To define a profile, focus on the **Profiles Configuration** section and do the following:



a. To create a multiscreen profile click **Add**. A blank record appears and you can define the profile parameters.

b. Under **Profile Name**, view the name of the profile.

c. Under **Video Resolution**, select the required resolution.

For HD, see *Table 6–3 on page 159*

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For SD, see *Table 6–4 on page 160*

For Sub SD, see *Table 6–5 on page 161*

d. Under **Destination Multicast**, enter the required multicast IP of the profile. This multicast IP address with a UDP port specific for each multiscreen profile, define the SPTS included in the MBTS.

e. Under **Destination Port**, define the output UDP port of the profile.

f. Under **PMT PID**, enter the PMT PID of all programs included in the profile.

g. **Reserved Bitrate** - The total bitrate required for all passthrough audio/data PIDs that are attributed to this MBTS profile. In case you changed passthrough PIDs configuration, enter under **Reserved Bitrate**, the appropriate bitrate following your changes to passthrough data/audio PIDs. Reserved Bitrate is automatically calculated, but you can configure it in case passthrough PIDs configurations is changed and it is required to re-set the total bitrate of the passthrough PIDs within the output TS. Automatic Calculation of Reserved bitrate is as follows:
In CBR Mode - Video Bitrate + Transcoded Audios (TS) Bitrate + PSI + Reserved Bitrate (for all passthrough streams)
In ABR Mode - (Video Bitrate)*4 + Transcoded Audios (TS) Bitrate + PSI + Reserved Bitrate (for all passthrough streams)
In case automatic calculation adds high overhead of Null packets to the output TS, you can adjust it by re-setting the Reserved Bitrate.

h. Under **Transcode Bitrate**, enter the required bitrate fro the available range.

For HD, see *Table 6–3 on page 159*

For SD, see *Table 6–4 on page 160*

For Sub SD, see *Table 6–5 on page 161*

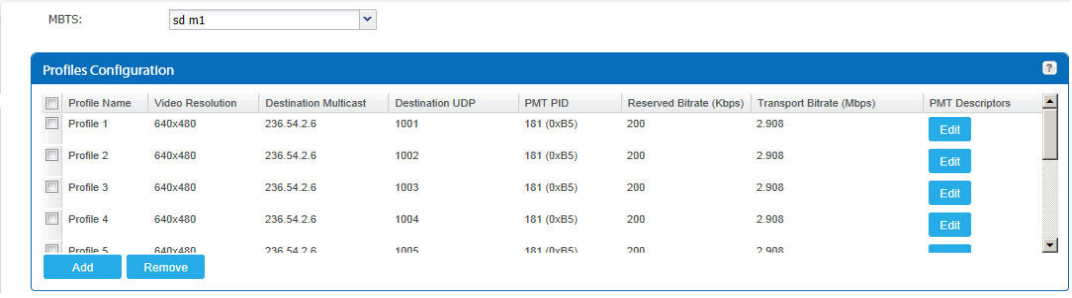
i. Under **PMT Descriptors**, edit the PMT descriptors. See *Configuring PMT* on page 64.

Editing the Multiscreen Profiles List

To delete multiscreen profiles:

NOTE: Removing/adding multiscreen stream from a profile is service affecting for all streams in the profile.

1. Log into the device and select the **Multiscreen** page.
2. Select **MBTSs** > **Profiles Configuration** section.



3. Open the **MBTS** list and select the required MBBTS.
4. In **Profiles Configuration**, select the required profile(s).
5. Click Add/Remove.

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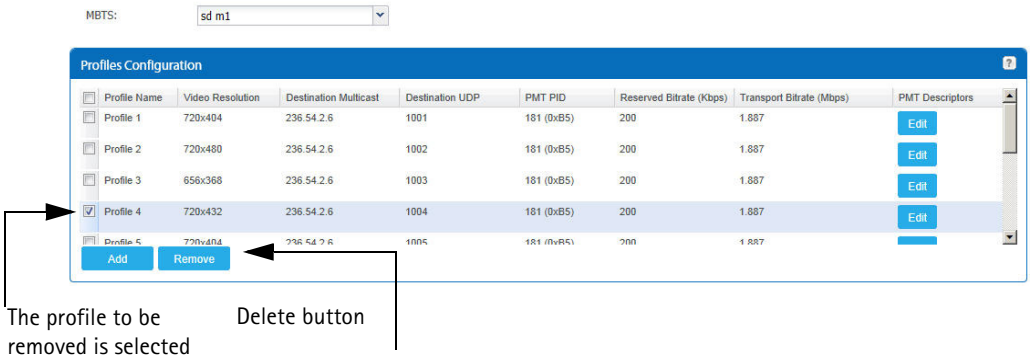
If you click **Add**, see *Configuring MBTS Profile* on page 166.

If you click **Remove**, the profile is removed from the MBTS.

.



NOTE: If you remove all profiles from an MBTS, the MBTS is deleted as well.

Configuring Profile PIDs

Each profile may have up to 25 PIDs. Each profile should have a transcoded video stream, it may have multiple transcoded audio streams and may have data streams.

To define/view the streams:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Multiscreen** > **MBTS Configuration**:

NOTE: This page appears only if MBTSs are configured.

3. Open the **MBTS** list and select the require MBTS.
4. To define profile PIDs, focus on the **PID Selection** section and do the following:
   a. Under **Name**, view the name of the PID. The name indicated whether video, audio or data.
   b. Under **Input PID**, select the input PID.
   c. Under **Type**, view the type of the PID, whether video, audio or data.
   d. Under **Original Coding Format**, for video PID, view the coding format of the PID. For audio or data PID, select the required input coding format.
   e. Under **Output PID**, enter the required output PID.
   f. Under **Coding Format**, for video PID, view the output coding format of the PID. For audio or data PID, select the required output coding format. See *Table 6–7* on page 172.
   g. Under **ES Bitrate (bps)**, open the bitrate list and select the required bitrate.
   h. Under **Used in (Profiles)**, view the profiles this PID is associated with.
   i. Under **PMT Descriptors**, edit the PMT descriptors. See *Table* on page 64.
   j. To duplicate the stream, see *Duplicating Audio/Data Streams* on page 174.

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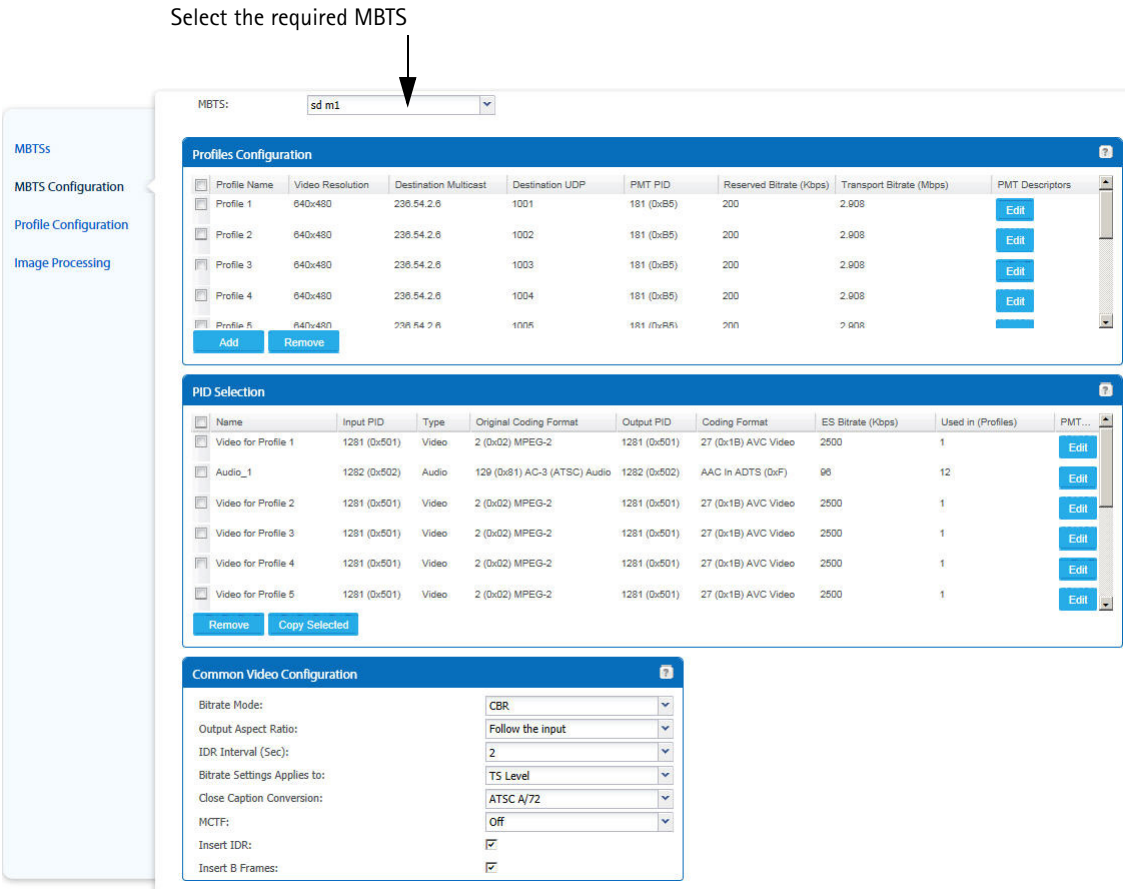
Configuring Common Video Parameters

To configure common video parameters:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Multiscreen** > **MBTS Configuration**:

NOTE: This page appears only if MBTSs are configured.



3. Open the **MBTS** list and select the required MBTS.
4. To define the parameters common to all multiscreen streams, focus on the **Common Video Configuration** section and do the following:
   a. Open the **Bitrate Mode** list and select either of the following:
      - CBR - Constant Bitrate
      - ABR - Average Bitrate
   b. **Output Aspect Ratio –** allows to match picture to type of screen, standard or wide screen. To configure output aspect ratio, open the **Output Aspect Ratio** list and select one of the following:
      Follow the Input
      4:3
      16:9

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NOTE: To form a 16:9 image in case the input aspect ratio is 4:3, the input image is rescaled with black pixel columns added to the left and right sides of the rescaled image (i.e. pillar-boxing).

c. In **IDR Interval (sec)**, enter the required interval between the IDR frames.

d. Open the **Bitrate Settings Applies to:** list and select either of the following:

- TS Level - the baseline for calculating the output transport stream bitrate includes the ES bitrate and the TS header encapsulation overhead
- ES Level - the baseline for calculating the output transport stream bitrate includes only the ES bitrate

e. Open the **Close Caption Conversion** list and select either of the following:

- ATSC A/72
- Discard

NOTE: : Closed caption/V-Chip information is passed through only for full frame rate profiles (29.97fps), due to standards restriction.

f. **MCTF** (Motion-Compensated Temporal Filtering) - by default it is off. Mctf affects the video quality and reduces noises. If the service bit rate is low it is recommended to use strong Mctf. However, strong Mctf affects the sharpness of the picture. To select the required Mctf, open the **Mctf** list and select the required level ranging from very weak to very strong.

g. **Insert IDR** - select to insert IDR frames.

h. **Insert B Frames** - select to insert B frames.

Configuring MBTS Profiles

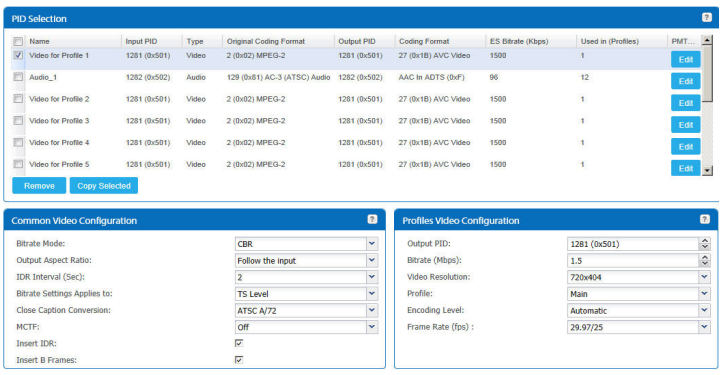
To configure MBTS Profiles:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Multiscreen** > **MBTS Configuration**:

NOTE: : This page appears only if MBTSs are configured.

3. Open the **MBTS** list and select the require MBTS.
4. To define profile parameters, in **PID Selection**, select the required video PID.

   The **Profiles Video Configuration** section appears:



5. **Output PID** - select the required output PID.

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6. **Bitrate (Mbps)** - select the required output bitrate of the video PID.
7. **Video Resolution** - select the required output resolution. See
   - HD - *Table 6–3* on page 159
   - SD *Table 6–4* on page 160
   - Sub SD *Table 6–5* on page 161
8. **Profile** - select the required profile. You can select: Baseline, Main or High.
9. **Encoding Level**, select either automatic, or a level defined by the H.264 specifications:
   - Automatic - encoding level is automatically defined according to the frame size, frame rate and max bit rate.
   - Available levels: 1.1, 1.2, 1.3, 2.0, 2.1, 2.2, 3.0, 3.1, 3.2, 4.0, 4.1. If configurable level does not comply with the configured frame size, frame rate and bitrate, ACE accepts the configured level and raises the alarm *Encoding level violation*.
10. **Frame Rate**, select either of the following:
    - 29.97 / 25 - applies to Full frame rate, where:
      29.97 fps for 60Hz (default)
      25 fps for 50Hz (default)
    - 14.98 / 12.5 - applies to Half frame rate, where:
      14.985 fps for 60Hz (default)
      12.5 fps for 50 Hz

Configuring Audio Transcoding PID

The **Audio TX Configuration** section appears once you select an audio PID in **PID Selection** section.

To configure an Audio Transcoding PID:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Multiscreen** > **MBTS Configuration**:

NOTE: : This page appears only if MBTSs are configured.

3. Open the **MBTS** list and select the require MBTS.
4. To define the parameters of the audio PID, select in **PID Selection** the required audio PID.
5. **Output PID** - Select the required output PID.
6. **Coding Format** - Allows to configure the compression type and to allocate transcoding resources. Select one of the following output coding formats: Coding format options depend on the selected input stream type as the following table lists:

Table 6–7: Output Coding Format

Input Stream Type	Coding Format Options
(0x3) MPEG-1 Audio	Any coding format. Not configurable
AC-3 ATSC	
E-AC-3 ATSC	

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Table 6–7: Output Coding Format

Input Stream Type	Coding Format Options
AC-3/E-AC-3 DVB	Any
	AC-3
	E-AC-3
AAC	Any input coding format
	AAC LC
	ACC HE

If the coding format of the input stream is unknown, select Any. If a low MHz decoder (AAC LC / AC3) is selected and the actual decoding format is a high MHz decoder (AAC HE / E-AC3), an alarm is raised.

7. **Input ES Type** - select the type of the input elementary stream.
8. **ES Type** - Read only. View the type of the input elementary stream.
9. **Input Coding Mode** - Allows to define the number of channels and to allocate transcoding resources. Select one of the following coding modes: Any, Stereo, or Multichannel. Coding mode options depend on the selected input stream type as the following table lists:

Table 6–8: Output Coding Mode

Input Stream Type	Coding Format Options
(0x3) MPEG-1 Audio	Any coding format. Not configurable
AC-3/E-AC-3 all flavors ACC	Any
	Stereo/Mono
	Multichannel

10. **Sample Rate (kHz)** - Read only. Sampling rate is 48 kHz and it is not converted.
11. **ES Bitrate (Kbps)** - Select the required bitrate, The ES Bitrate list is updated according to the output stream type and the selected output codec.
12. **MPEG 1 Layer II / AC-3 EAC-3 / AAC** - this section is updated according to the selected Coding Format. For details see:

    MPEG 1 Layer II - *Specific MPEG-1L2 Configuration* on page 147

    AC 3 EAC-3 - *Specific Dolby ® AC-3™/E-AC-3™ Configuration* on page 148

    AAC - *Specific AAC Configuration* on page 148
13. **Effective Bitrate (Kbps)** - Read only. Displays the actual bitrate.

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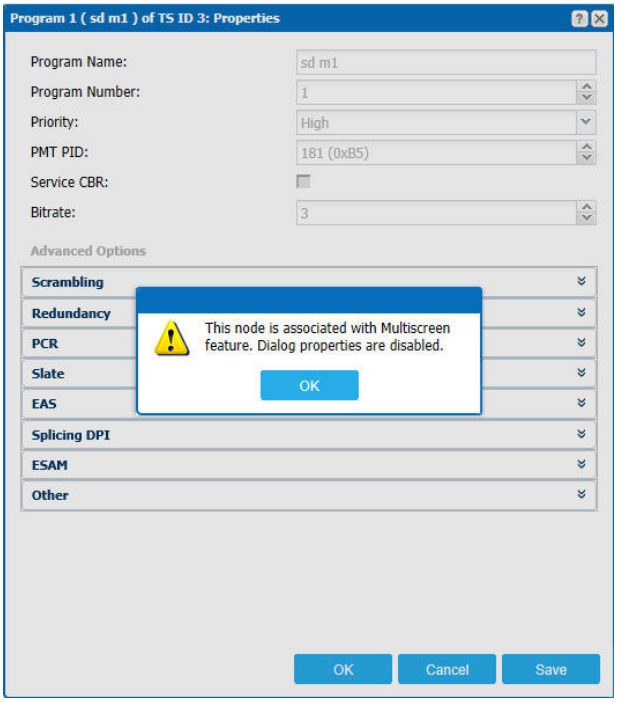
The multiscreen transcoding is configured via the **MBTS** menu only. However, if you select in the Logical Output pane a multiscreen service > **Properties**, the Properties page appears with the following message. Once you click OK in the message, the Properties dialog opens with limited configuration. The same applies for PIDs.



Duplicating Audio/Data Streams

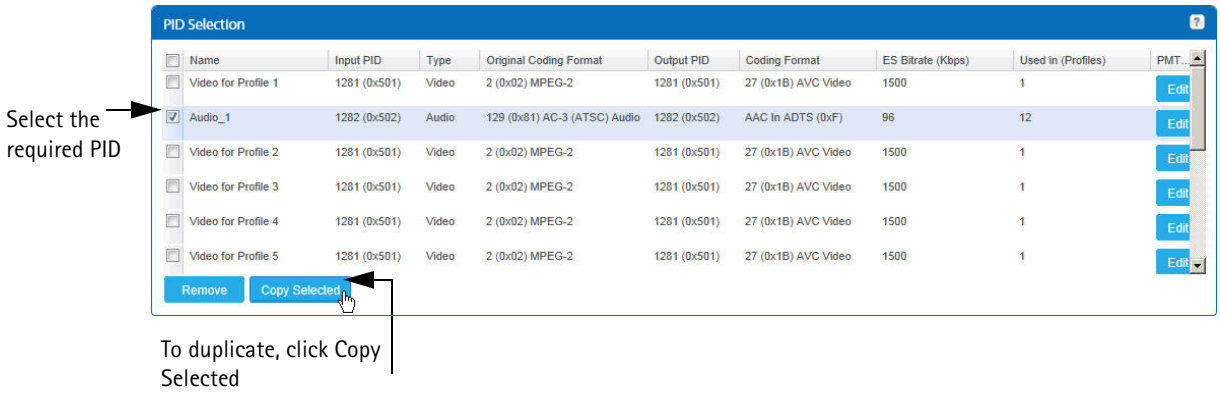
You can transcode/passthrough each audio/data stream multiple times, with different output PID and transcoding parameters. You can also configure whether to enable each audio/data stream per specific MBTS Profile.

Each MBTS may have up to 25 streams.

Duplication of audio/data streams is done across all MBTS profiles.

To duplicate a stream:

1. Select **Multiscreen** > **MBTS Configuration** > PID Selection section.



2. Select the required audio/data PIDs.

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3. Click **Copy Selected**.

   The required PIDs are copied and appear below the original PID.

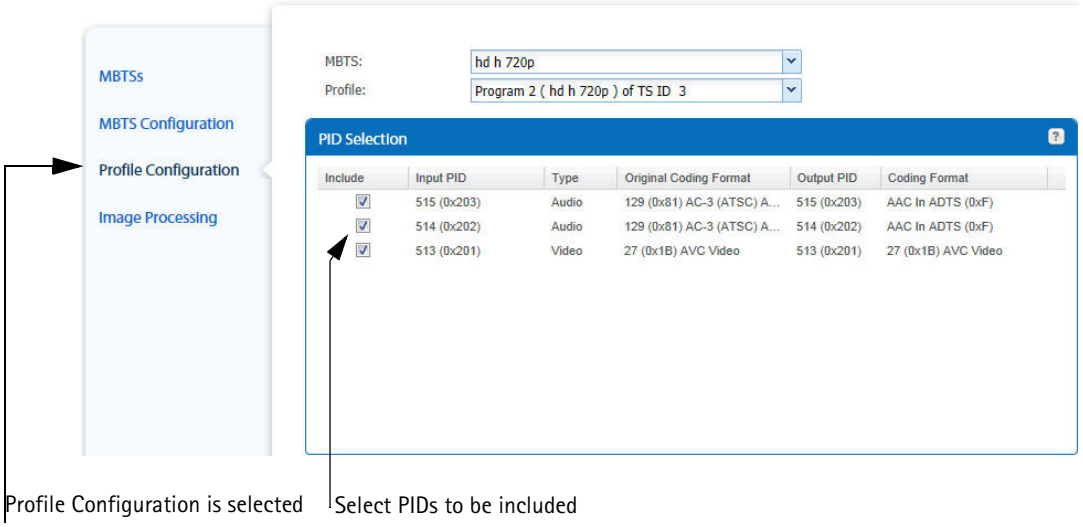
NOTE: To remove PIDs, use the **Remove** button.

Associating ESs with a Profile

To associate the streams with a profile, select the required profile/profiles. By default, stream are associated to all profiles.

To select the required profile:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Multiscreen** > **Profile Configuration**:



3. Open the **MBTS** list and select the required MBTS.
4. Open the **Profile** list and select the required profile.

   The **PID Selection** section is updated with the PIDs of the MBTSs.
5. Under, **Include**, select/de-select the PIDs to be included/excluded

Multiscreen Image Processing

Multiscreen image processing includes the following features:

- Logo Insertion - see *Logo Insertion* on page 164
- Cropping - see *Cropping* on page 164.

To configure Logo Insertion and Cropping:

1. Log into the device as explained in *Logging into the Device* on page 12.

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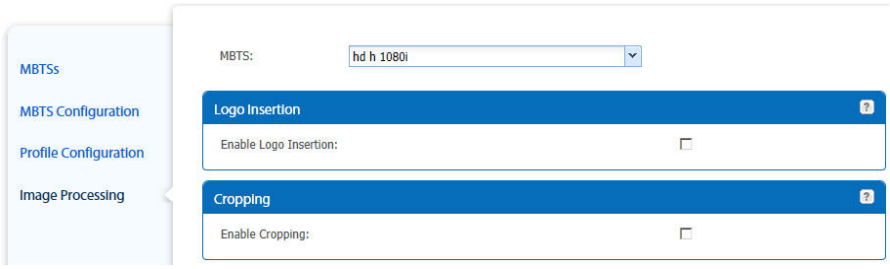
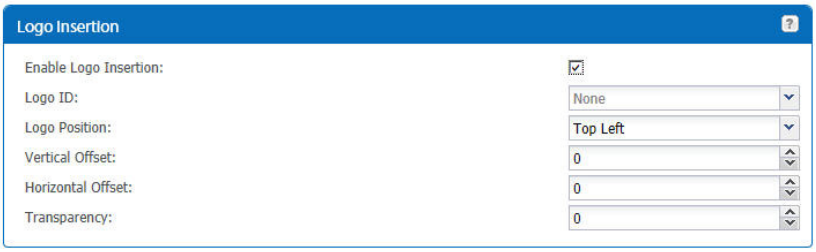
2. Select **Multiscreen** > **Image Processing**:



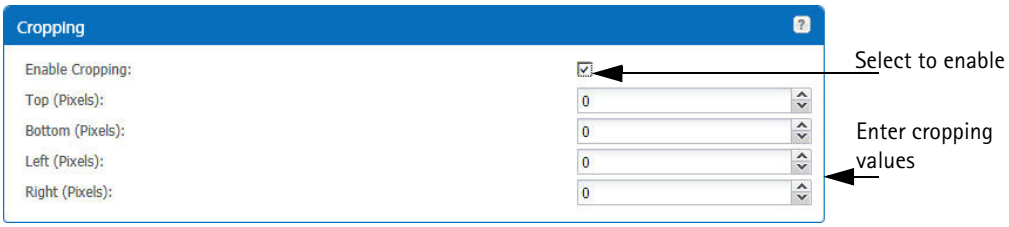
3. Open the **MBTS** list and select the required MBTS.
4. Open the **Logo ID** to select the required logo file. You need to upload logo files via the **Assets** tab. See *Uploading Logo Insertion Files* on page 177.
5. To configure Logo Insertion, focus on the **Logo Insertion** section.
6. Select **Enable Logo Insertion**.



   a. To enable the **Logo Insertion** section, select **Logo Insertion**. For logo insertion specifications, see *Logo Insertion* on page 164.
   b. Open the **Logo Position** list and select the required position for the logo: Top Left, Top Right, Bottom Left, Bottom Right.
   c. In **Vertical Offset** and **Horizontal Offset**, select the required distance, respectively.
   d. In T**ransparency**, enter the required value, or move the slider.

To configure Cropping:

7. In the Cropping section, select **Enable Cropping**.



   a. Enter the desired cropping values in the **Top**, **Left**, **Bottom** and **Right** boxes. Enter even-numbered values between 0 to 100. See *Cropping* on page 164.
8. To send to device, click **Apply**.

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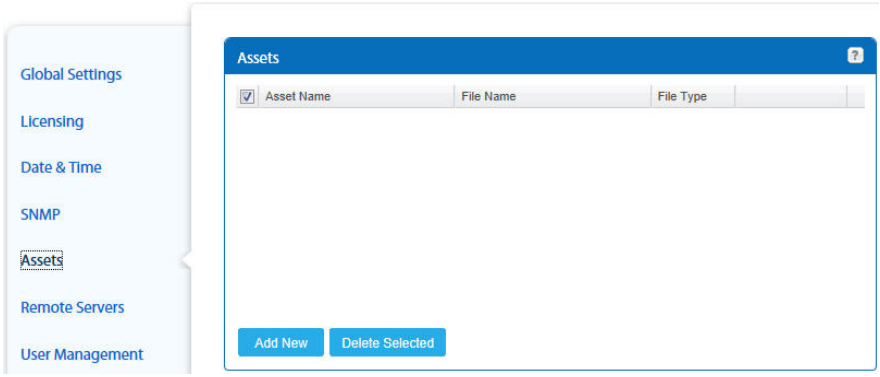
Uploading Logo Insertion Files

To upload a logo file:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select the **Administration** > **Assets** page:



3. Click **Add New**.
4. Click **Browse**, and browse to the required logo file.
5. Click **Open**. The file is uploading and its name appears in the dialog.
6. In **Uploading Asset** page, click **OK**.

   The required file is loaded and the **Assets** page is propagated with the loaded file.
7. Select **Multiscreen** > **Image Processing** > **Logo Insertion**.
8. **Enable Logo Insertion** - select this option to enable logo insertion.

   The Logo Insertion list is populated with the loaded files.
9. Open the **Logo ID** list and select the required file.

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Chapter 7
Splicing

Splicing Overview

Digital Programming Insertion (DPI) or Splicing is the process in which the main feed is spliced to allow the insertion of another stream, usually an ad. The transition from the main feed to the inserted stream and vise versa should be seamless, frame-accurate splice, to allow a flawless broadcast.

DPI Standards

A splicing standard-based solution supports the following standards:

SCTE35 - Digital Program Insertion Cueing Message for Cable protocol. A protocol for in band cue messages that defines the potential splice time-slots (avails) in the stream.

SCTE30 – Digital Program Insertion Splicing API. A communication protocol between AD Servers and Splicers, to communicate splice messages.

DPI Terminology

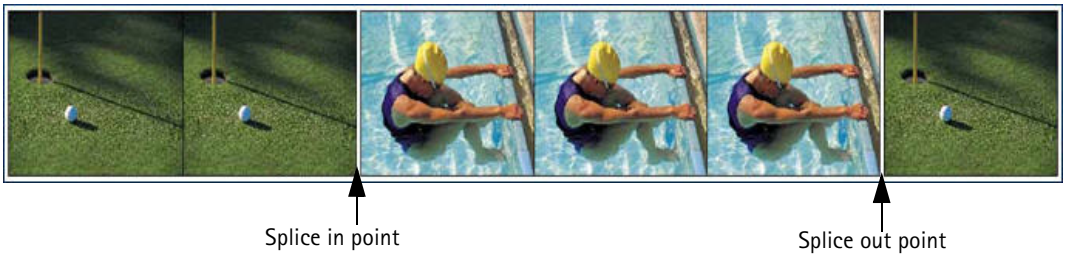
Network feed - another name for the main feed, that is the feed to be spliced.

Avail - time slots for inserting content into the network feed. The avails are transmitted over a SCTE35 PID, or SCTE30 PID.

Cue message - sent from the Splicer to the AD server via SCTE30. The cue message informs the AD server of an avail to allow the AD server to retrieve the ad spots scheduled for that avail.

Insertion channel - the channel over which the AD server streams the ads to the Splicer. The Insertion channel interface is an IP one.

Splice In Point and Splice Out Point - Splice In Point indicates the frame for inserting content into the network feed. Splice Out Point indicates the frame for ending the insertion and returning to the network feed.



Ad - a short commercial clip, typically 30 seconds long.

Back-to-Back Insertion (B2B) - when more than one ad is inserted, the ads are inserted one following the other without returning to the network feed.

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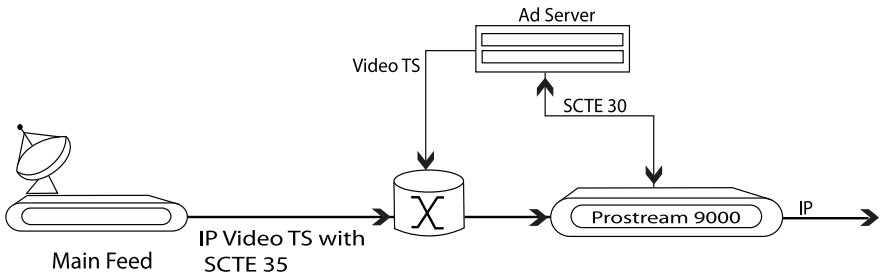
Components of the Splicing Solution

The following illustration shows the main components of the Splicing solution:



AD Server

The AD server does the following:

- Manages the splicing - the AD server initiates the splicing and it defines when to splice, what to insert and for how long. To control the splicing it communicates with the Splicer over the SCTE30 protocol.
- Controls the Insertion channel - the AD server contains all the insertion content and streams the ads as required over the Insertion channel to the Splicer. The Insertion channel interface is either IP or ASI as the above illustrations show.
- Interfaces with an NTP server - Both AD server and Splicer interface with the same NTP server. The AD server receives time signals from the NTP server and synchronizes its internal clock with the external NTP clock. This clock is also utilized by the Splicer. Both the Splicer and AD server share a common time-base to ensure maximum synchronization between them.

Digital Splicer

ProStream 9000, the digital Splicer in this solution, allows a smooth and seamless transition from one stream to another. The Splicer performs the following:

- Receives main feed - the Splicer receives the main feed with SCTE35 data over its IP interface.
- Encapsulates SCTE35 data - the Splicer encapsulates SCTE35 data as SCTE30 Cue messages. The Splicer sends these messages to the AD server to inform it of an avail and to allow the AD server to initiate a splice.
- Receives Splice requests and insertion content - The Splicer receives from the AD server a splice request and the insertion content and executes a splice at the required time. Without SCTE35, AD server may initiate a splice request via SCTE30.
- NTP Interface - allows the Splicer to receive a time signal from the system NTP server and to synchronize its clock according to the NTP time.

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Splicing Specifications

The following table lists splicing specifications supported by ProStream 9000 Splicer:

Table 7–1: Splicing Specifications

Item	Specification
Video Format	H264/MPEG2/SD/HD, 50/60 Hz
Audio type	Supports all types
Spliceable services	Up to 70 spliceable service per device pending on bitrate.
Network feed interface	IP
Insertion Channel Interface	IP
Spliceable service type	Flows through the platform over IP, IP in and IP out.
Spliceable service content	1 video PID Up to 8 Audio PIDs Up to 4 data PIDs
Supported protocols	Standard-based SCTE30 and SCTE35
AD Specifications	CBR, 0.5- 12 Mbps

AD Server Specifications

ProStream 9000 is a SCTE35/30 compliant Splicer. It is integrated with Vigor AD Server. The following table shows the specifications of these AD servers

Table 7–2: Vigor Specification

Item	Specification
Insertion channel	IP
Splice request mode	PIDs mode
Splicing request initiation	Based on an external system

Tips for AD Server Configuration

When configuring the AD server for working with ProStream 9000 as a splicer, it is recommended to configure as follows the parameters indicated below:

Table 7–3: Tips for AD Server Configuration

Parameter	Explanation	Recommended Value
Splice Request Pre-roll	How much time should lapse between the AD server sends the splice request and the splice event	3.5 seconds

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Table 7–3: Tips for AD Server Configuration

Parameter	Explanation	Recommended Value
AD Streaming Pre-roll	How much time should lapse between the AD server streams the ad and the splice event	0.9 seconds

Configuring the Splicer

Defining Splicer-AD Server Communication Parameters

To allow the Splicer and AD server to communicate, define the following parameters. The value of these parameters should be identical for both the Splicer and AD server. The following instructions guide you on how to configure the Splicer via the web client. For AD server configuration, see AD server documentation.

- Splicer name - a unique name of the Splicer. See *Defining Splicer Names* on page 181.
- Splicer IP address and SCTE30 port - The default SCTE30 port is 5168. See *Defining the SCTE30 Port and Allocating Resources* on page 182.
- Services - enter a name for each spliceable service. See *Configuring Spliceable Services & SCTE35 PID* on page 182.
- Insertion Channel - In the Splicer, verify that the input port over which the Splicer receives the Ad insertion, is enabled. In the AD server configuration, verify that the port settings match this port.
- NTP Server - enter the IP address of the NTP server and verify that NTP communication is enabled. See *Synchronizing Splicer Time* on page 182.

Once the AD server is up and running it sends an Initiation request via SCTE30 for each spliceable service. If the configuration is valid, the Splicer sends a positive Initiation response and the AD server and Splicer communicate.

Defining Splicer Names

To define a splicer name:

1. Open a browser and type the IP address of the device.
2. Login to the device.
3. Do either of the following:
   - Select **Platform** > **HW Inventory** > **Platform Properties** section:.

   Or
   - Select **Administration** > **Global Settings**> **General** section:
4. In **Device Name**, enter the name of the Splicer. When configuring the AD server, use this name as the Splicer name.

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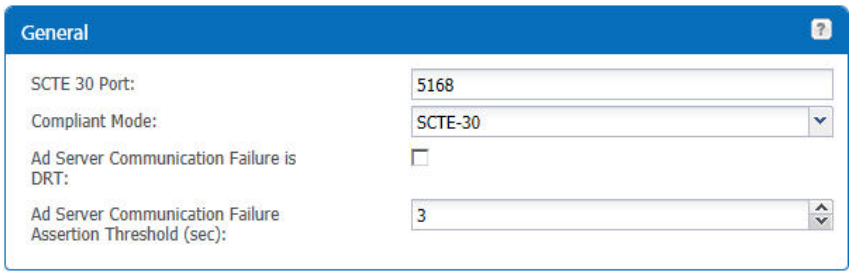
Defining the SCTE30 Port and Allocating Resources

To define and allocate an SCTEE30 port:

1. Select **Platform** > **DPI**:.



2. In **SCTE30 Port**, enter the port number via which the AD server manages the splicer. The default is 5168.
3. Open the **Compliant Mode** and select either of the following:
   - SCTE30
   - DVS
4. **Ad Server Communication Failure is DRT** - when selected, a communication failure with the ad server, is a Device Redundancy Trigger (DRT).
5. **Ad Server Communication Failure Assertion Threshold (sec)** - enter the period of time to wait before asserting a DRT.
6. Click **Apply**.

Synchronizing Splicer Time

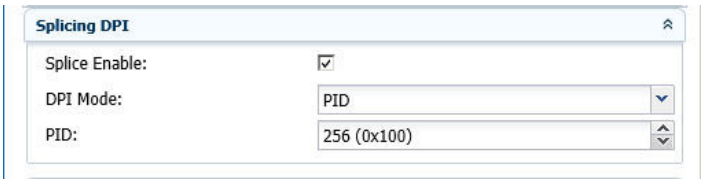
See *Network Time Protocol (NTP)* on page 240.

Configuring Spliceable Services & SCTE35 PID

To splice a service, configure it as a spliceable service. Spliceable services should flow into the device and out of the device via a GbE port of the GbE 4G module.

To configure the registration mode of the SCTE35 PID:

1. In the web client, in **Logical Output**, select the required program.
2. In the drop-down menu, select **Properties**. *Network Time Protocol (NTP)* on page 240
3. Select the **Splicing DPI** Section:.



4. Select **Enable Splicing**.
5. To configure the registration mode, open the **DPI Mode** list and select one of the following options:
   - **None** - Do not register to receive any SCTE35 message

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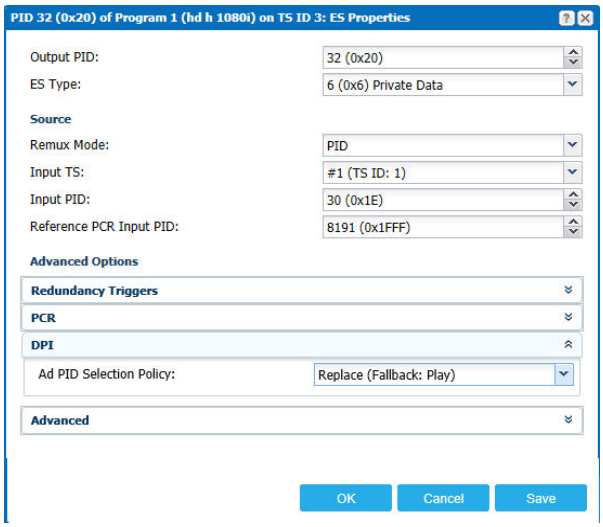
- **PID** - Identify and register the DPI PID according to its PID ID. Once you select PID, the PID box appears. In the PID box, enter the required PID number.
- **ES Type** - Identify and register the DPI PID according to its ES Type. Usually SCTE35 PID is type 0x86.
- **Component** - Identify and register the DPI PID according to the required component parameters. Once you select Component, the **Service** and the **Component** boxes appear. Enter the required service details and the required component ID.
- **RSS** - Identify and register the DPI PID according to the ID of the configured Reference Service. Once you select RSS, the service box appears. Enter the required service ID.

6. Click **Apply**.

Configuring Data PIDs

To configure a Data PID:

1. In the web client, in Logical Output, select the required program.
2. Enable splicing for the program. Select **Program** > **Properties** > **Splicing DPI** and select **Splice Enable**.
3. Select the data PIDs of the service and from the drop-down menu select **Properties**.
4. In the PID# Properties dialog, focus on DPI.



5. To coordinate between network PIDs and AD server PIDs, open the **Ad PID Selection Policy** list and select one of the following options:
   - Replace (Fallback: Block) - Try to match Ad PID to network PID. If a matching PID is not found, block the network PID.
   - Replace (Fallback: Play) - Try to match Ad PID to network PID. If a matching PID is not found, play the network PID.
   - Always Play Network PID - Do not try to match Ad PID to network PID, always play the network PID
   - Block PID During Ad - Do not try to match Ad PID to network PID, always block the network PID
6. Click **OK**.

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Monitoring Splicing

To monitor splicing activity, see *Splicing Logging* on page 259.

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Chapter 8
CAS

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.

ProStream 9000 devices support the following CAS mode:

- DVB CSR scrambling - ProStream 9000 may be used as a DVB-CSA scrambler over its ASI and GbE interfaces. ProStream 9000 is fully-integrated and certified to work with the following CA Systems:
  - NagraVision
  - NDS
  - Irdeto
  - Viaccess
  - Conax

When working as a scrambler, the following options apply:

- DVB encryption with external or internal EIS. See *Using Internal EIS* on page 190.
- BISS - See *BISS Overview* on page 193.
- Virtual IP Address. See *Setting ETH1-2 Parameters* on page 22.

Setting General CAS Parameters

Setting the general CAS parameters comprises the following procedures:

- Set communication parameters between ProStream and EIS.
- Set the Crypto Period Duration.
- Set communication parameters between ProStream and ECMG.
- Allocate ECM PIDs.
- Set communication parameters between ProStream and EMMG.
- Allocate EMM PIDs.

Setting CAS General Parameters

To set CAS general parameters:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **CA&BISS** > **General** > **General** section.
3. In **CAS Mode**, select one of the following options:
   - DVB - default option. CAS that supports the DVB protocol
   - AES CBC - CAS that supports the Advance Encryption Standard (AES) CBC protocol.
   - AES ECB - CAS that supports the Advance Encryption Standard (AES) protocol.
4. In the **CP Duration (Sec)** box, type the required value to set how often ProStream should change the encryption key. The Crypto Period is indicated in seconds and the valid range is 5 - 7200.

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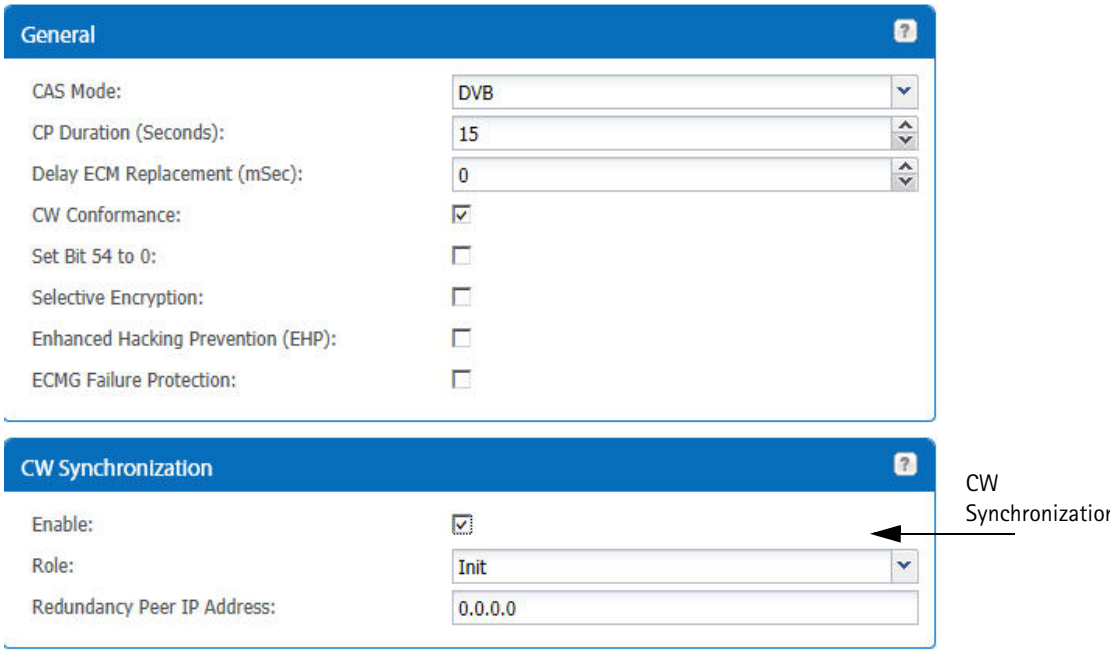
5. **Delay ECM Replacement (mSec)** - select the amount of time, in millisecond, that elapses until ECM replacement takes place.
6. Select **CW Conformance** to allow CW conformance.
7. **Set Bit 54 to 0** - when selected bit 54 of the CW is set to 0.
8. **Selective Encryption** - by default this check box is not selected. When selected, it allows the trick mode of scrambled content. This option supports live ingests of channels such as nPVR, Catchup TV, and StartOver.
9. **Number of Unencrypted Packets** - enabled once you select **Selective Encryption**. Open the list and select the number of clear packets.
10. **Partial/Random Encryption** - enabled once you select **Selective Encryption**. Mark to select Partial/Random Encryption.
11. **Enhanced Hacking Prevention (EHP)** - select to enable enhanced hacking prevention. When selected, the device does not scramble TS packets with and without adaptation headers that contain identical payload bytes.
12. **ECMG Failure Protection** - select to enable ECMG failure protection. When selected, whenever the ECM is not received from at least one ECMG, the device continues scrambling TS packets of the relevant SCG(s) using the last 2 control words (toggling between them), with an increasing crypto-period number. For the failed ECMG, the last two ECMs are transmitted, for other ECMG(s) the new received ECMs are transmitted.
13. To configure CW synchronization, focus on the **CW Synchronization** section. This configuration applies to NMX control mode.



14. **Enable**, to enable CW synchronization. When checked, there is CW synchronization between the primary and backup device.
15. In **Role**, select one of the following:
    - Init - applies to NMX control mode only.
    - Primary - this device functions as the primary device for CAS purposes

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- Backup - this device functions as the backup device for CAS purposes
- Standalone - this device works in a standalone mode

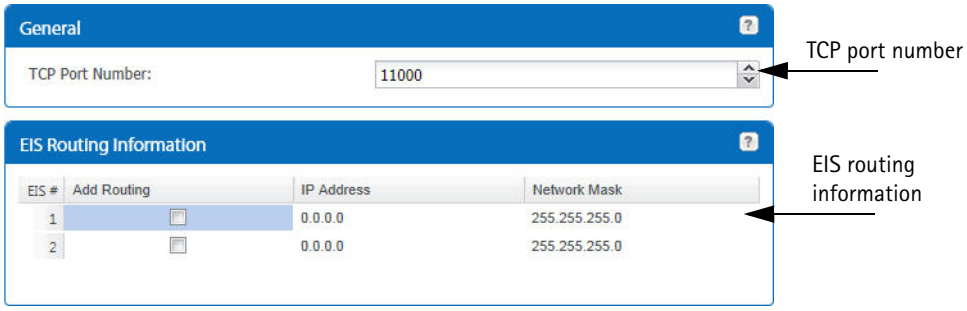
16. In **Redundancy Peer IP Address**, enter the IP address of the backup CAS device.

Configuring EIS Parameters

The SCS-EIS page enables you to configure the EIS and ProStream communication.

To configure EIS parameters:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **CA & BISS** > **SCS-EIS**.



3. Focus on the **General** section.
4. **TCP Port Number** - select the required value to set the TCP port through which ProStream communicates with the EIS. Valid values range between 1024 and 65535. The default value is 11000.

NOTE: ProStream 9000 is a server to the EIS device.

5. Focus on the **EIS Routing Information** to configure the EIS details.
6. In **EIS Data**, enter the IP address and subnet mask of EIS1 and EIS2 as explained below:
   - **Add Routing** - select to enable the routing.
   - In **IP Address**, enter the IP address of EIS1 and EIS2.
   - In **network Mask**, enter the subnet mask of EIS1 and EIS2, respectively, to enable communication when the EIS is hooked to a network other than the CAS or the management network.

Configuring ECMG Servers

To configure ECMG servers:

1. Log into the device as explained in *Logging into the Device* on page 12.

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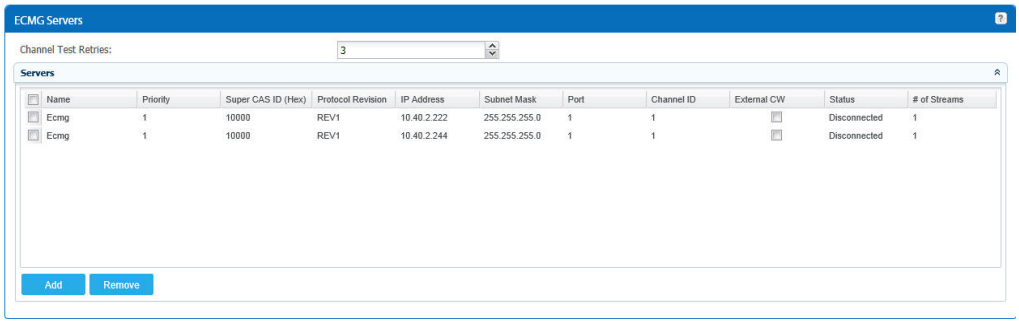
2. Select **CA & BISS** > **ECMG**.



3. In the **Channel Test Tolerance** list, select the required value to define the allowed channel-tests before closing the connection with the ECMG. The default value is 3.
4. Click **Add**, to add an ECMG.

   You may add up to 30 ECMGs.
5. Configure the ECMG according to the following parameters:

- Name - type in a name for the ECMG.
- Priority - to allow redundancy, set priority by indicating the primary and secondary ECMG of the same SuperCAS ID.The ProStream always tries to connect first to the ECMG with the same SuperCAS ID and the highest priority and then to the next highest priority. Assign priority from 1-10 with 1 as the highest priority.
- SuperCasID (hex) - a 32-bit identifier of the EIS provided by the CAS vendor.
- Protocol Revision - specify the mode of operation of the ECMG. Select revision 1, 2 or 3.
- IP Address - set the IP address of the ECMG. This IP address should be of the same subnet as the ETH2 IP address.
- Subnet Mask - set subnet mask for the ECMG. In case ECMG resides in a subnet other than the management or CAS subnets, set ECMG Subnet Mask to allow communication.
- Port - set in decimal, the number of the ECMG TCP port used to connect the ECMG to the ProStream. The CAS vendor provides this value.
- Channel ID - set a unique number to define a unique ECMG.
- Ext. CW - when selected, an external CW is used. Select this option in case the ECMG generates a CW.
- Status - a read only filed which indicates the state of the connection. The connection state is either of the following:
  - Connected - ECMG and ProStream are communicating.
  - Disconnected - no connection is taking place at the moment.

TIP: Once you have set the CAS configuration and send configuration to the device, allocate the ECM PID.

  - # of Streams - the number of streams that are open for the ECMG.

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Setting EMMG Parameters

The Entitlement Management Message Generator issues EMMs (Entitlement Management Messages) that carry private Control Access (CA) information as access permits to specific users, access revocations etc. When configuring the EMMG, you set communication parameters to establish communication between the ProStream and the EMMG. The configuration is done via the EMMG page.

Configuring EMMG

You can add up to 30 EMMGs.

To configure an EMMG:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **CA & BISS** > **EMMG**.
3. To add an EMMG, click **Add** You can add up to 20 EMMGs.
4. Configure the EMMG by filling in the EMMG table:
   - Control TCP Port - enter the TCP port via which the ProStream communicates with the EMMG. ProStream supports up to five ports.
   - Client/Super CAS ID (hex) - enter in hex. an identifier of the EMMG. The EMMG vendor provides this number.
   - Data Protocol - specify whether the connection is TCP or UDP/broadcast. If you select UDP, the **Sect TS Packet** field is enabled and you should select the required option. question to QA
   - IP Address - type in the IP address of the EMMG.
   - Subnet Mask - type in the subnet mask of the EMMG to enable communication when the EMMG is hooked to a subnet other than the management or CAS subnets.
   - Sect TS Packet - enabled only if you select Broadcast under Control. The Sect TS Packet field defines the format of the EMM. The available formats are as follows:
     Section - the EMM is in MPEG-2 section format.
     Packet - the EMM is in MPEG-2 transport stream packet format.
   - Data ID - enabled only if you select Broadcast under Control. Type in the data source identifier.
   - Data Format - enabled only if you select Broadcast under Control. Allows to select either EMM or PDG data format.

TIP: Once you have configured the EMMG parameters, allocate EMM PIDs for the required TSs.

   - Remove - check the box of the EMMG you wish to delete.

Allocating ECM PIDs

When allocating ECM PIDs you actually define PIDs as ECM PIDs. This procedure is performed via the **Configuration** page using the Injected ECM option.

For step-by-step instructions on how to allocate the ECM PID, see *Adding and Configuring ECM PIDs to the TS* on page 103.

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Allocating EMM PIDs

When allocating EMM PIDs you actually define PIDs as EMM PIDs. This procedure is performed via the **Configuration** screen and you can add an EMM in either of the following options:

- Injected EMM PID - for step-by-step instructions on how to allocate the injected EMM PID, see *Configuring an Injected ECM PID* on page 106.
- Passed EMM PID - for step-by-step instructions on how to allocate the EMM PID, see *Configuring a Passed ECM PID* on page 107.

What's Next...

To start scrambling, activate your EIS to start issuing SCGs. If you do not have a vendor's EIS integrated in your CAS, you may use the Internal EIS.

Internal EIS

ProStream 9000 is furnished with internal EIS and you can create, configure and send SCGs to scramble the required service or PID. ProStream 9000 allows to provision up to 200 SCGs.

An SCG request applies to a service or a PID and each SCG should be unique. The following table lists the required combined parameters for creating a unique SCG:

Table 8–1:

Data Type	SCG Components	Comments
Service	NID, TSID, SID, ECM ID	A single SCG may supports multiple TSs,
PID	NID, TSIN, PID, ECM ID	

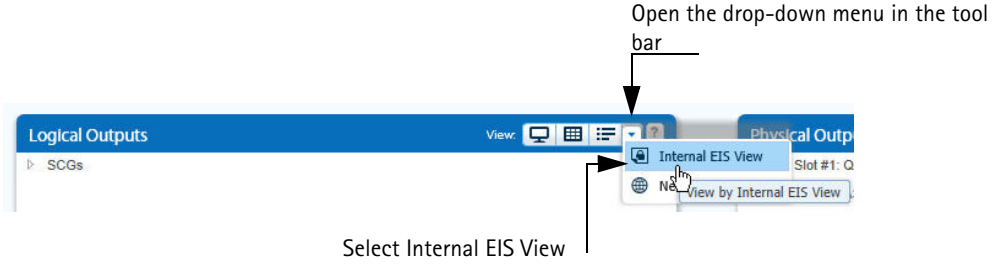
Using Internal EIS

Using the internal EIS comprises the following procedures:

- Define SCG components
- Associate an ECM with the SCG
- Send a provision

To use the internal EIS:

1. In Logical Output tool bar, open the drop-down menu and select **Internal EIS View**.



2. From the SCG drop-down menu, select **Add New**.
3. Configure the SCG as follows:

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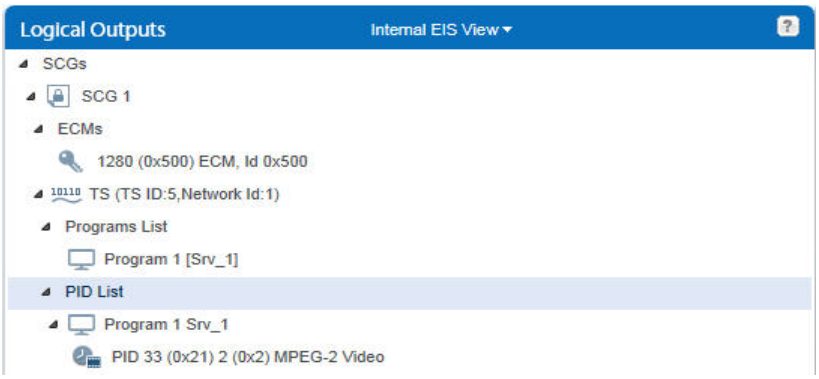
a. SCG - select the required SCG ID.

b. Network - select the required network.

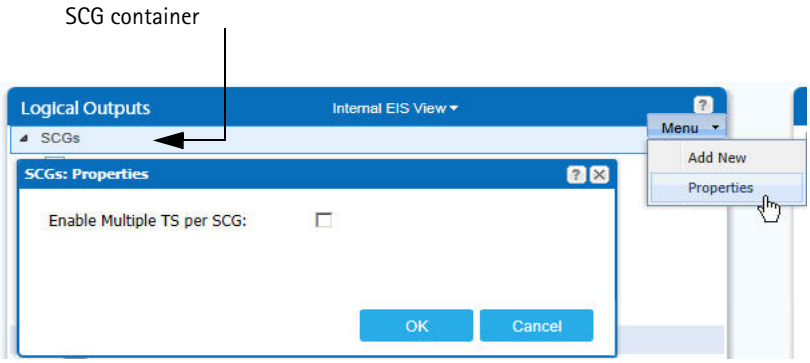
c. TS ID - select the required TS ID.

4. Click OK.

When you drill down the SCG, you can view the available ECMs and the configured TS. You can view the TS through its programs and PIDs.



5. To select multiple TSs, select the SCG container and from the drop-down list select Properties:



a. **Enable Multiple TS per SCG** - select this option to enable multiple TS.

b. Click **OK**.

In this case the services/PIDs of the output TSs with the selected ID, regardless of their NID (Network ID) appear in the Component List.

6. You can set the components to be scrambled. To select the components to be scrambled, select either a program(s) from the Program List or PIDs.

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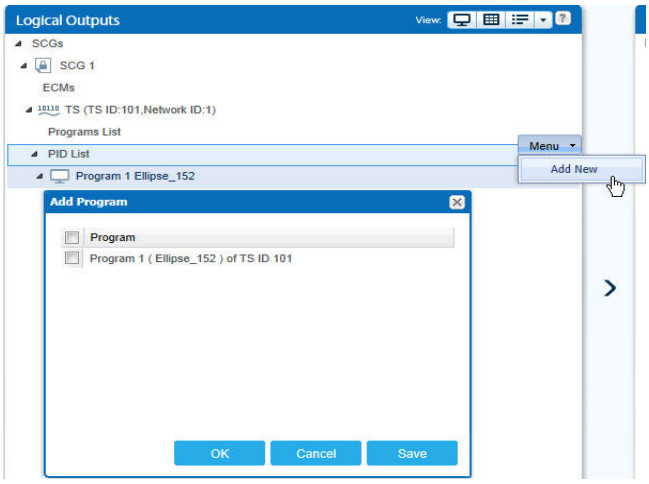
To scramble a program:

a. Select the Program List container and from the drop-down menu select **Add New**.



The **Add Program** dialog appears.

b. Select the required program to be scrambled.

To scramble a PID, do the following:

a. Select the Program List container and from the drop-down menu select **Add New**.

b. . The **Add PID** dialog appears.

c. Select the required PID(s) to be scrambled.

d. Click **OK**.

7. To add ECMs, click Add New from the ECMs container. You can add up to 30 ECMs per SCG.
8. To associate an ECM PID, select the required ECM and from the drop-down menu select **Properties**.
9. Configure the access criteria and view the ECM parameters.
10. To provision the SCG, click **Apply**.

Viewing Internal EIS

To view an internal EIS:

1. Select **CS & BISS** > **SCG**.
2. To view SCG, focus on the SCG List and view the following:
   - SCG - SCG number
   - CP - the crypto period
   - Time to Next CP
   - TS ID
   - Program - the programs to be scrambled
   - PIDs - the PIDs to be scrambled
   - Activation Time - shows the ID of the service(s)/PIDs to be scrambled by this SCG request.
   - Number of ECM Groups - the number of associated ECM groups.

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- EIS - indicates whether internal EIS
- Configuration Match
- State - indicates whether OK or Failed

3. To view the ECMs, focus on ECMS and do the following:
4. In Select SCG list, select the required SCG.
5. View the following ECM information
   - ECM ID
   - Super CAS ID (Hex)
   - AC - access criteria
   - Status - indicates the ECM state.

BISS Overview

Basic Interoperable Scrambling System (BISS) is an open Standard for protecting digital contribution applications.

Digital contribution applications require the direct entry of a Session Word (SW) at the transmitter and receiver. The sender and receiver(s) of the transmission share the SW, and thus only the intended users receive the transmission. The Integrated Receiver Decoder (IRD) device can decode the content only if the SW is the same and complies with the BISS standard.

BISS supports the following modes of work:

- Mode 0 - no scrambling
- Mode 1 - transmission is scrambled and a fixed clear SW is required for decoding.
- Mode E - transmission is scrambled and a fixed encrypted SW is required for decoding.

BISS Specifications

Table 8–2: BISS Specifications

Specification	Explanation
ProStream 9000	In standalone mode only
Supported BISS mode	BISS Mode 1 Note: BISS-E mode is currently unsupported.
Supported Interfaces	Output ASI and GbE ports
Scrambling component	■ Service level only ■ All ES components unless **Always Clear** is configured. See *Applying BISS with Clear PID(s)* on page 195.
IRD	PVR-2900

NOTE: ProStream 9000 does not decode the transmitted streams. Decoding is performed by the specified IRD.

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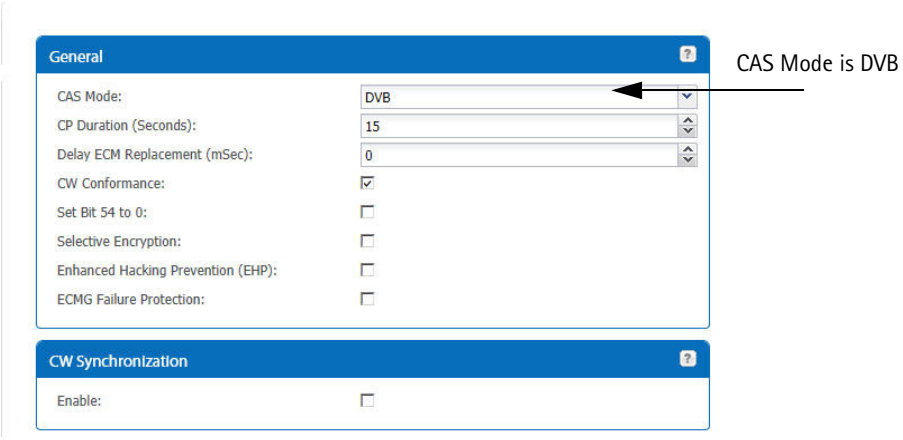
Configuring BISS

NOTE: BISS is applied on a service level only.

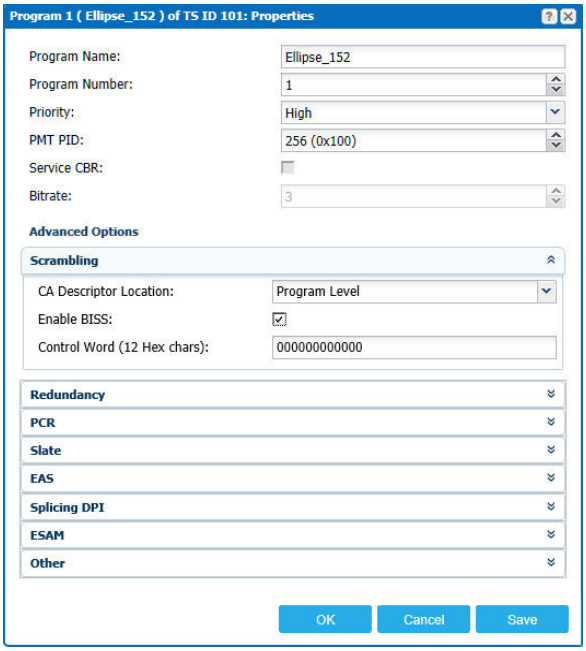
To configure BISS:

1. Open the web client of the device.
2. Select the **Symulcrypt Protocols** tab.



3. Verify that in **CAS mode** DVB is selected.

1. In Logical Output, select the required program.
2. Select the **Scrambling** section.



3. Tick **Enable BISS**.

   The Control Word box is enabled.

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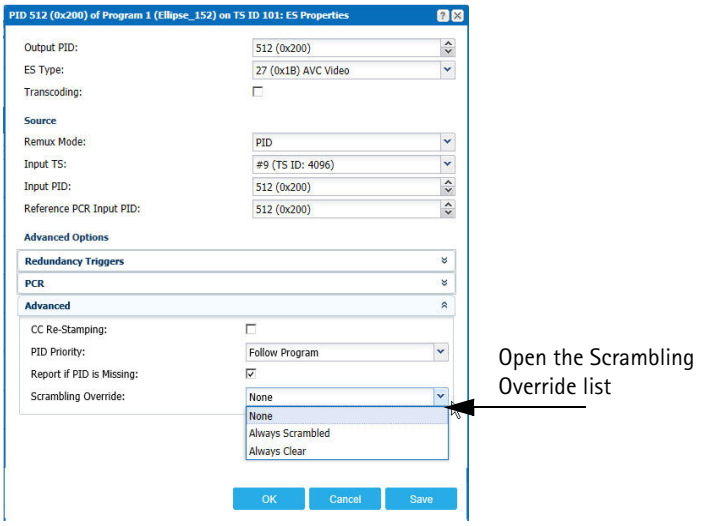
4. Enter the required Control Word with up to 12 hexadecimal characters (six bytes). The CW is required for decoding the scrambled transmission.
5. Click **OK**.

Applying BISS with Clear PID(s)

To apply BISS with clear PIDs:

1. Select the **Configuration** page.
2. In Logical Output, select the required PID.
3. Click **Advanced**.



4. Open the **Scrambling Override** list and select the required option:
   - Per Service/Transport No Override - follows the scrambling configuration of the TS or service
   - Always Scramble - even if TS or service are not scrambled, the PID is scrambled as long as a fixed key or a CW is provided
   - Always Clear- even if TS or service are scrambled, the PID is always clear.

CA

According to the BISS standard a CA descriptor must be present in the PMT to support BISS. ProStream 9000 automatically adds a CA descriptor when BISS is enabled. You can add more descriptors if required.

CAT

Verify that the Conditional Access Table (CAT) is enabled when BISS is enabled.

To enable CAT:

1. In Logical Output switch to the Tables view.

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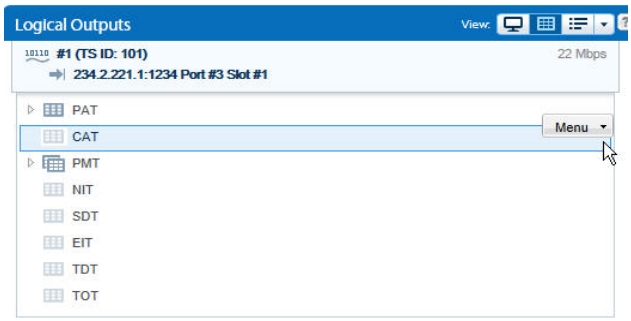
2. Select the required TS and click to view its tables:

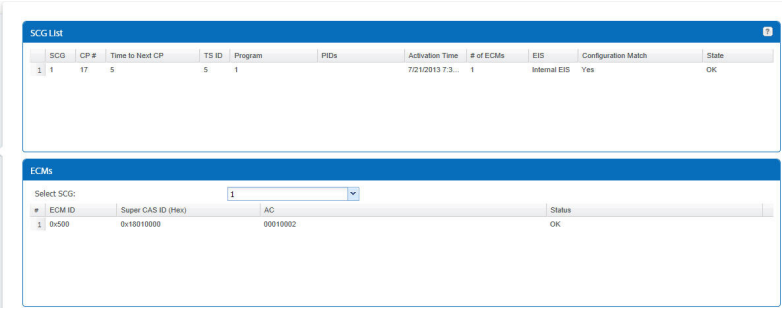


3. Select the **CAT** table.
4. Configure it as explained in *Configuring CAT* on page 70.

Viewing SCGs and ECMs

To view SCGs and ECMs:

1. Select CA & BISS > SCGs.



2. Focus on the **SCG List** and view the following parameters:
   - SCG ID - a unique identifier 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.
   - Time to Next CP - indicates how often the ECM is changing for this stream.
   - TS ID - the stream that carries the service to be encrypted as sent by the EIS.
   - Service - the ID of the program/service being scrambled using the specific SCG
   - PIDs - if PIDs are scrambled, indicates the scrambled PIDs
   - Activation Time - the activation time of this configuration
   - # ECMs - the number of associated ECMs
   - EIS - whether internal or not
   - Configuration Match - whether the SCG and ECM configuration is identical to the ECM PID allocation.
   - State - whether scrambling is successful or not.
3. Focus on the ECM section.
4. Open the Select **SCG list** and select the required SCG from the list.

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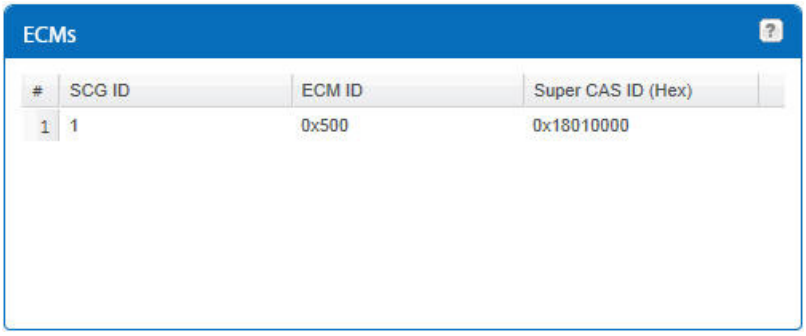
5. View the following parameters of the ECMs associated with the selected SCG:
   - ECM ID - a unique identifier of the ECM
   - Super CAS ID - a 32-bit identifier of the EIS provided by the CAS vendor.
   - AC - the access criteria associated with this ECM.
   - Status - indicates the ECM status, whether OK or failed.

Viewing ECMs

To view the available ECMs:

1. Select **CA & BISS** > **ECMs**.



2. View the following ECMs parameters:
   - SCG ID - the SCG the ECM is associated with.
   - ECM ID - the ID of the ECM.
   - Super CAS ID (Hex) - Super CAS ID - a 32-bit identifier of the EIS provided by the CAS vendor.

Using a PSIG Device

When using a Program Specific Information Generator (PSIG) device, use the PSIG page. The PSIG interfaces with the ProStream device to receive information required for building the PSI tables and for injecting them to the ProStream 9000 device.

To work with PSIG:

1. Select **CAS & BISS** > **PSIG** page.
2. In **Controlled Via**, select the required enabled network to communicate with the PSIG. Select either Management or CAS.
3. In **Channel Test Retries**, enter the required retrials for establishing communication with the PSIG.
4. Select **Enable** to enable the connection.
5. To add a PSIG, click **Add**.
6. Enter the following parameters:
   - TCP Port - enter the TCP port number over which the ProStream device communicates with the PSIG.
   - Retries Interval (msec) - enter the required testing interval.

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- IP Address - enter the IP address of the PSIG.
- Subnet Mask - enter the required subnet mask.

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In the event of a malfunction, the following events take place:

Table 9–1: Malfunction Reaction

Object	Reaction
Front panel	The alarm LED is illuminated in red.
Web client	The alarm icon turns red. The number of active alarms is updated. a message appears notifying you of the nature of the problem.

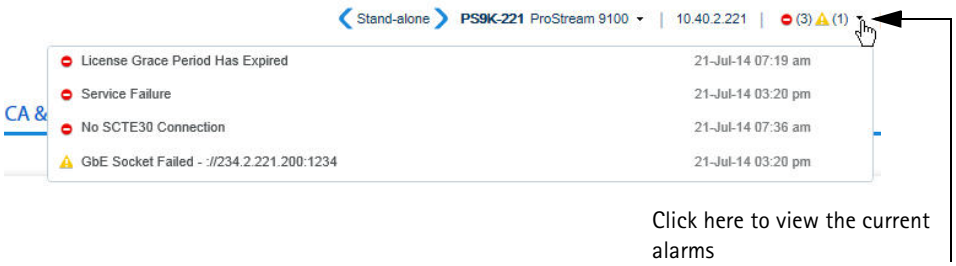
Viewing Alarms

You may view the alarms via the **Alarms** page. This page also allows you to view the Alarm log and to save it as an XML file.

To view alarms:

1. Do either of the following:

   In the title bar, click the Alarms drop-down menu:



   Or

   In the web client, select **Alarms**.

The Alarm are listed in a chronological order, the first alarm in the list is the latest alarm to be registered. The **Active Alarm** pate provides the following information:

Table 9–2: Active Alarm

Parameter	Explanation
Description	Describes the fault that invoked the alarm
Fault Object	The faulty object that caused the alarm
Assert Time	Indicates the time the alarm was raised

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Table 9–2: Active Alarm

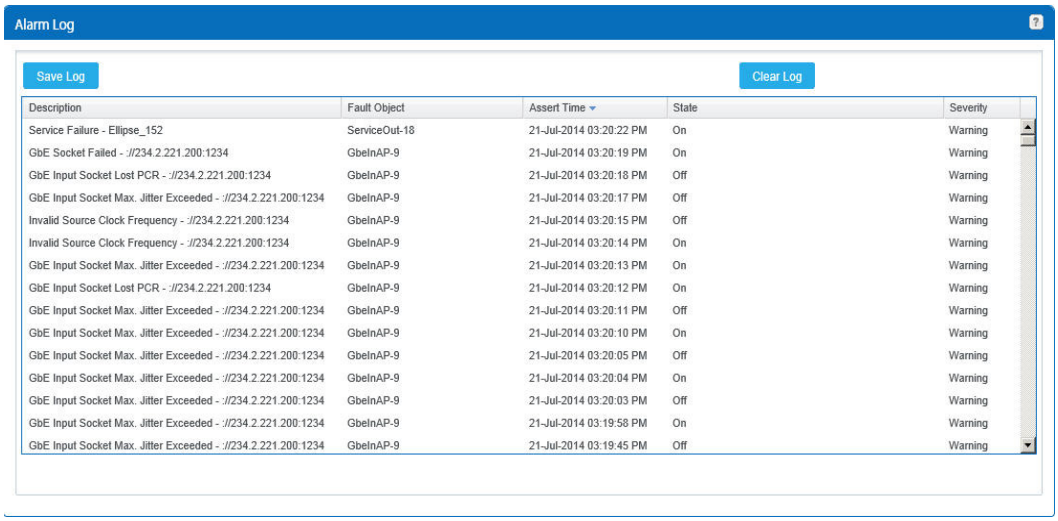
Parameter	Explanation
Severity	The severity of the alarm: ■ Warning - 4 ■ Major - 5 ■ Critical - 6
Recovery Tip	Tips to remit the alarm

Alarms Log

The **Alarm Log** page displays in a chronological order alarms that occurred up to the time you generated the log. To view an updated log, refresh the log. You may view, refresh, clear and save the log.

To view the alarm log:

1. Select **Alarms** > **Alarm Log**.



2. View the log. It displays the alarms registered up to the time you generated the log and informs you of the following:

Table 9–3: Alarm History

Parameter	Explanation
Description	Describes the fault that invoked the alarm
Faulty Object	The faulty component
Assert Time	Indicates the time the alarm was raised
State	Indicates whether the alarm is on or off
Severity	The severity of the alarm

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To clear the log:

1. In the **Alarm Log** page, click **Clear Log**.

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

To save the log to a file:

1. In the Alarm screen, click **Save Log**.
2. Select a location for saving the file and click **Save**.

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

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Chapter 10
Troubleshooting

Troubleshooting

The table below lists the alarm messages and describes their probable cause and possible solutions. The alarms are arranged by module and in alphabetical order:

Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Platform	4	CPC Card Temp. Sense Exceed Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, call Customer Support.
	5	CPC Card Voltage Error	Inappropriate power supply for CPC card.	Power-off the device and Call Customer Support.
Platform	6	CPC Card HW Failure	An essential component of the card is faulty.	Power-off the device and Call Customer Support
	7	Platform Initializing	Indicative alarm that appears in History log only.	N/A
	11	NTP Connection Failure	Connection to NTP failed or lost	■ Check Ethernet link of Ethernet port 3. ■ Check NTP server definitions.
	16	Front Panel Not Present	Front panel malfunction	Call Customer Support
	17	Failure Generating CW	The CWS (Control Word Server) does not successfully generate CW.	Power down and power up the CWS
	18	More Than One NMX Connected to the Device	More than one NMX is controlling the device.	In the web client of the device, open the Support page, and click View Net Stat. Look for TCP connections port 80 (HTTP) and try to figure out via IPs which NMX is yours. If there is an unknown IP, ask your IT team about it.
	19	Got New Configuration	Indicative alarm that appears in History log only. Indicates a change in the configuration.	N/A

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Platforms	20	Platform Change to be Backup	Indicative alarm that the unit configuration has changed and currently it is configured as a backup device	N/A
	21	Platform Change to be Primary	Indicative alarm that the unit configuration has changed and currently it is configured as a primary device	N/A
	22	DT Mux Priority Changed	Indicative alarm remitted when a redundancy switch has taken place. Thus, the DT mux priority was changed.	N/A
	24	Auto-Negotiation Failed: management network	The handshake protocol with the switch failed	Reconfigure the switch to use auto-negotiation settings.
	25	Auto-Negotiation Failed: CAS network	The handshake protocol with the switch failed	Reconfigure the switch to use auto-negotiation settings.
	26	Could not Reserve Max Splice Engines	The device could not reserve maximum splice engines to splice services.	Check how many spliceable services were configured and remove unnecessary services
	31	Reset Required after Successful DL	The required firmware is ready. Reset the device to bootup with the new firmware.	Reset the device.
	32	Background Download in Progress	Background download in progress	N/A
	33	Background Download in Progress - Retry	Indicative alarm. Background Download is in Progress.	N/A
	34	Background Download Failed - TFTP Error	Background download failed due to TFTP error.	Check that the TFTP server is up and running. Zap the device.
	35	Background Download Failed - Disk Full	Background download failed because the disk is full.	Remove previous firmware files to free up space.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Platform	36	Background Download Failed - Error	Background download failed.	Check that the TFTP server is up and running. Zap the device.
	37	Background Download Cancelled	Background Download was cancelled	Reboot the device or retry to download firmware.
	38	Reserved BR in Safe Mode	At least one of the DiviTrack pools was configured to enable the reservation of pool bitrate. When this is true, the Multiplexer expects the reserved bitrate client to communicate with it at least once every 5 seconds. This term was not fulfilled, so the actual reserved bitrate for every DiviTrack pool will be the maximum configured bitrate.	Contact Harmonic Customer Support.
	65	Unavailable Internal Socket	The internal socket created for the insertion channel is not allocated.	If problem persists, call customer support.
	70	License Grace Period Enabled	A licensed feature has been used without a license. You have a grace period of 45 days to use this feature and to purchase a license	Purchase the license for the feature
	71	License Expired	License has reached its expiration date.	Purchase the required license
	73	License General Failure	An internal licensing failure is detected	■ Restart the device ■ If problem persists, call Customer Support.
	80	SFC Detection Failed	Failed to detect System Fan Controller due to: HW failure of the controller, or Controller is not installed.	Replace fan unit
	81	Cooling System Failure	Detected at least one faulty fan out of 6 or x of 8 fans	Replace fan unit
	82	SFC Cooling Communication Failure	A transient error indication.	Verify the alarm is remitted. If persists, replace fan unit.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Platform	83	SFC Ext Temp Near Threshold	Internal temperature >= Internal temperature threshold	To be defined
	84	SFC Amb Temp Near Threshold	External temperature >= external temperature threshold.	To be defined
	85	PSU1 Not Mounted	Power supply is not mounted in slot 1	Insert Power supply module in slot 1
	86	PSU2 Not Mounted	Power supply is not mounted in slot 2	Insert Power supply module in slot 2
	87	PS1 Not Operational	Power supply in slot 1 is malfunctioning	■ Check power ■ Check power cable ■ Check power supply unit in slot 1
	88	PS2 Not Operational	Power supply in slot 2 is malfunctioning	■ Check power ■ Check power cable ■ Check power supply unit in slot 1
	89	IPOL Card Temp. Sense Exceeds Limits	IPOL card is over heating	■ Check the fans for proper operation ■ Check the temp of the environment.
	90	SW Upgrade Failed		
	112	Syslog Server is Unreachable	There is not communication between the Splicer and the Syslog server	Check connectivity
	113	Ad Server Communication Error		
	114	CMG Protection Activated		
	115	CMG System is Slowing Down		
Slot	11	Card Missing	The configured card is not detected in the slot.	■ Verify that the card is mounted in the slot ■ Verify that card is secured to the slot. ■ If problem persists, replace card.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Slot	12	Card Mismatch	The detected card is not as configured	Verify that the appropriate card is mounted in the slot.
ASI Scr Card	4	ASI Sensed Temp Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the IOM card.
	5	ASI Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.
	6	ASI Card HW Failure	An essential component of the card is faulty.	Replace card.
	7	ASI Card Initializing	An essential card error.	Replace card.
8VSB Card	7	Meteor Card Initializing	An essential card error.	Replace card.
	6	Meteor Card HW Failure	An essential component of the card is faulty.	Replace card.
	4	Meteor Sensed Temp. Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the card.
	5	Meteor Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.
ASI Port	11	ASI Input Signal Loss	No ASI input flow	■ Check the ASI source ■ Check the ASI input cable and replace if defective.
	12	ASI Input Sync Loss	No valid MPEG data detected on the input ASI signal	Check the ASI source
	15	ASI Output Bitrate Unsynchronized		

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
8VSB Port		Meteor Demodulator Reset	No RF input is detected	Check RF input
Transcoding Card	7	Transcoding Card Initializing	Indicative alarm that appears in History log only.	N/A
	6	Transcoding Card Failure	The transcoding card crashed resulting from an unknown error.	Call Customer Support
	21	Transcoding Card is Not Supported by HW Model	The device RAM is less than 1G.	Call Customer Support
	4	Transcoding Card Temp. Sense Exceed Limits	The card is over heating	Call Customer Support
	5	Transcoding Card Voltage Error	Inappropriate power supply of transcoding card.	Call Customer Support
	12	ACE Card Buffer Overflow		
Transcoding Engine	17	No Communication with TransEngine	The main processing unit cannot communicate with the transcoding engine	Verify that the transcoding card is securely fastened in its slot If persists, call customer support
	11	TransEngine FPGA Signal Loss	Transcoding engine internal fault	Call Customer Support
	12	TransEngine FPGA Sync Loss	Transcoding engine internal fault	Call Customer Support

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Transcoding Engine	16	TransEngine FPGA Output Overflow	Transcoding engine internal fault	Call Customer Support
	20	Loss of Input TS (no nulls)	Transcoding engine internal fault	Call Customer Support
	21	TransEngine Application Error (no output)	Transcoding engine internal fault	Call Customer Support
	23	Host-TransEngine Sync Error (Time Change)	Transcoding engine internal fault	Call Customer Support
	24	TS RX Overflow Error	Transcoding engine internal fault	Call Customer Support
	25	TS TX Underflow Error	Transcoding engine internal fault	Call Customer Support
	27	Audio DSP - Communication Failure	Transcoding engine internal fault	Call Customer Support
	28	Audio DSP - Core Failure	Transcoding engine internal fault	Call Customer Support
	29	Audio DSP - System Failure	Transcoding engine internal fault	Internal problem. If problem persists, call Customer Support.
	30	Audio DSP - Not enough resources	Transcoding engine internal fault	Check that configuration meets spec.
		License Transcoding Missing	No license for transcoding and Grace period has expired.	Purchase the required license
		License PIP Missing	No license for PIP and Grace period has expired.	Purchase the required license
		License Audio Level Missing	No license for ALM and Grace period has expired.	Purchase the required license
Pool		License Pool Missing	No license for pool and Grace period has expired	Purchase the required license

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
GbE-1G Card	4	GbE Card Sensed Temp Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the IOM card.
	6	GbE Card HW Failure	An essential component of the card is faulty.	Replace card.
	7	GbE Card Initializing	An essential card error.	Replace card.
	5	GbE Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.
	11	GbE Output Multicast Buffer Overflow	Too many identical PIDs are output through the same IOM card.	Reduce the number of multicast PIDs.
	13	GbE Input Descrambling Bitrate Exceeded	The input traffic buffer overflowed.	Check the input bit rate.
	8	GbE Card Input Data Loss	An internal data error in the GbE IOM card.	Reassign the GbE IOM.
	12	Pacer Clock Error	An internal error in the GbE IOM card.	Reassign the GbE IOM.
	14	GbE Flash Upgrade in Process	A notification message during the upgrade of the GbE IOM firmware.	N/A
GbE-4G Card	4	GbE -4G Card Sensed Temp Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the IOM card.
	6	GbE-4G Card HW Failure	An essential component of the card is faulty.	Replace card.
	7	GbE-4G Card Initializing	An essential card error.	Replace card.
	5	GbE-4G Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
GbE-4G Card	11	GbE Output Multicast Buffer Overflow	Too many identical PIDs are output through the same IOM card.	Reduce the number of multicast PIDs.
	13	GbE Input Descrambling Bitrate Exceeded	The input traffic buffer overflowed.	Check the input bit rate.
	8	GbE-4 Card Input Data Loss	An internal data error in the GbE IOM card.	Reassign the GbE IOM.
	12	Pacer Clock Error	An internal error in the GbE IOM card.	Reassign the GbE IOM.
	14	GbE-4G Flash Upgrade in Process	A notification message during the upgrade of the GbE IOM firmware.	N/A
	21	GbE-4G Protobuf Server is Not Connected		
	200 300 1	Packets Without 47 in TS header		

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
GbE Port	17	GbE Auto-Negotiation Failed	The handshake protocol with the switch failed	Check switch.
	23	GbE Input Error	Input GBE port general failure.	1. Verify that an SFP is installed in the port. 2. Check the physical connection between the port and the switch. 3. Check the validity of the GbE port configuration and that it matches the network definitions.
	16	GbE Input IP Packet CRC Error	At least one IP packet has a CRC error	Check the switch, fiber, and SFP connections.
	24	GbE Input IP Packet Missing	At least one IP packet is missing	Check the switch, fiber, and SFP connections.
	20	GbE Input Non MPEG Buffer Overflow	Management traffic on the GbE network port exceeds the port's capacity.	Look for sources with excessive management traffic.
	21	GbE Input Inter Packet Gap Too Small	The Inter Packet Gap is below 12 ticks.	Check source.
	22	GbE Input Invalid IP/UDP Packet Length	The payload length of an input IP/UDP packet is not divisible by 188 bytes (standard length of an MPEG packet)	Check source.
	11	GbE Link Down - Cable Disconnect	The Gigabit Ethernet port is down.	Connect the cable.
	26	GbE Port Failed	The GbE port link is down.	Check the link for connectivity.
	15	GbE Output MPEG Buffer Overflow	FIFO overrun causes data to be dropped and might cause decoding problems.	Standalone - reset the module. If it does not remit the alarm, contact Harmonic Customer Support.
	12	GbE SFP Missing	The SFP connector is missing from the GbE port	Check that the SFP connector is fully inserted.
	25	GbE Slave Channel Activated	In port redundancy, the backup port is active	None

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
	200600 1	GbE-4 Port Input Data Loss		
	200601 2	GbE-4G Port Exceeds Max. 800 Mbps		
	200601 3	GbE-4G Port Exceeds Max. Input		

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
GbE In Access Point	41	GbE Input Backup Socket Not Active	No data is detected in the backup input socket	Verify the socket is correctly defined and is streamed to the device.
	42	GbE Input Primary Socket Not Active	No data is detected in the primary input socket	Verify the socket is correctly defined and is streamed to the device.
	21	GbE Input Socket Buffer Overflow	Input bit rate exceeds estimated bit rate	Check source
	22	Invalid Source Clock Frequency	Source clock frequency breaches the MPEG specifications	Check source
	24	GbE Input Socket Lost PCR	For more than 100ms, no PCR has been detected at input socket	Check source
	25	GbE Input Socket Erred PCR	PCR discontinuity with no Discontinuity indicator	Check source
	26	GbE Input Socket CBR Rate Changed	Detects a change in the bit rate of an MPTS. The MPTS must be a CBR stream.	Check source
	27	GbE Input Socket Max. Jitter Exceeded	An MPTS socket is not CBR	Check source
	28	GbE Input Socket Timestamp Error	The order of the transport stream packets inside the IP packet is wrong.	In most cases, this is a momentary alarm. If this alarm is not remitted, check the network.
	31	Failed to Receive CW for the Service	The descrambler does not successfully receive a CW response for the service from the CWS (Control Word Server).	Check that the CWS is alive and communication cables are connected.
	32	Invalid Response from CWS	There are problems in communication between the descrambler and CWS.	Check that the CWS is alive and communication cables are connected.
	33	Missing ECM	No ECM was extracted from PMT for the scrambled service.	The scrambler does not send ECM to the descrambler. Check scrambler configuration.
	34	Missing CA Information	There is no CA information for the descrambled service.	The CA descriptor is missing. Check the scrambler configuration.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
	35	Undefined Scrambling Algorithm	There is no AES descriptor in the PMT.	The descrambler still will try to descramble the service. The scrambler should add a CAS Mode descriptor to the PMT.
GbE In Access Point	37	Unsupported Scrambling Algorithm	The scrambling descriptor is not AES-NSA.	In this case, the descrambler will try to descramble the service. The scrambler should add a scrambling descriptor with an AES-NSA value to the PMT.
	38	Encoder's Clock Not Synced to Mux	The clock of the encoder is not synchronized with the clock of the multiplexer.	Check the schedule format against the specification.
	52	GbE Input Primary Socket-PAT Missing	PAT is missing in the primary socket for a longer period than the configured failover time	Check source
	53	GbE Input Backup Socket-PAT Missing	PAT is missing in the backup socket for a longer period than the configured failover time	Check source
	54	Missing PMT		
	55	Missing Backup PMT		
	50	GbE Backup Socket Activated	With access point/socket level redundancy configured, the primary transport has failed, and the backup transport is active or failed.	None
	43	Queue Depth Threshold Passed	The allocated buffer reaches the predefined fullness (50%)	Check bit rate configuration in the input data socket
		GbE Input Primary Socket - A/V Missing	With access point/socket/ service- level redundancy configured, the primary transport failed. GbE Input Backup Socket - A/V Missing	1. Check the GbE input for link and activity. 2. Check that the IP and UDP are flowing to the port. 3. Check that the IP and UDP do not create a conflict with other sockets (same 32 lower bits).

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
		GbE Input Backup Socket - A/V Missing	With access point/socket/ service- level redundancy configured, the primary transport failed.	1. Check the GbE input for link and activity. 2. Check that the IP and UDP are flowing to the port. 3. Check that the IP and UDP do not create a conflict with other sockets (same 32 lower bits).
	47	DiviTrack Upstream Problem	Connectivity problem between the DiviTrack controller and the encoder.	Check the connectivity between the device and the encoder.
GbE In Access Point	46	DiviTrack Downstream Problem	Connectivity problem between the encoder and the DiviTrack controller.	Check the connectivity between the device and the encoder.
	11	GbE Socket Failed	With access point/socket/ service- level redundancy configured, both the primary and the backup transports have failed.	1. Check that the IP and UDP are indeed flowing to the port. 2. Check that the IP and UDP do not create a conflict with other sockets (same 32 lower bits).
	15	PSIP Tables Missing	PSIP Master Guide Table (MGT) was lost.	Recheck the connection and extraction settings.
8VSB In Access Point	21	Meteor Weak Signal/Loss of Sync	No RF input is detected	Check RF input
	25	Meteor Packet Error Rate Threshold Exceeded	Problematic RF signal.	Check support Meteor page to get the actual instantaneous packet error rate value.
	23	Meteor Signal Quality (SNR) Below Threshold	Problematic RF signal.	Check support Meteor page to get the actual signal quality value.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
GbE Out Access Point	12	GbE Output Socket Not Transmitted	Cannot get MAC address of the destination in unicast mode.	Check IP connectivity to destination.
	13	GbE Output Socket - Unreachable Destination	Cannot get an updated destination MAC address. Output is sent to the last known MAC address. (in unicast mode)	Check IP connectivity to destination.
	16	GbE Output Socket - Buffer Overflow Level = High	The actual bit rate of the GbE output socket exceeds the configured output bit rate	Delete services from the alarmed TS until the bit rate stabilizes and the alarm is remitted or redefine bit rate for this socket.
	17	GbE Output Socket - Buffer Overflow Level = Normal	Because of PID priority, some PIDs from Normal priority are dropped.	Informational only.
	18	GbE Output Socket - Buffer Overflow Level = Medium	Because of PID priority, some PIDs from Medium priority are dropped.	Informational only
	19	GbE Output Socket - Buffer Overflow Level = Low	Because of PID priority, some PIDs from Low priority are dropped.	Informational only.
	20	Invalid CAS Mode	An invalid CAS mode is detected	Set the correct CAS mode
	11	DVB Regen. Not Supported by this HW Model	DVB Regenerations Not Supported	This HW model does not support this feature.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
TsIn		TsIn CC Error Detected	The splicer detected a continuity counter error on the transport stream input.	None
		TsIn MPEG Sync Loss	The port has lost sync with the incoming transport.	Check source
		Invalid CAS mode	The CAS mode for fixed key should be AES_CBC for both descrambler and scrambler	Change the CAS mode and reset the device
		Primary Source Failed	The primary source failed and redundancy switch took place	Check source
		Backup Source 1 Failed	Backup source 1 failed	Check source

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
TsIn		Backup Source 2 Failed	Backup source 2 failed	Check source
		Backup Source 3 Failed	Backup source 3 failed	Check source
		Backup Source 4 Failed	Backup source 4 failed	Check source
		Backup Source 5 Failed	Backup source 5 failed	Check source
		Primary Source PID Underflow	Average bitrate of the primary source in the pre-defined bitrate window is under the pre-defined threshold	Check source
		Backup Source 1 PID Underflow	Average bitrate of the backup source 2 in the pre-defined bitrate window is under the pre-defined threshold	Check source
		Backup Source 2 PID Underflow	Average bitrate of the backup source 2 in the pre-defined bitrate window is under the pre-defined threshold	Check source
		Backup Source 3 PID Underflow	Average bitrate of the backup source 3 source in the pre-defined bitrate window is under the pre-defined threshold	Check source
		Backup Source 4 PID Underflow	Average bitrate of the backup source 4 in the pre-defined bitrate window is under the pre-defined threshold	Check source
		Backup Source 5 PID Underflow	Average bitrate of the backup source 5 source in the pre-defined bitrate window is under the pre-defined threshold	Check source
		Primary Source PAT Missing	PAT is missing in primary	Check source
		Backup Source 1 PAT Missing	PAT is missing in backup source 1	Check source
		Backup Source 2 PAT Missing	PAT is missing in backup source 1	Check source

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
		Backup Source 3 PAT Missing	PAT is missing in backup source 1	Check source
TsIn		Backup Source 4 PAT Missing	PAT is missing in backup source 1	Check source
		Backup Source 5 PAT Missing	PAT is missing in backup source 1	Check source
		Primary Source PMT Missing	PMT is missing in primary	Check source
		Backup Source 1 PAT Missing	PAT is missing in backup source 1	Check source
		Backup Source 2 PMT Missing	PMT is missing in backup source 1	Check source
		Backup Source 3 PMT Missing	PMT is missing in backup source 1	Check source
		Backup Source 4 PMT Missing	PMT is missing in backup source 1	Check source
		Backup Source 5 PMT Missing	PMT is missing in backup source 1	Check source
		Primary Source CC Errors Detected	The number of detected continuity counter errors in a pre-configured time exceeds the pre-defined number of allowed CC errors on the primary source.	Check source
		Backup Source 1 CC Errors Detected	The number of detected continuity counter errors in a pre-configured time exceeds the pre-defined number of allowed CC errors on backup source1.	Check source
		Backup Source 2 CC Errors Detected	The number of detected continuity counter errors in a pre-configured time exceeds the pre-defined number of allowed CC errors on backup source2.	Check source
		Backup Source 3 CC Errors Detected	The number of detected continuity counter errors in a pre-configured time exceeds the pre-defined number of allowed CC errors on backup source3.	Check source

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
		Backup Source 4 CC Errors Detected	The number of detected continuity counter errors in a pre-configured time exceeds the pre-defined number of allowed CC errors on backup source 4.	Check source
TsIn		Backup Source 5 CC Errors Detected	The number of detected continuity counter errors in a pre-configured time exceeds the pre-defined number of allowed CC errors on backup source 5.	Check source
		Primary Source Detected Scrambled PID	Detected a scrambled PID on primary source.	Check source
		Backup Source 1 Detected Scrambled PID	Detected a scrambled PID on backup source 1.	Check source
		Backup Source 2 Detected Scrambled PID	Detected a scrambled PID on backup source 2.	Check source
		Backup Source 3 Detected Scrambled PID	Detected a scrambled PID on backup source 3.	Check source
		Backup Source 4 Detected Scrambled PID	Detected a scrambled PID on backup source 4.	Check source
		Backup Source 5 Detected Scrambled PID	Detected a scrambled PID on backup source 5.	Check source
		TS Protection Activated	A TS protection redundancy switch took place.	Check source
		Could Not Find a Proper Backup Source	All backup sources are faulty.	Check source
Service In				
ECM PID Allocation	11	ECM Stream Error	This alarm is related to the ECMG machine. Cannot get ECM from ECMG.	1. Check ECMG logs. 2. Check AC. 3. Check the error number, reported from ECMG.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
	12	ECM Spooling Error	There is a failure in ECM spooling.	The total number of spooled tables should not exceed 128 tables per transport stream.
EMM PID Allocation	11	EMM PID Missing	The configured EMM is missing	■ Check EMM configuration ■ Check connectivity between device and EMMG.
	12	EMM Bitrate Exceeded	The bit-rate of the EMM is higher than the configured bit-rate	Check EMM configuration
CAS	11	SCS EIS Not Connected	The TCP connection with the EIS client on port 11000 is not established.	Ensure the following: ■ The TCP link with EIS (ping) exists. ■ The EIS configuration is 11000.
	12	ECM is Missing in Configuration	One or more ECMs in one or more SCG messages are missing, or the device receives an SCG message with an unknown ECM ID.	Add an ECM and update as necessary to ensure that all ECMs in SCG messages are present in the ECM configuration.
	13	PID to Scramble is Missing in Config	One of the PIDs that suppose to be scrambled isn't configured in the output.	Verify output configuration and EIS SCG provisioning.
	15	SCS ECMG Connection Failure	The ECMG connection has been disconnected for 10 seconds. Services may not be encrypted properly.	Check the ECMG properties, the Ethernet network, and the ECMG.
	16	SCS ECMG Communication Problem	The ECMG connection has been disconnected for 10 seconds. Services may not be encrypted properly.	Check the ECMG properties, the Ethernet network, and the ECMG.
	17	SCS CP Less than Delay Start	The Crypto Period is less than the delay start.	Adjust the Crypto Period or Delay Start property values so that the crypto period is greater than the delay start value.
	18	Backup is Not Connected		

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Reference Service		Remap Range Overflow	The number of PIDs of the Reference Service exceeds the configured number	Increase the configured remap range.
		Input Service Missing	The PMT of the Reference Service is missing	Check source
		Input RSS PID Missing	At least one PID is missing in the Reference Service	Check source

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Output Stream		PID Missing	Provisioned PID is missing in the input	Check source.
		Unsupported Chroma Sampling Mode	The input video stream is not 4:2:0.	Do not attempt to re-encode video streams of chroma sampling mode other than 4:2:0.
		Low Delay Video Stream Detected	The input video stream is low-delay and cannot be re-encoded.	Do not attempt to re-encode low-delay content.
		HD Stream Detected	The video stream is HD and cannot be re-encoded.	Do not attempt to re-encode HD streams.
		Unsupported Frame Rate	The input video stream is not NTSC.	Do not attempt to re-encode non-NTSC video.
		Unsupported Resolution	The input video stream horizontal resolution is not supported.	Do not attempt to re-encode a video stream with a horizontal resolution that is not 480, 528, 544, 704, or 720.
		Encrypted PID	The input stream is encrypted and cannot be re-encoded.	Do not attempt to re-encode encrypted content.
		No DTS/PTS Detected at Input	No DTS/PTS was detected at input for 700 ms. The input video stream is not MPEG compliant.	Check the input stream.
		Invalid DTS at Input	The input video stream is not MPEG compliant.	Check the input stream.
		Sequence Header Error	The input video stream is not MPEG compliant.	Check the input stream
		Picture Header Error	The input video stream includes an invalid picture header or bad marker bits. The input video stream is not MPEG-compliant.	Check input stream.
		Video Macro Block Level Error	A problem was encountered in decoding the slice and macro blocks.	Check the source.
		MPEG1 Stream Detected	The video stream is MPEG1 and cannot be re-encoded.	Do not attempt to re-encode MPEG1 streams.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
		Progressive Refresh Stream Detected	A progressive refresh video stream was detected in a re-encoded service. Re-encoded services do not support progressive refresh streams.	Remove the progressive refresh stream from the re-encoded service.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Output Stream		Field Pictures Detected	Field pictures were detected. Field picture streams are not supported in re-encoded services.	Remove field picture stream from the re-encoded service.
		Unexpected Frame Rate (Video Standard)	The input video stream is not MPEG compliant.	Check the input stream
		Unable to Decode Input Stream	The device cannot decode the input stream.	Check the input stream.
		Corrupt Input TS	The input transport stream is corrupted.	Check the input stream.
		Processing Input PID Missing	Internal error in transcoding engine	Call customer support
		Wrong Video Standard (MPEG2/H264)	This input video format is not supported in this version.	Check input
		Input Vertical Resolution Mismatch	The configured VR does not match the actual VR	Check input
		Vertical Resolution Changed on Input	A notification because it is service affecting. While transcoding the input VR type changed.	Engine is resetting and transcodes with new resolution.
		Invalid Picture Type (not I, P or B)	Applies to input video format H264. It is a stream related failure while decoding the stream.	Check input
		Reference PCR PID Interval Error	Did not get reference PCR for > 500 ms. Either the PID does not contain PCR values or it is missing.	Check the source.
		PIP Configured but PIP Mode is Disabled	PIP Configured but PIP Mode is Disabled	
		PID Recoding Failure	Invalid content for reencoding.	Check source
		PID Xcoding Failure	Invalid content for transcoding	Check source

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
		Input Codec Not Supported	The input video type is different than 2, x80 and x1B.	Change the input type (should not require removal and re-creating the stream)
		Output Codec Not Supported	The output codec is not supported	Change the output
		SD Transcoding Not Supported	When trying to transcode a SD stream.	Check configuration

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Output Stream		Audio - Cannot decode - Corrupted input	Invalid content for decoding.	Check input source. If problem persists, call Customer Support.
		Audio - Decoder Failure	The device cannot decode the input stream due to either input source or stream configuration.	Check input source and stream configuration. If problem persists, call Customer Support.
		Audio - Encrypted PID detected	Cannot decode an encrypted PID.	Check input source.
		Audio - No input/ Unable to sync	No input stream is detected	Check input source.
		Audio - No PES detected	No audio frames are detected in the input stream.	Check input source.
		Audio - Input Audio Mode Higher than Config	Inconsistency between actual input audio mode and configured audio mode. For example, actual is MC and configured is ST.	Check Input Coding Mode configuration.
		Audio - Decoding Format Mismatch Config.	The input decoding format is set to a low MHz decoder (AAC LC / AC3) but actually decoding format is a high MHz (AAC HE / E-AC3)	In the **Audio Transcoding** tab, configure decoding format to **Any**.
		Audio - Encoder Failure	Is this output stream????	Internal problem. If problem persists, call Customer Support.
		Audio - Unsupported Output Bitrate	The configured output bitrate is not supported for the configured coding mode.	Check that bitrate configuration is supported for configured Output Coding Mode. See Table 5–27 on page 141.
		Audio - Unsupported Output Coding Mode	The configured output coding mode is not supported.	Check configuration. Try changing *Follow* to another value.
		Audio - Unsupported Output Sample Rate	Output sample rate is always as in the input.	Check configuration

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
		Audio - Cannot Meet PCR Insertion Rate	PCR insertion rate is too low.	Increase the audio ES bitrate
Output Stream		Audio - Encoder detect PTS Gap	No PTS was detected at input for XXX ms. The input video stream is not MPEG compliant	Check input source
Output Service		Backup Service 1 is Activated	Backup serivce1 is activated	Informational alarm only. Look for another alarm that triggered the backup service.
		Backup Service 2 is Activated	Backup service 2 is activated	Informational alarm only. Look for another alarm that triggered the backup service.
		Backup Service 3 is Activated	Backup service is 3 activated	Informational alarm only. Look for another alarm that triggered the backup service.
		Service Failure	Service is not streamed out	Check source
		Recoding Unit Failure	The recoding unit crashed resulting from an unknown error, or the input video stream is not MPEG compliant.	Check the input stream
		Input PCR Interval Error	Interval error > 100 ms.	Informational only.
		Corrupt Input PCR	The device detects more than one time base discontinuity within one second.	
		PCR on Unsupported Component	The input PCR is not carried on the video component.	Informational alarm.
		Too Many ES	The input service includes a number of non video elementary streams beyond the device's re-encoding capabilities. The maximum number of ES on the ProStream 9000 is 6.	Do not attempt to re-encode content with more than one video and five non video elementary streams.
		Could not Allocate Recoding Unit	The device could not allocate a re-encoder to re-encode this service. There were no free units to re-encode the program.	Check how many re-encoded services (VBR, Caped VBR, and DTMX pools) were configured and remove unnecessary services.

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Output Service		Excessive Non-Video Rate	The allocated video rate is less than 2 Mbps.	Monitor the service to check its behavior. If problem persists, call Customer Support.
		I-Frame Dropped	Due to errors in the input, the capped GOP structure was violated, and an I-frame was dropped.	Check the input stream.
		ReEncoded Service Required Video ES	There is no video ES for the re-encoded service.	Verify that a video PID is provisioned on the service.
		ReEncoded Service Rate Too Low	In DiviTrackMX, the rate is too low for encoding.	N/A
		EAS is Activated	EAS service is activated.	None
		EAS Input Service Missing	The associated EAS input service is missing.	Check the EAS input transport to ensure that the associated EAS input service exists.
		Pass-Through Service Exceeded Max Rate	Input bit rate of the Pass-Through Service is higher than Max Bit Rate. Service output will be muted.	Check input signal.
		Slate Service is Activated	Occurs when the Slate feature is activated.	None
		Slate Service Failure	Occurs on the service output when the Slate is missing from the service input (even when the Slate is not activated).	The stream cannot flow end-to-end. Check input stream.
		Primary Service Failure	The primary/backup source failed.	The stream cannot flow end-to-end. Check input stream.
		Backup Service 1 Failure	The stream cannot flow end-to-end.	Check input stream.
		Backup Service 2 Failure	The stream cannot flow end-to-end.	Check input stream.
		Backup Service 3 Failure	The stream cannot flow end-to-end.	Check input stream.
		Service Name SCTE30 Error	In splicing, another spliceable service with the same name is detected	Check configuration

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
Output Service		Exceeded Spliceable ESs Capacity	In splicing, too many PIDs are associated with the service. The maximum PIDs are: Up to one video, up two audio, up to eight data PIDs	Check configuration to match spec
		No SCTE30 connection	In splicing, Ad-Server either did not send Init request or Init request is wrong.	Check Ad-Server configuration
		Insertion Channel is Missing	Insertion channel (ad) did not arrive on time.	Check Ad-Server streaming interface.
		Input PMT Missing	PMT entry required on the output was not received on the input.	Recheck the extraction settings on the service provided as the tables' input for the PSIP/DVB regeneration.
		Input VCT Missing	VCT entry required on the output was not received on the input.	Recheck the extraction settings on the service provided as the tables' input for the PSIP regeneration.
		ReEncoded Service Missed Rate	DiviTrackMX, internal fault	If alarm persists, call Customer Support
		Transcoding Unit Failure	The transcoding unit crashed resulting from an unknown error, or the input video stream is not MPEG compliant.	Check the input stream.
		Could not Allocate Transcoding Unit	Too many services to transcode. Cannot allocate trans engine	Check configuration
		Reenc and Trans are selected for the Service	Wrong configuration	Check configuration either to reencode or to trans
		Service Name SCTE30 Error	Another Splice enabled service with the same name is provisioned	Change to a unique service name

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Table 10–1: Alarm List Raised by Platform

Source Object	ID	Alarm Message	Description	Solution
		Exceeding No. of PIDs per Splice Service	Check the max. number of PIDs per Splice enabled service.	Max. number of PIDs per Splice enabled service is: ■ 1 Video PID ■ Up to 8 Audio PIDs ■ Up to 4 Data PIDs
Service Output		Insertion Channel is Missing	Splicer could not receive the Ad at the insertion channel for a certain Splice event.	Check connection with the Ad server (video network)
		Splice Event Failed. Session ID #	Splicer could not play the Ad and had to return to the network feed	Check that ad streams are provisioned and that they are valid
		Splicing License Missing	Exceeded the number of installed DPI licenses.	Install additional DPI licenses or reduce number of splice enabled services
		Could Not Allocate Splice Engine	Splicer could not allocate a Splice Engine for the service.	Check that the GbE 4G card is installed properly
		Splice Enabled Service Must Have 1 Video PID	A Splice enabled service supports only one video PID	Verify that the input service has only one video PID

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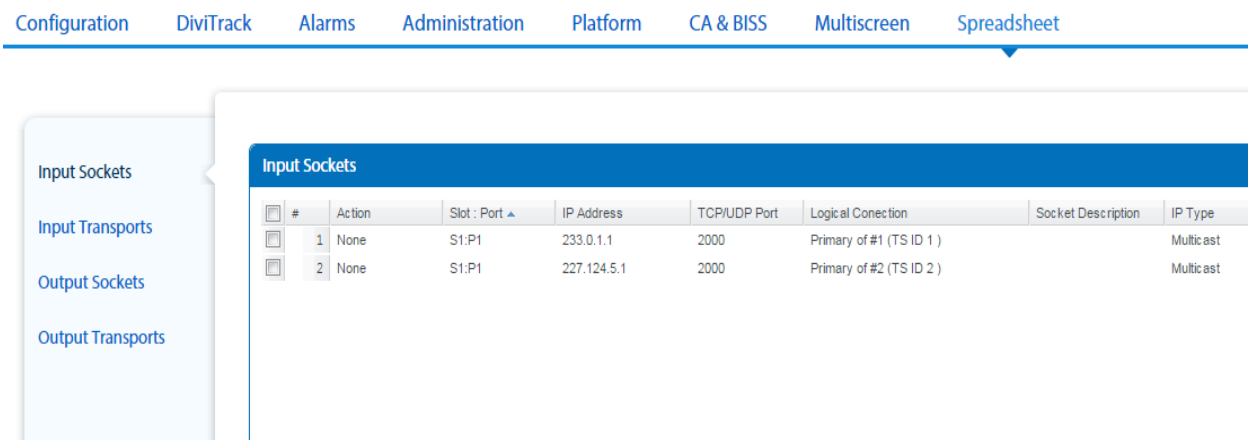
Chapter 11
Spreadsheet

The Spreadsheet page shows sections of the transport streams found on the Configuration page. These include:

- Input Sockets
- Input Transports
- Output Sockets
- Output Transports



Bulk processing of sockets or streams on any Spreadsheet page can be done in one of two ways:

- select the stream sockets or streams required. Filters on spreadsheet column can be used to make this process easier.
- make a change on any one of the selected items. All selected items will reflect the same change. This includes using the **Remove** button in the bottom left corner. Pressing this button will delete all selected streams.

NOTE: To ensure best spreadsheet performance while processing more than 100 sockets, filter them first, then sort.

Input Sockets

The Input Sockets sheet accesses information found in the Physical Inputs section of the Configuration page. You can display, sort, and manipulate information by means of drop-down menus.

To work with Input Sockets:

1. Click Input Sockets in the left column of the Spreadsheet page.
2. Select the box for the Input Socket required, or select the top box in the left column for all sockets.
3. In the **Action** column, select the line required. Select the appropriate action:

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a. None

b. Open Dialog, to view the Input Socket Properties dialog.
For further information, see *Configuring a Socket* on page 35

c. Tree View, to see the socket in the Configuration page.

d. Duplicate, to make copies of the socket with new logical transport streams for the copies. Here you can:

- Set the number of copies
- Select/clear Increment IP Address
- Select/clear Increment Port Number

5. Use the drop-down menu on the right side of each column to enable the following:

a. Sort Ascending

b. Sort Descending

c. Columns: two options are available.

- Check/clear a box to select/deselect the column view
- Filter by Subject.

For filtering options, see *Table 11–1* on page 233

d. Filter

5. Click on the following columns to configure them:

a. IP Address

b. TCP/UDP Port

c. Socket Description

d. IP Type

e. Encapsulation Mode

f. SSM-1 IP

g. SSM-2 IP

h. SSM-3 IP

i. SSM-4 IP

j. De-Jittering Mode

k. Delay (ms)

l. Average Input Bitrate (Mbps)

Table 11–1: Input Socket Column Filter by Subject

	Show All	General	FEC	SSM	De-Jittering
Slot: Port	√	√	√	√	√
IP Address	√	√	√	√	√
TCP/UDP Port	√	√	√	√	√

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Table 11–1: Input Socket Column Filter by Subject

	Show All	General	FEC	SSM	De-Jittering
Logical Connection	√	√	√	√	√
Socket Description	√	√	√	√	√
IP Type	√	√			√
Encapsulation Mode	√	√	√		√
SSM-1IP	√			√	
SSSM-2 IP	√			√	
SSM-3 IP	√			√	
SSM-4 IP	√			√	
FEC	√		√		
De-Jittering Mode	√				√
Delay (ms)	√				√
Average Input Bitrate (Mbps)	√				√

Input Transports

The Input Transports sheet accesses information found in the Logical Inputs section of the Configuration page. The information can be displayed, sorted, and manipulated by means of drop-down menus.

To work with Input Transports:

1. Select **Input Transports** in the left column of the Spreadsheet page.
2. Select the Input Transport required, or select the top box in the left column for all transports.
3. In the **Action** column, select the line required. Select the appropriate action:
   a. None
   b. Open Dialog to see the Input TS: Properties box. For further information, see *TS Properties* on page 41
   c. Tree View to see the transport stream in the Configuration page.
4. Unless otherwise noted, all columns have a drop-down menu on the right side of the column. This menu enables access to the following:
   a. Sort Ascending
   b. Sort Descending

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c. Columns: two options are available.

- Select/clear a box to select/deselect the column view
- Filter by Subject:

  TS ID

  Description

  Primary Source

  Report CC Errors Alarm

  Eligible for Slate

  Bitrate (Mbps)

  Padding (Mbps)

  Effective Rate (Mbps)

  Transport Errors

  Number of Errors

d. Filters

5. Click on the following columns to configure them:

   a. Description - free text

   b. Report CC Errors Alarm - Always, Never, If PID is Passed

   c. Eligible for Slate - check/clear checkbox

Output Sockets

The Output Sockets sheet accesses information found in the Physical Outputs section of the Configuration page. The information can be displayed, sorted, and manipulated by means of drop-down menus.

To work with Output Sockets:

1. Select **Output Sockets** in the left column of the Spreadsheet page.
2. Select the box for the Output Socket required, or the top box in the left column for all sockets.
3. In the **Action** column, select the line required. Select the appropriate action:

   a. None

   b. Open Dialog, to see the Output Socket Properties dialog.

   For further information, see *Configuring the Output Socket - GbE Output Port Only* on page 55

   c. Tree View, to see the transport stream in the Configuration page.

   d. Duplicate, to make copies of the socket with new logical transport streams for the copies. Increment the IP Address and Port Number by checking the boxes provided. Click OK to create the new sockets.

5. Unless otherwise noted, all columns have a drop-down menu on the right side of the column. This menu enables the following:

   a. Sort Ascending

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b. Sort Descending

c. Columns: two options are available.

- Check/clear a box to select/deselect the column view
- Filter by Subject: for filter options, see *Table 11–2* on page 236

d. Filters

5. Click on the following columns to configure them:

- IP Address
- UDP Port
- Socket Description
- Encapsulation Mode
- IP Type
- Bitrate
- Bitrate (Mbps)
- FEC Enable
- Static Destination MAC (checkbox)
- Static Destination MAC (address)
- IP Packet Size
- Time to Live
- Source IP Type
- Source IP Address

Table 11–2: Output Socket Column Filter by Subject

	Show All	General	FEC	Source	QoS	Bitrate	VLAN Tagging
Slot: Port	√	√	√	√	√	√	√
IP Address	√	√	√	√	√	√	√
UDP Port	√	√	√	√	√	√	√
Logical Connection	√	√	√	√	√	√	√
Socket Description	√	√	√	√	√	√	√
Encapsulation Mode	√	√	√	√	√	√	
IP Type	√	√		√	√	√	
Bitrate	√					√	
Bitrate (Mbps)	√					√	

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Table 11–2: Output Socket Column Filter by Subject

	Show All	General	FEC	Source	QoS	Bitrate	VLAN Tagging
FEC Enable	√		√				
Number of Columns	√		√				
Number of Rows	√		√				
Static Destination MAC	√						
IP Packet Size (Bytes)	√						
Time to Live	√						
Source IP Type	√			√			
Source IP Address	√			√			
Source UDP Port	√			√			
QoS Type	√				√		
TOS Value (8 bits)	√				√		
Precedence	√				√		
Type of Service	√				√		
VLAN Tagging Mode	√						√
VLAN Identifier	√						√
Drop Eligible Indicator	√						√
Priority Code Point	v						√

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Output Transports

The Output Transports sheet accesses transport-related information found in the Logical Outputs section of the Configuration page. The information can be displayed, sorted, and manipulated by means of drop-down menus.

To work with Output Transports:

1. Select **Output Transports** in the left column of the Spreadsheet page.
2. Select the box for the Output Transport required, or the top box in the left column for all transports.
3. In the **Action** column, click on the line required. Select the appropriate action:
   a. None
   b. Open Dialog, to open the Output TS: Properties box.

   For further information, see *Configuring Output TS Properties* on page 61.
   c. Tree View, to see the transport stream in the Configuration page.
4. Unless otherwise noted, all columns have a drop-down menu on the right side of the column. This menu enables the following:
   a. Sort Ascending
   b. Sort Descending
   c. Columns: two options are available.
      - Check/clear a box to select/deselect the column view
      - Filter by Subject
      - TS ID
      - TS Description
      - Network ID
      - Scrambling Mode
      - Scrambling Key
      - Bitrate
   d. Filters
5. Click on the following columns to configure them:
   a. TS Description
   b. Scrambling Mode
   c. Scrambling Key

NOTE: Press **Apply** to have all changes entered take effect.

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Chapter 12
Administration and Platform Parameters

Overview

The Administration, Platform, and Spreadsheet pages include additional features as well as ways to configure a ProStream. These features are grouped as follows:

Administration Page:

- IGMP - allows you to select the required IGMP version. See *Selecting IGMP Version* on page 239
- NTP and Time - allows you to set the time of the device. See *Setting Device Time* on page 240
- Password - allows to define an access level. See *Setting a Password* on page 241
- HW Clock Source - allows to set the hardware clock source. See *Defining HW Clock Source* on page 241
- DPI - allows to define the SCTE30 Port and allocate resources. See *Defining the SCTE30 Port and Allocating Resources* on page 182.
- A/V Processing - allows to define the following:
  - Set-top-box mode. See *Defining the Set-Top-Box* on page 241.
  - ACE Video Configuration - allows to enable PIP and to set the video frequency. See *To enable ACE video processing, select **ACE Picture in Picture (PIP)**. See Transcoding a PIP Service on page 126.* on page 242.
  - ACE Audio Configuration - allows to define silence insertion. See *Defining ACE Audio Configuration* on page 242.
- SNMP - see *Defining SNMP Parameters* on page 242
- BDS - for future use
- VIS - see *Video Inventory System (VIS)* on page 243
- Licenses - see *Licenses* on page 244
- Assets - allows to upload logo insertion files. See *Uploading Logo Insertion Files* on page 177.
- Syslog - see *Syslog Settings* on page 258

Platform Page:

- Redundancy - see *Device Redundancy* on page 260
- EAS - allows you to configure Emergency Alert System. See *Defining SNMP Parameters* on page 242.
- ESAM - allows to configure ESAM system. See *ESAM (Event Signaling and Management)* on page 268.

Selecting IGMP Version

IGMP-v3 enables you to reuse multicast addresses in a network. Multicast streams in an IGMP-v3 enabled network are identified not only by their destination address, but also by their source address.

ProStream 9000 may operate either in IGMP-v2 or IGMP-v3 mode. Switching between modes is service affecting.

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To select IGMP Version:

1. In the web page, select **Administration** > **Global Setting** page.

2. Open the list and select the required mode:
   - Auto Detect
   - IGMP Version 2
   - IGMP Version 3

Setting Device Time

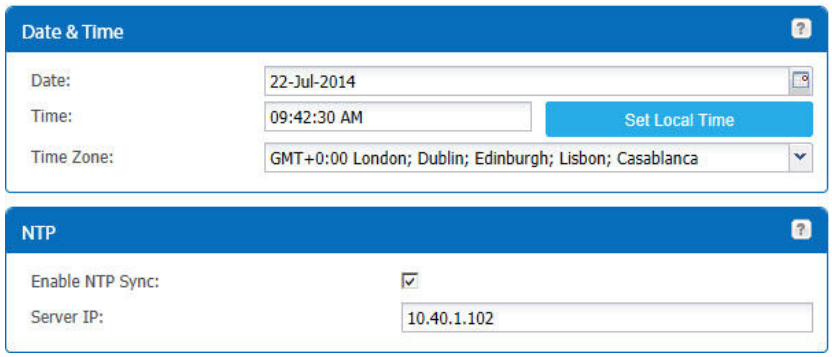
Network Time Protocol (NTP)

The Network Time Protocol table allows to synchronize the device time with the Universal Time Coordination (UTC) by connecting the device to an NTP server. If you enable this option, you cannot set the time of the unit manually.

To set ProStream time according to the NTP server:

Once you set the time according to the NTP server, you cannot set ProStream time manually.

1. In the web page, select **Administration** > **Date & Tim** page.



2. To synchronize the ProStream time with the UTC time, check **Enable NTP Sync**.
3. In **Server IP**, enter the IP address of the NTP server.

   In case an NTP server is unavailable, you may set the unit time manually.

Setting Device Time Manually

To set the device time manually:

1. In the **Date** and **Time** fields, enter date and time respectively. Date format: dd/month/yyyy. Time format: hh:mm:ss AM/PM.
2. To send required date and time to the unit, click **Set Local Time**.

   A verification message appears.

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3. Click **Ok**.

   The required time is sent to the unit and the date and time are updated immediately.

4. To set the local time offset according to the Greenwich Mean Time (GMT), open the **Time Zone** list and select the required GMT offset.

NOTE: Set manually local time offset upon Day Light Saving changes.

Setting a Password

- Select **Administration** > **User Management** page. See *Setting/Changing a Password* on page 12.

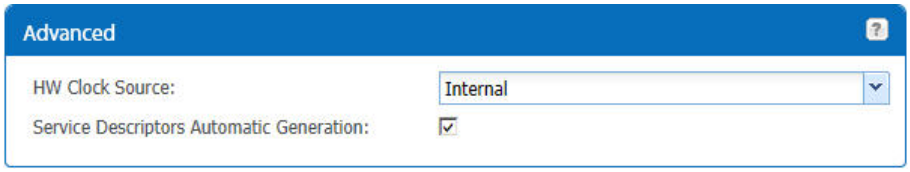
Defining HW Clock Source

NOTE: SFN application is currently unsupported.

In SFN application, the Receiver accepts an external clock signal over an ASI port 1 of any card.

To define the HW clock source:

1. In the web page, select **Administration > Global Settings** > **Advanced section**:.



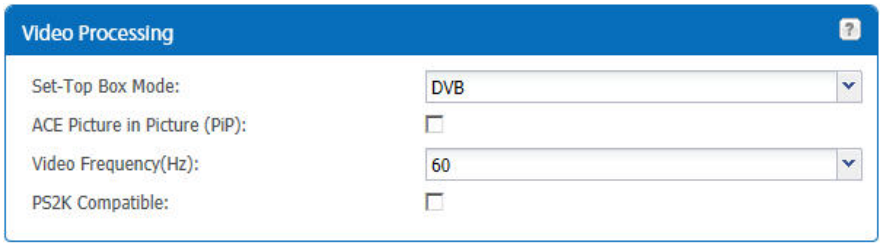
2. Under **HW Clock Source**, select the required option:
   - Internal - to revert to an internal clock
   - Slot 1- slot 5 - select the requires slot for receiving the external clock.
3. **Service Descriptors Automatic Generation** - select to allow automatic generation of service-name descriptor in SDT table.

Defining the Audio/Video Processing

Defining the Set-Top-Box

To configure Set-Top-Box:

1. Select **Administration** > **Global Settings > Video Processing** section.



2. Open the **Set-Top Box Mode** list and select one of the following:

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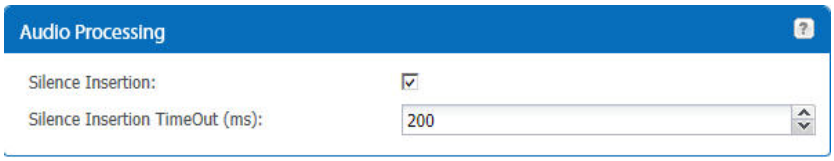
- DVB
- Motorola
- Phillips
- Samsung SMT (gives an 8:9 aspect ratio for video headers of transcoded H.264 720x480i output)

3. To enable ACE video processing, select **ACE Picture in Picture (PIP)**. See *Transcoding a PIP Service* on page 126.
4. To set the video frequency, open the Video Frequency list and select 50Hz or 60Hz.
5. PS2K Compatible - select to allow compatible with ProStream 2000.

Defining ACE Audio Configuration

To configure ACE audio:

1. Select **Administration** > **Global Settings > Video Processing** section.



2. Open the **Silence Insertion Enable** list and select either of the following:
   - Enable - Full support of Silence Mode. If enabled, silence is inserted in cases of corrupt/missing audio input.
   - Disable
3. In **Silence Insertion Timeout (msec)**, enter the required time out. The default is 200 milli.seconds. Indicates the period of time for input loss that requires the activation of silence insertion.

Defining SNMP Parameters

The device is capable of reporting its status via SNMP (Simple Network Management Protocol) to a third-party SNMP-based network management systems.

The status of the device is reported to the SNMP manager as SNMP Traps - notifications that the device initiates and sends to the SNMP manager to indicate the assertion or remittance of an alarm or warning. SNMP Traps are sent only to SNMP managers that are registered with the device. To allow sending SNMP traps, configure up to four SNMP managers as explained below:

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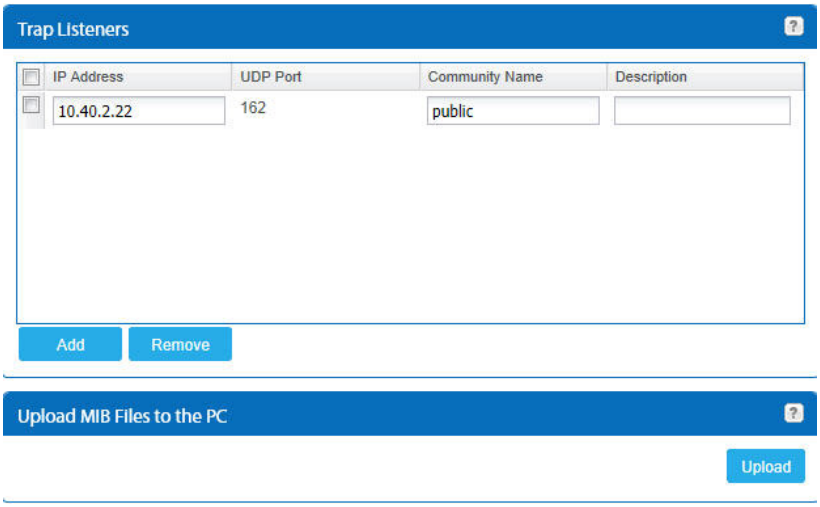
To forward SNMP traps:

1. Select **Administration** > **SNMP** page.



2. In IP Address, enter the IP address of the computer to which you wish to forward all SNMP traps from the device.
3. In UDP port enter the UDP the device uses for connecting and sending traps.
4. Community Name - The required string value for the Get Community. The Get Community is the community with Read access to the network elements. The elements will respond to this community Get commands. The default string is public.
5. Description - enter a short description of the Trap Listener.
6. To add another device to receive the traps, click **Add**.

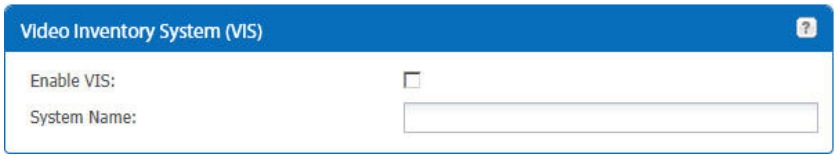
Video Inventory System (VIS)

As services traverse the network, multicast addresses change due to local service aggregation and ad splicing. Since the operator cannot correlate a multicast address to a particular service, it becomes difficult to address quality issues and resolve outages in a timely fashion resulting in longer down times, higher call volume, and a less than optimal customer experience.

The VIS feature allows to create a video inventory system by appending information to the Service Description Table (SDT). The SDT is populated at the multiplex source within the Comcast network, and updated by each device that manipulates the MPEG transport stream with a device identification. Thus, you can easily determine the path for any given service.

To use the VIS feature:

1. Select **Administration** > **Global Settings** > **Video Inventory System (VIS)** section:



2. Select **Enable VIS** to enable the VIS feature.
3. In **System Name** enter the required name to append to the SDT table.

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Licenses

The following features of ProStream 9000 require licensing:

- Video and audio transcoding - each transcoded stream requires a license
- VBR pools - ACE DiviTrackMX™

To transcode, you need to purchase a license. For the complete list of available licenses, see *Table 12–3* on page 245.

Licenses are arranged in hierarchy according to their capabilities. You can use a license with a high hierarchy for operation that requires a lower hierarchy as the following examples show:

- If you purchased a HD transcoding license, you can use it for SD transcoding.
- If you purchased a H.264 transcoding license, you can use it for MPEG-2 transcoding.

To view license hierarchies, see *Licenses Hierarchy* on page 251.

ProStream 9000 is shipped with the purchased licenses. In case you need an additional license, ProStream 9000 grants you a grace period that allows you to use this feature. Grace period is for 45 days of device uptime. When Grace period is active, the alarm *License Grace Period Enabled* is raised. Once licenses are installed, the grace period is reloaded.

The following table lists the licensing specifications

Table 12–1: Licensing Specifications

Parameter	Explanation
Licensed feature	■ Video and audio transcoding (ACE only) - per each stream ■ VBR pools - ACE DiviTrackMX™
License Type	■ Permanent - Once you install a license, it is for unlimited time ■ Grace - All features are working for 45 days grace period. Grace period of 45 days is counted according to device uptime. ■ Expired - Licenses that are based on a calendar timeline. These licenses are for demo purposes only.
License Management	Licenses are added/removed via the following: ■ External license tool (NLM) - this tool resided on another PC. The device uses HTTP to transfer files from/to NLM. See *Licensing System Architecture* on page 245. **Note**: Adding/removing licenses does not affect running streams. However, it affects licensing allocation. See *License Allocation* on page 252. **Note**: In case of card failure, to release licenses you should manually disable transcoding.
Firmware Upgrade/ Downgrade	Licenses are maintained after upgrade/downgrade.
License Allocation	Licenses are allocated according to their hierarchy. See *License Allocation* on page 252.

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Licensing System Architecture

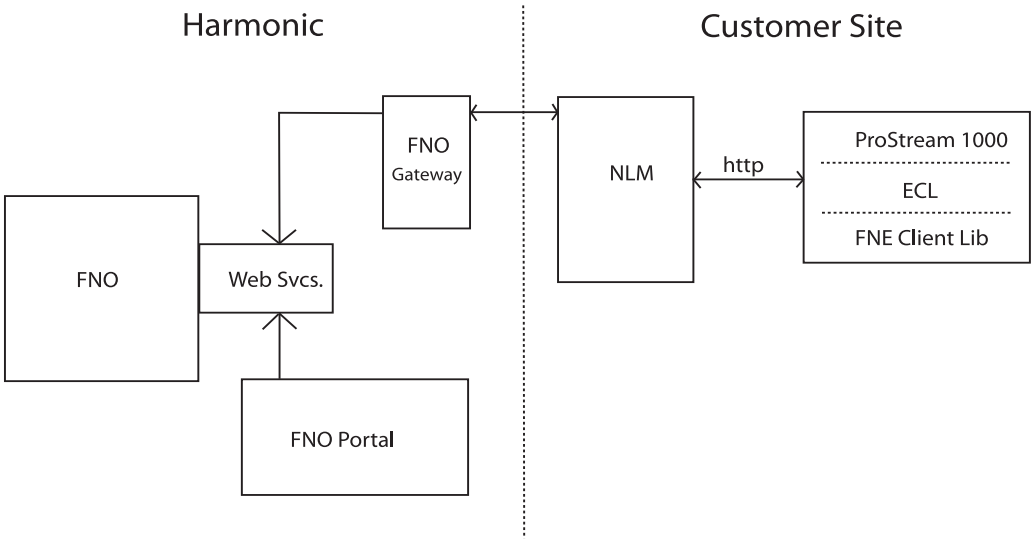

Table 12–2: Licensing System Architecture Legend

Term	Explanation
NLM	Nodelock License Manager. A desktop application
FNO	Flexera database that stores licenses at the Harmonic backoffice

Supported Licenses

The following table lists the currently supported licenses

Table 12–3: Supported Licenses

#	License Name	Duration	Description
2	FW-PRM-9K-ACE-ANY-FORMAT-DEMO	180 days	Firmware License for DEMO enables output of HD, SD, MPEG-2, H.264, audio Transcoding
3	FW-PRM-9K-ACE-ANY-FORMAT-LAB	p	Firmware License for LAB enables output of HD, SD, MPEG-2, H.264, audio Transcoding
4	FW-PRM-9K-ACE-ANY-FORMAT-OUT	P	Firmware License for ANY output format: HD, SD, MPEG-2, H.264 Transcoding
	FW-PRM-9K-ACE-BACKUP	P	Firmware License for Transcoding FIRMWARE LICENSE FOR ALL ProStream 9000 FUNCTIONS for BACKUP

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Table 12–3: Supported Licenses

#	License Name	Duration	Description
5	FW-PRM-9K-ACE-SPARE	30 days	Firmware License for ACE COLD SPARE HD, SD, MPEG-2, H.264 output Transcoding
6	FW-PRM-9K-ACE-ANY-OUT-SD	P	Firmware License for SD MPEG-2, H.264 output Transcoding
7	FW-PRM-9K-ACE-PIP-AVC-OUT	P	Firmware License for H.264 PIP output Transcoding
8	FW-PRM-9K-ACE-AVC-OUT-HD	P	Firmware License for HD, H.264 output Transcoding For hierarchy, see *[012]: FW-PRM-9K-ACE-AVC-OUT-HD* on page 253
9	FW-PRM-9K-ACE-AVC-OUT-SD	P	Firmware License for SD, H.264 output Transcoding For hierarchy, see *[013]: FW-PRM-9K-ACE-AVC-OUT-SD* on page 253
10	FW-PRM-9K-ACE-MP2-OUT-HD	P	Firmware License for HD, MPEG-2 output Transcoding For hierarchy, see *[017]: FW-PRM-9K-ACE-MP2-OUT-HD* on page 254
11	FW-PRM-9K-ACE-MP2-OUT-SD	P	Firmware License for SD, MPEG-2 output Transcoding For hierarchy, see *[018]: FW-PRM-9K-ACE-MP2-OUT-SD* on page 254
12	FW-PRM-9K-ACE-DWCV-AVC-OUT-SD	P	Firmware License for DownConvert to SD, H.264 output Transcoding For hierarchy, see *[014]: FW-PRM-9K-ACE-DWCV-AVC-OUT-SD* on page 253
13	FW-PRM-9K-ACE-DWCV-MP2-OUT-SD	P	Firmware License for DownConvert to SD, MPEG-2 output Transcoding For hierarchy, see *[015]: FW-PRM-9K-ACE-DWCV-MP2-OUT-SD* on page 254
14	FW-PRM-9K-ACE-HD-AVC-PIP-OUT	P	Firmware License for HD H.264 PIP output Transcoding For hierarchy, see *[016]: FW-PRM-9K-ACE-HD-AVC-PIP-OUT* on page 254
15	FW-PRM-9K-ACE-SD-AVC-PIP-OUT	P	Firmware License for SD H.264 PIP output Transcoding For hierarchy, see *[022]: FW-PRM-9K-ACE-SD-AVC-PIP-OUT* on page 255

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Table 12–3: Supported Licenses

#	License Name	Duration	Description
16	FW-PRM-9K-ACE-AUD-ST-OUT	P	Firmware License for Audio Transcoding of Stereo output Transcoding For hierarchy, see *[009]: FW-PRM-9K-ACE-AUD-ST-OUT* on page 253
	FW- PRM-9K-ACE-AUD-MC-OUT		Firmware License for Audio Transcoding of Multichannel output Transcoding For hierarchy, see *[008]: FW-PRM-9K-ACE-AUD-MC-OUT* on page 253.
17	FW-PRM-9K-ACE-AUD-DD-MC-OUT	P	Firmware License for Audio Transcoding of Dolby Digital Multichannel output Transcoding see *[004]:FW-PRM-9K-ACE-AUD-DD-MC-OUT* on page 252
17	FW-PRM-9K-ACE-AUD-DD-ST-OUT	P	Firmware License for Audio Transcoding of Stereo Dolby Digital output Transcoding For hierarchy, see *[005]:FW-PRM-9K-ACE-AUD-DD-ST-OUT* on page 252
18	FW-PRM-9K-ACE-AUD-DD+-MC-OUT	P	Firmware License for Audio Transcoding of Dolby Digital+ Multichannel output Transcoding For hierarchy, see *[002]:FW-PRM-9K-ACE-AUD-DD+-MC-OUT* on page 252
19	FW-PRM-9K-ACE-AUD-DD+-ST-OUT	P	Firmware License for Audio Transcoding of Dolby Digital+ Stereo output Transcoding For hierarchy, see *[003]:FW-PRM-9K-ACE-AUD-DD+-ST-OUT* on page 252
20	FW-PRM-9K-ACE-AUD-DWMIX-OUT	P	Firmware License for Audio Transcoding of Multichannel IN, Stereo OUT output Transcoding For hierarchy, see *[007]:FW-PRM-9K-ACE-AUD-DWMIX-OUT* on page 252

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Table 12–3: Supported Licenses

#	License Name	Duration	Description
21	FW-PRM-9K-ACE-AUD-DWMIX-DD-OUT	P	Firmware License for Audio Transcoding of Multichannel IN, Stereo Dolby Digital output Transcoding For hierarchy, see *[006]:FW-PRM-9K-ACE-AUD-DWMIX-DD-OUT* on page 252
22	FW-PRM-9K-ACE-AUDLVL-MC	P	Firmware License for Multichannel 5.1 Audio Leveling For hierarchy, see *[010]: FW-PRM-9K-ACE-AUDLVL-MC* on page 253
23	FW-PRM-9K-ACE-AUDLVL-ST	P	Firmware License for Stereo 2.1 Audio Leveling For hierarchy, see *[011]: FW-PRM-9K-ACE-AUDLVL-ST* on page 253
24	FW-PRM-9K-ACE-MW-AUD-AAC-OUT	P	Firmware License for Mobile/Web audio xcoding of AAC stereo out For hierarchy, see *[019]: FW-PRM-9K-ACE-MW-AUD-AAC-OUT* on page 254
25	FW-PRM-9K-ACE-MW-MBR-OUT-HD	P	Mobile/Web AVC MBR-group of 2 HD or 1HD + 0 to 3 SD profiles Firmware License For hierarchy, see *[020]: FW-PRM-9K-ACE-MW-MBR-OUT-HD* on page 254
26	FW-PRM-9K-ACE-MW-MBR-OUT-SD	P	Mobile/Web AVC MBR-group of up to 4 SD profiles Firmware License For hierarchy, see *[021]: FW-PRM-9K-ACE-MW-MBR-OUT-SD* on page 254
27	FW-PRM-9K-DTMX-1	P	DTMX FW License For hierarchy, see *[028]: FW-PRM-9K-DTMX-1* on page 255
28	SW-LIC-PRM-9K-DT	P	Firmware DiviTrackIP License per pool For hierarchy, see *[037]: SW-LIC-PRM-9K-DT* on page 256
29	FW-PRM-9K-SLATE-SRV-1	P	Firmware for Slate insertion per service. Enable to switch any service to an alternative source (Slate) For hierarchy, see *[036]: FW-PRM-9K-SLATE-SRV-1* on page 256

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Table 12–3: Supported Licenses

#	License Name	Duration	Description
30	FW-PRM-9K-EAS-1	P	Firmware license for Emergency Alert System For hierarchy, see *[030]: FW-PRM-9K-EAS-1* on page 255
31	FW-PRM-9K-SELCSCR-1	P	Firmware license for Selective Encryption of 1 SPTS For hierarchy, see *[035]: FW-PRM-9K-SELCSCR-1* on page 256
32	FW-PRM-9K-BISS-FIX-SRV-1	P	Firmware license for BISS Fixed key Scrambling per Service For hierarchy, see *[024]: FW-PRM-9K-BISS-FIX-SRV-1* on page 255
33	FW-PRM-9K-8VSB	P	Firmware license for platform equipped with 8VSB Receiver module, enabling reception of one ATSC RF channel For hierarchy, see *[001]:FW-PRM-9K-8VSB* on page 252
34	FW-PRM-9K-DESAES-1	P	Firmware license for AES De-Scrambling of 1 Service For hierarchy, see *[025]: FW-PRM-9K-DESAES-1* on page 255
35	FW-PRM-9K-SCTE35-1	P	Firmware license for SCTE-35 Insertion on 1 service For hierarchy, see *[033]: FW-PRM-9K-SCTE35-1* on page 256
36	FW-PRM-9K-AES-CW	P	Firmware license for AES Scrambling per 1 service For hierarchy, see *[023]: FW-PRM-9K-AES-CW* on page 255
37	FW-PRM-9K-DVB-CW	P	Firmware license for DVB Scrambling per 1 service For hierarchy, see *[029]: FW-PRM-9K-DVB-CW* on page 255
38	FW-PRM-9K-DESFIX-SRV-1	P	Firmware license for Fixed key De-Scrambling of 1 service For hierarchy, see *[026]: FW-PRM-9K-DESFIX-SRV-1* on page 255
39	FW-PRM-9K-SCRFIX-SRV-1	P	Firmware license for Fixed key Scrambling of 1 service For hierarchy, see *[032]: FW-PRM-9K-SCRFIX-SRV-1* on page 256

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Table 12–3: Supported Licenses

#	License Name	Duration	Description
40	FW-PRM-9K-FEC-TS-1	P	Firmware license for ProMPEG COP3 Forward Error Correction for 1 MPTS For hierarchy, see *[031]: FW-PRM-9K-FEC-TS-1* on page 256
41	FW-PRM-9K-SELC-EHP-1	P	Firmware enabling Encryption Hacking Protection scrambling mode per platform For hierarchy, see *[034]: FW-PRM-9K-SELC-EHP-1* on page 256
	FW-PRM-9K-SELC-EHP-1	P	Firmware enabling Encryption Hacking Protection scrambling mode per platform. For hierarchy, see *[034]: FW-PRM-9K-SELC-EHP-1* on page 256
42	FW-PRM-9K-DEVICE-REDUNDANCY	P	Firmware enabling device redundancy in Stand Alone Mode using Internal Harmonic Protocol For hierarchy, see *[027]: FW-PRM-9K-DEVICE-* on page 255
	FW-PRM-9K-ACE-MW-LOGO		ProStream 9000 ACE Logo insertion for multiscreen -1 Firmware License for MBTS group For hierarchy, see *[038]: FW-PRM-9K-ACE-MW-LOGO* on page 256
49	FW-PRM-9K-DPI-AVC-HD		Firmware Option for ProStream 9000 for H.264 AVC HD splicing For hierarchy, see *[052] FW-PRM-9K-DPI-AVC-HD* on page 256
50	FW-PRM-9K-DPI-AVC-SD		Firmware Option for ProStream 9000 for H.264 AVC SD splicing For hierarchy, see *[051] FW-PRM-9K-DPI-AVC-SD* on page 256
51	FW-PRM-9K-DPI-MP2-HD		Firmware Option for ProStream 9000 for MP2 HD splicing For hierarchy, see *[054] FW-PRM-9K-DPI-MP2-HD* on page 257
52	FW-PRM-9K-DPI-MP2-SD		Firmware Option for ProStream 9000 for MP2 SD splicing For hierarchy, see *[053] FW-PRM-9K-DPI-MP2-SD* on page 257

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Table 12–3: Supported Licenses

#	License Name	Duration	Description
	FW-PRM-9K-ACE-DPI-COND	P	ProStream 9000 ACE SCTE 35 stream conditioning support license. One per video stream required. For hierarchy, see *[055] FW-PRM-9K-ACE-DPI-COND* on page 257.
	FW-PRM-9K-DVBSUB-BURN	P	ProStream 9000 DVB-sub burn-in Firmware License per 1 service. For hierarchy, see *[056] FW-PRM-9K-DVBSUB-BURN* on page 257.

Working with Licenses

To transcode and to work with VBR pools, you need to purchase licenses.

To mange your licenses, that is to install and to remove licenses, use the NLM (Nodelock License Manager), an external tool. See *Licensing System Architecture* on page 245.

Once you select **Transcoding** per audio/video PID (Re Muxing tab) and click **Apply**, the device activates the license according to the output transcoding format. (See following captures)

NOTE: If you did not configure video or audio transcoding, yet selected **Transcoding**, once you click **Apply**, the default license is activated.

Licenses Hierarchy

Licenses are arranged in a hierarchical order: Hierarchy is divided as follows:

- Video - hierarchy among video licenses
- Audio - hierarchy among audio licenses

The following table lists the licensing hierarchy. Hierarchy is arranged from left to right. The left most license is the most limited license and the right most license is the most comprehensive one.

License Hierarchy – Example 1

If you purchased license: FW-PRM-9K-ACE-MP2-OUT-HD and you need to output an MPEG-2 SD stream.

Due to license hierarchy (see *Hierarchy of Licenses* on page 252), you can use the FW-PRM-9K-ACE-MP2-OUT-HD license to output an MPEG-2 SD stream.

License Hierarchy – Example 2

If you purchased license: FW-PRM-9K-ACE-MP2-OUT-HD and you need to output an MPEG-2 SD stream.

Due to license hierarchy (see *Hierarchy of Licenses* on page 252), you can use the FW-PRM-9K-ACE-MP2-OUT-HD license to output an MPEG-2 SD stream. However, if you also need to transcode to HD MPEG-2 output, your purchased license is already occupied by the MPEG-2 SD stream. In this case, you can transcode to HD MPEG-2 output with a Grace type license. The

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device grants you with the FW-PRM-9K-ACE-MP2-OUT-HD license for a grace period of 45 days. During this time, you can purchase another license and install it as explained in the following section *License Allocation*.

License Allocation

To use the FW-PRM-9K-ACE-MP2-OUT-HD, purchase the FW-PRM-9K-ACE-MP2-OUT-SD license. Once the latter is installed, licenses are re-allocated, and as a result FW-PRM-9K-ACE-MP2-OUT-HD is free for MPEFG-2 HD transcoding.

Hierarchy of Licenses

[001]:FW-PRM-9K-8VSB

FW-PRM-9K-8VSB -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[002]:FW-PRM-9K-ACE-AUD-DD+-MC-OUT

FW-PRM-9K-ACE-AUD-DD+-MC-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

[003]:FW-PRM-9K-ACE-AUD-DD+-ST-OUT

FW-PRM-9K-ACE-AUD-DD+-ST-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-9K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[004]:FW-PRM-9K-ACE-AUD-DD-MC-OUT

FW-PRM-9K-ACE-AUD-DD-MC-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[005]:FW-PRM-9K-ACE-AUD-DD-ST-OUT

FW-PRM-9K-ACE-AUD-DD-ST-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD+-ST-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[006]:FW-PRM-9K-ACE-AUD-DWMIX-DD-OUT

FW-PRM-9K-ACE-AUD-DWMIX-DD-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD+-ST-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[007]:FW-PRM-9K-ACE-AUD-DWMIX-OUT

FW-PRM-9K-ACE-AUD-DWMIX-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-

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PRM-9K-ACE-AUD-DWMIX-DD-OUT -> FW-PRM-9K-ACE-AUD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD+-ST-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[008]: FW-PRM-9K-ACE-AUD-MC-OUT

FW-PRM-9K-ACE-AUD-MC-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUD-DD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[009]: FW-PRM-9K-ACE-AUD-ST-OUT

FW-PRM-9K-ACE-AUD-ST-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUD-DD-ST-OUT -> FW-PRM-9K-ACE-AUD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD+-ST-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[010]: FW-PRM-9K-ACE-AUDLVL-MC

FW-PRM-9K-ACE-AUDLVL-MC -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

[011]: FW-PRM-9K-ACE-AUDLVL-ST

FW-PRM-9K-ACE-AUDLVL-ST -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUDLVL-MC

[012]: FW-PRM-9K-ACE-AVC-OUT-HD

FW-PRM-9K-ACE-AVC-OUT-HD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

[013]: FW-PRM-9K-ACE-AVC-OUT-SD

[013]: FW-PRM-9K-ACE-AVC-OUT-SD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-ANY-OUT-SD -> FW-PRM-9K-ACE-AVC-OUT-HD -> FW-PRM-9K-ACE-DWCV-AVC-OUT-SD

[014]: FW-PRM-9K-ACE-DWCV-AVC-OUT-SD

FW-PRM-9K-ACE-DWCV-AVC-OUT-SD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AVC-OUT-HD

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[015]: FW-PRM-9K-ACE-DWCV-MP2-OUT-SD

FW-PRM-9K-ACE-DWCV-MP2-OUT-SD -> FW-PRM-9K-ACE-DWCV-MP2-SD-STI -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-DWCV-AVC-OUT-SD -> FW-PRM-9K-ACE-MP2-OUT-HD

[016]: FW-PRM-9K-ACE-HD-AVC-PIP-OUT

FW-PRM-9K-ACE-HD-AVC-PIP-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-PIP-AVC-OUT -> FW-PRM-9K-ACE-SD-AVC-PIP-OUT -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AVC-OUT-SD -> FW-PRM-9K-ACE-AVC-OUT-HD

[017]: FW-PRM-9K-ACE-MP2-OUT-HD

FW-PRM-9K-ACE-MP2-OUT-HD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AVC-OUT-HD

[018]: FW-PRM-9K-ACE-MP2-OUT-SD

FW-PRM-9K-ACE-MP2-OUT-SD -> FW-PRM-9K-ACE-MP2-OUT-SD-STI -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO ->FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-ANY-OUT-SD -> FW-PRM-9K-ACE-MP2-OUT-HD -> FW-PRM-9K-ACE-AVC-OUT-SD -> FW-PRM-9K-ACE-AVC-OUT-HD -> FW-PRM-9K-ACE-DWCV-MP2-OUT-SD -> FW-PRM-9K-ACE-DWCV-AVC-OUT-SD

[019]: FW-PRM-9K-ACE-MW-AUD-AAC-OUT

FW-PRM-9K-ACE-MW-AUD-AAC-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AUD-ST-OUT -> FW-PRM-9K-ACE-AUD-DD-ST-OUT -> FW-PRM-9K-ACE-AUD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD-MC-OUT -> FW-PRM-9K-ACE-AUD-DD+-ST-OUT -> FW-PRM-9K-ACE-AUD-DD+-MC-OUT

[020]: FW-PRM-9K-ACE-MW-MBR-OUT-HD

FW-PRM-9K-ACE-MW-MBR-OUT-HD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

[021]: FW-PRM-9K-ACE-MW-MBR-OUT-SD

FW-PRM-9K-ACE-MW-MBR-OUT-SD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-MW-MBR-OUT-HD

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[022]: FW-PRM-9K-ACE-SD-AVC-PIP-OUT

FW-PRM-9K-ACE-SD-AVC-PIP-OUT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE -> FW-PRM-9K-ACE-PIP-AVC-OUT -> FW-PRM-9K-ACE-HD-AVC-PIP-OUT -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-ACE-AVC-OUT-SD -> FW-PRM-9K-ACE-AVC-OUT-HD

[023]: FW-PRM-9K-AES-CW

FW-PRM-9K-AES-CW -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[024]: FW-PRM-9K-BISS-FIX-SRV-1

FW-PRM-9K-BISS-FIX-SRV-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[025]: FW-PRM-9K-DESAES-1

FW-PRM-9K-DESAES-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[026]: FW-PRM-9K-DESFIX-SRV-1

FW-PRM-9K-DESFIX-SRV-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[027]: FW-PRM-9K-DEVICE-

FW-PRM-9K-DEVICE-REDUNDANCY -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[028]: FW-PRM-9K-DTMX-1

FW-PRM-9K-DTMX-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[029]: FW-PRM-9K-DVB-CW

FW-PRM-9K-DVB-CW -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[030]: FW-PRM-9K-EAS-1

FW-PRM-9K-EAS-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

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[031]: FW-PRM-9K-FEC-TS-1

FW-PRM-9K-FEC-TS-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[032]: FW-PRM-9K-SCRFIX-SRV-1

FW-PRM-9K-SCRFIX-SRV-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[033]: FW-PRM-9K-SCTE35-1

FW-PRM-9K-SCTE35-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[034]: FW-PRM-9K-SELC-EHP-1

FW-PRM-9K-SELC-EHP-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[035]: FW-PRM-9K-SELCSCR-1

FW-PRM-9K-SELCSCR-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[036]: FW-PRM-9K-SLATE-SRV-1

[036]: FW-PRM-9K-SLATE-SRV-1 -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[037]: SW-LIC-PRM-9K-DT

SW-LIC-PRM-9K-DT -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL -> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-SPARE

[038]: FW-PRM-9K-ACE-MW-LOGO

FW-PRM-9K-ACE-MW-LOGO -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL-> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-1K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

[051] FW-PRM-9K-DPI-AVC-SD

FW-PRM-9K-DPI-AVC-SD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL-> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-1K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-DPI-AVC-HD

[052] FW-PRM-9K-DPI-AVC-HD

FW-PRM-9K-DPI-AVC-HD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL-> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-1K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

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[053] FW-PRM-9K-DPI-MP2-SD

FW-PRM-9K-DPI-MP2-SD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL-> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-1K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT -> FW-PRM-9K-DPI-MP2-HD

[054] FW-PRM-9K-DPI-MP2-HD

FW-PRM-9K-DPI-MP2-HD -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL-> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-1K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

[055] FW-PRM-9K-ACE-DPI-COND

FW-PRM-9K-ACE-DPI-COND -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL-> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-1K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

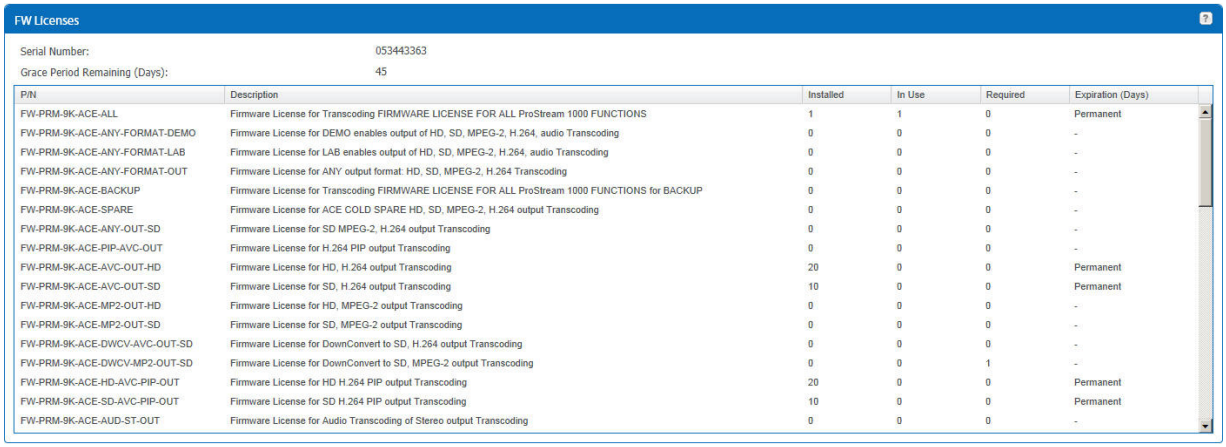
[056] FW-PRM-9K-DVBSUB-BURN

FW-PRM-9K-DVBSUB-BURN -> FW-PRM-9K-SUPPORT -> FW-PRM-9K-ACE-ANY-FORMAT-LAB -> FW-PRM-9K-ACE-ANY-FORMAT-DEMO -> FW-PRM-9K-ACE-ALL-> FW-PRM-9K-ACE-BACKUP -> FW-PRM-9K-ACE-1K-SPARE -> FW-PRM-9K-ACE-ANY-FORMAT-OUT

License Status

To view license status:

1. Log into the device via the web client. See *Logging into the Device* on page 12.
2. Select **Administration** > **Licensing**.



3. **Serial Number** - view the unique number of licenses host, usually chassis serial number.

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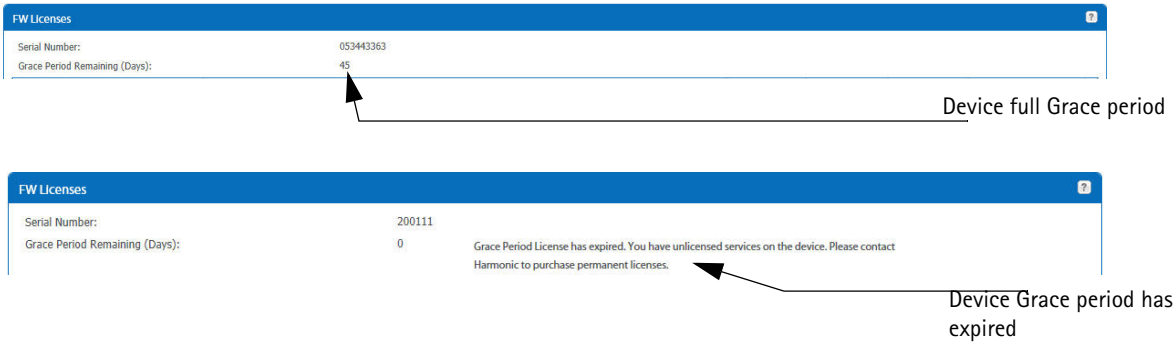
4. **Grace period** - indicates the grace period in days. When Grace period is expired, you are asked to purchase permanent licenses.



5. In the table, view the following:
   - Feature Part Number - the part number of the license
   - Description - a short description of the license. See *Licenses* on page 244.
   - Installed - the total number of licenses per type installed on the device
   - In Use - indicates the number of licenses per type that are currently being used
   - Required - the number of licenses requested for current transcoding configuration
   - Expiration - indicates the expiration date of the license. For none expired licenses, Permanent appears.

Licenses may appear in the table in the following colors:

Table 12–4: Licenses and Colors

Color	Explanation
Grayed out	Licenses that are not installed or requested
Gray	Licenses that are properly installed
Red	Licenses in a grace period
Yellow	Licenses that are not installed and use other licenses according to licensing hierarchy

NOTE: In case of an internal licensing failure, a general failure message appears in the **Licenses** page.

Syslog Settings

ProStream 9000 can send data to a Syslog server for logging, monitoring and troubleshooting purposes. The Syslog server presents the logged data in a user friendly interface that allows to easily track device activity.

The syslog server is a computer that the Syslog Watcher application is installed on it. For installation instructions, see Syslog Watcher documentation.

The following section describes and instructs you on how to configure the communication between the device and the Syslog server.

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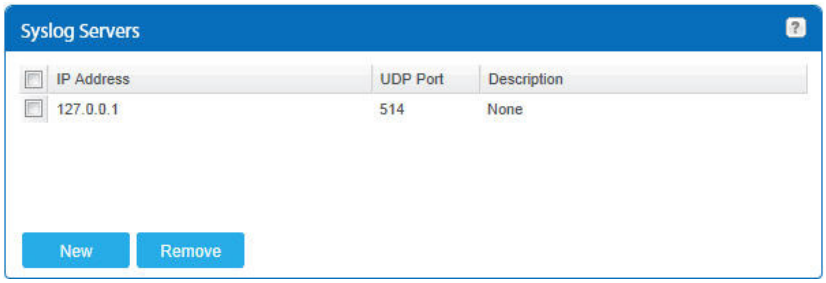
Syslog Configuration

To log device activity:

1. Enable the Syslog option and enter the Syslog server IP address as instructed below.
2. Log into the device via the web client. See *Logging into ProStream 9000* on page 11.
3. Select **Administration** > **Remote Servers**.



4. In **IP Address**, enter the IP address of the Syslog server.
5. In **UDP Port**, enter the port number over which the Splicer sends the messages and the Syslog server sniffs. The default port is 514. If you change the port number, change it also at the Syslog server.

   To allow the Syslog server to sniff the port, configure the Firewall of the Syslog server to open the Syslog port for sniffing.
6. To enable logging device activity, click **Apply**. In this version, splicing activities are logged.

   In case you enable Syslog and there are communication problems between the splicer and the Syslog server the alarm *Syslog Server is Unreachable* is raised.

Splicing Logging

Once you enable Syslog, you can retrieve the following data:

- Indications of the actual Splice activity - exchange of messages between Splicer and AD server with indication of the sender:
  - Init Request
  - Init Response
  - Cue Request
  - Cue Response
  - Splice Request
  - Splice Response
  - Splice Complete Response
  - Abort Request
  - Abort Response
  - Keep Alive Request
  - Keep Alive Response
- Information about the splicing activity
  - PID Matching - Information about the relations between network PID and ad PID prior to the splice event
  - Switch Info - Information about the switching between the feeds related to the splice

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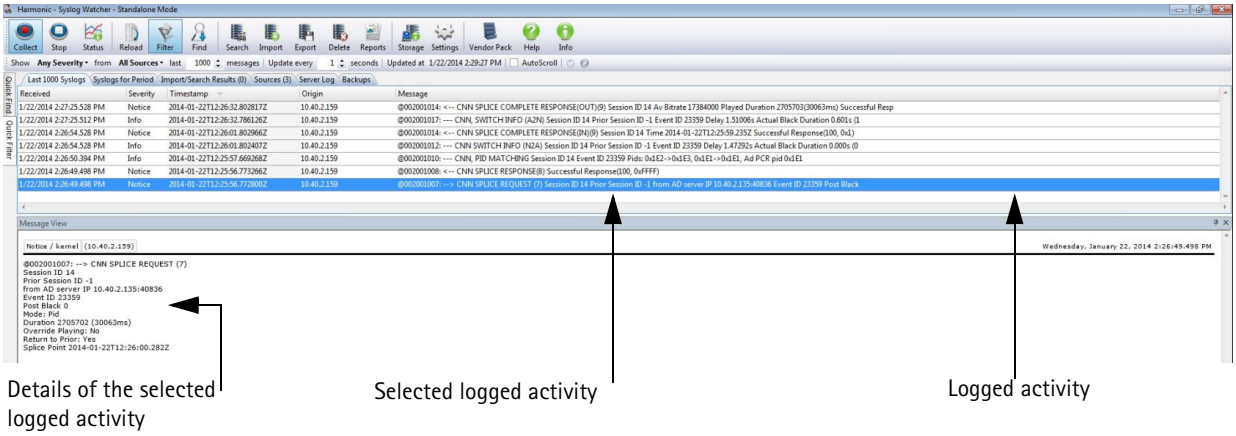
event

The following picture shows the logged splicing activities as they are presented by the Syslog server:



The Syslog server presents each activity with the following parameters:

Table 12–5: Syslog Server

Parameter	Explanation
Received	Time the message was logged
Severity	Message severity
Time stamp	Time the message was issued
Origin	The device that sent the message
Message	Message text. Each message has an ID

Once you select a logged activity, you can view its details in a friendly and legible format at the bottom section of the screen.

Device Redundancy

In order to ensure the continuous transmission of video/data streams, transmitting networks employ various protection or redundancy options. Redundancy solutions are implemented where high availability is required. Redundancy solutions provide various levels of assurance (power supply versus device redundancy) and are application dependent.

This section discusses the redundancy solution in the stream processing realm that relates to device redundancy of devices that work in standalone mode. This solution eliminates the need for NMX management for achieving device redundancy. The redundancy mechanism is a 1:1 device redundancy and it protects from severe failures and provides a high level of assurance.

To allow redundancy, the system is organized as follows:

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- Primary device - one of the ProStream devices is defined as the Primary device. This is the device that advertises the latest configuration.
- Backup device - one of the devices is defined as the Backup device. This is the device that gets the most updated configuration from the primary device. Usually the backup device polls the configuration of the primary device once redundancy is applied and during operation to monitor for changes in the primary configuration. Once the backup device gets the configuration it performs the following:
  - Updates the configuration and apply it - when updating configuration, basic device parameters are not updated. For example, device IP address and the assignment of ports. You need to make sure that the configuration of the port assignment is identical for the devices in the same group ID. See page 264.
- Device Connectivity - Primary and backup devices are connected via management, or CAS or GbE ports.
  - The connection over any of the ports should be multicast.
  - On each device, in the same redundancy group, at least two of the ports eligible for redundancy, should be assigned.
  - On each device, in the same redundancy group, at least same two ports should be assigned for redundancy.
  - The connection is either directly or via a switch. The devices communicate via HHP (Harmonic Heartbeat Protocol). The devices send to each other heartbeat messages at an interval defined in milliseconds.
- Group ID (GID) - A network includes multiple Harmonic devices with same ID. To differentiate between the devices, devices that are on the same redundancy system, are associated to the same group. Currently, a redundancy system consists of two devices only, a primary device and its backup device.
- Redundancy Types:
  - Warm - Backup gets the configuration of the primary device and applies it but the backup is in active, it does not broadcast
  - Hot - Backup gets the configuration of the primary device and applies it and backup is active, it broadcasts
- Redundancy Switch Types:
  - Manual - Upon a Device Redundancy Trigger (DRT), only a manual redundancy switch takes place. That is, you need to switch from primary to backup.
  - Automatic - Upon a Device Redundancy Trigger (DRT), an automatic redundancy switch takes place.

The following table lists the redundancy switch types and the state of the primary and backup devices

Table 12–6: Redundancy Types and Redundancy Switch

Redundancy Switch Type	Primary	Backup – Warm	Backup – Hot
Manual	Active	In active	Active
Automatic	Active/In active*	Active/In active*	N/A

* Pending device state - always one device is active and the other is in active.

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List of DRTs (Device Redundancy Triggers)

When the following alarms are raised a redundancy switch takes place:

CPC HW Failure

Card Missing

Card Mismatch

8VSB Card HW Failure

GbE Card HW Failure

Quad GbE Card HW Failure

ASI Input Signal Loss

ASI Input Sync Loss

To see the list of alarms related to redundancy, see *Troubleshooting* on page 202, under Platform.

Configuring Device Redundancy

The following instructions refer to 1:1 device redundancy. You need to configure the redundancy parameters for both the primary and for the backup device. The instructions refer to both, unless otherwise indicated.

To configure device redundancy:

1. Log into the device via the web client. See *Logging into the Device* on page 12.
2. Select **Platform** > **Redundancy** > **General** section.

3. Select **Enable Redundancy**.

NOTE: Once two devices are working in redundancy mode and you disable redundancy, the device starts broadcasting as a standalone device.

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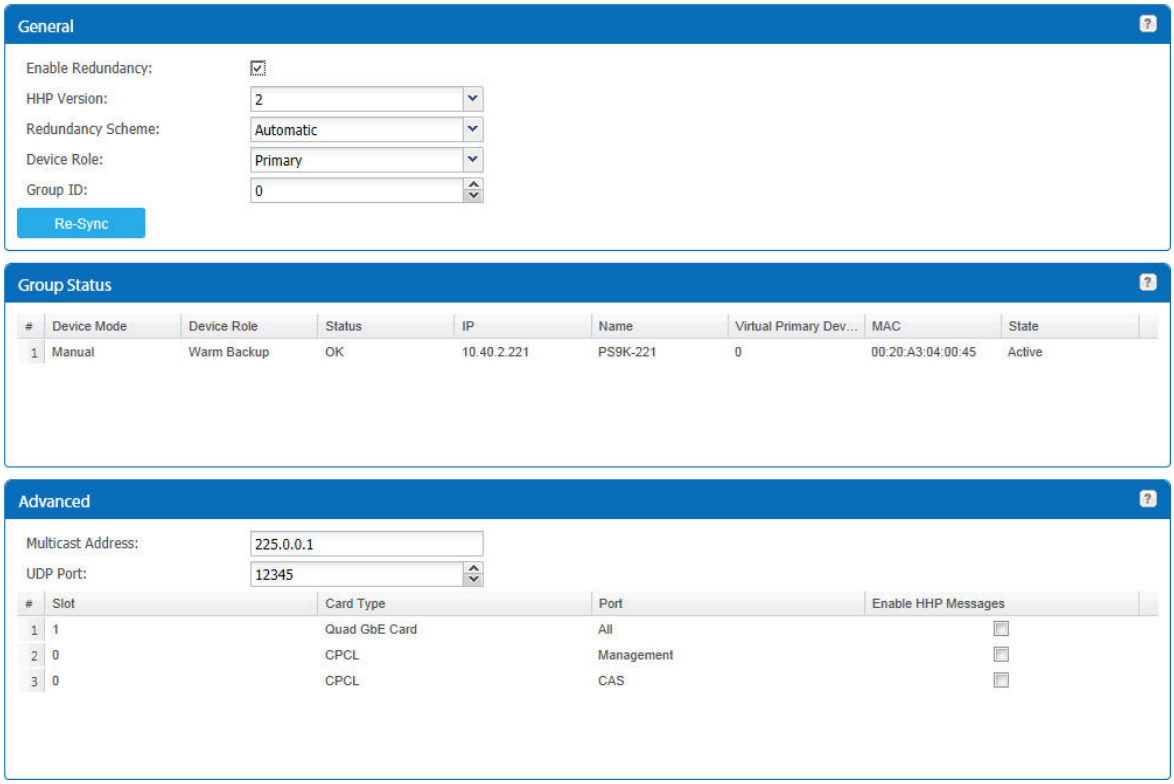
The tab is updated as the following picture shows:.



4. **HHP Version** - open the **HHP Version** list and select the required version:
   - Version 1 - Applies to NMX device redundancy only.
   - Version 2 - By default **Version 2** is selected.
5. **Redundancy Scheme** - open the **Redundancy Mode** list and select either of the following:
   - Automatic - the default option
   - Manual - the redundancy switch is done by the user.
6. **Device Role** - open the **Device Role** list and select one of the following options:
   - Primary - this device advertises the latest configuration.

   The following options refer to a backup device:
   - Warm Backup - Backup gets the configuration of the primary device and applies it but the backup is in active, it does not broadcast.
   - Hot Backup - Backup gets the configuration of the primary device, applies it and broadcasts.
7. **Group ID** - enter the required Group ID number. Group ID should be the same for the primary and backup device.

NOTE: You should not move a device from a group when it is broadcasting and is connected to a network.

8. Click **Apply**.

   The redundant devices start communicate via the HHP protocol. The backup device obtains the configuration of the primary device and during operations monitors for changes in the configuration of the primary device.

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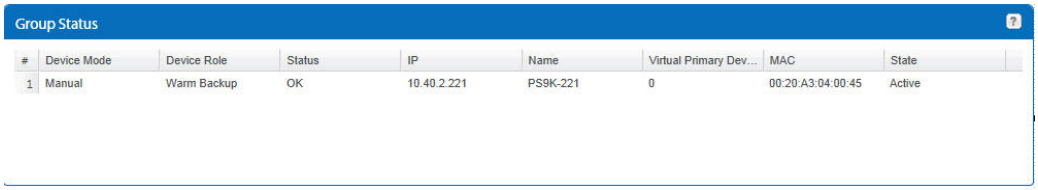
Re-Synchronization Button

The Resync button allows to obtain the configuration of the primary. Typically, the backup device polls the primary configuration during operation to monitor for changes in the configuration. Use this button in case a problem arises.

Viewing Redundancy Group Information

To view redundancy group information:

1. Log into the device via the web client. See *Logging into ProStream 9000* on page 11.
2. Select **Platform** > **Redundancy** > **General** section
3. Focus on the **Group Status** section:.



4. View the following for all devices of the group:

Table 12–7: Redundancy Group Information

Parameter	Explanation
#	Sequential number
Device Mode	Indicates whether Automatic or Manual.
Device Role	Indicates whether primary /warm backup/hot backup
Status	OK - device is up and running Fail - device is faulty
IP	The IP address of the device
Name	The name of the device
Virtual Primary Device	The group number of the virtual primary device.
MAC	The MAC address of the device
Configuration Sync.	The exact time and date the last configuration synchronization between the primary and backup took place. For future use.
State	The actual state of the device: Active Inactive - Standby

Advanced Redundancy Configuration

The Advanced tab allows you to view and configure the GbE ports parameters. It is only for advanced users.

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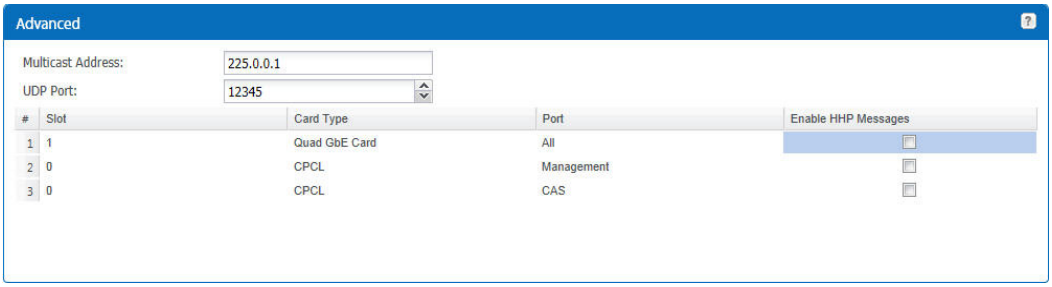
To configure GbE port parameters:

1. Log into the device via the web client. See *Logging into ProStream 9000* on page 11.
2. Select **Platform** > **Redundancy** > **General** section.
3. Focus on the Advanced section.



4. In **Multicast**, enter the multicast address that serves the redundancy. The multicast should be identical for the primary and the backup device.
5. In **UDP port**, select the required UDP port,
6. View and configure the GbE ports to carry the redundancy data

Table 12–8: GbE Ports Redundancy Information

Parameter	Explanation
Slot #	The slot number on which the GbE port is located.
Card Type	Indicates whether CPCL card, or any of the available cards.
Port	Indicates the following: ■ GbE - port number ■ Main - whether management or CAS ■ All - refers to all card ports
HHP Messages	If selected, the port communicates via an HHP protocol for redundancy purposes.

NOTE: Configure at least two ports to communicate via HHP.

Configuring EAS Parameters

To configure the Emergency Alert System:

1. Select **Platform** > **EAS**.

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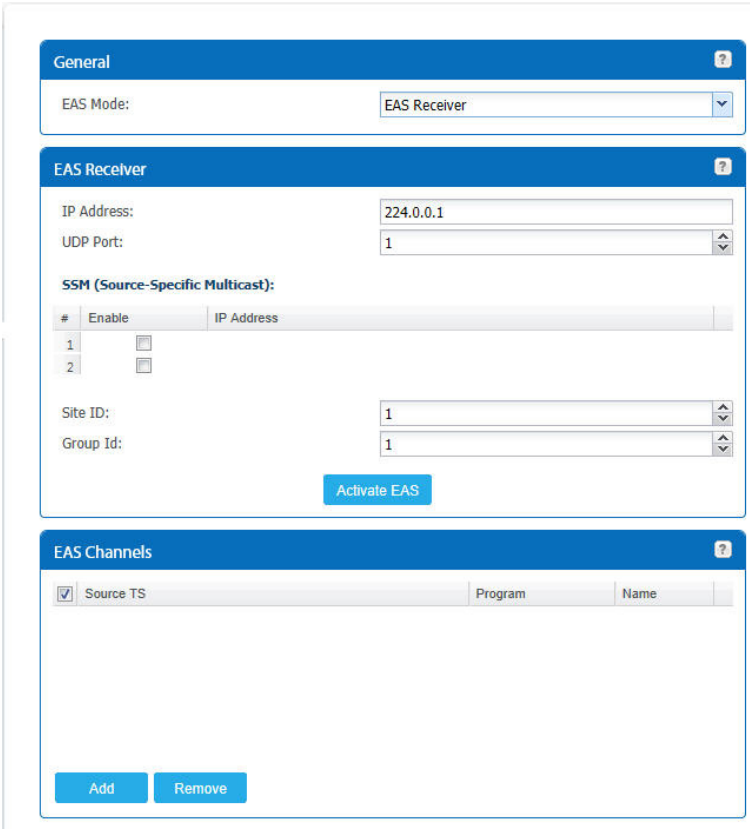
2. Open the **EAS Mode** list and select one of the following:
   - None - no EAS application
   - GPI Converter - ProStream 9000 serves as the GPI converter that generates EAS request.
   - EAS Receiver - ProStream 9000 serves as the EAS receiver. Once you select EAS Receiver, additional fields appear for configuring the EAS receiver and the input EAS channel.

Configuring EAS Receiver

To configure EAS receiver:

1. Select **EAS Receiver**. The following fields appear in the EAS tab:



2. In **IP Address**, enter the EAS receiver IP address.
3. In **UDP Port**, enter the UDP port to receive the EAS.
4. **SSM (Source Specific Multicast)** - Source Specific Multicast. This feature allows you to define up to four different sources for the TS by entering the IP address of the upstream transmitting devices. This feature is relevant only when working in GMPv3. To configure it select Enable and enter the multicast IP address.
5. In **Site ID**, enter the site ID of the EAS receiver.
6. In **Group ID**, enter the group ID of the EAS receiver.
7. Click **Active AES**, to activate ProStream 9000 as AES receiver.
8. To add an EAS channel, click **Add**.

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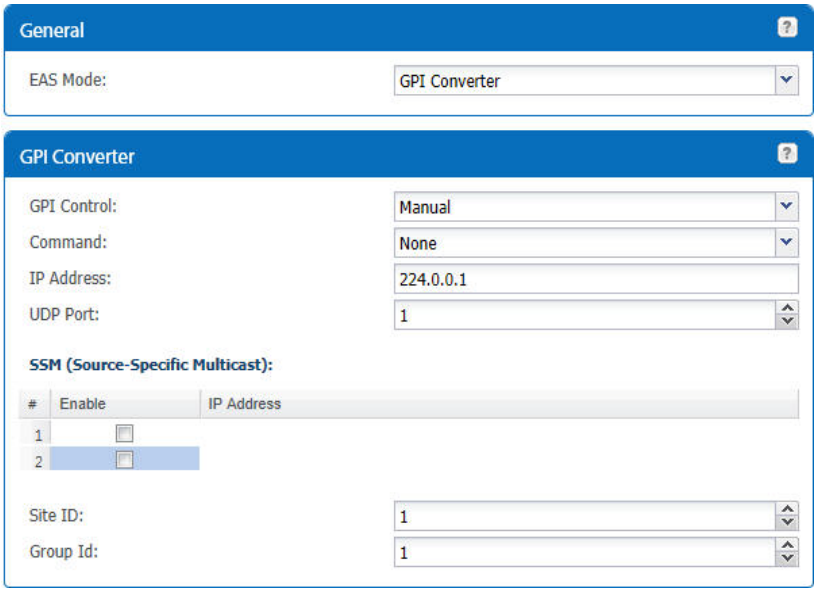
9. Open the **Source TS** and select the required TS. This list is populated with TSs with EAS services.
10. In **Program**, enter the required service ID, that is an EAS service.
11. In **Name**, enter the required service name for this EAS service.

NOTE: See also *Configuring EAS Parameters* on page 265.

Configuring GPI Converter

To configure GBPI Converter:

1. Select **GPI Converter**. The following fields appear in the EAS tab:



2. Open the **GPI Control** list and select either Manual or Automatic. The control can be:
   - Automatic - a corresponding command is sent according to the IRD signal.
   - Manual - the user is required to send the command manually
3. Open the Command list and select one of the following:
   - None - no EAS activation command
   - Activate - EAS activation command is enabled and the GPI is ready to send it to the EAS receiver
   - Deactivate - EAS de-activation command is enabled and the GPI does not send it to the EAS receiver
4. In IP Address, enter the IP address for sending and receiving EAS commands.
5. In UDP port, select the UDP port number for sending and receiving EAS commands.
6. **SSM (Source Specific Multicast)** - Source Specific Multicast. This feature allows you to define up to four different sources for the TS by entering the IP address of the upstream transmitting devices. This feature is relevant only when working in GMPv3. To configure it select Enable and enter the multicast IP address.
7. In **Site ID**, enter the site ID of the EAS receiver.

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8. In **Group ID**, enter the group ID of the EAS receiver.

ESAM (Event Signaling and Management)

The Event Signaling and Management feature is a blackout solution for linear channels. It is based on the ESAM (SMI and MMI) interface that is used for ad insertion and blackout on the multiscreen platform. The ESAM system includes the following:

BMS (Blackout Management System). The BMS receives blackout information from the content providers. The BMS has the following information:

- Blackout schedule for each program and blackout zone
- Database of all the Virtual IRDs (VIRD)
- Database of all the possible alternative feeds

The BMS communicates with the LSS and LSP over ESAM

LSP - (Linear Stream Processor). The LSP is the Harmonic ProStream located in the Central Headend. The LSP supports synchronous (from incoming SCTE35-2012) and asynchronous signaling (from the BMS), and based on these signaling, it generates SCTE35-2012 for each program that is streaming to the IP Network. The protocol between BMS to the LSP is the standard ESAM-SMI

LSS - (Linear Stream Switcher). The LSS is the Harmonic ProStream located at the edge of the network and is responsible for switching to and from alternative feed, based on BMS commands. The LSS can manage multiple blackout zones for each input program, meaning, multiple VIRDs for each input program. The LSS has a database of all the VIRDs. The LSS communicates with the BMS over ESAM. The LSS support up to 400 VIRDs.

VIRD (Virtual IRD). It represents a single program at the output of the LSS, for a specific blackout zone, and it replaces a physical IRD that is feeding today the legacy QAM plant.

To configure a program with ESAM, see *Event Signaling and Management (ESAM) Feature* on page 90.

Configuring General ESAM Parameters

To configure general ESAM Parameters:

1. Log into the device as explained in *Logging into the Device* on page 12.
2. Select **Platform** > **ESAM**:

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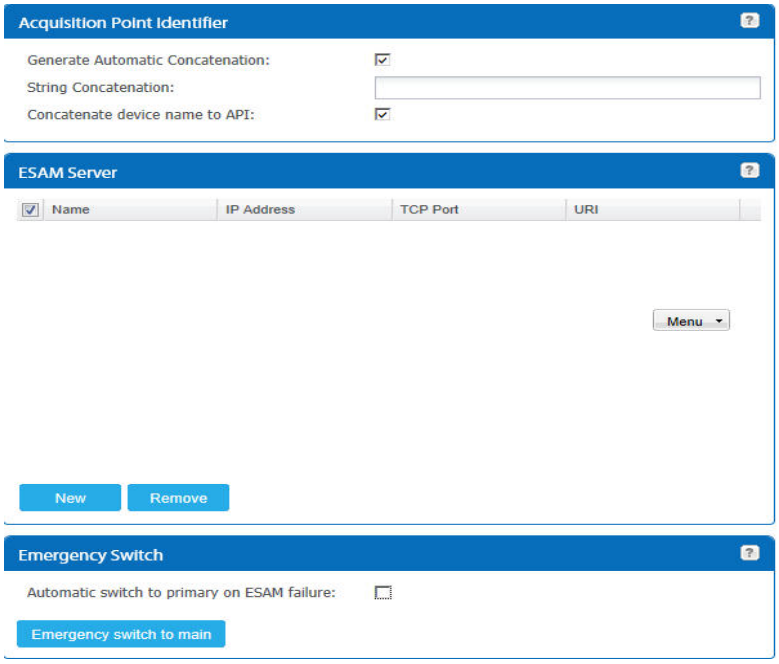
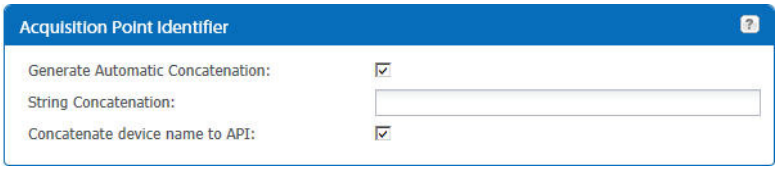


3. To configure the Acquisition Point Identifier, focus on this section:

NOTE: Configure the following steps (4 - 6) before LSS/LSP configuration.



4. **Generate Automatic Concatenation** - Applies to LSS only. Select to add a string concatenation to the API (Acquisition Point Identifier) of the program.
5. **String Concatenation** - Enter the string concatenation.
6. **Concatenate Device Name to API** - If selected, device name is added to the string concatenation. This option applies to LSP only.

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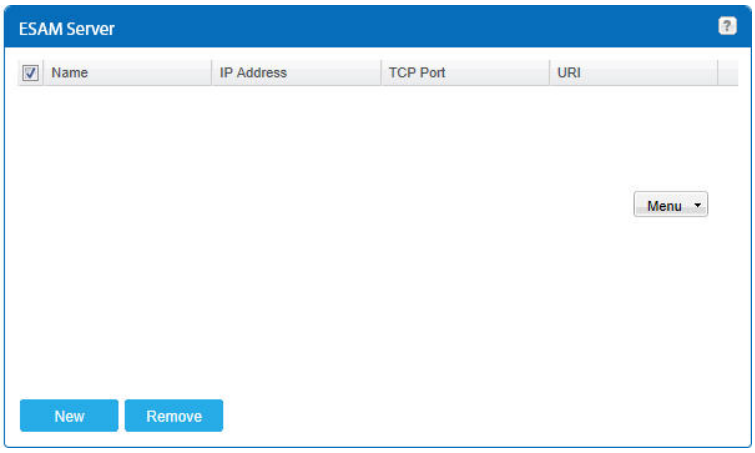
7. To configure the ESAM servers, focus on the ESAM Server section:



8. Click **New** to add a blank line to the table.
9. **Name** - enter the name of the ESAM server.
10. **IP Address** - enter the IP address of the server.
11. **TCP Port** - select the port over which the ESAM server listens to messages.
12. **URI** - enter the type of notification event, like blackout.
13. To engage Emergency Switch, focus on the **Emergency Switch** section
    - **Automatic Switch to Primary on ESAM Failure** - when selected, upon communication failure, automatically switches the LSS services to the primary LSS services.
    - **Emergency switch to main** - manually switches from an alternate service to a primary service.

NOTE: The **Emergency switch to main** button can also be found at **Configuration>Logical Outputs>Programs>Program x: Properties> ESAM**

NOTE: If the service is already defined as Main, pressing Emergency switch to main will have no effect.

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Chapter 13
Backing Up & Restoring Device Configuration

Overview

You can save the ProStream configuration and upload it to your device or any other ProStream unit when required. Downloading and uploading the configuration enables the following:

- backup configuration
- To upload the configuration to another device
- To upload various settings to the device.

Backing Up the Configuration

When downloading the ProStream configuration it is saved it as an.XML file. The XML file includes all the configuration beside the IP address, Subnet mask and default gateway of ETH1 port.

Back up the current configuration to a file. The default location of the XML file is the Downloads folder and the default name is Platform. You can change the name and save it to your defined location on the device hard disk.

To back up the configuration:

1. Log into the device.
2. Select Platform > Backup/Restore.
3. Focus on the **Backup Device Configuration to a File** section:

4. To backup, click **Backup**.

   The file is created in the default location with a default name, Downloads > Platform.xml

Restoring Configuration from a File

When restoring configuration, the uploaded configuration is loaded to the device and the previous configuration is removed.

NOTE: It is recommended to backup the current configuration before restoring as restoring overwrites the current configuration

To restore the configuration:

1. Log into the device.
2. Select **Platform** > **Backup/Restore**.

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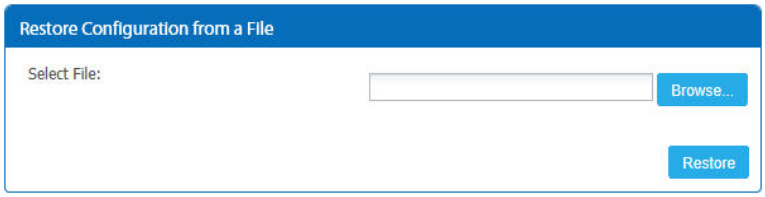
3. Focus on the **Restore Configuration from a File** section:



1. To locate the required configuration, click **Browse**.
2. Browse to the configuration file of your choice and click **Open**.

   The file name appears in the **Select File** box.
3. To restore, click **Restore**.

   The previous configuration is removed and the new one is uploaded.

NOTE: The uploaded configuration does not include the IP address, Subnet Mask and default gateway of ETH1.

Restoring Default Configuration

To restore the default configuration:

1. Log into the device.
2. Select **Platform** > **Backup/Restore**.
3. Focus on the **Restore to default Configuration** section:

4. Click **Restore**.

   The previous configuration is removed and the device boots up with the default configuration.

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Appendix A
Contacting the Technical Assistance Center

Harmonic Global Service and Support has many Technical Assistance Centers (TAC) located globally, but virtually co-located where our customers can obtain technical assistance or request on-site visits from the Regional Field Service Management team. The TAC operates a Follow-The-Sun support model to provide Global Technical Support anytime, anywhere, through a single case management and virtual telephone system. Depending on time of day, anywhere in the world, we will receive and address your calls or emails in one of our global support centers. The Follow-the-Sun model greatly benefits our customers by providing continuous problem resolution and escalation of issues around the clock.

Report an issue online at:

http://harmonicinc.com/webform/report-issue-online

Table A–1: Technical Support Phone Numbers and Email Addresses

Region	Telephone Technical Support	Email
Americas	888.673.4896 (888.MPEG.TWO) or +1.408.490.6477	*support@harmonicinc.com*
Europe, Middle East, and Africa (EMEA)	+44.1252.555.450	*emeasupport@harmonicinc.com*
India	+91.120.498.3199	*apacsupport@harmonicinc.com*
Russia	+7.495.926.4608	*rusupport@harmonicinc.com*
Mainland China	+86.10.6569.5580	*chinasupport@harmonicinc.com*
Japan	+81.3.5565.6737	*japansupport@harmonicinc.com*
Asia Pacific – Other Territories	+852.3184.0045 or 65.6542.0050	*apacsupport@harmonicinc.com*

The Harmonic Inc. support website is:

http://www.harmonicinc.com/content/technical-support

The Harmonic Inc. software downloads sites are:

Distribution and Delivery Software	*ftp://ftp.harmonicinc.com*
Production and Playout Software	*ftp://ftp.Omneon.com//Updates/Omneon/Current/*
Software for Select Electra Encoders	*https://harmonic.force.com/SWAccess/SWDownloadLogin*

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The Harmonic Inc. corporate address is:

Harmonic Inc.
4300 North First St.
San Jose, CA 95134, U.S.A.
Attn: Customer Support

The corporate telephone numbers for Harmonic Inc. are:

Tel. 1.800.788.1330 (inside the U.S.)
Tel. +1.408.542.2500 (outside the U.S.)
Fax.+1.408.542.2511

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Appendix B
Safety and Regulatory Compliance Information

Legal Disclaimer: Information in this document is provided in connection with Harmonic products. Unless otherwise agreed in writing Harmonic products are not designed nor intended for any application in which the failure of the product could cause personal injury or death.

NOTE: The information in this appendix may apply to purchased products only.

Important Safety Instructions

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions are found throughout the guide where they apply, but may not appear here. Please read and follow the important safety information, noting especially those instructions related to risk of fire, electric shock or injury to persons. You must adhere to the guidelines in this document to ensure and maintain compliance with existing product certifications and approvals. In this document, we use “product,” “equipment,” and “unit” interchangeably.

This equipment generates, uses, and can radiate radio frequency energy. It may cause harmful interference to radio communications if it is not installed and used in accordance with the instructions in this manual. Operation of this equipment in a residential area is likely to cause harmful interference If this occurs, the user will be required to correct the interference at his or her own expense.

In event of conflict between the information in this document and information provided with the product or on our website for a particular product, this product documentation takes precedence.

Safety Symbols & Translated Safety, Warning & Caution Instructions (English)

To avoid personal injury or property damage, before you begin installing or replacing the product, read, observe, and adhere to all the following safety instructions and information. Harmonic products and/or product packaging may be marked with the safety symbols used throughout this document, when it is necessary to alert operators, users, and service providers to pertinent safety instructions in the manuals.

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Mark	Notes
Warning	**Installing or Replacing the Product Unit Warning** ■ Only trained and qualified service personnel should be allowed to install, replace, or service this unit (refer AS/NZS 3260 Clause 1.2.14.3 Service Personnel). ■ Read the installation instructions before connecting the system to the power source. ■ When installing or replacing the unit, always make the ground connection first and disconnect it last. ■ Installation of the unit must comply with local and national electrical codes. ■ This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of special tool, lock and key or other means of security. ■ Use only specified replacement parts. ■ Do not use this unit in or near water. Disconnect all AC power before installing any options or servicing the unit unless instructed to do so by this manual.
Warning	**Rack Mount Warning** ■ To prevent bodily injury when mounting or servicing this unit in a rack, special precautions must be taken to ensure your safety and stability of system: ■ Conform to local occupational health and safety requirements when moving and lifting the equipment. ■ Ensure that mounting of the unit by mechanical loading tools should not induce hazardous conditions. ■ To avoid risk of potential electric shock, a proper safety ground must be implemented for the rack and each piece of equipment installed on it.
Warning	**Chassis Warning** ■ Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. ■ To prevent personal injury or damage to the chassis, lift the unit only by using handles that are an integral part of the chassis, or by holding the chassis underneath its lower edge. ■ Any instructions in this guide that require opening the chassis or removing a board should be performed by qualified service personnel only. ■ Slots and openings in the chassis are provided for ventilation. Do not block them. Leave the back of the frame clear for air exhaust cooling and to allow room for cabling - a minimum of 6 inches (15.24 cm) of clearance is recommended.

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Mark	Notes
 Warning	**Electric Shock Warning** ■ This unit might have more than one power cord. To reduce the risk of electric shock, disconnect the two power supply cords before servicing the unit. ■ Before working on a chassis or working near power supplies, unplug the power cord on AC units. ■ Do not work on the system or connect or disconnect cables during periods of lightning activity. ■ This unit is grounded through the power cord grounding conductor. To avoid electric shock, plug the power cord into a properly wired receptacle before connecting the product input or outputs. ■ Route power cords and other cables so that they are not likely to be damaged. Disconnect power input to unit before cleaning. Do not use liquid or aerosol cleaners; use only a damp cloth to clean chassis. ■ Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on. Do not insert anything into either of the system's two power supply cavities with power connected ■ Never install an AC power module and a DC power module in the same chassis. ■ Do not wear hand jewelry or watch when troubleshooting high current circuits, such as the power supplies. ■ To avoid fire hazard, use only the specified correct type voltage and current ratings as referenced in the appropriate parts list for this unit. Always refer fuse replacement to qualified service personnel. ■ This unit relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). ■ To avoid electrocution ensure that the rack has been correctly grounded before switching on the unit. When removing the unit remove the grounding connection only after the unit is switched off and unplugged.
 Caution	**Electrostatic Discharge (ESD) Caution** ■ Follow static precaution at all times when handling this unit. ■ Always wear an ESD-preventive wrist or ankle strap when handling electronic components. Connect one end of the strap to an ESD jack or an unpainted metal component on the system ■ Handle cards by the faceplates and edges only; avoid touching the printed circuit board and connector pins. ■ Place any removed component on an antistatic surface or in a static shielding bag. ■ Avoid contact between the cards and clothing. ■ Periodically check the resistance value of the antistatic strap. Recommended value is between 1 and 10 mega-ohms (Mohms).

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Mark	Notes
Warning	**Laser Radiation Warning** Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Never operate a unit with a broken fibre or with a separated fiber connector.
Warning	Lithium Battery Handling Safety Instructions ■ CALIFORNIA PERCHLORATE ADVISORY: Some lithium batteries may contain perchlorate material. The following advisory is provided: "Perchlorate Material - special handling may apply, see: *www.dtsc.ca.gov/hazardous waste/perchlorate/ for information*".
Caution	■ Risk of explosion if battery is replaced incorrectly or with an incorrect type ■ Dispose of used batteries according to the manufacturer's instructions ■ There are no user-serviceable batteries inside Harmonic products. Refer to Harmonic qualified personnel only to service the replaceable batteries

Symboles de sécurité et traduits de sécurité, d'avertissement et Attention Instructions (français)

Pour éviter des blessures ou des dommages matériels, avant de commencer l'installation ou le remplacement du produit, lire, observer, et de respecter toutes les instructions et informations de sécurité suivantes. Produits harmoniques et / ou l'emballage du produit peuvent être marqués avec les symboles de sécurité utilisés dans le présent document, lorsque cela est nécessaire pour alerter les opérateurs, les utilisateurs et les fournisseurs de services de consignes de sécurité pertinentes dans les manuels.

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Mark	Notes
 Avertissement	**Installation ou remplacement de l'unité de produit Avertissement** ■ Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés. (voir AS / NZS 3260 article 1.2.14.3 du personnel de service). ■ Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation. ■ Lors de l'installation ou le remplacement de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier. ■ L'équipement doit être installé conformément aux normes électriques nationales et locales. ■ Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. ■ Utilisez uniquement des pièces de rechange spécifiées. ■ Ne pas utiliser ce produit dans l'eau ni à proximité de l'eau. Débrancher toutes les prises d'alimentation secteur avant d'installer des options ou d'effectuer l'entretien de l'unité, à moins d'instructions contraires dans le présent manuel.
 Avertissement	**Rack Monture Avertissement** Pour éviter les blessures corporelles lors du montage ou l'entretien de cet appareil dans un rack, des précautions particulières doivent être prises pour assurer votre sécurité et la stabilité du système: ■ Conformez-vous aux exigences de médecine du travail et de sécurité lorsque vous déplacez et soulevez le matériel. ■ Assurez-vous que le montage de l'appareil par des outils de chargement mécaniques ne doit pas induire des conditions dangereuses. ■ Pour éviter tout risque d'électrocution, le rack et chaque élément de l'équipement installé dans le rack doivent être correctement reliés à la terre.
 Avertissement	**Châssis Avertissement** ■ Avant de connecter ou de déconnecter les câbles d'alimentation (pôles et terre) du châssis, vérifiez que le circuit de courant continu est hors tension. ■ Pour éviter toute blessure ou des dommages au châssis, soulevez l'unité uniquement par les poignées du châssis lui-même ou en portant celui-ci par le bord inférieur. ■ Toutes les opérations du présent guide nécessitant l'ouverture du châssis ou le retrait d'une carte doivent être uniquement effectuées par du personnel d'entretien qualifié. ■ Le châssis est muni de fentes et d'ouvertures d'aération. Ne pas les bloquer. Dégager l'arrière du cadre pour permettre le refroidissement de l'évacuation d'air et laisser de la place au câblage; un dégagement d'au moins 15.24 cm (6 po) est recommandé.

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Mark	Notes
 Avertissement	**Choc électrique Avertissement** ■ Il est possible que cette unité soit munie de plusieurs cordons d'alimentation. Pour éviter les risques d'électrocution, débrancher les deux cordons d'alimentation avant de réparer l'unité. ■ Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif. ■ Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage. ■ Ce unité est mis à la terre par le conducteur de protection intégré au cordon d'alimentation. Pour éviter les chocs électriques, brancher le cordon d'alimentation dans une prise correctement cable avant de raccorder les entrées ou sorties du unité. ■ Installer les cordons d'alimentation et autres cables de sorte qu'ils ne risquent pas d'être endommagés. Couper l'alimentation avant nettoyage. Ne pas utilizer de nettoyant liquide ou en aérosol; utiliser seulement un linge humide. ■ Des courants électriques dangereux circulent dans cet appareil. Afin d'éviter les lessures, ne pas toucher les connexions et composants exposés lorsque l'appareil est sous tension. Ne rien insérer dans l'une ou l'autre des cavités des prises de courant du système lorsque l'appareil est sous tension. ■ N'installez jamais un module d'alimentation AC et un module d'alimentation DC dans le même châssis. ■ Ne pas porter de bijoux aux mains ni de montre durant le dépannage des circuits à haute tension, comme les transformateurs. ■ Pour prévenir les risques d'incendie, n'utiliser que le type, la tension et le courant nominal spécifiés dans la nomenclature des pièces de ce unité. Toujours confier le remplacement des fusibles à du personnel d'entretien qualifié. ■ Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge). ■ Pour éviter l'électrocution, assurez-vous que le rack a bien été mis à la terre avant de mettre l'unité en marche. Lors du retrait de l'unité, retirer le raccordement de terre seulement après avoir mis l'unité à l'arrêt et l'avoir débranchée.

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Mark	Notes
Attention	**Les décharges électrostatiques (ESD) Attention** ■ Respecter systématiquement les precautions relatives aux charges électrostatiques durant la manipulation de cet unité. ■ Portez toujours un poignet ou la cheville bracelet antistatique préventive lors de la manipulation des composants électroniques. Branchez une extrémité de la sangle à une prise ESD ou d'un composant métallique non peinte sur le système. ■ Manipulez les cartes en les faces avant et les bords seulement; éviter de toucher la carte de circuit imprimé et les broches du connecteur. ■ Placer un composant retiré sur une surface antistatique ou dans un sac de protection statique. ■ Éviter tout contact entre les cartes et les vêtements. ■ Vérifier périodiquement la valeur de résistance de la sangle antistatique. Valeur recommandée est comprise entre 1 et 10 méga-ohms (Mohms).
Avertissement	**Rayonnement laser Attention** ■ Rayonnement laser invisible peut être émis à partir de fibres ou les connecteurs débranchés. Ne pas regarder en faisceaux ou regarder directement avec des instruments optiques. Ne jamais faire fonctionner une unité en cas de bris d'une fibre ou de séparation d'un connecteur de fibre.
Avertissement	**Batterie au lithium Manipulation instructions de sécurité** ■ Perchlorate pour la Californie Consultatif: Certaines batteries au lithium, peuvent contenir du perchlorate. le texte qui suit consultatif est prévu: "Présence de perchlorate - une manipulation spéciale peut s'appliquer, voir: *www.dtsc.ca.gov/hazardous waste/perchlorate/ for information*".
Attention	■ Il y a danger d'explosion si la batterie est remplacée de manière incorrecte ou par une batterie de type incorrect. ■ Mettre au rebut les batteries usagees conformement aux instructions du fabricant. ■ Les batteries des produits Harmonic ne peuvent pas être réparées ni entretenues par l'utilisateur. Ne confier l'entretien des batteries remplaçables qu'à du personnel compétent de Harmonic.

Sicherheit Symbole und übersetzt Sicherheit, Achtung & Vorsicht Anleitung (Deutsch)

Um Verletzungen oder Sachschäden zu vermeiden, bevor Sie mit der Installation oder Austausch des Produkts zu beginnen, zu lesen, zu beobachten, und sich an all den folgenden Sicherheitshinweise und Informationen. Harmonic Produkte und / oder Produktverpackungen können mit den Sicherheitssymbole in diesem Dokument verwendet werden, markiert, wenn es notwendig ist für die Betreiber, Anwender und Dienstleister, um relevante Sicherheitsanweisungen in den Handbüchern zu alarmieren.

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Mark	Notes
 Warnung	**Installation oder den Austausch des Produkts Einheit Warnung** ■ Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet warden (siehe AS / NZS 3260 Clause 1.2.14.3 Servicepersonal) ■ Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen. ■ Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden. ■ Die Installation der Geräte muss den Sicherheitsstandards entsprechen. ■ Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang. ■ Verwenden Sie nur die angegebenen Ersatzteile ■ Das Gerät in oder in der Nähe von Wasser verwenden. Trennen Sie vor der Installation von Optionen oder Wartung des Gerätes, es sei denn, dies wurde von diesem Handbuch alle Netz.
 Warnung	**Rack-Montage-Warnung** Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt: ■ Entsprechen den lokalen Arbeitsschutzanforderungen beim Bewegen und Heben der Ausrüstung. ■ Stellen Sie sicher, dass die Montage des Gerätes durch mechanische Belastung Werkzeuge sollten nicht gefährlichen Bedingungen zu induzieren. ■ Um das Risiko von möglichen elektrischen Schlag zu vermeiden, muss mit einer angemessenen Erdung für Rack und jedes Gerät installiert ist implementiert werden.
 Warnung	**Chassis Warnung** ■ Gleichstrom-Unterbrechung Bevor Sie Erdungs- oder Stromkabel an das Chassis anschließen oder von ihm abtrennen, ist sicherzustellen, daß der Gleichstrom-Stromkreis unterbrochen ist. ■ Um Verletzungen und Beschädigung des Chassis zu vermeiden, sollten Sie das Chassis nicht an den Henkeln auf den Elementen (wie z.B. Stromanschlüsse, Kühlungen oder Karten) heben oder kippen; oder indem Sie es unterhalb der Unterkante packen. ■ Alle Hinweise in diesem Handbuch, die das Öffnen benötigen Sie das Gehäuse oder das Entfernen eines Board sollte nur von qualifiziertem Fachpersonal durchgeführt werden. ■ Für Schlitze und Öffnungen im Chassis vorgesehen. Blockieren Sie sie nicht. Lassen Sie die Rückseite des Rahmens frei für Abluftkühlung und um Platz für die Verkabelung ermöglichen - ein Minimum von 6 Zoll (15,24 cm) Abstand wird empfohlen

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Mark	Notes
 Warnung	**Elektroschock-Warnung** ■ Diese Einheit hat möglicherweise mehr als ein Netzkabel. Zur Verringerung der Stromschlaggefahr trennen Sie beide Netzgerätekabel ab, bevor Sie die Einheit warten. ■ Vor der Arbeit an einem Chassis für Arbeiten in der Nähe Stromversorgung, ziehen Sie das Netzkabel mit Netzeinheiten. ■ Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert. ■ Dieses Gerät ist über das Netzkabel Erdungsleiter geerdet. Um einen Stromschlag zu vermeiden, stecken Sie das Netzkabel in eine Steckdose richtig verdrahtet, bevor Sie das Produkt Eingang oder Ausgänge. ■ Verlegen Sie Netzkabel und andere Kabel, so dass sie wahrscheinlich nicht beschädigt werden. Trennen Eingangsleistung Einheit vor der Reinigung. Verwenden Sie keine flüssigen oder Aerosolreiniger; nur mit einem feuchten Tuch zu reinigen Chassis. ■ Gefährliche Spannungen vorhanden sind an mehreren Stellen in diesem Produkt. Um Verletzungen zu vermeiden, berühren Sie nicht freiliegenden Anschlüsse und Komponenten während schaltet ist. Sie keine Gegenstände in einem der beiden Stromversorgungs Hohlräume des Systems mit Strom verbunden einführen. ■ Ein Wechelstromsmodul und ein Gleichstrommodul dürfen niemals in demselben Chassis installiert werden. ■ Tragen Sie keine Hand Schmuck oder schauen Sie bei der Fehlersuche hohen Stromkreise, wie beispielsweise die Stromversorgung. ■ Um die Brandgefahr zu vermeiden, verwenden Sie nur den genannten richtige Art von Spannung und Strom Ratings als in der entsprechenden Stückliste für diese Einheit verwiesen. Beziehen sich immer auf Austausch der Sicherung von qualifiziertem Fachpersonal. ■ Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 240 V Wechselstrom, 10 A (bzw. in den USA 120 V Wechselstrom, 15 A) an den Phasenleitern (allen stromführenden Leitern) verwendet wird. ■ Um einen Stromschlag zu vermeiden, sicherzustellen, dass die Zahnstange wurde korrekt vor dem Einschalten des Gerätes geerdet. Beim Entfernen der Einheit entfernen Sie die Masseverbindung nur, nachdem das Gerät ausgeschaltet und der Netzstecker gezogen.

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Mark	Notes
Vorsich	**Elektrostatische Entladung (ESD) Vorsicht** ■ Folgen Sie statische vorsorglich zu jeder Zeit beim Umgang mit diesem Gerät. ■ Tragen Sie immer einen ESD-präventive Handgelenk oder Knöchel-Riemen beim Umgang mit elektronischen Komponenten. Schließen Sie ein Ende des Bandes an einem ESD-Buchse oder ein unlackiertes Metallteil auf dem System. ■ Hand Karten nur durch die Faceplates und Kanten; Berühren Sie die bedruckte Leiterplatte und Steckerstifte. ■ Legen Sie alle entfernten Komponenten auf eine antistatische Oberfläche oder in einem Statik-Beutel. ■ Kontakt zwischen den Karten und Kleidung vermeiden. ■ Den Widerstandswert der gegen statische Gurt in regelmäßigen Abständen überprüfen. Empfohlener Wert ist zwischen 1 und 10 Mega-Ohm (MOhm).
Warnung	**Laserstrahlungen Warnung.** Unsichtbare Laserstrahlung kann von getrennten Fasern oder Stecker emittiert werden. Nicht in die Strahlen blicken oder direkt mit optischen Instrumenten. Niemals ein Gerät mit einem gebrochenen Faser oder mit einem Glasfaseranschluss getrennt.
Warnung	**Lithium-Batterie Handhabung Sicherheitshinweise** CALIFORNIA PERCHLORATE ADVISORY: Einige Lithium-Batterien kann Perchlorat enthalten. Die folgende Beratungs gesetzt: "Perchlorat - Sonderbehandlung kann erforderlich sein, finden Sie unter: *www.dtsc.ca.gov/ hazardous waste/perchlorate/ for information*".
Vorsich	■ Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr ■ Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers. ■ Es gibt keine zu wartenden Akkus im Harmonic Produkte. Siehe Harmonic qualifiziertes Personal, um die austauschbare Batterien Service

Site Preparation Instructions

NOTE: Only trained and qualified service personnel (as defined in IEC 60950 and AS/NZS 3260) should install, replace, or service the equipment. Install the system in accordance with the U.S. National Electric Code if you are in the United States.

1. Preparing & Choosing a Site for Installation
   - ❑ To ensure normal system operation, plan your site configuration and prepare the site before installation.
   - ❑ Install the unit in a restricted access area.

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- Choose a site with a dry, clean, well-ventilated and air-conditioned area.
- Choose a site that maintains an ambient temperature of 32 to 104°F (0 to 40°C)

2. Creating a Safe Environment
   - Connect AC-powered systems to grounded power outlets or as per local regulations.
   - Do not move or ship equipment unless it is correctly packed in its original wrapping and shipping containers.
   - Only allow Harmonic trained personnel to undertake equipment service and maintenance. Do not permit unqualified personnel to operate the unit.
   - Wear ear protection when working near an NSG Pro platform for a longer period of time.
3. Rack Mounting the Unit
   - Install the system in an open rack whenever possible. If installation in an enclosed rack is unavoidable, ensure that the rack has adequate ventilation.
   - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips). This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
   - When mounting this unit in the partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
   - If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.
   - The rack must be anchored to an immovable support to prevent it from tipping when the unit is mounted on it. The rack must be installed according to the rack manufacturer's instructions.
   - Disconnect all power and external cables before lifting the unit. Depending on the weight of the unit, more than one person might be required to lift it.
4. Power Considerations
   a. AC Power
      - Adding to the system a UPS (Uninterrupted Power Supply) and an AVR (Automated Voltage Regulator) is highly recommended.
      - Installing the main power supply by a qualified electrician, according to power authority regulations. Make sure all powering are wired with an earth leakage, according to local regulations.
      - It is recommended to install the encoder within 1.5m (approximately 5 feet) from an easily accessible grounded AC outlet.
      - When the encoder is rack-mounted, ensure that the rack is correctly grounded.

   b. DC Power
      - Ensure a suitable overcurrent device is in-line between the equipment and the power source.
      - Connect DC-input power supplies only to a DC power source that complies with the safety extra-low voltage (SELV) requirements in the UL60950-1, CAN/CSA-C22.2 No. 60950-1-03, AS/NZS 60950-1, EN/IEC 60825-1, 21 CFR 1040, EN 60950-1, and IEC 60950-1 standards.
      - Ensure that power is removed from the DC circuit before installing or removing power supplies
5. Handling Fiber Channel Cables
   - Always read and comply with the handling instructions on the shipping container.
   - Follow all ESD precautions and approved fiber cleaning procedures.

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- The fiber is made of a very pure, expensive glass and should be treated with great care. Handle fibers only in areas that are very clean and do not contain sharp objects.
- Wear finger cots or gloves as dirt and oils can damage the fiber and contaminate connectors.
- Do not allow kinks or knots to develop in the fiber. If tangles occur, carefully work out the tangles avoiding pulling or bending the fibre beyond its bend radius.
- Always use the correct tools for stripping and cleaving the fiber. It will save time and reduce breakage caused by scratches.
- If you must secure a bundle of fiber cables together, avoid plastic and metal tie wraps; secure with Velcro instead.

6. Disposing of the Unit
   - Dispose of the unit and its components (including batteries) as specified by all national laws and regulations.

Product End-of-Life Disassembly Instructions

For disassembly instructions, please call the technical support in order to remove components requiring selective treatment, as defined by the EU WEEE Directive (2012/19/EU). See Contacting the *Technical Assistance Center.*

Product Disassembly Process

1. Disassemble equipment at a dedicated area only, gather the needed tools for disassembly.
2. Remove covers, housing, etc.
3. Remove and separate sub-assemblies (i.e. cables, metals, displays, fans, etc.).
4. Separate hazardous materials from the remainder of the material.
   a. Sort hazardous materials into their different types (i.e., batteries, hazardous liquids, hazardous solids, fiberglass, etc.).
   b. Proceed with hazardous waste management processes only.
5. Identify re-usable materials/sub-assemblies and separate these from the rest of the material.
6. Identify and separate recyclable materials as per below examples:
   a. Scrap material to be sent to smelter(s).
   b. E-waste such as displays, CPU's, cables and wires, hard drives, keyboards, etc.
   c. Metals such as steel, brass, and aluminum.
   d. Plastics such as fan casings, housings, covers, etc.
   e. Fiber optics and plastic tubing not containing electrical or data wiring.

Safety Rules (English)

Recycle personnel are to wear personal protective equipment including proper eye protection, proper hand protection, and proper breathing protection if needed.

Recycle personnel shall be experienced with using the proper tools required for disassembling equipment. Untrained personnel shall not disassemble Harmonic products. Unfamiliarity with tools can cause damage and injury.

Règles de sécurité (French)

Le personnel du recycleur doit porter de l'équipement de protection individuelle, y compris des lunettes, des gants et un masque de protection appropriés au besoin.

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Le personnel du recycleur doit avoir de l'expérience des outils de démontage de l'appareil. Les produits Harmonic ne doivent pas être démontés par du personnel non qualifié. Une mauvaise connaissance des outils peut causer des dommages et des blessures.

EU Manufacturer's Declaration of Conformity

This equipment is in compliance with the essential requirements and other provisions of Directives 73/23/EEC and 89/336/EEC as amended by Directive 93/68/EEC.

NOTE: For specifics, about which standards have been applied, refer to the Declaration of Conformity of the product on Harmonic website at *Product Regulatory Compliance* or contact Harmonic Compliance Team at *regulatory.compliance@harmonicinc.com*

Electromagnetic Compatibility Notices – Class A

a. FCC Verification Statement (USA)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

Connections between the Harmonic equipment and other equipment must be made in a manner that is consistent with maintaining compliance with FCC radio frequency emission limits. Modifications to this equipment not expressly approved by Harmonic may void the authority granted to the user by the FCC to operate this equipment and you may be required to correct any interference to radio or television communications at your own expense.

b. ICES–003 Statement (Canada)

English: This Class A digital apparatus complies with Canadian ICES-003.

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

c. CE Declaration of Conformity (European Union)

This product has been tested in accordance too, and complies with the Low Voltage Directive (2014/30/EU) and EMC Directive (2014/35/EU). The product has been marked with the CE Mark to illustrate its compliance.

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d. VCCI Class A Warning (Japan)

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation of the notice above:

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) from Information Technology Equipment. If this equipment is used in a domestic environment, it may cause radio interference. When such trouble occurs, the user may be required to take corrective actions.

e. BSMI EMC Notice (Taiwan)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策

English translation of the notice above:

This is a Class A Information Product, when used in residential environment, it may cause radio frequency interference, under such circumstances, the user may be requested to take appropriate counter measures.

f. Class A Warning (Korea)

주의 A급 기기 이 기기는 업무용으로 전자파 적합 등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

English translation of the notice above:

This is a Class A device and is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this was sold or purchased by mistake, it should be replaced with a residential-use type.

g. Class A Statement (China)

中华人民共和国“A类”警告声明

声 明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

English translation of the notice above:

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When labeled with the CCC marking, the product meets the applicable safety and EMC requirements for China. This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

h. Class A Warning – CISPR 22 (AS/NZS)

Warning (English)

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

Attention (French)

Il s'agit d'un produit de classe A. Dans un environnement local, ce produit peut entraîner des perturbations radioélectriques, auquel cas l'utilisateur devra éventuellement prendre des mesures adéquates.

Product Regulatory Compliance

Harmonic products are typically tested to the latest safety and electromagnetic compatibility (EMC) specifications and test methods, and are marked with one or more of the following regulatory/certification markings. Some of the certification markings will vary depending on what certifier was used to obtain a certification.

Please visit Harmonic *Product Regulatory Compliance* page to view information on applied safety & EMC standards and regulatory marks on Harmonic products. You can also email us at *regulatory.compliance@harmonicinc.com* for assistance on regulatory compliance for Harmonic products.

Product Regulatory Compliance Markings

Table B–1:Regulatory Compliance Markings

Country/ Region	Testing Standard/ Specification	Certification Type	Regulatory Mark Name	Product Marketing
USA/ Canada	EN 60950-1:2006+A11:2009+A1:2010+A12:2011; CAN/CSA C22.2 No. 60950-1-07+A1:2011/UL 60950-1:2011	Safety	NRTL (National Recognized Test Laboratory)	c UL us LISTED or TÜVRheinland c us
USA/ Canada	FCC CFR 47 Part 15, Class A ICES-003: Issue 5, 2012; Class A	EMC	FCC Class A Statement	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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Table B–1:Regulatory Compliance Markings

Country/ Region	Testing Standard/ Specification	Certification Type	Regulatory Mark Name	Product Marketing
European Union	RoHS: EN 50581:2012; EN55022:2010/ CISPR 22:2008; EN55024:2010/ CISPR 24:2010; EN61000-3-2:2006+A1:2009+A2:2009; EN61000-3-3:2008; Class A	Safety and EMC	CE / Low Voltage Directive	CE
Germany	EN 60950-1; EN60825-1 (for laser)	Safety	GS	TÜVRheinland CERTIFIED GS geprüfte Sicherheit
Mexico	NOM-019-SCFI-1998	Safety	NOM	NOM
Taiwan	CNS 14336-1:2010 CNS 13438:2006; Class A	Safety and EMC	BSMI Certification (RPC) Number & Class A Warning	R3A001 警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。
Japan	VCCI V-3/2013.04; CISPR 22:2008, Class A	EMC	VCCI	VCCI
Australia and New Zealand	AS/NZS CISPR22:2009+A1:2010; Class A	Safety	C-Tick	NXXXXX
Korea	KN22 Class A and KN 24	EMC	KC	KC

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Table B–1:Regulatory Compliance Markings

Country/ Region	Testing Standard/ Specification	Certification Type	Regulatory Mark Name	Product Marketing
China	GB4943.1-2011 GB9254-2008 GB17625.1-2012	Safety and EMC	CCC	
India	IS 13252 (Part 1): 2010	Safety	BIS Compulsory Registration	"Self Declaration - Conforming to IS 13252 (Part 1):2010, R-XXXXXXXX"

Product Environmental Compliance

Harmonic manufactures high quality and innovative IT and telecommunications equipment, video delivery infrastructure solutions and services for its customers worldwide. Harmonic is committed to providing our customers with safe and environmentally friendly products that are compliant with all relevant regulations, customer specifications, and environmental legislation, including the directives described below.

EU RoHS

In July 2006, the European Union's (EU) Directive (2002/95/EC) on the Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment (EEE) went into effect, and in July, 2011, the European Union's RoHS Recast Directive (2011/65/EU) also known as RoHS II entered into force.

Harmonic understands the environmental risks associated with the substances covered by the RoHS Directive and has committed to eliminating or reducing the use of these, as well as other environmentally sensitive substances in our products. Harmonic also continues to comply with the requirements under RoHS II.

For more information, please visit EU RoHS directive page at official EU website.

http://ec.europa.eu/environment/waste/rohs_eee/legis_en.htm

Restricted Substance Statement

Harmonic products contain less than the permitted limits for the six restricted substances except where exemptions published in the RoHS2 Directive are applicable. This statement is based on vendor-supplied analysis or material certifications, and/or lab test results of the component raw materials used in the manufacture of Harmonic products.

Table B–2:Restricted Substances

Restricted Substance	Permitted Limit*
Cadmium (Cd)	≤0.01%
Lead (Pb)	≤0.1%
Chromium (VI) (Cr (VI))	≤0.1%
Mercury (Hg)	≤0.1%

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Table B–2:Restricted Substances

Restricted Substance	Permitted Limit*
Polybrominated biphenyls (PBBs)	≤0.1%
Polybrominated diphenyl ether (PBDE)	≤0.1%
*Homogeneous material definition as per the EU Directive.	

EU REACH

REACH (Registration, Evaluation, Authorization and restriction of Chemicals) (EC 1907/2006) is a European Union's regulation on chemicals and their safe use which came into force in June, 2007.

Harmonic supports the basic aim of REACH in improving the protection of human health and environment through the better and earlier identification of intrinsic properties of chemical substances. Harmonic products are considered "articles" under REACH; therefore, we are required to provide recipients of our products with information on Substance of Very High Concern (SVHC) present in concentration above 0.1% (w/w).

Substances in our products are not intended to be released under normal or reasonably foreseeable conditions of use; therefore, the registration requirement in REACH Article 7(1) does not apply to our products.

For more information, please visit REACH regulation page at official EU website.

http://ec.europa.eu/environment/chemicals/reach/reach_en.htm

China RoHS

China's regulation on restriction of the use of certain hazardous substances commonly (China RoHS), is applicable to all Electronic and Information Products (EIPs) and parts sold in China after March 01, 2007. China RoHS regulation restricts the use of the same six substances as the European Union's ROHS, but has requirements for product labeling and regulated substance information disclosure.

Harmonic complies with China RoHS Phase I for labeling and information disclosure requirements and continues to monitor new developments in China RoHS Phase II towards substance restriction and certification program.

For more information, please visit China RoHS regulation page at official US export website.

http://www.export.gov/china/doingbizinchina/

China RoHS Disclosure Report

Below table shows the presence of hazardous substances, or elements in Harmonic products, if the part is present.

该表显示哈雷公司产品中可能含有的有毒有害物质元配件的信息，除了来源于元配件供应商的物料成分资料， 亦来自其它相关的机构与资料。哈雷产品不一定使用这些元配件。

This table shows those components where hazardous substances may be found in Harmonic products based on, among other things, material content information provided by third party suppliers. These components may or may not be part of the product.

除非特殊注明，哈雷公司产品的环保使用期限 均为 20 年。该环保使用期限的有效条件为：必须遵循

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该产品使用手 册的规定，对该产品进行使用或存储。

The Environmental Protective Use Period for Harmonic products is 20 years unless displayed otherwise on the product. The EPUP period is valid only when the products are operated or stored as per the conditions specified in the product manual.

部件名称 (Part name)	有毒有害物质或元素 (Hazardous Substance)					
	铅	汞 (Hg)	镉 (Cd)	六价铬 (CrVI)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (Printed Circuit Assemblies)	X	O	O	O	O	O
机械组件 (Mechanical Subassemblies)	X	O	O	O	O	O
光学组件 (Optical Subassemblies)	X	O	O	O	O	O
电源 (Power Supplies)	X	O	O	O	O	O
缆线 / 线束 (Cables, harnesses)	X	O	O	O	O	O
屏幕 / 显示器 (Screens, Monitors)	X	O	O	O	O	O
金属零件 (Metal Parts)	X	O	O	O	O	O
塑料 / 发泡材料 (Plastics, foams)	O	O	O	O	O	O
电池 (Batteries)	O	O	O	O	O	O

O: 表示在该部件的所有均质材料中，此类有毒有害物质的含量均小于 SJ/T11363-2006 标准所规定的限量。

O: Indicates the content of the toxic and hazardous substances at the homogeneous material level of the parts is below the limit defined in SJ/T11363 2006 standard.

X: 表示至少在该部件的某一均质材料中，此类有毒有害物质的含量超出 SJ/T11363-2006 标准规定的限量。

X: Indicates that the content of the toxic and hazardous substances in at least one of the homogeneous materials of the parts is above the limit defined in SJ/T11363 2006 standard.

Other RoHS and REACH type Regulations

Harmonic will comply with RoHS and REACH type regulations evolving in other countries, if they become relevant to our products or in markets where we sell our products.

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Waste Electrical and Electronic Equipment (WEEE)

European Parliament and the Council of the European Union's WEEE Directive (2002/96/EC) came into force on August, 2005 and, were more recently amended in July, 2012. This directive encourages the reuse, recycling, and recovery of WEEE and to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, especially those dealing with WEEE. Harmonic ensures that all requirements for registration, reporting, design and data tracking are complied with to meet the objectives of the WEEE directive.

For more information, please visit WEEE directive page at official EU website.

http://ec.europa.eu/environment/waste/weee/legis_en.htm

Battery Directive

In September 2006, the European Union's Directive 2006/66/EC (Battery Directive) came into force with an aim to prohibit the sale of batteries and accumulators containing hazardous substances and to set rules and promote collection, treatment, recycling and disposal of waste batteries and accumulators. This directive applies to spent batteries collected together with WEEE and requires their removal and separate collection. Once removed from WEEE, spent batteries are governed by the Battery Directive. Harmonic uses lithium batteries in its products and our responsibility under the Battery Directive is taken care of under our WEEE Take-Back program.

For more information, please visit Batteries and Accumulators directive page at official EU website.

http://ec.europa.eu/environment/waste/batteries/

Harmonic is committed to manufacturing environmentally safe products for the community, and will make reasonable efforts and required adjustments to its practices, if necessary, to comply with various environmental directives and industry initiatives on the elimination of hazardous substances, labeling, marking, certification and registration as required in markets where we sell our products.

Download Harmonic's Environmental Compliance Statement at the following location:

http://www.harmonicinc.com/sites/default/filesEnvironmental%20Compliance%20Statement.pdf

WEEE Take-Back Request Program

In order to assist EU member states to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally, Harmonic strives to recycle in compliance with the WEEE Directive any of its products that cannot be re-used.

Harmonic's customers should:

- Not discard equipment in household or office garbage
- Arrange proper recycling of unneeded equipment. For the take-back of Harmonic equipment, customers must:
  - Collect the information required to complete Harmonic's WEEE Take-Back Request form
  - Complete and submit the online WEEE Take-Back Request form. Please note that forms must be fully completed in order to prevent process delays
  - Receive instant online confirmation indicating the reference number
  - Receive the End of Life (EOL) asset return authorization number and instruction for EOL asset return

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- Not ship EOL product to Harmonic without a Harmonic-provided EOL asset return authorization number

The crossed-out wheeled bin symbol on a Harmonic-branded commercial product indicates that the product should not be disposed of along with municipal waste, but invites our customers to return the product to us under Harmonic's WEEE Take-Back program for product disposal.

Harmonic will pay for the cost of shipping and will provide a Certificate of Recycling or a Certificate of Destruction upon request. For more information on collection, reuse and recycling or to initiate the WEEE take-back process, please complete the form at *http://www.harmonicinc.com/webform/weee-takeback-request* or contact *Harmonic Technical Assistance Center (TAC) or email RMA team at rma.emea@harmonicinc.com.*

Compliance with additional country specific environmental, safety and EMC standards:

In addition to above listed standards and compliance regulations, Harmonic products may also be compliant with other country specific environmental, safety and EMC requirements. Please contact Harmonic Compliance Team at *regulatory.compliance@harmonicinc.com* or your local sales representative for more information about compliance with particular country or standard.

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Appendix C
Standard ES Types and Descriptors

Standard Elementary Stream (ES) Types

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

Table C–1: Elementary stream types

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

H.1 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

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Value	Description
0x4	hierarchy descriptor
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

H.2 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

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