



AG 6000 4K/UHD Receiver Decoder

User Manual



openGear

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About Sencore

Sencore is an engineering leader in the development of high-quality signal transmission solutions for the broadcast, cable, satellite, IPTV, telecommunications, and professional audio/video markets. The company's world-class portfolio includes video delivery products, system monitoring and analysis solutions, and test and measurement equipment, all designed to support system interoperability and backed by best-in-class customer support. Sencore meets the rapidly changing needs of modern media by ensuring the efficient delivery of high-quality video from the source to the home. For more information, visit www.sencore.com.

Revision History

Date (MM/DD/YYYY)	Version	Description	Author
1/14/2020	1.0	Initial Release	BCR
1/27/2020	1.1	Appending to S2X Module Specs	BCR
06/20/2020	1.2	4.2.2 Release	BCR
06/24/2020	1.3	4.2.3 Release	BCR
02/02/2021	1.4	4.3.0 Release	JDN
02/09/2021	1.5	4.4.0 Release	RAG
05/14/2021	1.6	Revised 8VSB Specifications	RAG
8/17/2021	1.7	Changed PID filter from 10 to 5	IWG

Safety Instructions

- Read and follow all instructions
- Keep this manual
- Heed all warnings
- Do not use this apparatus near water
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- Do not expose this apparatus to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
- To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle.
- The mains plug of the power supply cord shall remain readily operable.
- **Damage Requiring Service:** Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - When the power-supply cord or plug is damaged.
 - If liquid has been spilled, or objects have fallen into the product.
 - If the product has been exposed to rain or water.
 - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of the controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
 - If the product has been dropped or damaged in any way.
 - The product exhibits a distinct change in performance.
- **Replacement Parts:** When replacement parts are required, be sure the service technician uses replacement parts specified by Sencore, or parts having the same operating characteristics as the original parts. Unauthorized part substitutions made may result in fire, electric shock or other hazards.

SAFETY PRECAUTIONS

There is always a danger present when using electronic equipment.

Unexpected high voltages can be present at unusual locations in defective equipment and signal distribution systems. Become familiar with the equipment that you are working with and observe the following safety precautions.

- Every precaution has been taken in the design of your AG 6000 to ensure that it is as safe as possible. However, safe operation depends on you the operator.
- Always be sure your equipment is in good working order. Ensure that all points of connection are secure to the chassis and that protective covers are in place and secured with fasteners.
- Never work alone when working in hazardous conditions. Always have another person close by in case of an accident.
- Always refer to the manual for safe operation. If you have a question about the application or operation call Sencore for assistance.
- **WARNING** – To reduce the risk of fire or electrical shock never allow your equipment to be exposed to water, rain or high moisture environments. If exposed to a liquid, remove power safely (at the breaker) and send your equipment to be serviced by a qualified technician.
- To reduce the risk of shock the AG 6000 must be securely connected backplate in a frame that is connected to a mains socket outlet with a protective earthing connection.

CAUTION – Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

STATIC DISCHARGE

Throughout this chapter, please heed the following cautionary note:



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

FCC Class A Information

The AG 6000 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 instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

Shielded cables must be used with this unit to ensure compliance with the Class A FCC limits.

FCC Class B Information

The CRD 1900 has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

⚠ Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Dolby Digital Information

This product has been manufactured under license from Dolby Laboratories.

“Dolby Digital”, “AC-3”, and “Dolby Digital Plus” are licensed trademarks of Dolby Laboratories.

Package Contents

The following is a list of the items that are included along with the AG 6000:

1. Declaration of Conformity
2. Backplate
3. Quick Start Guide

Note: If any option cables were ordered with the AG 6000, they will be included in the box as well.

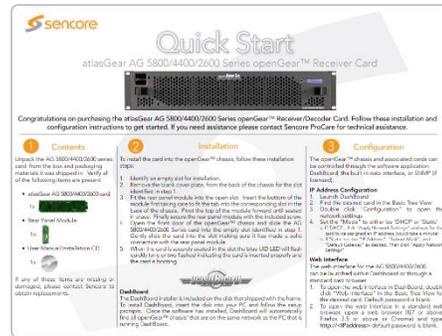
If any of these items were omitted from the packaging of the AG 6000 please call 1-800-SENCORE to obtain a replacement. Manuals for Sencore products can be downloaded at www.sencore.com



1) Declaration of Conformity



2) Backplate



3) Quick Start Guide

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Section 1 Overview



Introduction

This section includes the following topics:

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1.1 Product Introduction

The AG 6000 is a new UHD receiver decoder card for the openGear® form factor. Built with the latest generation ASIC to deliver a dense, cost-effective multiformat decoding solution. Perfect for applications such as monitoring, digital-turnaround, digital signage, hospitality and enterprise video delivery.

The AG 6000 will decode HEVC/H.264/MPEG2 and output UHD/HD/SD video with 4 audio services (8 audio channels) with all ancillary data required for professional video delivery networks. Input and output options include ASI, MPEG/IP, DVB/S/ S2/S2X, QAM/VSF, DVB-T/T2, C/C2 and ISDB-T. Licenses and hardware options for descrambling include with BISS and dual DVB-CI CAM slots.

The AG 6000 maintains our long tradition of ease of use, with a straight-forward user interface and web APIs and backed by Sencore's best-in-class staff of ProCare support engineers.

1.2 Cooling

The AG 6000 is cooled via forced induction through the front of the AG 4800X-XS frame and exhausted through the vents in the rear of the backplate. The AG 6000 is equipped with a temperature controlled status indicator. If the external temperature of the card exceeds 60° C, a temperature error will be triggered and the description of the error will appear in the "Error List."

1.3 Rack Information

The AG 6000 is intended to be mounted in an AG-4800X-XS openGear™ or CRD 1900 frame (or equivalent). The card takes up two slots in the 20 slot chassis (10 card maximum).

Section 2 Installation



Introduction

This section includes the following topics:

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2.1 Installation

Carefully unpack the AG 6000 card and inspect it for any signs of damage. Do not insert the card into the openGear™ frame if any damage is evident, and if so, please contact Sencore.

The AG 6000 occupies two slots in the AG-4800X-XS openGear™ frame, allowing up to 10 cards to be inserted into the frame.

Fit the rear panel PCB supplied with the AG 6000 card at the selected slot location, removing the blanking plate if necessary. The rear panel PCB is fixed to the rear panel of the openGear™ frame using a single screw. Figure 1 shows the openGear™ frame mounting system.

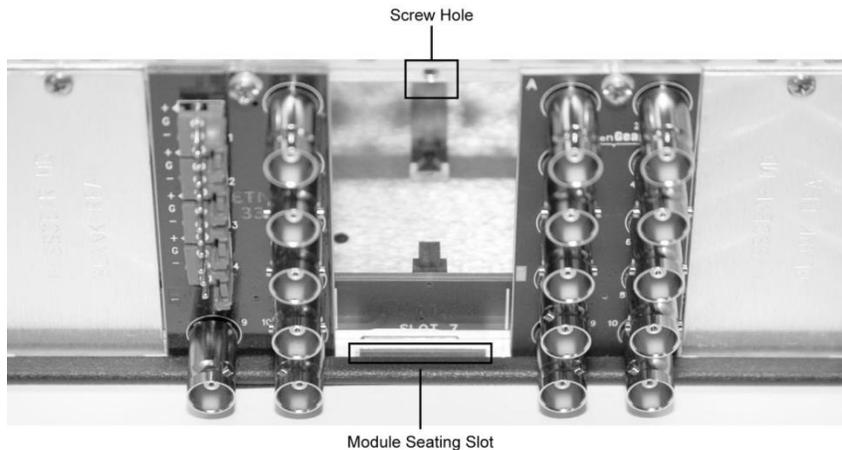


Figure 1

Open the openGear™ front panel and slide the AG 6000 card carefully into place. As the card fits into the backplate, the removal lever at the bottom front edge of the card will move to its fully upright position. This lever can be used to remove the card easily if required.

The openGear™ frame can be operated with the front panel open; however, if enough cards are fitted the warning buzzer will sound, indicating that the chassis is beginning to overheat. Operating the openGear™ frame while the warning buzzer is sounding is not advised and may cause damage to the cards. The warning buzzer can be cancelled by pressing the small button at the front edge of the openGear™ controller card. The openGear™ frame incorporates powerful cooling fans in the front panel, and for normal operation the front panel should be closed to ensure adequate cooling, and the vent slots free from obstruction.

More information about the openGear™ frame can be found in the AG-4800X-XS Frame Manual. The CRD 1900 chassis information can be found in [Appendix G](#).

2.2 Onboard Controls and LEDs

The AG 6000 decoder card uses a button to reboot/recover the card and LEDs to provide local status information. *Figure 2* indicates the button and LEDs, and they are also briefly described in this section.

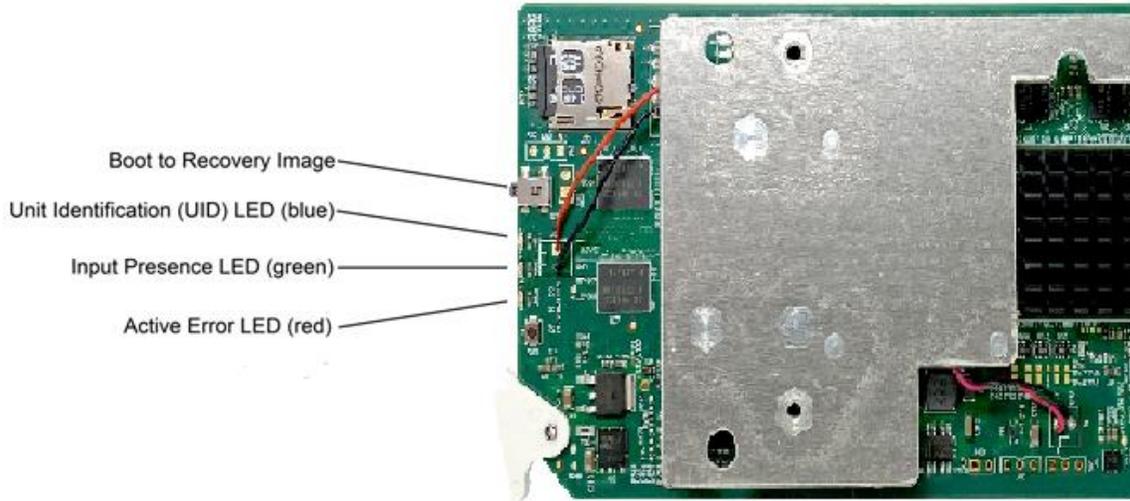


Figure 2: View of card edge controls and LEDs

Button Controls

There is one button available on the AG 6000:

- **Boot to Recovery Image:** If the card becomes corrupted, the user can remove the card from the slot and then reinsert the card while pressing and holding this button to boot to the recovery image. The user must hold the button down until the blue LED (UID) light quits flashing (about 10 seconds). Once in the recovery image, the user can push new software to the card.

Status LEDs

Three LEDs are located on the front edge of the board:

- **Unit Identification (UID) LED:** The user can enable this LED to easily identify a specific card. When enabled, this LED (along with one on that back of the card that can be seen through a hole in the backplate) will light up blue.
- **Input Presence LED:** This illuminates green when receiving a transport stream on the active input.
- **Active Error LED:** This illuminates red whenever an error is currently active on the AG 6000.

2.3 Backplate

Each AG 6000 card comes paired with a compatible backplate. Figure 3 shows the AG 60001 backplate, which comes with the digital video output option.

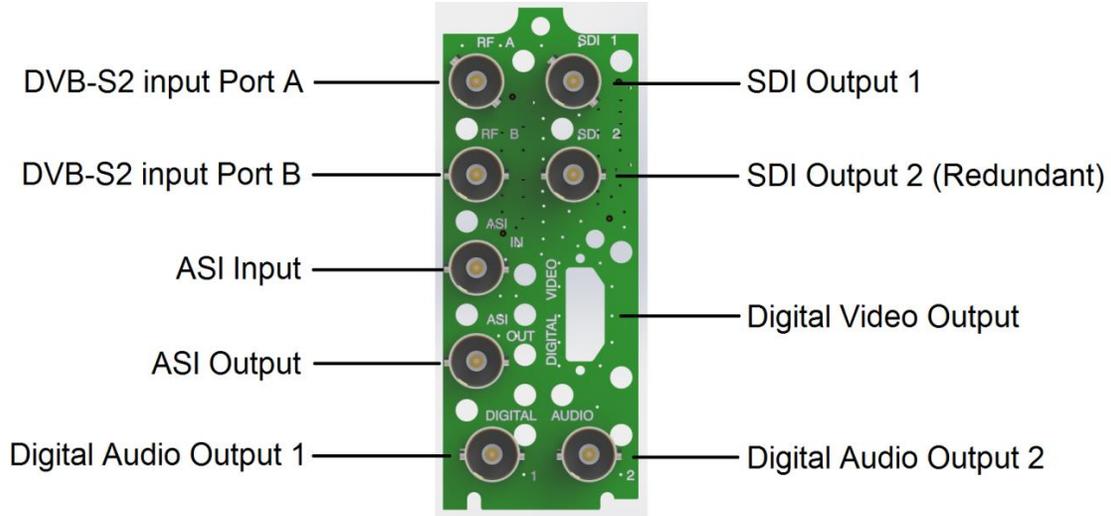


Figure 3: AG 60001 Backplate

Figure 4 shows the AG 60002 backplate that is capable of outputting UHD/4K through its four 3G-SDI ports.

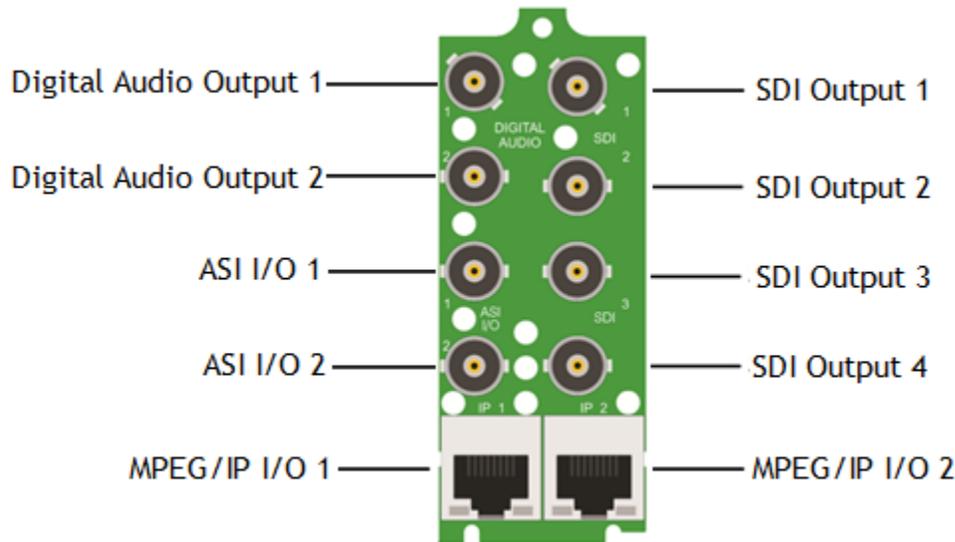


Figure 4: AG 60002 Backplate

Figure 5 shows the AG 60003 backplate that is capable of outputting SDI over IP (SMPTE ST 2110) through its two SFP+ ports.

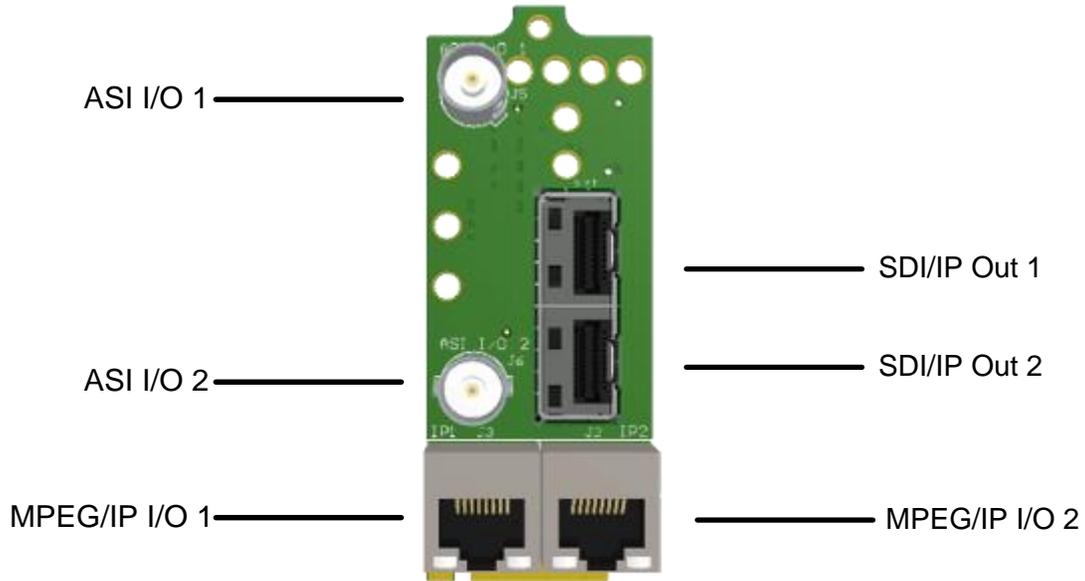


Figure 5: AG 60003 Backplate

2.3.1 AG 60001 Backplate

From Figure 3 in section 2.3, there are two SDI output ports and one output port for Digital Video. These three ports are all redundant of each other, and configuring the video output (see section 3.2.11) will influence all three of these ports. On these backplates, the two ASI ports are separated by purpose of input and output.

2.3.2 AG 60002 Backplate

From Figure 4 in section 2.3, all of the four 3G-SDI BNC ports output the same resolution based on the Primary Video output settings (see section 3.2.11). When outputting HD and SD, the SDI ports will all output redundantly. When a UHD/4K video resolution is decoded and set in the Primary Video output format (section 3.2.11), SDI outputs labeled 1, 2, 3 and 4 are used to output UHD via quad 3G-SDI. The two ASI BNC ports and two MPEG/IP RJ45 ports can both act as either input or output.

2.3.3 AG 60003 Backplate

From Figure 5 in section 2.3, there are two SDI/IP output ports and two ASI I/O ports. The second SFP port is redundant of the first port. Configuring the video output (see section 3.2.11) will influence these ports.

2.4 Maintenance

The AG 6000 is virtually a maintenance-free piece of equipment. There are no user serviceable parts on the card.

2.5 Setting up the AG 6000 using DashBoard™

This section provides step-by-step operating instructions for configuring the IP address of the AG 6000 card using the DashBoard™ remote user interface. Once an IP address is assigned the card can be controlled through the Web GUI.

Installing DashBoard™

To install the DashBoard™ user interface software, use the following steps:

1. Insert the included CD into a computer and launch the installer file.
or
2. Visit <https://www.opengear.tv/control-monitoring/dashboard-control-system/> to download the DashBoard™ setup file.
3. Click on the Dashboard installation link that matches your operating system (Windows, OSX, or Linux). There will be a number of license agreements to accept, then the suggested installation location and start folder name will be displayed. It is recommended that the suggested locations and folder names are accepted. It is required that a network connection is present to allow remote control of the openGear™ frame(s).

After installation, DashBoard™ will start automatically. There is no requirement to restart your PC.

DashBoard™ screen layout overview

Error! Reference source not found. shows the startup DashBoard™ screen. DashBoard™ has discovered an accessible frame. Note the “Sencore 4800X-XS Frame1” icon near the top of the Basic Tree View pane.

Clicking on the triangle (▶) symbol next to the frame name will display the available cards in the frame.

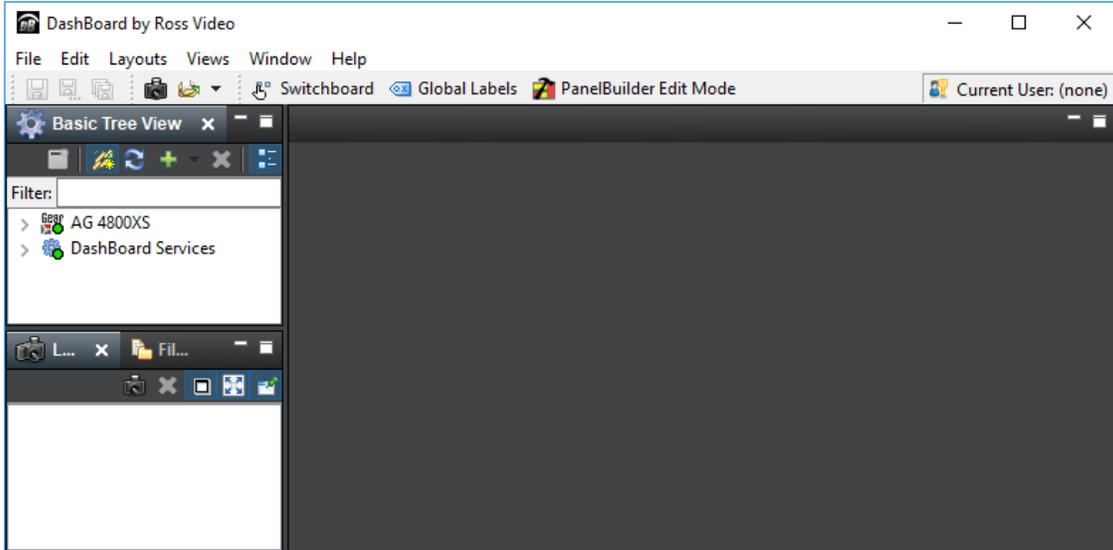


Figure 4: DashBoard™ opening window view

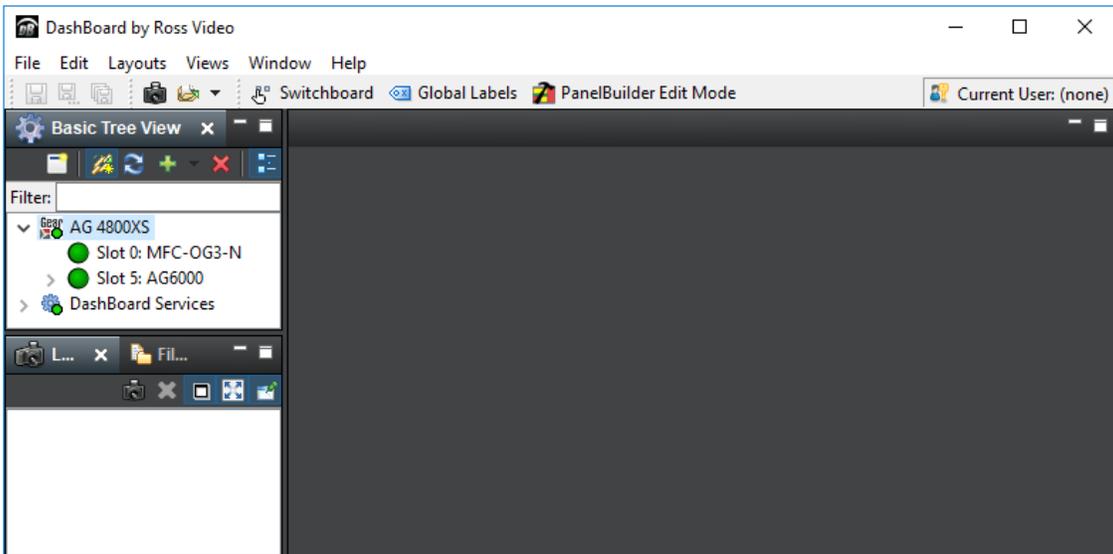


Figure 5: Available cards window view

Error! Reference source not found. shows that the Master Frame Controller (MFC) card, and the Sencore AG 6000 card is available in Slot 5, and are currently showing no alarms. Hovering the mouse pointer over each LED icon will give a tooltip style summary of status. Clicking on the triangle (▶) symbol next to the AG 6000 card will display the “Configuration” and “Web Interface” selections for that card (see **Error! Reference source not found.**).

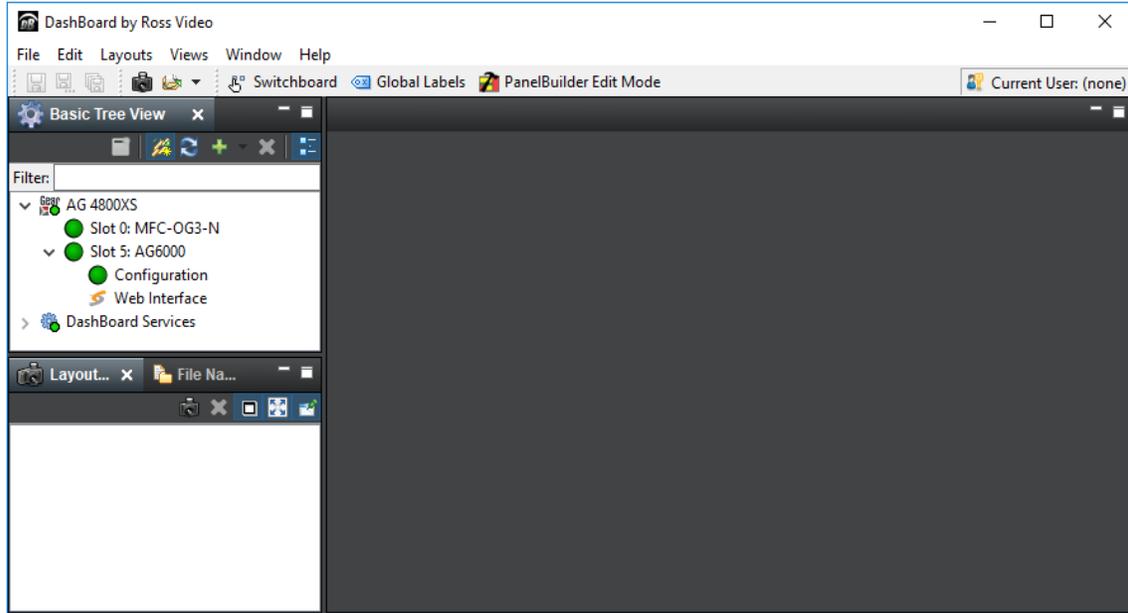


Figure 6: Configuration and Web Interface in Basic Tree View

Network setup using DashBoard™

Double clicking “Configuration” will launch the setting and status window panes for the AG 6000 card shown in Figure 7.

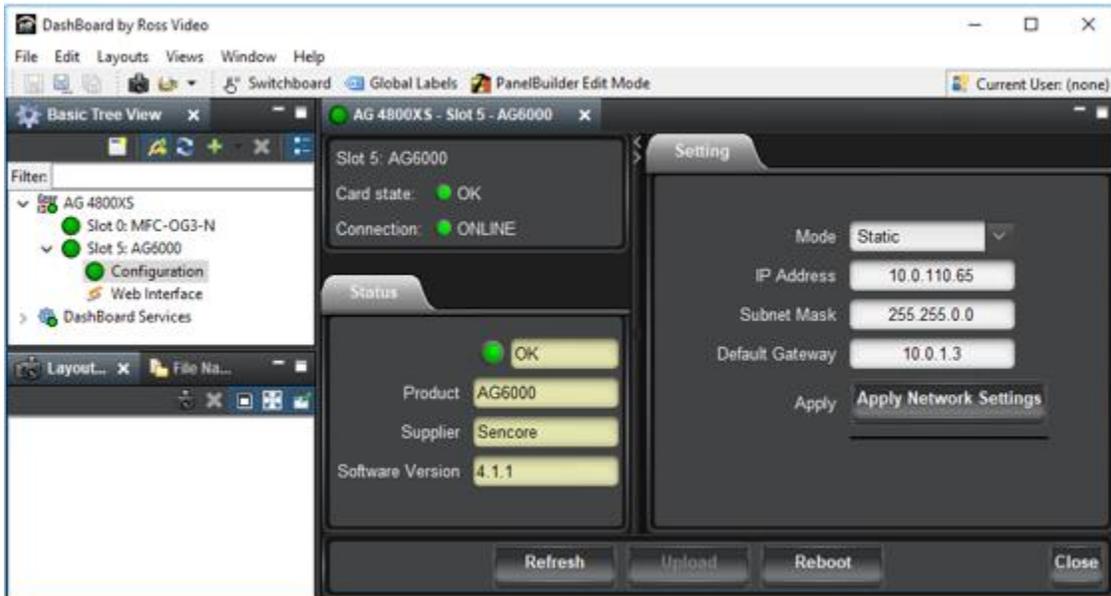


Figure 7: Configuration Panel

In the setting pane, the user can view the following network configuration settings:

- 1) IP Address
- 2) Subnet Mask
- 3) Default Gateway
- 4) Mode

The AG 6000 card can be assigned either assigned an IP address either manually, or by DHCP (card will be set to DHCP by default).

Follow the following steps to provide a static IP address to the card:

- 1) In the setting pane, change ‘Mode’ to “Static”.
- 2) Set the ‘IP Address’, ‘Subnet Mask’, and ‘Default Gateway’ to the desired settings.
- 3) Click ‘Apply Network Settings’.

Follow the following steps to obtain an IP address using DHCP:

- 1) In the setting pane, change ‘Mode’ to “DHCP”.
- 2) Click ‘Apply Network Setting’.

Note: It may take up to a minute for the AG 6000 to obtain an IP address.

2.6 Setting up the AG 6000 using the CRD 4900

This section provides step-by-step operating instructions for configuring the IP address of the AG 6000 card using the CRD 4900 remote user interface. Once an IP address is assigned the card can be controlled through the Web GUI.

CRD 4900 screen layout overview

Figure 8 shows the CRD 4900 main screen. The CRD 4900 has discovered accessible cards. Note the “AGXXXX” cards listed in Figure 9. There are also buttons on the menu for each AG card installed in the chassis. At the top there are different panels that can be accessed including Main, Admin, Reporting and About.

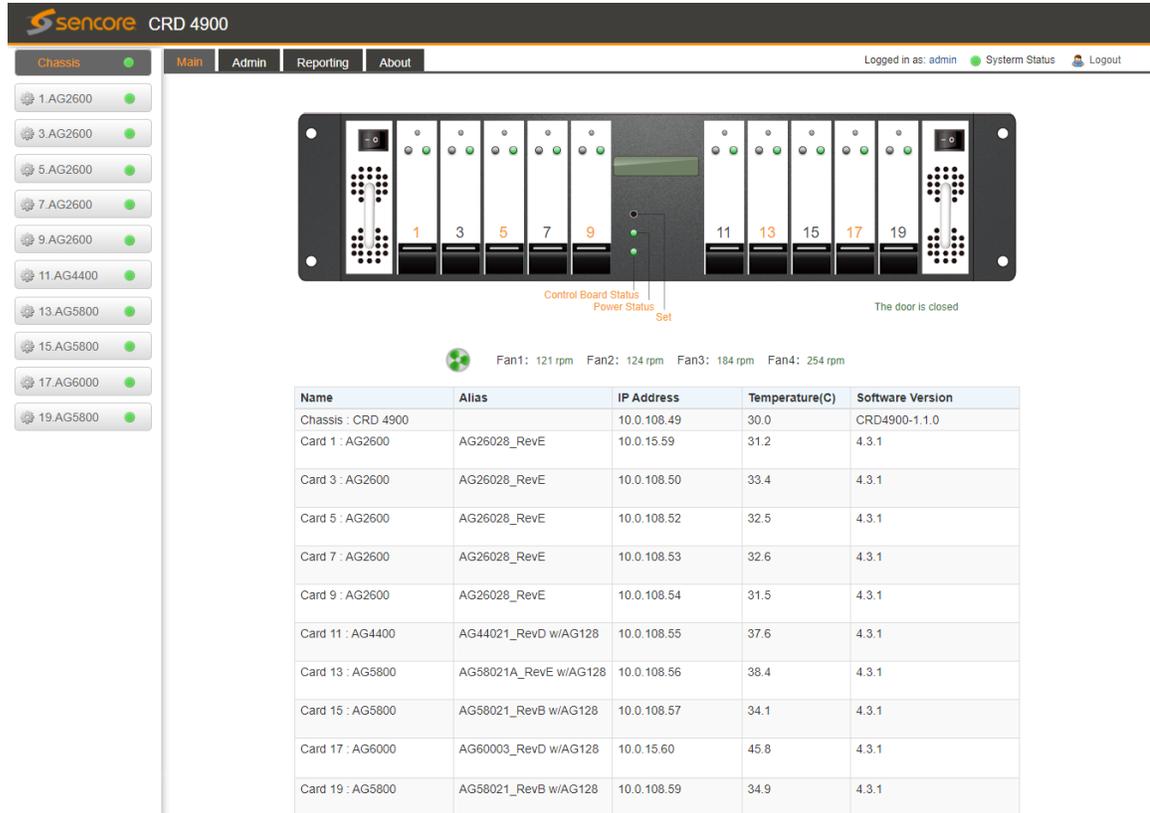


Figure 8: CRD 4900 main screen

Name	Alias	IP Address	Temperature(C)	Software Version
Chassis : CRD 4900		10.0.108.49	30.0	CRD4900-1.1.0
Card 1 : AG2600	AG26028_RevE	10.0.15.59	31.2	4.3.1
Card 3 : AG2600	AG26028_RevE	10.0.108.50	33.4	4.3.1
Card 5 : AG2600	AG26028_RevE	10.0.108.52	32.5	4.3.1
Card 7 : AG2600	AG26028_RevE	10.0.108.53	32.6	4.3.1
Card 9 : AG2600	AG26028_RevE	10.0.108.54	31.5	4.3.1
Card 11 : AG4400	AG44021_RevD w/AG128	10.0.108.55	37.6	4.3.1
Card 13 : AG5800	AG58021A_RevE w/AG128	10.0.108.56	38.4	4.3.1
Card 15 : AG5800	AG58021_RevB w/AG128	10.0.108.57	34.1	4.3.1
Card 17 : AG6000	AG60003_RevD w/AG128	10.0.15.60	45.8	4.3.1
Card 19 : AG5800	AG58021_RevB w/AG128	10.0.108.59	34.9	4.3.1

Figure 9: Available card window view

Network setup using Dashboard™

Clicking on the settings cog next to an AG card will launch the Configure IP window for the AG 6000 card shown in Figure 10.

Figure 10: Configure IP window

In the setting pane, the user can view the following network configuration settings:

- 1) Mode
- 2) IP Address
- 3) Subnet
- 4) Gateway
- 5) UID Status

The AG 6000 card can be assigned either assigned an IP address either manually, or by DHCP (card will be set to DHCP by default).

Follow the following steps to provide a static IP address to the card:

- 1) In the setting pane, change 'Mode' to "Static".
- 4) Set the 'IP Address', 'Subnet Mask', and 'Gateway' to the desired settings.
- 5) Click 'Apply'.

Follow the following steps to obtain an IP address using DHCP:

- 10 In the setting pane, change 'Mode' to "DHCP".
- 11 Click 'Apply'.

Note: It may take up to a minute for the AG 6000 to obtain an IP address.

Section 3 Operating the Web Interface



Introduction

This section includes the following topics:

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3.1 AG 6000 Web Interface Overview

3.1.1 Logging into the AG 6000 Web Interface

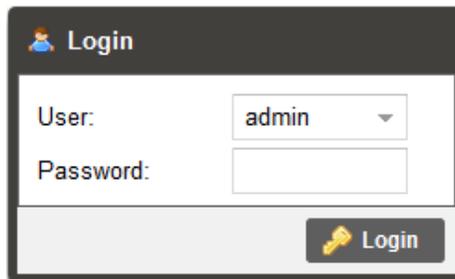
To open the AG 6000 web interface use one of the following supported browsers and navigate to the unit's IP address:

- Internet Explorer 7 & above
- Firefox 3.5 & above
- Google Chrome

The user will need to login to the web interface. Press the login button in order to login to the web interface. Default Credentials

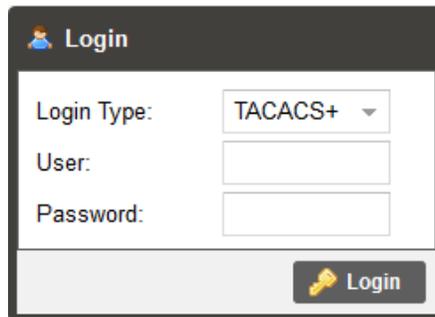
Username: admin

Password: mpeg101

A screenshot of the AG 6000 web interface login page. The page has a dark header with a user icon and the word "Login". Below the header, there are two input fields: "User:" with a dropdown menu showing "admin" and "Password:" with an empty text box. At the bottom right, there is a "Login" button with a key icon.

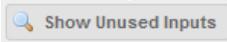
Default Login Prompt

When TACACS+ is enabled and configured as described in [Section 3.3.6](#), the "Login Type" dropdown is present with the option between TACACS+ and Local. When the TACACS+ login type is selected, the user and password credentials will be assigned by the network administrator and validated by the TACACS+ server.

A screenshot of the AG 6000 web interface login page when TACACS+ is selected. The page has a dark header with a user icon and the word "Login". Below the header, there are three input fields: "Login Type:" with a dropdown menu showing "TACACS+", "User:" with an empty text box, and "Password:" with an empty text box. At the bottom right, there is a "Login" button with a key icon.

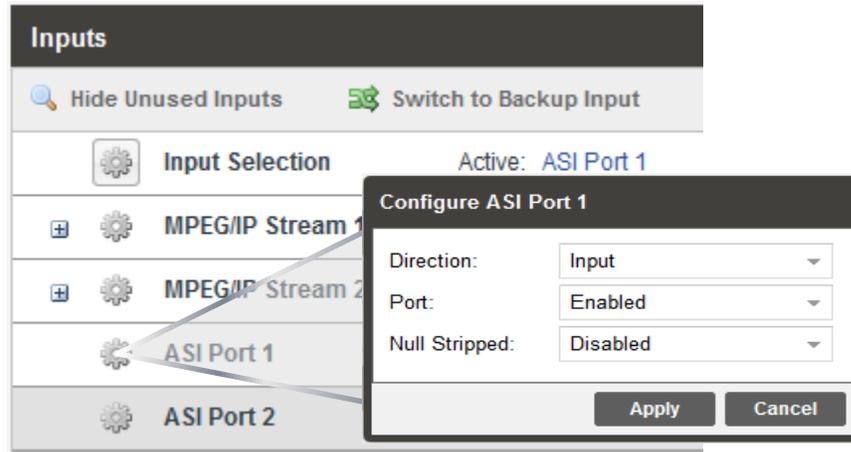
TACACS+ Login Prompt

3.1.2 Hiding Unused Inputs

The AG 6000 web interface lets the user hide inactive inputs with the  button or show all available inputs by click the  button. Only the inputs configured as the Primary Input and Backup Input (see Section 3.2.1) will be displayed when unused inputs are hidden.

3.1.3 Button and Status Indicators

When the  icon is shown, user configuration is available. Clicking this button will open menus where settings can be changed by the user.



ASI Port 1 Configuration Pop-Out

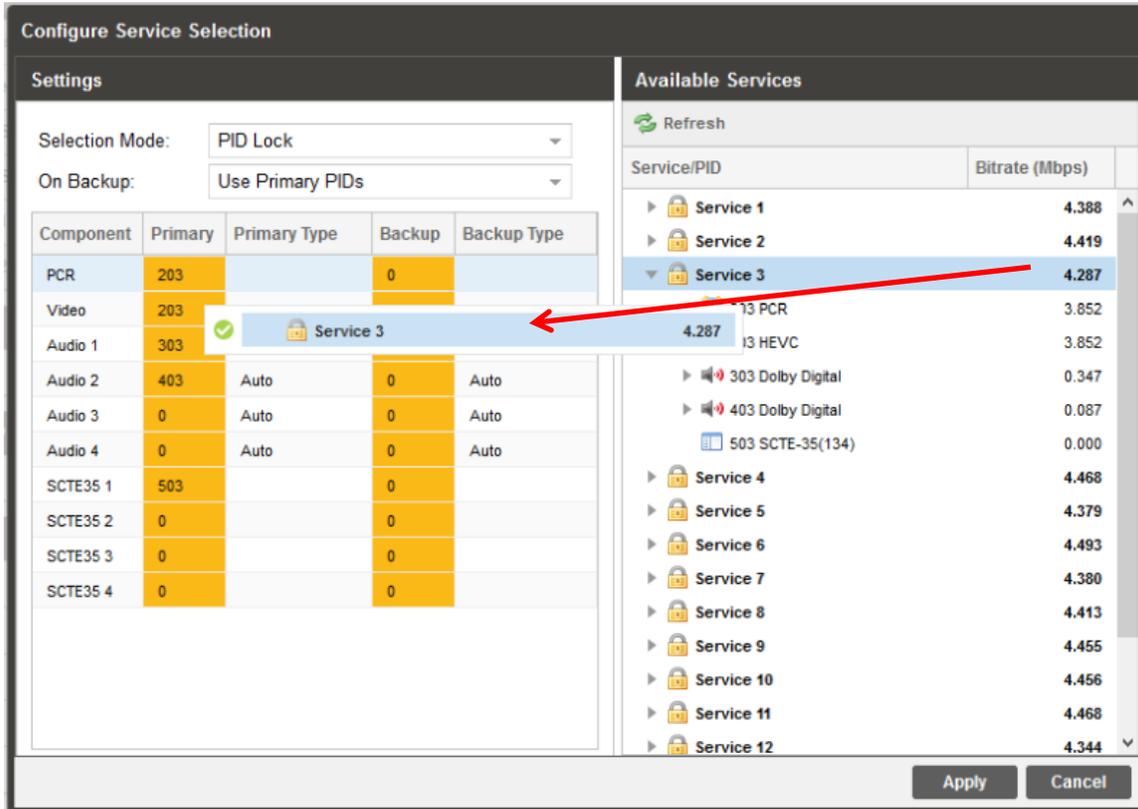
When the  icon is shown additional status information can be viewed. Clicking this button expands the menu to display the additional status information. All text in status menus shown in **ORANGE** are user configurable settings. Text shown in **BLUE** is not user configurable and is strictly a status or value. To minimize the status windows again click the  icon.

Status in the AG 6000 web interface is shown with LED status indicators:

- Green LED**  Status is good. No errors are present and function is operating normally.
- Red LED**  Status indicates function is affected by active error. To view the errors navigate to Alarms panel to view Active Errors.
- Grey LED**  Status is inactive. Function is currently disabled or unavailable.

3.1.4 Drag and Drop Menus

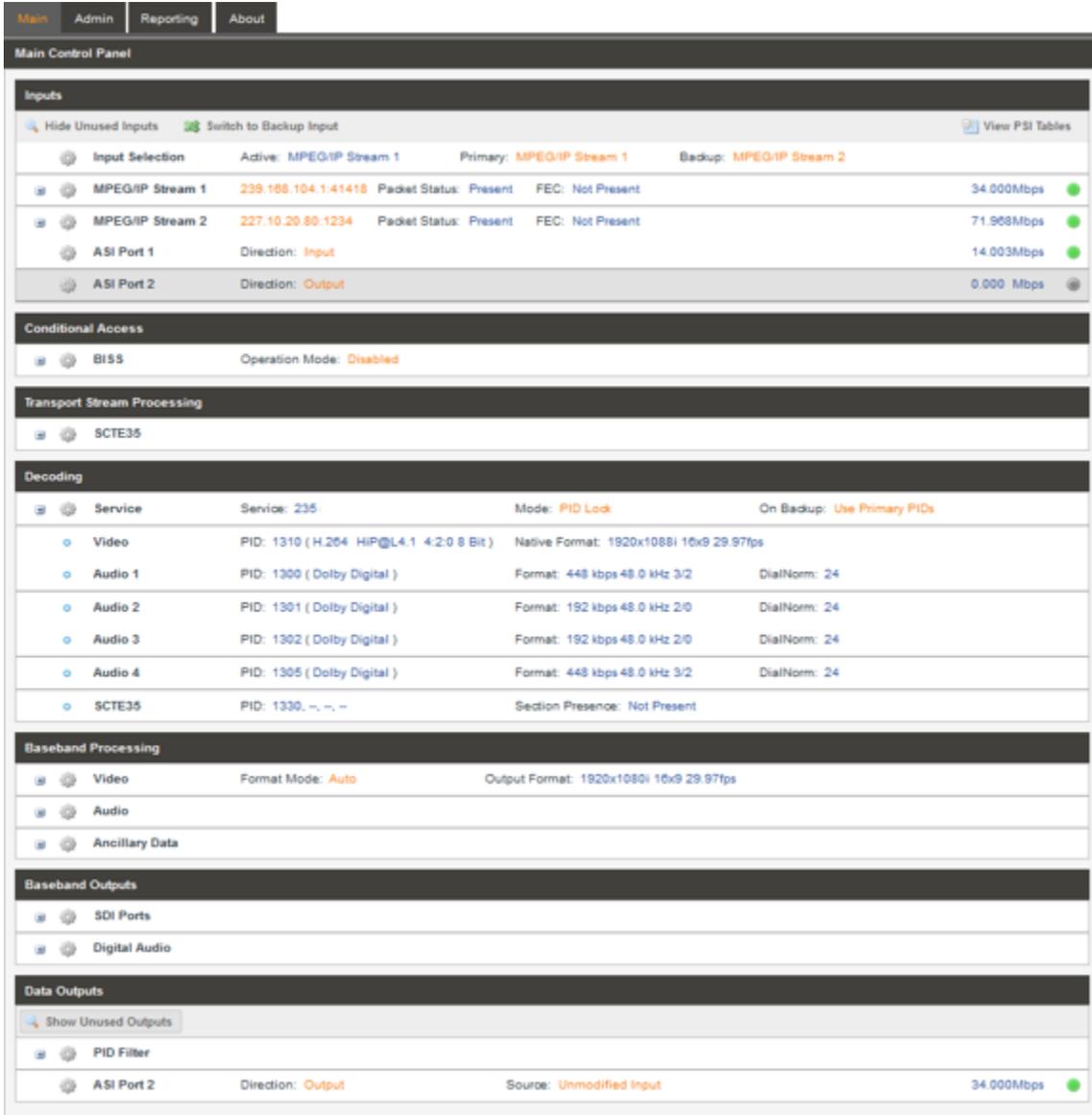
Certain menus in the AG 6000 allow the user to drag and drop items to auto populate fields. Conditional Access and Service Selection menus are some examples of menus that drag and drop can be used. In the example below a service in the transport stream view on the right hand side of the window is selected and dragged over to auto populate the PIDs in the service selection section.



Service Selection Menu

3.2 Main Panel

The Main panel of the AG 6000 web interface is used to configure the unit to decode, de-encapsulate and demodulate. When configuring the AG 6000 the user begins at the top of the menu and works down. The inputs are configured, then descrambling (if present), then service or PIDs are selected for decode, then outputs are configured. Pictured on the next page is a fully populated unit with all options licensed.



GUI Main Page

3.2.1 Configuring Active Inputs

The user can see which inputs are currently primary or backup inputs using the active input indicator. The user can quickly switch between the Primary and Backup Inputs by clicking the  **Switch to Backup Input** button.

Inputs			
		Switch to Backup Input	
	Input Selection	Active: MPEG/IP Stream 1	Primary: MPEG/IP Stream 1 Backup: MPEG/IP Stream 2
	 MPEG/IP Stream 1	239.168.104.1:41418	Packet Status: Present FEC: Not Present
	 MPEG/IP Stream 2	227.10.20.80:1234	Packet Status: Present FEC: Not Present
	ASI Port 1	Direction: Input	
	ASI Port 2	Direction: Output	

Active Input Indicator

To configure the primary and backup inputs, click the  icon next to Input Selection. In this same menu, the “Switch On”, “Restore On” and “Switchover” options present have the purpose of toggling to and from the backup input in the case of an input failover or input return.

Configure Inputs

Primary Input:

Backup Input:

Switch On:

Restore On:

Switchover (secs.):

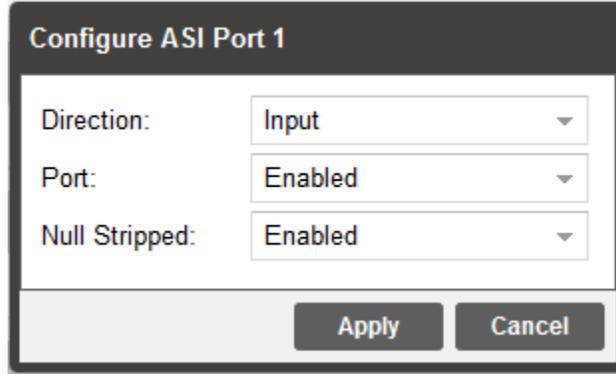
Active Input and Failover Configuration Menu

Setting	Range	Description
Primary Input	ASI Port X MPEG/IP Stream X	Used for both normal operation and input failover settings. During normal operation this input will be the active input.

	DVB-S2 Slot X Port X DVB-S2X Stream X 8VSB/QAM Slot X DVB-T2/C2/ISDB-T Slot X None	
Backup Input	ASI Port X MPEG/IP Stream X DVB-S2 Slot X Port X DVB-S2X Slot X Stream X 8VSB/QAM Slot X DVB-T2/C2/ISDB-T Slot X None	During failover operation this input will become the active input. The catalyst for what causes the unit to switch to this input is configured in the following setting.
Switch On	Manual Only TS Sync Loss Decode Failure	<p><i>Manual Only:</i> the unit will not switch inputs automatically. The user must manually switch inputs.</p> <p><i>TS Sync Loss:</i> the AG 6000 will switch from the primary to the backup input if the primary stream loses synchronization for the duration of the Switchover Interval.</p> <p><i>Decode Failure:</i> the unit will switch to the backup input when it encounters decoding errors on the primary input.</p>
Restore On	Manual Only Primary Input TS Restored Backup Input TS Sync Loss Decode Failure	<p><i>Manual Only:</i> the unit will not restore to the primary input automatically. The user must manually switch inputs.</p> <p><i>Primary Input TS Restored:</i> the AG 6000 restores to primary when the Primary input regains transport stream synchronization.</p> <p><i>Backup Input TS Sync Loss:</i> the unit will switch from backup to primary when the backup stream loses synchronization for the duration of the Switchover interval.</p> <p><i>Decode Failure:</i> the unit restores to the Primary Input when the Backup Input experiences a decoding error.</p>
Switchover	1-20 seconds	The time in seconds which <i>Switch On</i> or <i>Restore On</i> value must remain in the configured state before the AG 6000 switches between the Primary Input and Backup Input or vice versa.

3.2.2 Configuring ASI Input

This menu allows the user to either Enable or Disable the ASI Input on the AG 6000. The ASI ports can be configured as either an input or output. ASI inputs can be configured to enable or disable the null stripped feature.

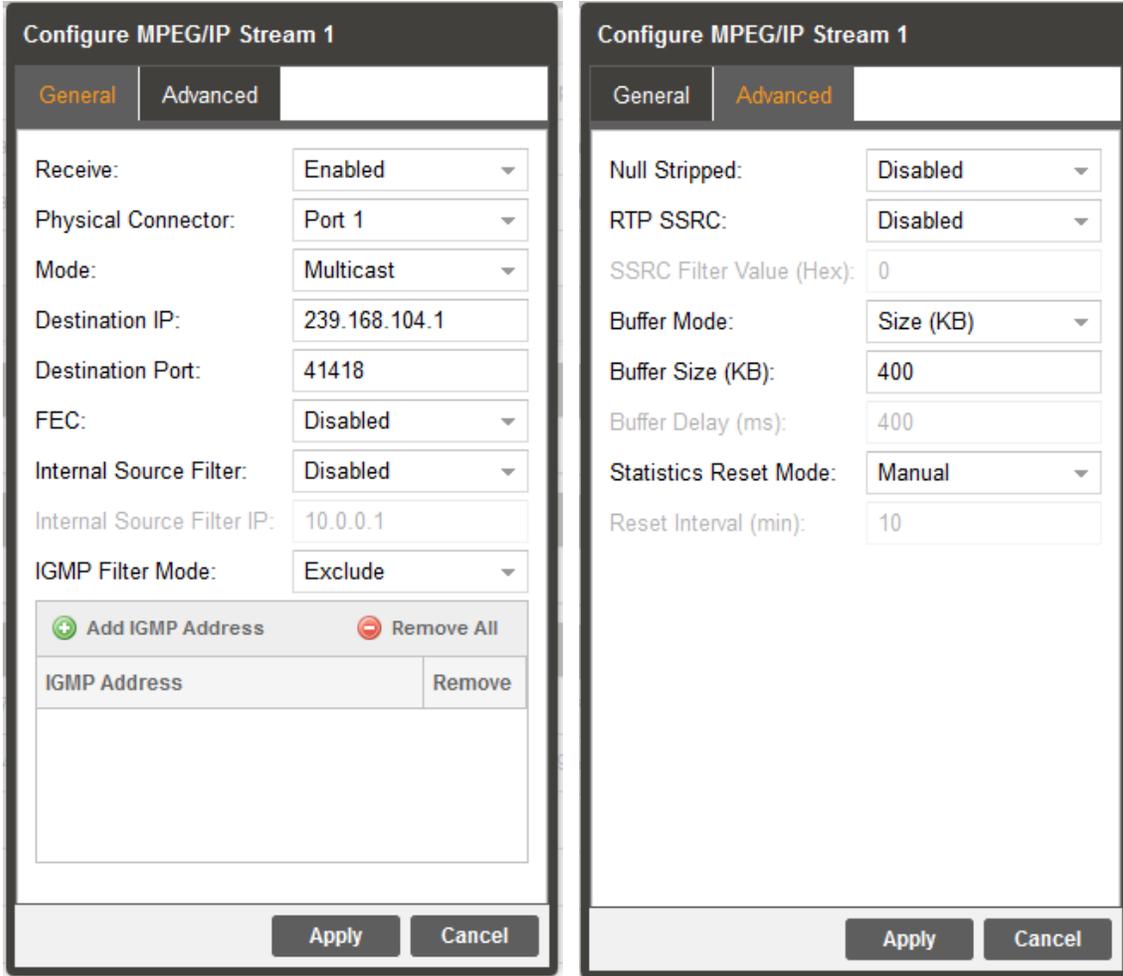


ASI Port 1

Setting	Range	Description
Direction	Input Output	Configure the ASI port to either an input or an output. Main board version can be located on the about tab under the Options section.
Port	Enabled Disabled	This setting allows the user to enable or disable the ASI Input to the AG 6000.
Null Stripped	Disabled Enabled	Enabling Null Stripped allows the AG 6000 to receive streams that do not contain null packets. (i.e. VBR Transport Streams)

3.2.3 Configuring MPEG/IP Input

If the MPEG/IP Input card was selected as a factory installed option, the following menus and options will be available for configuration. This menu allows the user to configure the MPEG/IP inputs. Each MPEG/IP card has two ports that can be set to receive and/or transmit. This menu is for setting up the reception of MPEG/IP unicast or multicast transport streams. The menu for Stream 1 and 2 have the same settings. IGMPv2 is used to join/leave multicast streams by default if no IGMP Filter addresses are entered. If IGMP Filter Mode addresses are specified then IGMPv3 is used.



General and Advanced options for IP input

General

Setting	Range	Description
Receive	Enabled Disabled	This setting allows the user to enable or disable these input stream settings.
Physical Connector	Port 1 Port 2	The physical connector on the MPEG/IP card that will be used to receive the input.
Mode	Multicast Unicast	<i>Multicast</i> setting allows the unit to receive multicast streams. Multicast streams originate from the IP range 224.0.0.0 – 239.255.255.255. <i>Unicast</i> allows the unit to receive unicast streams. Unicast streams originate directly from a source device.

Destination IP	224.0.0.0 – 239.255.255.255	This setting is only available when receiving a multicast stream. This address is the IP address the source device is sending to.
Destination Port	0 - 65535	This is the UDP port the source device is sending to. This is the only setting required to receive a unicast stream.
FEC	Enabled Disabled	Enabling FEC (Forward Error Correction) tells the AG 6000 to look at Destination Port +2 and Destination Port +4 for a SMPTE 2022 FEC Matrix.
Internal Source Filter	Enabled Disabled	Enabling Source filtering disables IGMP V3 filtering and allows a user to whitelist a single IP address for a given multicast and block all other source IP's
Internal Source Filter IP	0.0.0.0 – 255.255.255.255	Source IP for whitelist. All other source IP addresses are blocked
IGMP Filter Mode	Exclude Include	Used on networks supporting IGMPv3. If this setting is set to <i>Exclude</i> any streams originating from the user defined IP addresses will be rejected. If this setting is set to <i>Include</i> any streams originating from the user defined IP addresses will be received.
Null Stripped	Enabled Disabled	Enabling Null Stripped allows the AG 6000 to receive streams that do not contain null packets. (i.e. VBR TS Streams)
RTP SSRC	Enabled Disabled	Enabling RTP SSRC allows the AG 6000 to filter the input by the user defined value. Only streams containing the user defined value will be received by the AG 6000.
SSRC Filter Value	0 - 4294967295	The Filter Value the AG 6000 checks for before receiving a stream with RTP SSRC.
Buffer Mode	Size (KB) Delay (ms)	Allows option to set buffer mode to Size in KB or Delay ms
Buffer Size (KB)	1 – 4000 KB	This setting determines how much data is received before the AG 6000 starts decoding. Increasing this value will allow the AG 6000 to receive streams on networks with high network jitter. Increasing this value also increases the latency of the AG 6000.
Buffer Delay (ms)	1 – 4000 ms	The buffer delay setting allows the buffer size to be set by delay time. The Buffer delay time will be determined by the input data rate.

Statistics Reset Mode	Manual Auto	Statistics can be viewed by hitting the '+' symbol next to the MPEG/IP option card on the main window. Auto will reset the statistics on a chosen interval. When reset occurs, statistical information for that period will be logged. Selecting Manual will only clear the statistics by hitting the refresh button.
Reset Interval (min)	5-65535	Interval in which the Auto option will reset and log the statistics displayed on the main window

The IP Statistics menu can be used to view a number of important details about the incoming IP input that will help the user to determine the quality of the stream and connection.

MPEG/IP Slot 1 Stream 1 224.2.3.1:1002 Packet Status: Present

Status	Statistics
Buffer Delay: 187 ms	Out of Order Packets: 0
Sync Status: Locked	Duplicate Packets: 0
Packets Per Frame: 7	Lost Packets: 0
Encapsulation: UDP	Corrected Packets: 0
FEC Columns (L): 0	Uncorrected Packets: 0
FEC Rows (D): 0	IAT (ms): 0.613
Corrected Packets / FEC Period: 0	Max IAT (ms): >262.143
	Statistics Reset Mode: Manual
	Reset Interval: 10 min
	Last Reset: 1970-01-01 00:00:00

IP statistics menu

3.2.4 Configuring DVB-S/S2/S2X Input

If the DVB-S/S2/S2X input card was selected as a factory installed option, the following menus and options will be available for configuration of DVB-S/S2/S2X Inputs. The input card will automatically detect modulation and symbol rate during signal acquisition. LNB Power configuration for this input card is done in the DVB-S/S2/S2X menu.

Configure DVB-S2X Slot 1 Stream 1

Receive:

Physical Connector:

Satellite Frequency (MHz):

Symbol Rate Mode:

Symbol Rate (MSps):

Manual Search Range:

Search Range (MHz):

LO Offset (MHz):

PL Scrambling Code:

ISI:

	Physical ...	LNB Power	22 kHz Tone
	Port A	Off	--
	Port B	Off	--
	Port C	Off	--
	Port D	Off	--

Configuration of DVB-S2X

Setting	Range	Description
Receive	Enabled Disabled	This setting allows the user to enable or disable this input stream.
Physical Connector	Port A Port B Port C Port D	This setting allows the user to select which physical RF connector will be used to receive the stream.
Satellite Frequency	C-Band: 4GHz – 8GHz Ku Band: 11.2Ghz – 14.5Ghz L-Band: 950MHz – 2150MHz Dependent on LO Offset	If LO Offset is set to 0 then L-Band frequency is entered into the Satellite Frequency dialog box. If LO Offset to set to a pre-defined option then enter C-band or Ku-Band frequency.
Symbol Rate Mode	Auto Manual	This setting allows user to select if the satellite tuner automatically searches and determines the received signal symbol rate

		or if it is entered manually in the space below
Symbol Rate (Msps)	0.5 to 60	If Symbol Rate Mode is set to Manual then enter the satellite receive signal symbol rate
Manual Search Range	Enabled Disabled	This setting determines the satellite receiver automatic fine tuning (AFT) search range. Disabled by default – permits the receiver to auto tune or AFT range (+/- 20 MHz). Enabled allows the user to enter a manual range limiting or expanding the AFT search range
Search Range (MHz)	.5 – 70 MHz	If the Manual Search Range is set to Enabled then enter a MHz value for an AFT search range. The entered value includes a positive and negative search total range. For example: 10 MHz enables a +/- 5 MHz search range.
LO Offset	5150 9750 10600 10750 11250	The offset in MHz that the local oscillator is operating. Set to the LO frequency when you want to enter the Satellite transponder frequency in the Satellite Frequency field. Set to 0.0 when you want to enter the L-Band frequency in the Satellite Frequency field. <i>Note that this setting and the Satellite Frequency setting determine the L-Band frequency input to the receiver.</i>
PL Scrambling Code	0 – 262141	The AG has the ability to receive satellite signals scrambled using PL Scrambling. In order to receive the stream, enter the value of the incoming signals PL Scrambling code.
ISI	Enter input stream identifier (ISI)	Enter unique ID of the stream you want to receive within the DVB-S2/S2X satellite multi-stream (Advanced AG 60916 licensed feature)
LNB Power	Off 13 VDC 14 VDC 18 VDC 19 VDC	The AG 6000 has the ability to provide the necessary voltage to power an LNB. Select the correct voltage to supply to the LNB. Note: Due to power requirements, the AG4800A supports up to 7 AG 6000 cards per chassis when enabling LNB power.
22 kHz Tone	Enabled Disabled	Enabling or disabling the 22khz tone allows the AG 6000 to trigger the LNB to switch polarities.

3.2.5 Configuring DVB-S/S2 Input

If the DVB-S/S2 Input card was selected as a factory installed option, the following menus and options will be available for configuration. This menu allows the user to configure the DVB-S/S2 inputs. Each DVB-S/S2 input card has four ports (labeled A, B, C and D) which only one port can be active at a time. This menu is for setting up the reception of DVB-S/S2 satellite signals. The menu for Port A, B, C and D have the same settings.

Configure DVB-S2 Port A

Port: Enabled

Mode: Auto

Satellite Frequency (MHz): 950

Wide Search: Disabled

LO Offset (MHz): 0.0

Symbol Rate Mode: Manual

Symbol Rate (MSps): 1

PL Scrambling Code: 0

LNB Power: Off

22kHz Tone: Disabled

Multistream State: Disabled

ISI: 0

Apply Cancel

Configuration of DVB-S2

Setting	Range	Description
Port	Enabled Disabled	This setting allows the user to enable or disable this reception port.
Mode	DVB-S DVB-S2 Auto	This setting allows the user to choose between <i>DVB-S</i> or <i>DVB-S2</i> modulation schemes. Setting to Auto will have the unit

		automatically detect whether the input is DVB-S or DVB-S2.
Satellite Frequency	C-Band: 4GHz – 8GHz Ku Band: 11.2Ghz – 14.5Ghz L-Band: 950MHz – 2150MHz Dependent on LO Offset	If LO Offset is set to 0 then L-Band frequency is entered into the Satellite Frequency dialog box. If LO Offset to set to a pre-defined option then enter C-band or Ku-Band frequency.
Wide Search	Enable Disable	When Enabled the search range may be extended depending on the symbol rate. See appendix C for more information.
LO Offset	5150 9750 10600 10750 11250	The offset in MHz that the local oscillator is operating.
Symbol Rate Mode	Manual Auto	The Manual option allows the user to choose the symbol rate. The Auto option automatically detects the incoming symbol rate. Note: Acquisition time may be longer in auto mode, especially when the symbol rate is below 1MSps or above 55MSps.
Symbol Rate	0 - 60	The symbol rate of incoming satellite signal in Msps. Accurate to one decimal place (ksps). Used when Symbol Rate Mode is set to Manual.
PLS Code	0 – 262141	The AG 6000 has the ability to receive satellite signals scrambled using PL Scrambling. In order to receive the stream, enter the value of the incoming signals PL Scrambling code.
LNB Power	Off 13 VDC 14 VDC 18 VDC 19 VDC	The AG 6000 has the ability to provide the necessary voltage to power an LNB. Select the correct voltage to supply to the LNB.
22kHz Tone	Enabled Disabled	Enabling or disabling the 22khz tone allows the AG 6000 to trigger the LNB to switch polarities.
Multistream State	Enabled	The AG 6000 has the ability to receive multistream satellite signals. If the signal is

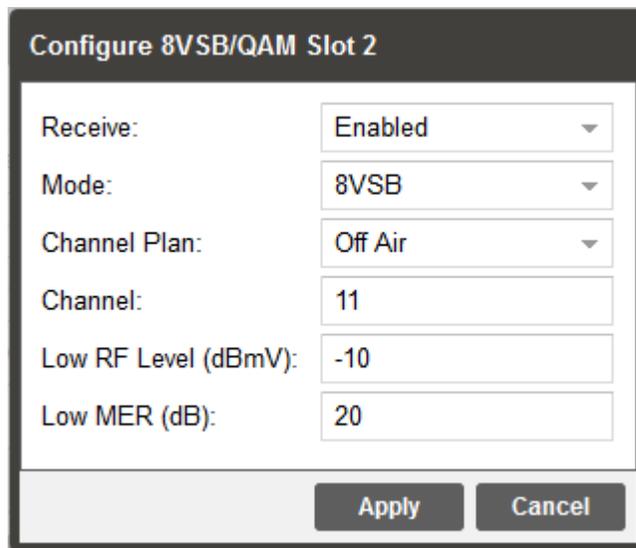
Disabled multistream capable, enable this setting. This option is only available in DVB-S2 Mode.

NOTE: This is a licensed feature.

ISI	0-255	This setting is the ISI (Input Stream Identifier) the AG 6000 uses to filter multistream input. This option is only available if Multistream is licensed and enabled.
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3.2.6 Configuring 8VSB/QAM Input

If the 8VSB/QAM Input card was selected as a factory installed option, the following menus and options will be available for configuration. This menu allows the user to configure the 8VSB/QAM input. This menu is for setting up the reception of 8VSB off air signals or QAM cable signals.



Configuration of 8VSB

Setting	Range	Description
Receive	Enabled Disabled	This setting allows the user to enable or disable this reception port.
Mode	8VSB 64-QAMB 256-QAMB	This setting allows the user to choose between 8VSB or QAM modulation schemes.

Channel Plan	Off Air FCC Cable HRC Cable IRC Cable	If 8 VSB is the selected Mode, the only available option is <i>Off Air</i> . If either 64-QAM or 256-QAM is the selected Mode, this setting allows the user to choose which Cable scheme is used.
Channel	Off Air: 2-69 FCC, HRC, or IRC Cable: 2-158	This setting is for the desired channel to be received.
Low RF Level (dBmV)	-34 - +40	This is the Low RF Level threshold when the <i>Low Level</i> Alarm will be triggered in dBmV
Low MER (dB)	0 – 40	This is the Low MER threshold when the <i>Low MER</i> Alarm will be triggered in dB.

3.2.7 Configuring DVB-T2/C2/ISDB-T Input

If the DVB-T2/C2/ISDB-T Input card was selected as a factory installed option, the following menus and options will be available for configuration. This menu allows the user to configure a DVB-T/T2/C/C2 or ISDB-T input.

Configure DVB-T2/C2/ISDB-T Slot 1

General

Receive:

Mode:

Channel Plan:

Channel:

Advanced

Frequency (MHz):

Bandwidth:

PLP ID:

Profile:

Low RF Level (dBmV):

Low MER (dB):

Configuration of DVB-T2/C2/ISDB-T

General

Setting	Range	Description
Receive	Enabled Disabled	This setting allows the user to enable or disable this reception port.
Mode	DVB-T DVB-T2 DVB-C DVB-C2 ISDB-T	This setting allows the user to choose between <i>DVB-T/T2/C/C2</i> or <i>ISDB-T</i> modulation schemes.
Channel Plan	Australia Eur-Asia-Afr Ireland New Zealand	This setting allows the user to select which channel plan they would like to use. Channel Plan options are tied to which modulation mode is selected.

Taiwan
 South Africa
 South America
 United Kingdom
 European Cable
 Japan
 Philippines

Channel	Select a channel from the channels available in the dropdown. The list of available channels will be based on which channel plan is selected
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Advanced

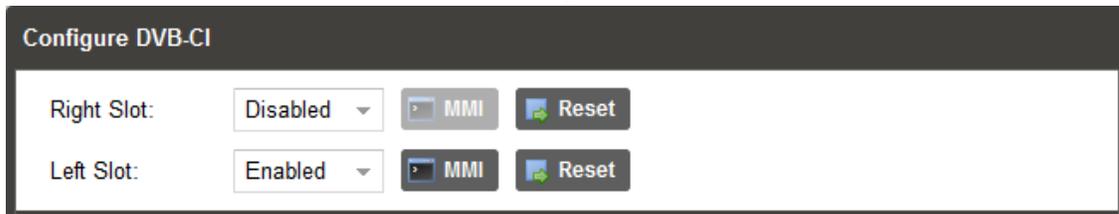
Setting	Range	Description
Frequency (MHz)	42-1002	Selecting a channel from the channel dropdown will populate this field automatically based on the user selected channel. A user can manually select a frequency if desired
Bandwidth	1.7 MHz 5 MHz 6 MHz 7 MHz 8 MHz	Selecting a channel from the channel dropdown will populate this field automatically based on the user selected channel plan. A user can manually select channel bandwidth if desired.
PLP ID		Unique PLP ID used to select a particular stream within the DVB-T2 or DVB-C2 input signal
Profile	Auto Base Lite	Select the DVB-T2 profile to use
Low RF Level (dBmV)	-34 - +40	This is the Low RF Level threshold when the <i>Low Level</i> Alarm will be triggered in dBmV
Low MER (dB)	0 - 40	This is the Low MER threshold when the <i>Low MER</i> Alarm will be triggered in dB.

3.2.8 Configuring DVB-CI Descrambling

This section will describe how to configure DVB-CI descrambling in the AG 6000. First, the user will need to configure the CAM slots and descrambling mode. Once this is complete the user can configure which services or PIDs to descramble.

3.2.8.1 Configuring DVB-CI Slots

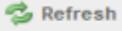
This menu allows the user configure the DVB-CI slots in the AG 6000. The AG 6000 has two DVB-CI slots, a left and a right, where CAM Modules can be inserted. Both slots are individually configurable using the Bottom Slot and Top Slot tabs. CAM Modules can be reset manually using the  button. The  button opens the MMI (Man Machine Interface) for the CAM in the respective slot. MMI support is dependent on what is supported by the CAM

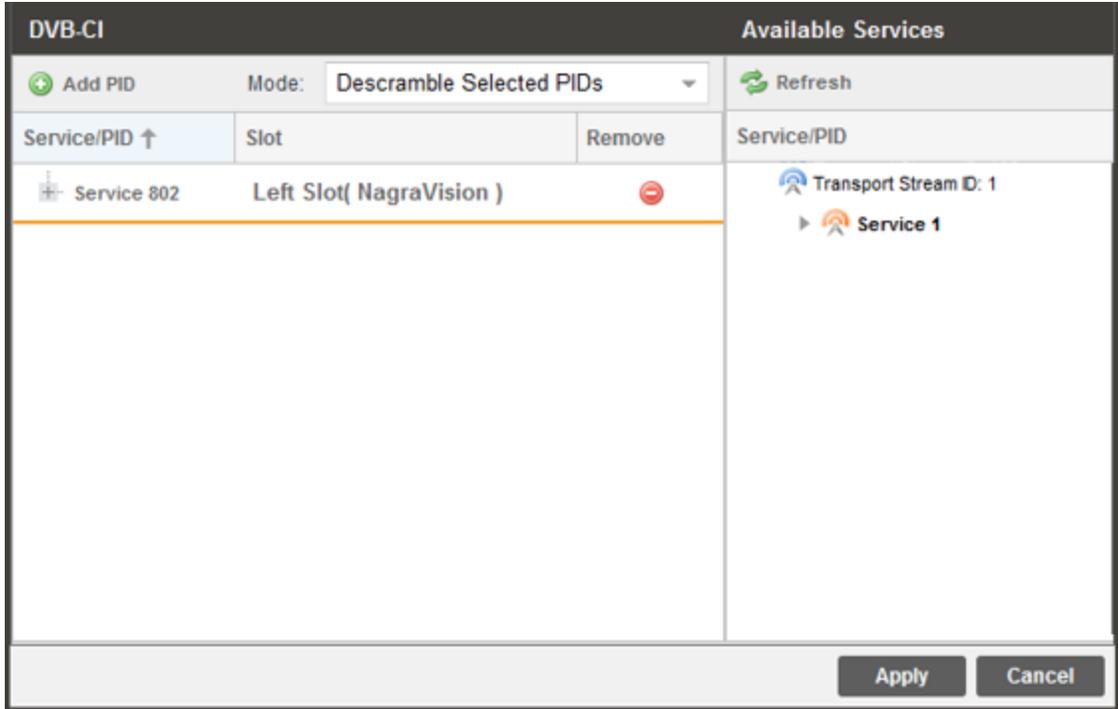


Configuring CAM Slots

Setting	Range	Description
Right Slot	Enabled	This setting allows the user to enable or disable the DVB-CI slot.
Left Slot	Disabled	

3.2.8.2 Configuring Service Descrambling

This menu allows the user to select the services the AG 6000 will descramble using the CAM Modules and Smart Cards inserted into the DVB-CI slots. These options are applicable only if the Mode in the DVB-CI settings is set to Selected PIDs or Selected Services (Refer to Section 3.2.10). The drag and drop method can be used to drag services from the right column to the left column. The drop down menu next to each selected service allows the user to choose either the bottom or top slot to descramble the service. If in Selected PIDs mode, PIDs to descramble can be added manually by clicking  button. If in Selected Services mode, Services to descramble can be added manually by clicking the  button. The icons next to each service indicate whether the service is scrambled or not scrambled. Scrambled services will show the  icon next to them while services that are not scrambled will show the  icon. Clicking the  button forces the AG 6000 to rescan the transport stream for changes.



DVB-CI Service Descrambling Menu

Setting	Range	Description
Mode	Descramble Decoded PIDs Descramble Selected PIDs Descramble Selected Services	<p><i>Decoded PIDs</i> sets the AG 6000 to descramble only the PIDs of the service that is currently set to decode. If the PIDs change in the incoming stream the AG 6000 will adapt to these changes, provided that Service Selection is set to “Service Lock” (Refer to Section 3.2.10). <i>Selected PIDs</i> sets the AG 6000 to descramble PIDs set in the Descramble Services window (Refer to Section 0). If the PIDs change in the incoming stream the AG 6000 will not adapt to these changes and will not be able to descramble. <i>Selected Services</i> sets the AG 6000 to descramble Services set in the Descramble Services window Refer to Section 0). If the Services change in the incoming stream the AG 6000 will not be able to descramble.</p>

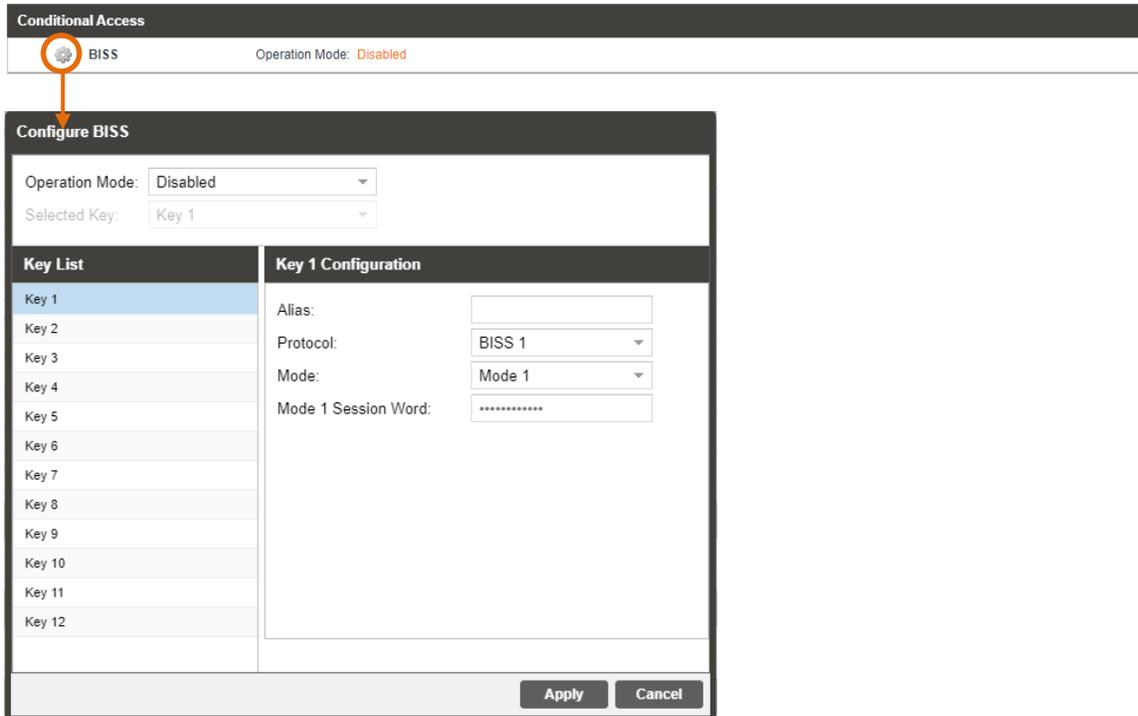
3.2.9 Configuring Conditional Access

This section will describe how to configure descrambling in the AG 6000. The AG 6000 allows decoding of BISS 1 and BISS 2 with additional licensing.

Note: BISS 1 and BISS 2 descrambling are licensed separately.

3.2.9.1 BISS 1 Descrambling

This menu allows the user to configure BISS descrambling. 12 unique BISS keys can be entered. Clicking on the gear icon allows the user to configure BISS 1.

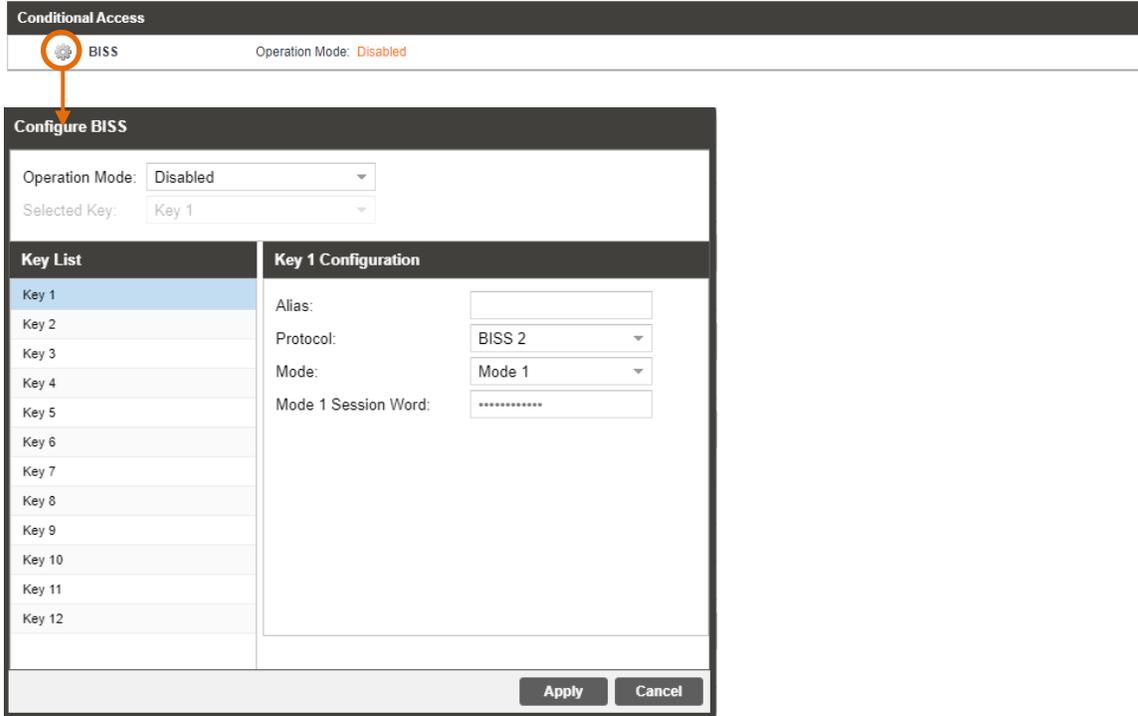


Setting	Range	Description
Operation Mode	Enabled Disabled	Enable / Disable BISS descrambling
Selected Key	Key 1 - 12	Select a key to configure
Alias	16 characters	Set an Alias for the selected key
Mode	Mode 1 Mode E	This setting sets the Mode of the BISS key that has scrambled the transport stream.
Mode 1 Session Word	N/A	If Mode 1 is selected the user enters the BISS session word here.

Mode E Session Word	N/A	If Mode E is selected the user enters the BISS session word here
Mode E Injected ID	N/A	If Mode E is selected the user enters the BISS injected ID here.

3.2.9.2 BISS 2 (BISS-CA) Descrambling

This menu allows the user to configure BISS descrambling. 12 unique BISS keys can be entered. Clicking on the gear icon allows the user to configure BISS 2.



Setting	Range	Description
Operation Mode	Enabled Disabled	Enable / Disable BISS descrambling
Selected Key	Key 1 - 12	Select a key to configure
Alias	16 characters	Set an Alias for the selected key
Protocol	BISS 1 BISS 2	Select which mode of BISS descrambling
Mode	Mode 1 Mode E Mode CA	This sets the Mode of the BISS key that has scrambled the transport stream.
Mode 1 Session Word	N/A	If Mode 1 is selected the user enters the BISS session word here.

Mode E Session Word	N/A	If Mode E is selected the user enters the BISS session word here
Mode E Injected ID	N/A	If Mode E is selected the user enters the BISS injected ID here
Mode CA Key Pair	Buried Injected	If Mode CA is selected the user will then select the type of conditional access. Buried or Injected
Mode CA Public Key	Download	If Mode CA Buried is selected, the user is able to download the Public Key from the AG 6000. The file will be generated as a .pub
Mode CA Private Key	Upload	If Mode CA Injected is selected, the user will need to upload the Private Key. The file name length must be less than 20 characters. The supported file types are .txt or .priv

3.2.10 Configuring Service Selection

This menu allows the user to configure the PIDs or Service the AG 6000 decodes. Depending on the Selection Mode that is selected, the menu changes to reflect the applicable settings.

Service Lock

In Service Lock mode the AG is set to decode a specified service number or service name. If the PIDs within the service change at any time, the AG continues to decode the service. The drag and drop method can be used to populate the Service Name or Service Number dialog boxes.

Configure Service Selection

Settings	Available Services				
<p>Selection Mode: <input type="text" value="Service Lock"/></p> <p>On Backup: <input type="text" value="Use Primary Service"/></p> <p>Primary</p> <p>Lock Mode: <input type="text" value="Service Number"/></p> <p>Service Number: <input type="text" value="1"/></p> <p>Backup</p> <p>Lock Mode: <input type="text" value="Service Name"/></p> <p>Service Name: <input type="text" value="Service 1"/></p>	<p> Refresh</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;">Service/PID</th> <th style="width: 20%;">Bitrate (Mbps)</th> </tr> </thead> <tbody> <tr> <td>▶ Service 1</td> <td style="text-align: right;">0.043</td> </tr> </tbody> </table>	Service/PID	Bitrate (Mbps)	▶ Service 1	0.043
Service/PID	Bitrate (Mbps)				
▶ Service 1	0.043				
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>					

Service Lock Selection Menu

Setting	Range	Description
Selection Mode	Service Lock PID Lock Auto Seek	Setting to <i>Service Lock</i> sets the unit to decode any PIDs associated with a service number or service name. Setting to <i>PID Lock</i> sets the unit to decode only the PIDs specified in the PID Lock Configuration matrix. <i>Auto Seek</i> mode will tune the unit to the first service listed in the PAT if a transport stream is present.
On Backup	Use Primary Service Use Backup Service	Sets the service the AG 6000 will tune to in case of an input failover. If <i>Use Primary Service</i> is selected the AG 6000 will tune to the service name specified in the Primary section. If <i>Use Backup Service</i> is selected the service name specified in the Backup section will be tuned. How the AG 6000

fails over inputs is configured in Section 3.2.1

Lock Mode	Service Name	If set to <i>Service Name</i> the AG will decode only services matching the name specified (SDT in DVB or TVCT in ATSC tables must be present in this mode). If set to <i>Service Number</i> the AG will decode only services matching the number specified.
	Service Number	

PID Lock Mode

In PID Lock mode the AG decodes only the PIDs specified by the user in the PID Lock Configuration matrix. The drag and drop method can be used to auto-populate the cells in the matrix. Stream types can be manually defined under the Primary Type and Backup Type columns. Individual cells under Primary and Backup columns can be selected and PIDs can be typed in manually.

Configure Service Selection

Settings					Available Services					
Selection Mode:		PID Lock			<div style="text-align: center; border-bottom: 1px solid #ccc; padding-bottom: 5px;">Refresh</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;">Service/PID</th> <th style="width: 20%;">Bitrate (Mbps)</th> </tr> </thead> <tbody> <tr> <td>▶ Service 1</td> <td style="text-align: right;">0.043</td> </tr> </tbody> </table>		Service/PID	Bitrate (Mbps)	▶ Service 1	0.043
Service/PID	Bitrate (Mbps)									
▶ Service 1	0.043									
On Backup:		Use Primary PIDs								
Component	Primary	Primary Type	Backup	Backup Type						
PCR	49		0							
Video	49	Auto	0	Auto						
Audio 1	50	Auto	0	Auto						
Audio 2	0	Auto	0	Auto						
Audio 3	0	Auto	0	Auto						
Audio 4	0	Auto	0	Auto						
SCTE35 1	0		0							
SCTE35 2	0		0							
SCTE35 3	0		0							
SCTE35 4	0		0							

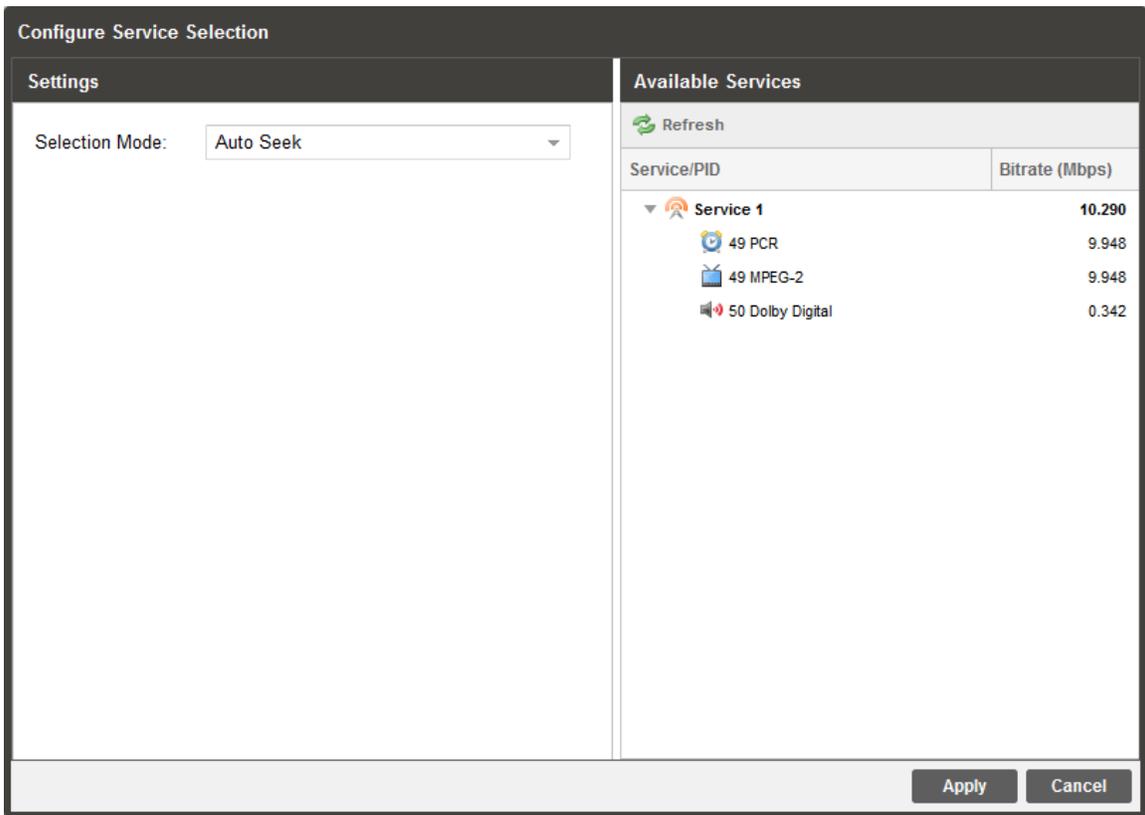
Apply
Cancel

PID Lock Selection Menu

Setting	Range	Description
On Backup	Use Primary PIDs Use Backup PIDs	Sets the PIDs the AG 6000 will tune to in case of an input failover. <i>If Use Primary PIDs is selected the AG 6000 will tune to the PIDs specified in the Primary PID column. If Use Backup PIDs is selected the service name specified in the Backup PID column will be tuned.</i> How the AG 6000 fails over inputs is configured in Section 3.2.1.

Auto Seek Mode

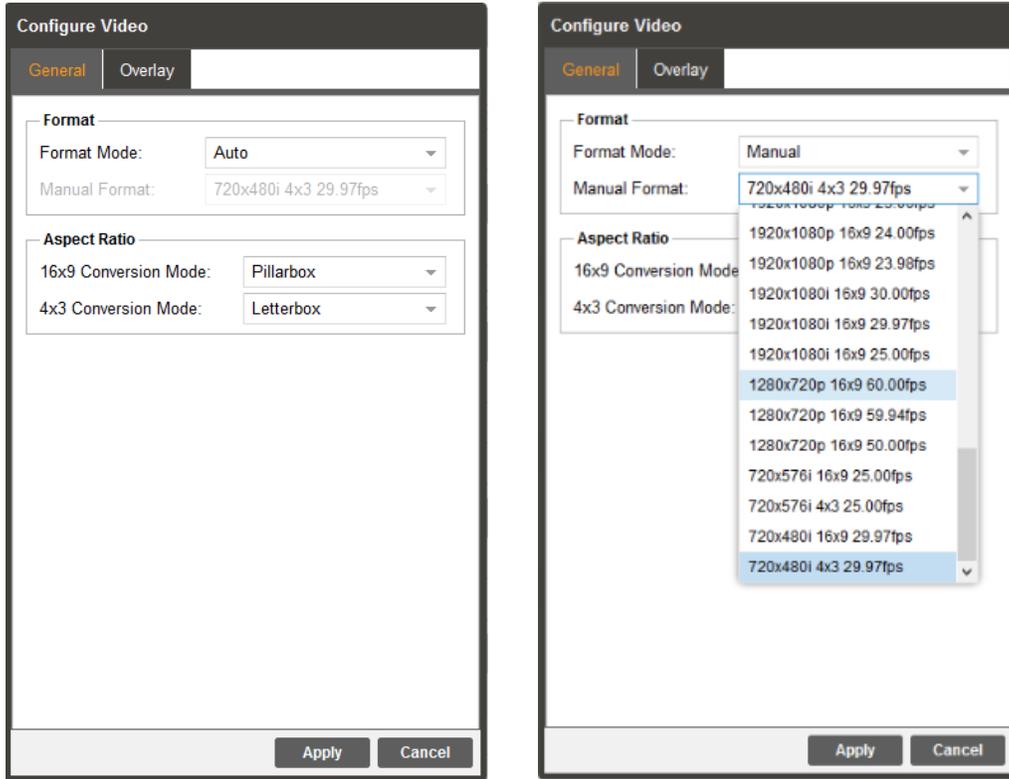
In Auto Seek mode the AG decodes the first service listed in the PAT. All PIDs in this service are automatically selected for decoding. No other configurations are available in this mode. This mode is recommended to verify the AG is receiving a valid signal and is able to decode. This mode is not recommended for a professional environment as changes in the PAT’s listings and order of listings can unexpectedly cause changes the service being decoded.



Auto Seek Menu

3.2.11 Configuring Primary Video

The menu allows the user to configure the SDI and Digital Video formats of the AG 6000. The backplate (see section 3.2) and video format selected determines which of the SDI output jacks is actively outputting.

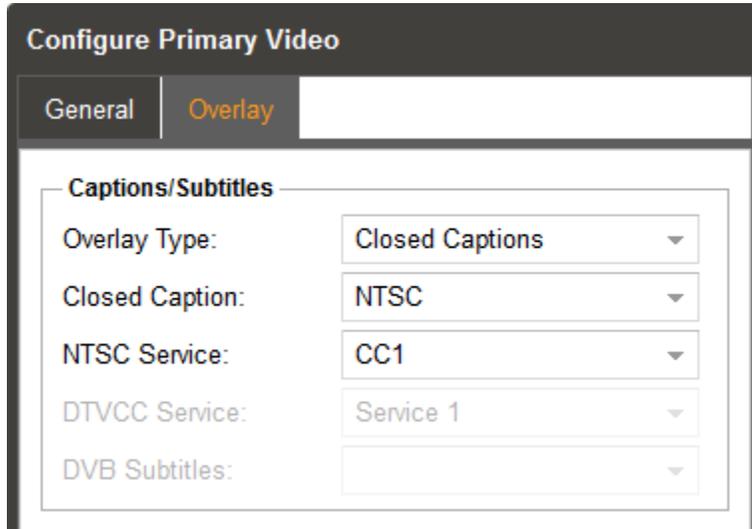


Manual and Auto Format Modes

Setting	Range	Description
Format Mode	Auto Manual	Setting to <i>Auto</i> the AG 6000 will output video to match the incoming native video format. Setting to <i>Manual</i> the user can define the video format the AG 6000 will output.
Manual Format	Refer to Appendix C for supported formats.	This setting is the video format the AG 6000 will output.
16x9 Conversion Mode	Pillar-box Center-Cut Anamorphic	<i>Center-Cut</i> cuts off top and bottom of the video. <i>Pillar-box</i> adds bars at the left and right of the video. <i>Anamorphic</i> stretches the video height and width to match the format mode.

4x3 Conversion Mode	Center-Cut	<i>Center-Cut</i> cuts off top and bottom of the video. <i>Letterbox</i> adds bars at the top and bottom of the video. <i>Anamorphic</i> stretches the video height and width to match the format mode.
	Letterbox	
	Anamorphic	

By configuring the overlay settings, closed captions or subtitles can be burnt into the video.



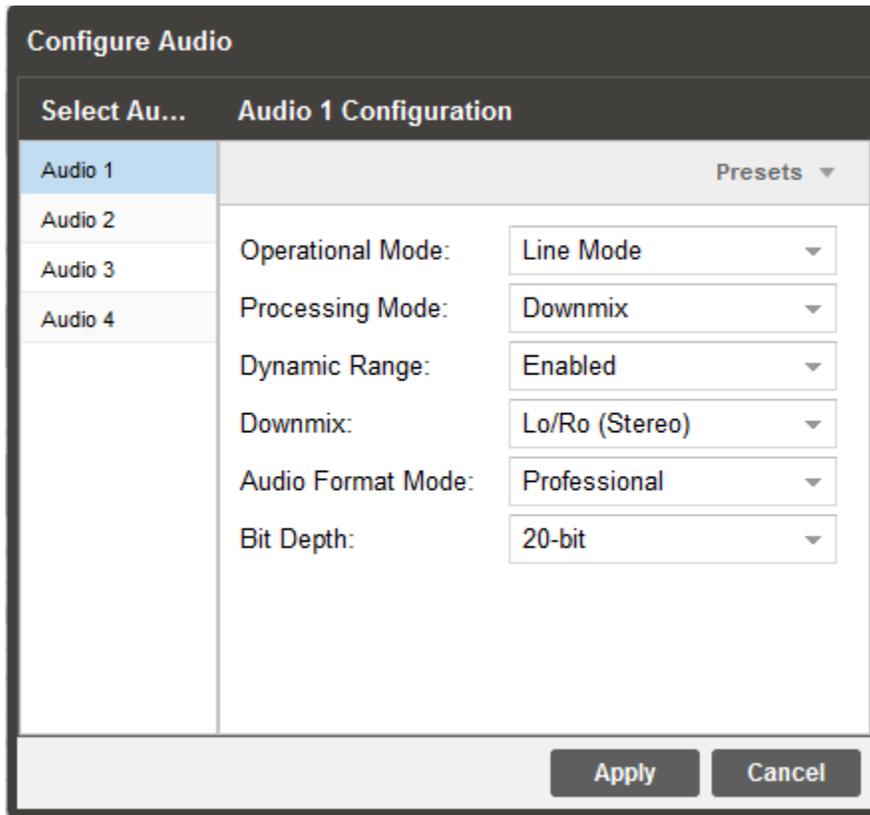
Overlay

Setting	Range	Description
Overlay Type	None Closed Captions DTB Subtitles	<i>Closed Captions</i> overlays burns closed captioning in the video output. <i>DVB Subtitles</i> burns subtitles in video output. <i>None</i> disables overlays completely.
Closed Caption	NTSC DTVCC	Sets the type of closed captions that will be in the overlay.
NTSC Service	CC1~CC4	Sets the NTSC closed caption service that will be displayed in the overlay. This setting is only available if the Closed Caption option is set to NTSC.
DTVCC Service	Service 1~6	Sets the DTVCC closed caption service that will be displayed in the overlay. This setting is only available if the Closed Caption option is set to DTVCC.
DVB Subtitles	Language Codes	If DVB Subtitles overlays are enabled this setting choosing the language which the subtitles are displayed. Only the languages present in the stream are given.

3.2.12 Configuring Audio

This menu allows the user to configure the audio downmix settings of the decoder. Two audio presets are available: Transmission and Monitor. These presets can be applied by clicking the **Presets** ▾ button. The menus for Audio 1 through Audio 4 all contain the same settings, although the “Processing Mode” feature for each one will change depending on what is selected for “Audio 1” (Downmix or Discrete). See the note below the “Audio Configuration Menu”.

Note: The number of audio services decoded by the AG 6000 and listed may vary with licensing.



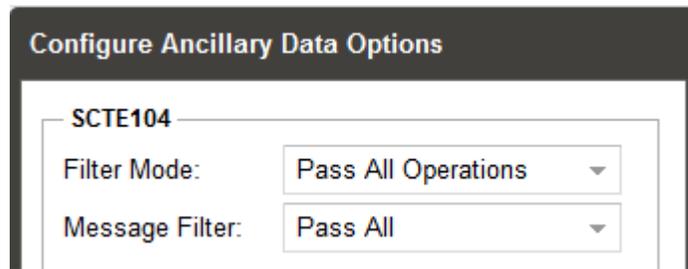
Audio Configuration Menu

Note: When selecting processing mode, the selection of Audio 1 is the most important, as it affects the other three Audios. Only Audio 1 can select “Discrete” mode. While Audio 1 is set to “Discrete” mode, Audio 2 will be locked into “Downmix” mode, and Audio 3 and Audio 4 will be grayed out as indication of all 8 audio channels being fully utilized. If Audio 1 is set to “Downmix” mode, then Audio 2, Audio 3 and Audio 4 will be locked into “Downmix” mode as well.

Setting	Range	Description
Operational Mode	Line Mode	Refer to Appendix D for explanation.
	RF Mode	
	Custom 1	
	Custom 0	
Processing Mode	Downmix	Refer to Appendix D for explanation.
	Discrete	Refer to Appendix E for explanation
Dynamic Range	Enabled	Refer to Appendix D for explanation.
	Disabled	
Downmix	Lo/Ro (Stereo)	When the audio is downmixed in the AG 6000 two audio channels are created. The channels can be configured using the settings available in the drop down menu. (Refer to Appendix D)
	Lt/Rt (Dolby Surround)	
	Lt/Rt (Auto)	
	Dual Mono	
	Dual Left	
	Dual Right	
Format Mode	Consumer	This option selects the PCM or Dolby Digital format mode. (Refer to Appendix D)
	Professional	
Bit Depth	20-bit	Defines the bit depth of the corresponding audio configuration.
	24-bit	

3.2.13 Configuring Ancillary Data

The following menus are present where ancillary data carried separately from the video and audio PIDs can be configured.



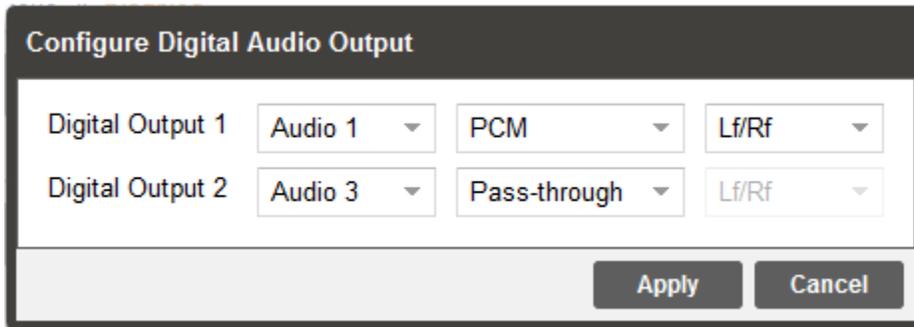
SCTE104

SCTE104

Setting	Ranges	Description
Filter Mode	Pass First Operation Pass All Operations	<i>Pass First Operation</i> ensures that embedded SCTE104 messages will contain no more than one operating ID. <i>Pass All Operations</i> allows embedded SCTE104 messages to contain all operations on output.
Message Filter	Pass Splice Insert Only Pass All	<i>Pass Splice Insert Only</i> selection will filter out all SCTE104 message types except for Splice Inserts. <i>Pass All</i> selection will allow all SCTE104 message types to pass to the output.

3.2.14 Configuring Digital Audio Output

This menu allows the user to configure the digital audio outputs of the AG 6000. Up to two digital audio outputs are available, and any of the four audio pairs can be selected for either one.



Digital Audio Configurations

Setting	Range	Description
Digital Output 1-2	Off Audio 1-4 PCM Audio 1-4 Pass-through	Assigning a <i>PCM</i> audio to a digital output will output the decoded or downmixed two channel audio using the settings defined in Section 3.2.12. Assigning <i>Pass-Through</i> to a digital output will output unprocessed compressed audio. Selecting Off disables the digital output completely.

3.2.15 Configuring SDI Ports

Under “Baseband Outputs”, in the “SDI Ports” configuration menu, there are four selection tabs: SD, HD, UHD and Audio. The SD and HD tabs are for configuring VANC settings of the SDI output from the BNC ports. The UHD tab allows the user to select which type of output mapping they wish to use. Finally, the Audio tab allows the user to assign audio services to the SDI output. For SD-SDI or HD-SDI formats, a single link connection is used as per SMPTE 259 or SMPTE 292.

3.2.15.1 SD-SDI VANC Embedding

The SD selection tab allows for configuration of the VANC settings for the SD-SDI outputs.

The screenshot shows a configuration window titled "Configure Primary SDI Output Port 1 & 2". It has four tabs: SD (selected), HD, UHD, and Audio. Under the "General" section, there is a "Video Loss Mode" dropdown menu set to "Display Raster". Under the "VANC" section, there are four rows of settings: "EIA 708-B" (Disabled, Line: 9), "TTX/VPS/WSS (S2031)" (Disabled, Line: 5), "RDD11" (Disabled), and "SCTE104" (Disabled, Line: 12). At the bottom right, there are "Apply" and "Cancel" buttons.

Primary SD Selection Tab

General

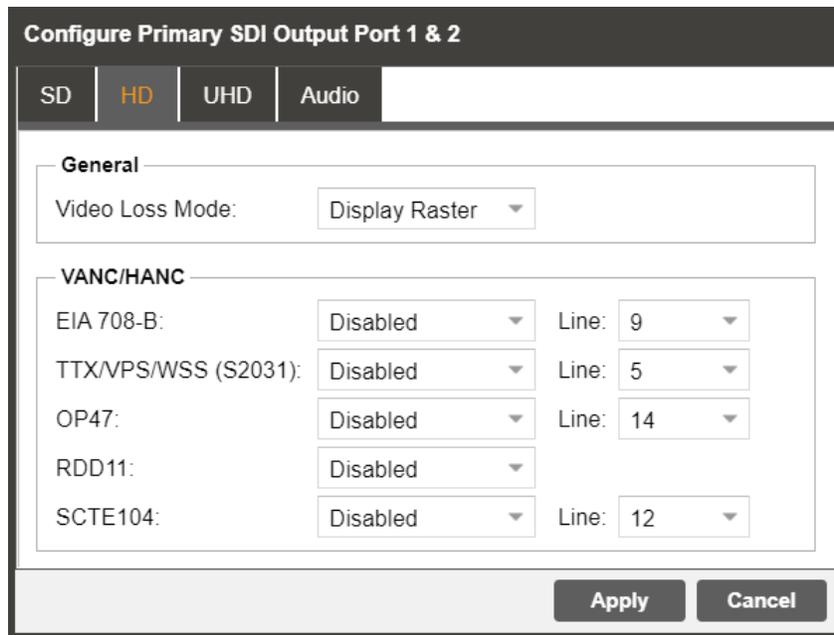
Setting	Range	Description
Video Loss	Disable SDI	Setting to <i>Disable SDI</i> squelches the SDI output of the AG 6000 in case of an error state. Setting to <i>Display Raster</i> the AG 6000 will display a black raster color.
	Display Raster	

VANC

Setting	Range	Description
EIA 708-B	Enable/Disable Line: 4~19	Enables and disables EIA 708-B Captions Allows user to specify which line the captions are assigned to.
TTX/VPS/WSS (S2031)	Enable/Disable Line: 4~19	When enabled, SMPTE 2031 data will be embedded in the VANC. Selecting line number determines which line the SMPTE 2031 data starts on.
RDD11	Enabled Disabled	Enable/Disable Registered Disclosure Document 11 (RDD11) embedding in the VANC.
SCTE104	Disabled/Enabled Line Number (4~21)	When enabled, SCTE35 to 104 Embedding occurs. Selecting line number determines which line SCTE104 data starts on.

3.2.15.2 HD-SDI VANC/HANC Embedding

The HD selection tab allows for configuration of the VANC/HANC settings for the HD-SDI outputs:



HD Selection Tab

General

Setting	Range	Description
Video Loss	Disable SDI Display Raster	Setting to <i>Disable SDI</i> squelches the SDI output of the AG 6000 in case of an error state. Setting to <i>Display Raster</i> the AG 6000 will display a black raster color.

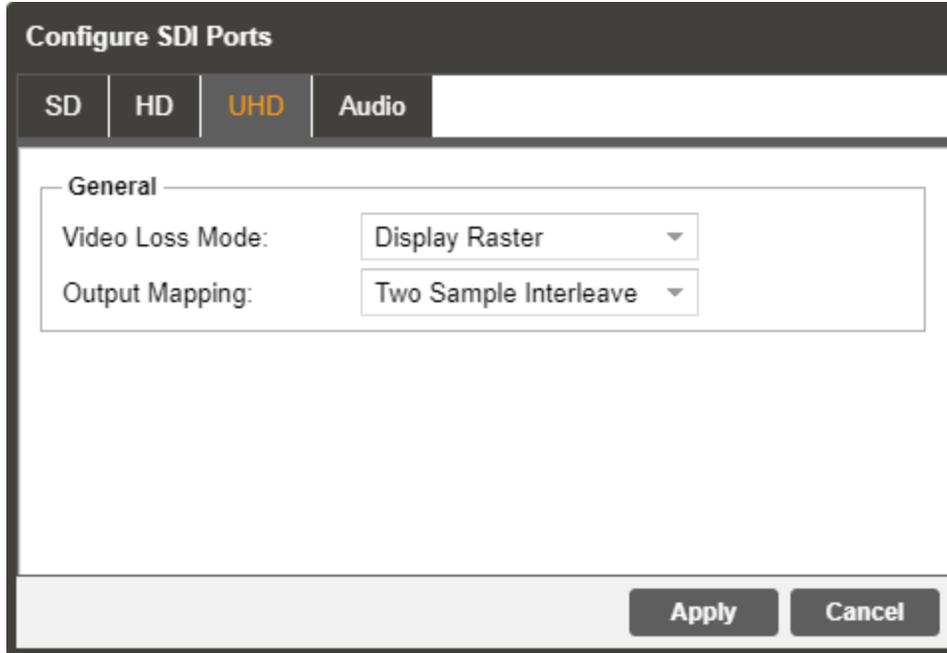
VANC/HANC

Setting	Ranges	Description
EIA 708-B	Disabled/Enabled Line Number (4~21)	When enabled, EIA 708-B captions will be embedded in the VANC. Selecting Line number determines which line the captions start on.
TTX/VPS/WSS (S2031)	Disabled/Enabled Line Number (4~21)	When enabled, SMPTE 2031 data will be embedded in the VANC. Selecting line number determines which line the SMPTE 2031 data starts on.
OP47	Disabled/Enabled Line Number (4~19)	When enabled, OP47 subtitle data will be embedded in the VANC.
RDD11	Enabled Disabled	Enable/Disable Registered Disclosure Document 11 (RDD11) embedding in the VANC.
SCTE104	Disabled/Enabled Line Number (4~21)	When enabled, SCTE35 to 104 Embedding occurs. Selecting line number determines which line SCTE104 data starts on.

3.2.15.3 UHD/4K Output Mapping

This section only applies to AG 6000 units with the quad 3G-SDI backplate (see section 3.2). With the backplate that has the digital output port (section 3.2.1), it is still possible to output 4K/UHD with the HDMI connector, but the AG 6000 will only output HD or SD from the SDI ports.

The UHD selection tab provides configuration of the UHD/4K outputs. The “Output Mapping” selection configures the quad 3G-SDI outputs to carry a 4K format to a compatible quad 3G-SDI input device/monitor.



UHD Selection Tab

General

Setting	Ranges	Description
Video Loss	Disable SDI	Setting to <i>Disable SDI</i> squelches the SDI output of the AG 6000 in case of an error state. Setting to <i>Display Raster</i> the AG 6000 will display a black raster color.
	Display Raster	
Output Mapping	Square Division	Setting to <i>Two Sample Interleave</i> configures the SDI output for quad 3G-SDI format in which each of 4 stream outputs carries ¼ pixels and the picture resolution. Setting to <i>Square Division</i> configures a quad 3G-SDI output format in which each of 4 streams carries a quarter section of the picture in full resolution. Quad 3G-SDI Formats conform to SMPTE 425-3 and SMPTE 425-5.
	Two Sample Interleave	

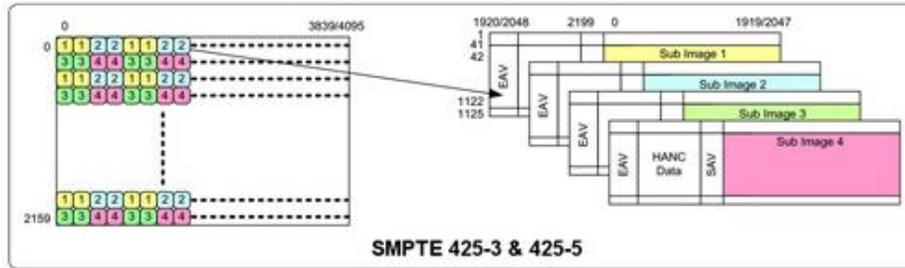
Outputting UHD/4K through quad 3G-SDI requires four SDI output port/connections. Ports 1, 2, 3, and 4 on the AG 6000 provide the respectable outputs for the 4K formats when selected. SDI Link connections 1, 2, 3, and 4 from the AG 6000 must appropriately match the four 3G-SDI inputs of the receive/monitor device so the 4K image can be properly processed/rendered. The following section provides a brief explanation of the two methods commonly used to interface a 4K-SDI signal over four 3G-SDI link connections.

SMPTE 425-3 and SMPTE 425 define new image mapping structures which provide a means to interface 4K over an SDI interface. Interfacing 4K-SDI up to 60 fps requires using four 3G-SDI links. Two methods of carrying 4K via 4 link connections include

1. Two Sample Interleave
2. Four Quadrant Division (Square Division).

In each of these methods $\frac{1}{4}$ of the picture image is carried by each of the four link connections. A brief explanation of each follows.

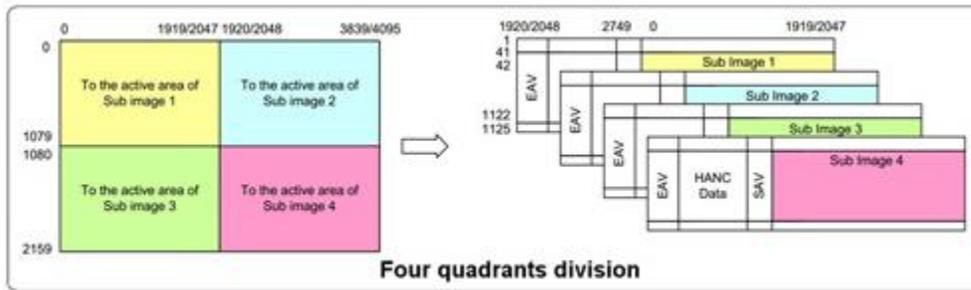
Two Sample Interleave



Two Sample Interleave Diagram

Two Sample Interleave breaks the image into interleaved samples of the entire picture. A line interleaving system has one line with alternating pixels 1 and 2, while the next line has alternating pixels 3 and 4 as illustrated. 3G-SDI link 1 carries the #1 pixels, while link 2 carries the #2 pixels, link 3 the #3 pixels and link 4 the #4 pixels. In this manner each of the 3G-SDI links carries pixels in $\frac{1}{2}$ the scan lines and $\frac{1}{2}$ the pixels in each line of the (1080p resolution) image or frame.

Square Division or Four Quadrants Division

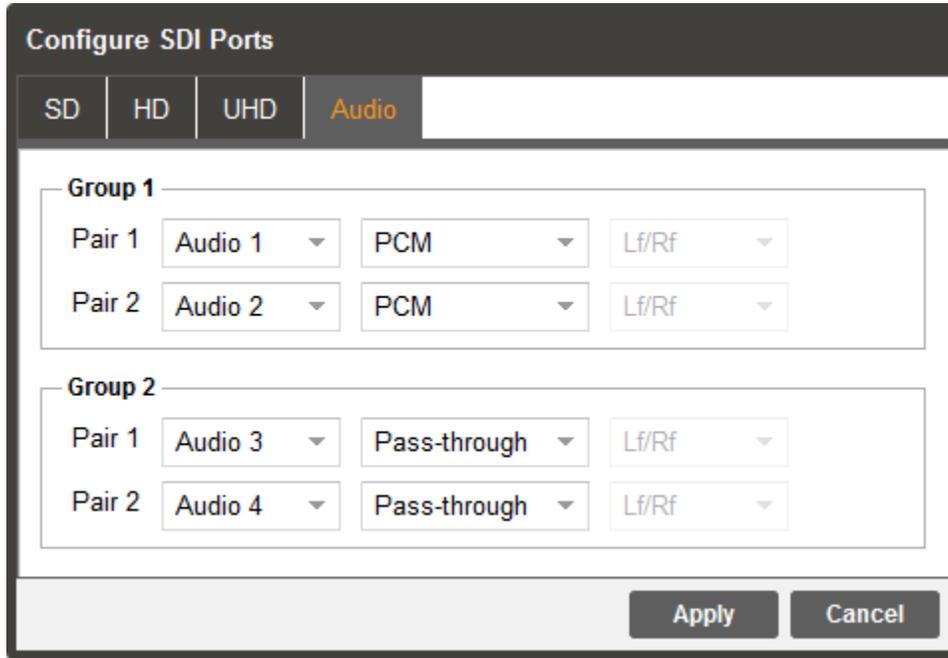


Square Division Diagram

The Square Division method, also referenced as Four Quadrant Division, divides the picture equally in quarter sections as illustrated. Each section is $\frac{1}{4}$ of the 4k image or 1080p. SDI link 1 carries the upper left image pixels, link 2 carries the upper right pixels, link 3 carries the lower left pixels, and link 4 carries the lower right pixels. The SDI receive device assembles the pixels from the 4 links to recreate the image.

3.2.15.4 SDI Audio Embedding

The Audio selection tab allows for configuration of SDI embedded audio settings based on the settings chosen from section 3.2.12. The AG 6000 comes standard with the ability to decode two audio services. With additional licensing the AG 6000 can handle up to four unique audio services. When licensed for four audio services, the user will have four audio pairs available to embed audio in the SDI. These two SDI groups provide inclusion of four audio pairs, with two pairs to each group. All audio pairs share the same options.



Primary Audio Selection Tab

Note: From section 3.2.12, if Audio 1’s “Processing Mode” is set to “Discrete”, then Audio 2 will only be capable of “PCM”, and Audio 3 and Audio 4 will only be capable of “Pass-through”.

Setting	Range	Description
Group 1-2	Disabled	Assigning a <i>PCM</i> audio to a Group Pair will embed the downmixed four channel audio. Assigning <i>Pass-Through</i> to a Group Pair will embed unprocessed compressed audio in the SDI VANC. Selecting Off disables the Group Pair completely. Also present are the options for decoding Dolby 5.1
Pair 1-2	Audio 1-4 PCM Audio 1-4 Pass-through Lf/Rf, C/LFE, Ls/Rs, Ch1/Ch2, Ch3/Ch4, Ch5/Ch6, Ch7/Ch8	

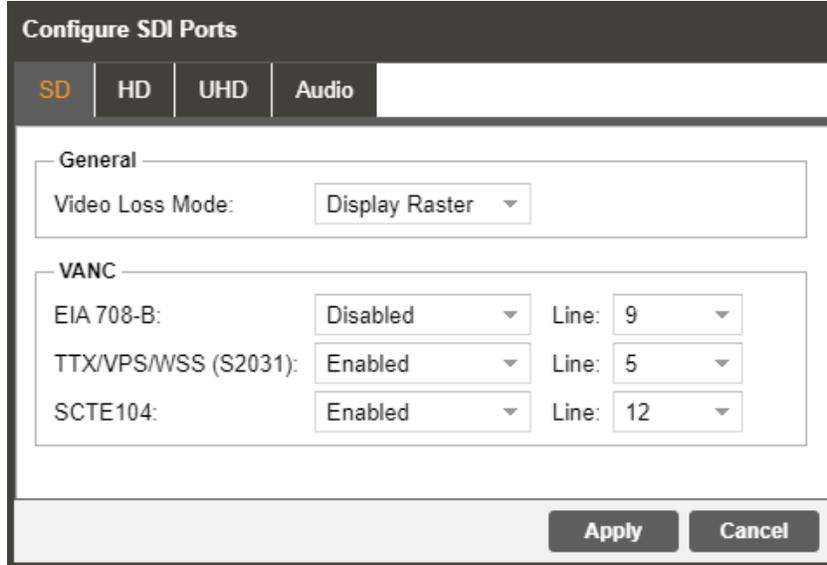
3.2.16 Configuring 2110 Output

This menu allows the user to configure the SMPTE 2110 output settings. The AG 6000 comes with the ability to configure two separate paths for SMPTE 2110. Also with SMPTE 2110 is the ability to configure eight audio pairs. Audio, Video, and Data Streams are all configurable to enable or disable the output, set Destination IP, and Destination Port.

Setting	Range	Description
Audio Packet Interval	0 us 125 us	This will set the path delay value for 2110-30 to either 0 us or 125 us.
Output	Enabled Disabled	This setting allows the user to enable or disable the output.
Destination IP	224.0.0.0 - 239.255.255.255	This setting allows a user to configure the output destination IP address.
Destination Port	0-65535	This is the UDP port the source device is sending to.

3.2.16.1 SD-SDI/IP VANC Embedding

The SD selection tab allows for configuration of the VANC settings for the SD-SDI outputs.



Primary SD Selection Tab

General

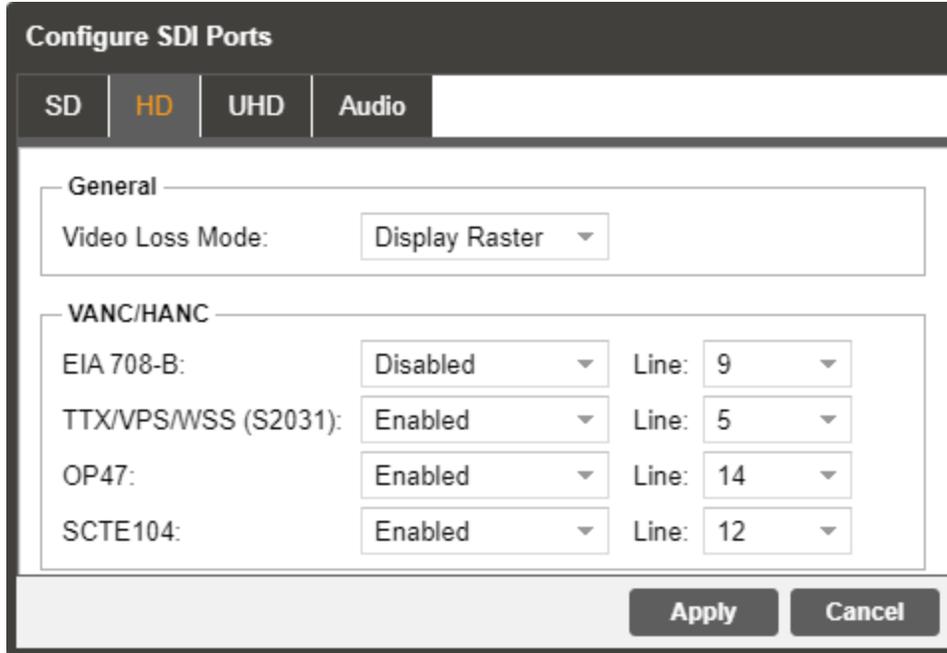
Setting	Range	Description
Video Loss	Disable SDI Display Raster	Setting to <i>Disable SDI</i> squelches the SDI output of the AG 6000 in case of an error state. Setting to <i>Display Raster</i> the AG 6000 will display a black raster color.

VANC

Setting	Range	Description
EIA 708-B	Enable/Disable Line: 4~19	Enables and disables EIA 708-B Captions Allows user to specify which line the captions are assigned to.
TTX/VPS/WSS (S2031)	Enable/Disable Line: 4~19	When enabled, SMPTE 2031 data will be embedded in the VANC. Selecting line number determines which line the SMPTE 2031 data starts on.
SCTE 104	Enable/Disable Line: 4~19	Enables and Disable SCTE35/104 Convert Allows user to specify starting line

3.2.16.2 HD-SDI/IP VANC/HANC Embedding

The HD selection tab allows for configuration of the VANC/HANC settings for the HD-SDI outputs:



HD Selection Tab

General

Setting	Range	Description
Video Loss	Disable SDI Display Raster	Setting to <i>Disable SDI</i> squelches the SDI output of the AG 6000 in case of an error state. Setting to <i>Display Raster</i> the AG 6000 will display a black raster color.

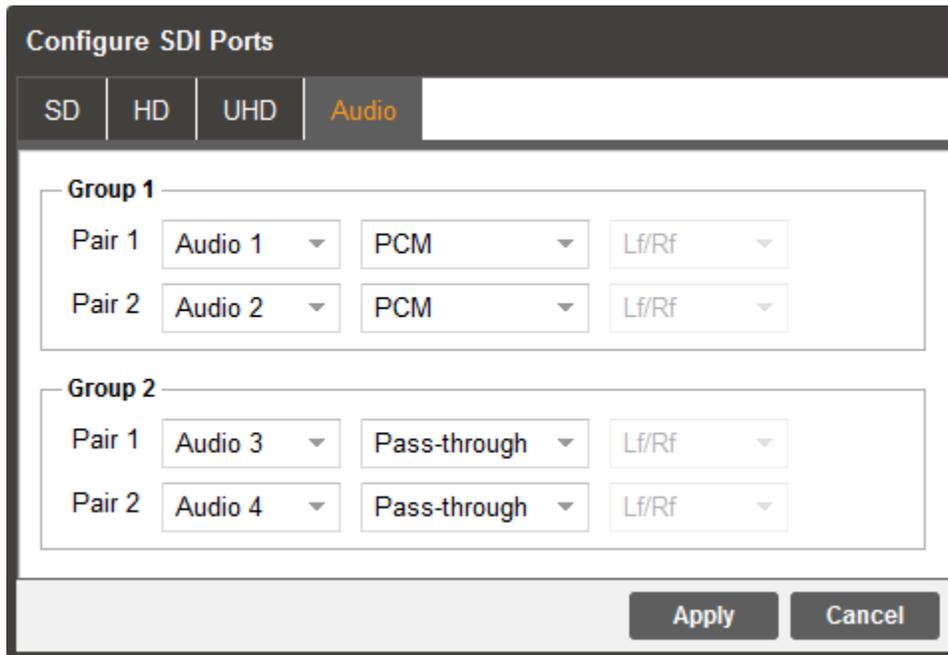
VANC/HANC

Setting	Ranges	Description
EIA 708-B	Disabled/Enabled Line Number (4~21)	When enabled, EIA 708-B captions will be embedded in the VANC. Selecting Line number determines which line the captions start on.
TTX/VPS/WSS (S2031)	Disabled/Enabled Line Number (4~21)	When enabled, SMPTE 2031 data will be embedded in the VANC. Selecting line number determines which line the SMPTE 2031 data starts on.

OP47	Disabled/Enabled Line Number (4~19)	When enabled, OP47 subtitle data will be embedded in the VANC.
SCTE104	Disabled/Enabled Line Number (4~21)	When enabled, SCTE35 to 104 Embedding occurs. Selecting line number determines which line SCTE104 data starts on.

3.2.16.3 SMPTE 2110 Audio Embedding

The Audio selection tab allows for configuration of SDI embedded audio settings based on the settings chosen from section 3.2.12. The AG 6000 comes standard with the ability to decode two audio services. With additional licensing the AG 6000 can handle up to four unique audio services. When licensed for four audio services, the user will have four audio pairs available to embed audio in the SDI. These two SDI groups provide inclusion of four audio pairs, with two pairs to each group. All audio pairs share the same options.



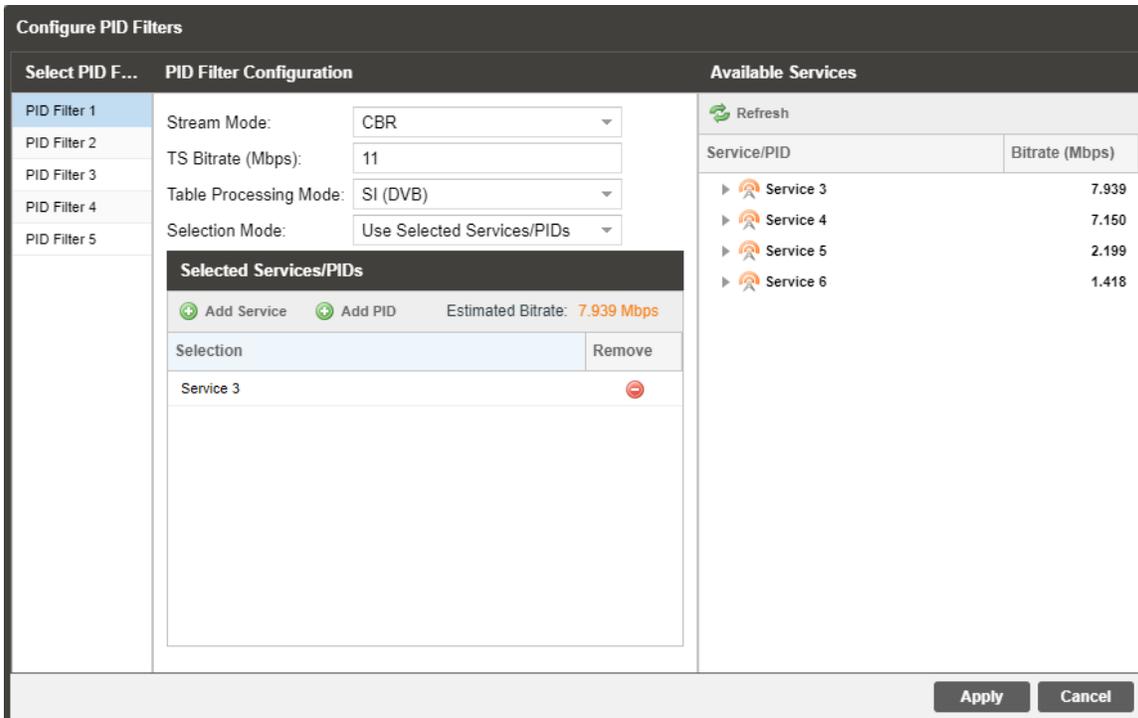
Primary Audio Selection Tab

Note: From section 3.2.12, if Audio 1's "Processing Mode" is set to "Discrete", then Audio 2 will only be capable of "PCM", and Audio 3 and Audio 4 will only be capable of "Pass-through".

Setting	Range	Description
Group 1-2	Disabled	Assigning a <i>PCM</i> audio to a Group Pair will embed the downmixed four channel audio. Assigning <i>Pass-Through</i> to a Group Pair will embed unprocessed compressed audio in the SDI VANC. Selecting Off disables the Group Pair completely. Also present are the options for decoding Dolby 5.1
Pair 1-2	Audio 1-4 PCM Audio 1-4 Pass-through Lf/Rf, C/LFE, Ls/Rs, Ch1/Ch2, Ch3/Ch4, Ch5/Ch6, Ch7/Ch8	

3.2.17 PID Filter

If the PID/Service Filter license is enabled, the following menus and options will be available for configuration. PID filtering will allow the user to create a new output TS by selecting and dragging one or more services/PIDs from the incoming transport stream into the Selected Services/PIDs box or use the currently decoded stream. The user can also configure a TS bitrate for each PID filtered stream and select different table inclusion options.

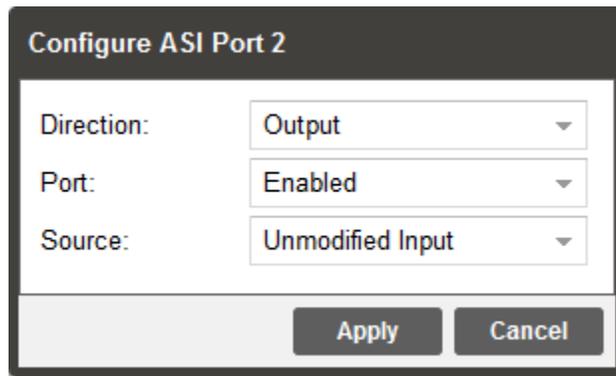


PID Filter Configuration

Setting	Range	Description
Select PID Filter	PID filter 1-5	Select which PID filter to configure
Stream Mode	CBR or VBR	Determine if the output TS bitrate will be constant or variable.
TS Bitrate (Mbps)	0.25 to 160	Configure the TS Bitrate for the PID filter stream selected if CBR is selected
Table Processing Mode	PSI (MPEG)	Adjusted tables: PAT, PMT Passed tables: CAT, NIT Discarded tables: all remaining
Table Processing Mode	SI (DVB)	Adjusted tables: PAT, PMT,SDT Passed tables: CAT, NIT, EIT, RST, TDT, TOT Discarded tables: TSDT, BAT
Selection Mode	Use Selected Services/PIDs Use Decoded Service	Use Selected Services/PIDs will allow the user to select which services are in the new TS. Use Decoded Service will only include the service that is currently selected for decoding by the AG 6000

3.2.18 Configuring ASI Output

This menu allows the user to configure the ASI output of the AG 6000. When enabled this output acts as an active loop output of the active input. For example, if the DVB-S/S2 input card is the current active input the ASI output port will output a demodulated signal of the satellite input. ASI outputs can be configured to pass the selected TS input directly unmodified to the output or apply PID filtering to the output.



ASI Port Configuration

Setting	Range	Description
Direction	Input / Output	Chooses whether acting port is input or output.
Port	Enabled Disabled	Enable or disable the ASI port.
Source	Unmodified Input Descrambled Descrambled and Processed PID Filter 1-5	Unmodified Input will pass the incoming TS to the output without applying any BISS or DVB-CI decryption Descrambled (or Descrambled and Processed) will output the TS with any applied BISS or DVB-CI decryption. PID Filter will output the TS from the PID filter menu option.

3.2.19 Configuring the MPEG/IP Outputs

This menu allows the user to configure the MPEG/IP outputs. The MPEG/IP backplate has two ports that can be set to receive and/or transmit. This menu is for setting up the transmission of MPEG/IP unicast or multicast transport streams. The menu for Stream 1 and 2 have the same settings. The menu for Streams 3 through 10 will contain the same options as Transmit 1 and Transmit 2 with one exception: Forward Error Correction is only available (if licensed) on Transmit 1 and 2.

Configure MPEG/IP Slot 1 Stream 1

General Settings

Transmit: Enabled

Source: Descrambled and Proc

Physical Connector: Port 2

Destination IP: 239.192.0.200

Destination Port: 10000

Source Port: 3020

TS Packets Per IP Packet: 7

Differentiated Services: Default

Encapsulation: UDP

Advanced Settings

FEC: Off

FEC Columns: 4

FEC Rows: 4

Apply
Cancel

Configuration of MPEG/IP Output

General

Setting	Range	Description
Transmit	Enabled Disabled	Enable or disable the MPEG/IP transmit group.
Source	Unmodified Input Descrambled and Processed PID Filter 1-5	Selecting <i>Unmodified Input</i> will pass the incoming TS to the output without applying any BISS or DVB-CI decryption. Choosing <i>Descrambled and Processed</i> will output the TS with any applied BISS or DVB-CI decryption. <i>PID Filter 1-5</i> will output the TS from the PID filter menu option.
Physical Connector	Port 1 Port 2	The physical connector on the MPEG/IP card that will be used to transmit the output.

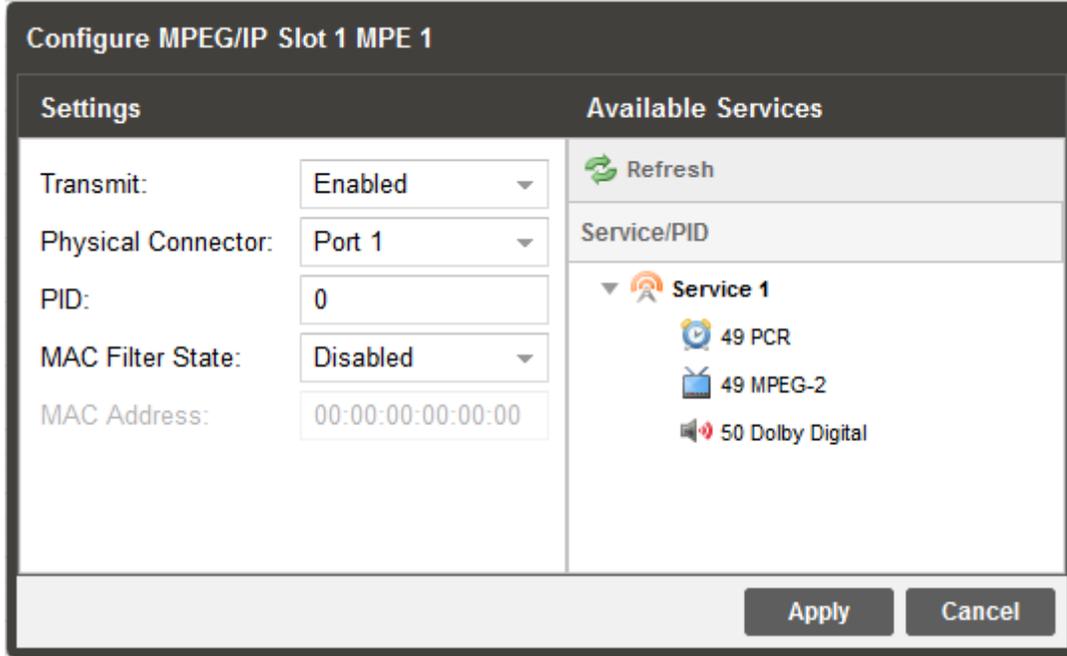
Destination IP	Multicast - 224.0.0.0 - 239.255.255.255	When sending to a unicast address the destination IP address must match the receiving device's IP address. When sending a multicast the address must be sent within the multicast IP range.
Destination Port	0 - 65535	When sending to a unicast address, the destination port must match the receiving device's port. When sending a multicast, any port within the accepted range can be used, but it is good practice to always choose a port >1030 and an even number
Source Port	0 - 65535	This is the port used by the AG 6000 to transmit the MPEG/IP stream.
TS Packets Per IP Packet	1-7	The number of TS packets that are contained with a single IP packet. Default is 7. Lowering this value below default increases network overhead.
Differentiated Services	Default Assured Forwarding 1-1 to 4-3 Expedited Forwarding	Define the quality of service (QoS) classification the packets carry when transmitted.
Encapsulation	UDP RTP	Sets the Encapsulation to UDP or RTP.

Advanced Settings

Setting	Range	Description
FEC	Off Columns Columns/Rows	Sets the FEC Type or disables FEC.
FEC Columns	1-20 (Columns) 4-20 (Columns/Rows)	Defines the number of Columns used to construct the FEC Matrix. (Columns * Rows must be ≤ 100.)
FEC Rows	4-20	Defines the number of Rows used to construct the FEC Matrix. (Columns * Rows must be ≤ 100.)

3.2.20 Configuring the MPEG/IP MPE Outputs

This menu allows the user to configure the MPEG/IP Multi-Protocol Encapsulation (MPE) outputs. Each MPE Output allows the user to select an MPE data PID from the transport stream to be output.

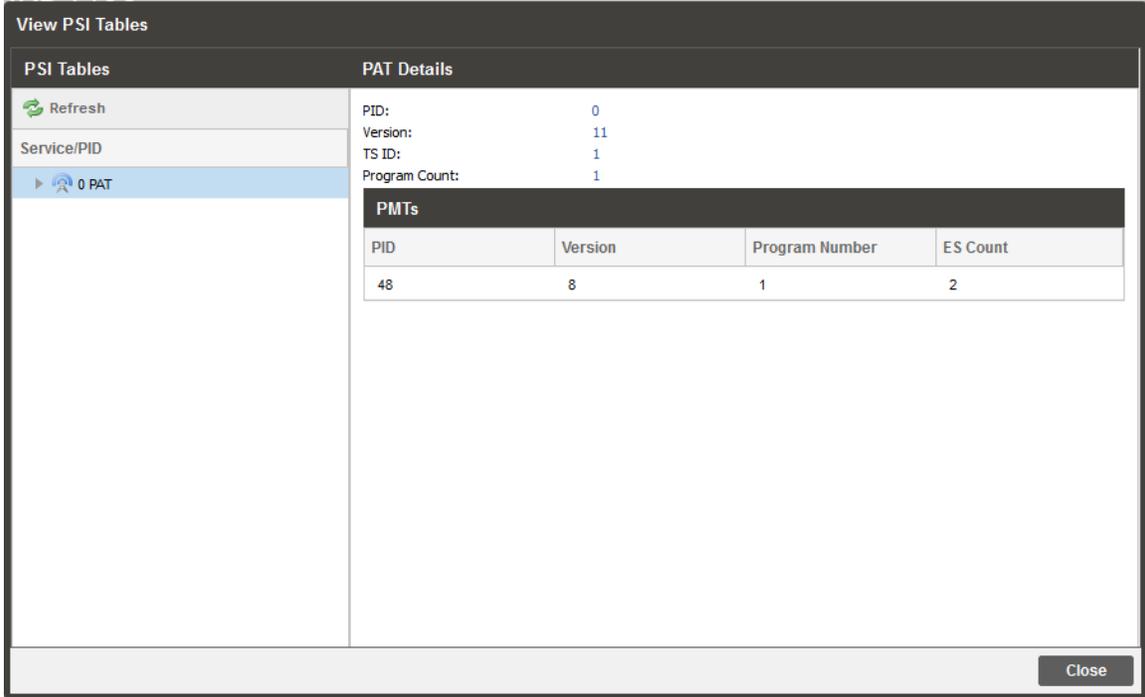


Configuring MPE Output

Setting	Range	Description
Transmit	Enabled Disabled	Enable or disable transmission of de-encapsulated MPE data.
Physical Connector	Port 1 Port 2	The physical connector on the MPEG/IP card that will be used to transmit the MPE data.
PID		Selected MPE PID from the transport stream to use for MPE output
MAC Filter State	Enabled Disabled	Enable or Disable the filtering of output data based on a MAC address in the selected MPE PID
MAC Address	00:00:00:00:00:00 FF:FF:FF:FF:FF:FF	Filtered MAC address that will be transmitted in the MPE output. All data with other MAC addresses in the selected MPE PID will be discarded

3.2.21 Viewing PSIP Information

To view the PSIP information for the applied TS, select the View PSI Tables button located on the right hand side of the Inputs section. This will open a new window that displays all of the PSIP information for the applied TS. The tables displayed will include PAT, PMT and CAT and tables associated with the stream type (DVB, ATSC). SDT tables will be displayed for DVB streams and MGT, TVCT, EIT, ETT, STT tables will be displayed for ATSC streams.



PSI Tables

Clicking the Refresh button in the upper left corner will update the tables displayed.

3.3 Admin Panel

The screenshot displays the Admin Control Panel interface with the following sections:

- General Settings:**
 - Unit Alias: (No Alias)
 - Protect BISS-E Injected ID: Yes
 - PID Display Mode: Decimal
 - ASI Port 2/Video Sync Function: ASI Out
- Unit Network Configuration:**
 - Configure Nameservers: Primary Nameserver: 172.16.0.86, Secondary Nameserver: 172.16.0.153

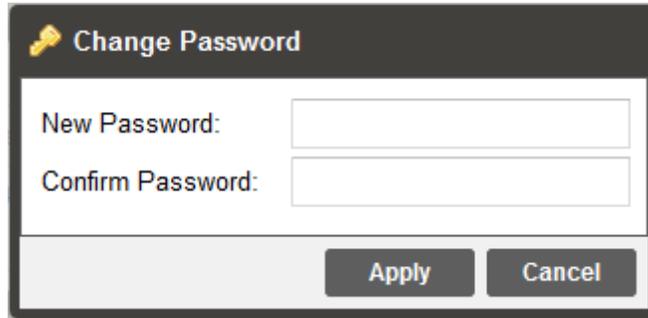
Mode	IP Address	Subnet Mask	Gateway	Hostname	MAC
Static	10.0.104.65	255.255.0.0	10.0.1.3	(none)	A0:69:38:02:A7:D4
- License Information:**

Option	Supported	State	Instances
AG 60730 - 4K/UHD Output License	Yes	Licensed	1
AG 60840 - 2x-4x Audio Service Decoding Upgrade	Yes	Licensed	1
AG 60851 - 5.1 Discrete Audio	Yes	Licensed	1
AG 60916 - DVB-S2 Advanced Feature License	Yes	Licensed	1
AG 60921 - BISS Descrambling License	Yes	Licensed	1
AG 60925 - IP FEC Output	No	Unsupported	1
AG 60928 - PID/Service Filter License	Yes	Licensed	1
AG 60991 - DVB-CI Multi-Service Descrambling License	Yes	Licensed	1
AG 60992 - SCPE 35 to 104 Output License	Yes	Licensed	1
- Date / Time:**
 - Update Mode: Manual
 - Current Date: 2019-09-13
 - Current Time: 05:29:44
 - NTP Server: 0.0.0.0
- SNMP Communities:**
 - Read-Only Community: public
 - Read-Write Community: private
- SNMP Trap Managers:** (Empty list)
- Syslog:**
 - State: Disabled
 - Network Protocol: UDP
 - IP Address: 10.0.0.1
 - Port: 514

To access the Admin Control Panel, click on the **Admin** tab. This menu allows for control of many aspects of the AG 6000.

3.3.1 Changing Unit Password

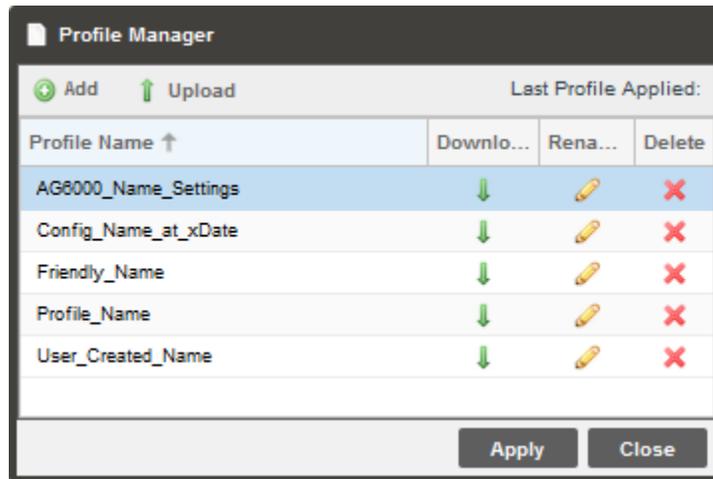
The AG 6000 can be assigned an access password and the current access password can be changed. In order to make changes to passwords, click the  button. A window will appear to enter the current password and new password.



Password Configuration

3.3.2 Profiles

The AG 6000 has the ability to save all configured settings to multiple profiles. Profiles can be saved locally, renamed and saved to external storage to be used on other AG 6000s. Profiles can be used to quickly and easily change the configuration of an AG 6000 to suit different inputs and decoding requirements.

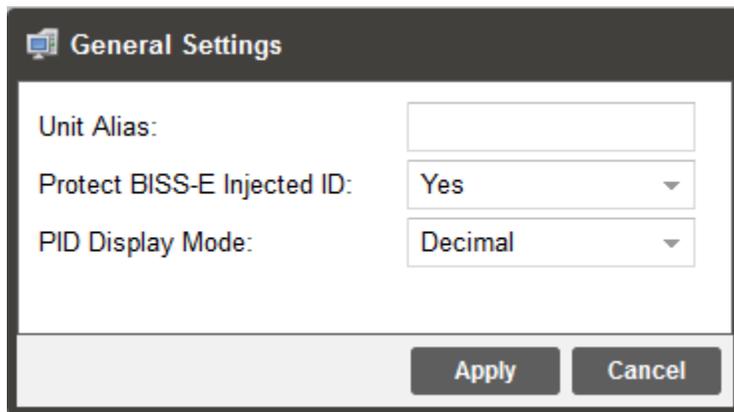


Profile Management Window

Action	Button	Description
Add New Profile	 Add	Adds a new profile from current settings. User must name profile before creation is complete.
Upload Profile	 Upload	Allows the user to browse to external storage or workstation to upload profile to AG 6000.
Apply Profile	 Apply	Select a profile from the drop down menu and click this button. The AG 6000 will apply all settings contained in the profile selected.
Rename Profile		Select a profile from the drop down menu and click this button. The user will be prompted for a new name for the profile.
Delete Profile		Select a profile from the drop down menu and click this button. The user will be prompted to confirm deletion of the profile.
Download Profile		Select a profile from the drop down menu and click this button. The user will be prompted to select a directory to download the profile.

3.3.3 General Settings

The AG 6000 can be assigned an alias which is displayed in the upper right hand corner of the web interface. The alias can help define which AG 6000 the operator is currently logged into. The BISS-E Injected ID for BISS Mode E can also be protected from being accidentally changed. Setting the Protect BISS-E Injected ID to “Yes” will force the user to unlock the dialog box in the BISS Descrambling configuration menu before allowing any changes to be made. The edit the Unit Alias or protect the BISS-E Injected ID click on the  **Configure General Settings** button. The PID Display mode changes how PID values are displayed in the web interface. The values can either be displayed in decimal or HEX values.



General Settings Menu

Setting	Range	Description
Unit Alias	User entered	Here a friendly name can be assigned to the unit.
Protect BISS-E Injected ID	Yes or No	Choose whether or not to protect the BISS-E Injected ID.
PID Display Mode	Decimal or Hexadecimal	Choose which format the PIDs should be numerically displayed.

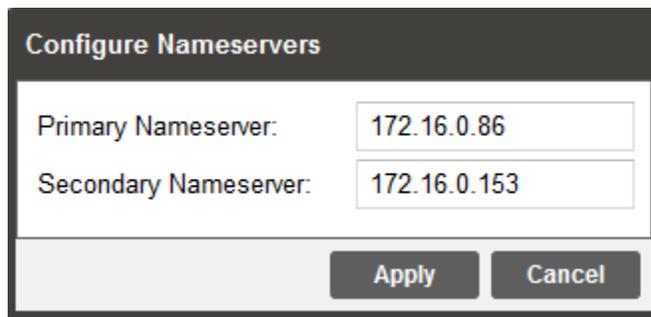
In the image below, the changes made to the “Unit Alias” portion of the general settings are reflected in the top right corner of the GUI.



Example of Unit Alias (User Test)

3.3.4 Unit Network Configuration

The management port of the AG 6000 can be configured from the web interface. To make changes to the management port click, the  button under the Unit Network Configuration section. Domain name servers can be configured on the AG clicking the  **Configure Nameservers** button. IP address and web address entries are accepted as Nameserver addresses.



Nameserver Configuration

If the AG 6000 contains a 60127 option card the unit can be configured to have an optional 2nd control port.

NOTE: Exercise extreme caution when performing changes to this menu as network communication can be lost with the AG 6000.

Configure TCP Settings

Mode:

Hostname:

Static Settings

IP Address:

Subnet Mask:

Gateway:

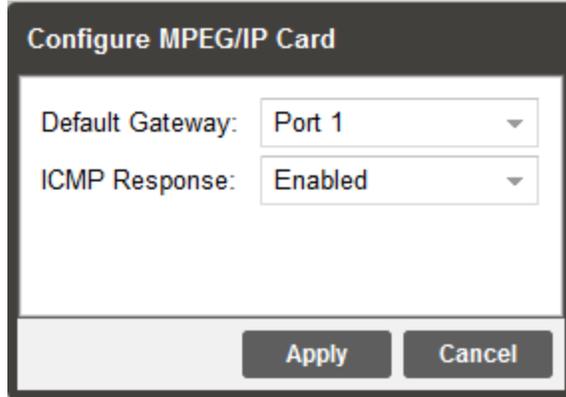
Control Port TCP Configuration

Setting	Range	Description
Mode	DHCP Static	Setting to <i>DHCP</i> will allow the network assign an IP address automatically to the AG 6000 (if supported). Setting to <i>Static</i> allows the user to manually define all TCP/IP settings for the management port.
Hostname	Valid characters: A to Z; 0 to 9 - (hyphen)	This setting allows the user to define an optional unit Hostname.
IP	Four decimal octets: XXX.XXX.XXX.XXX	This option is only available if Static Mode is set. This is the IP address assigned to the management port.
Subnet Mask	255.0.0.0 – 255.255.255.254	This option is only available if Static Mode is set. This is the Subnet Mask assigned to the management port.
Gateway	Four decimal octets: XXX.XXX.XXX.XXX	This option is only available if Static Mode is set. This is the Gateway address assigned to the management port.

The 2nd management port of the AG 6000 can be configured from the web interface. To make changes to which port is the 2nd management port click, the configure control ports  button under the Unit Network Configuration section.

3.3.5 MPEG/IP Network Configuration

The MPEG/IP card is used to receive MPEG over IP transport streams. The MPEG/IP card supports unicast, multicast, UDP and RTP. The ports of the MPEG/IP card on the AG 6000 can be configured from the web interface. To configure the Default Gateway and ICMP Response settings click the  **Configure Card** button.



MPEG/IP Card Configuration

Setting	Range	Description
Default Gateway	Port 1 Port 2	Setting to <i>Port 1</i> uses the gateway address of port 1 as the default gateway. Setting to <i>Port 2</i> uses the gateway address of port 2 as the default gateway.
ICMP Response	Enabled Disabled	Setting to enabled allows the AG 6000 to respond to ICMP requests (ping). If disabled the AG 6000 will not respond to these requests.

To configure the TCP/IP settings of the MPEG/IP ports click the  button under the MPEG/IP Network Configuration section next to the corresponding port. The settings for both ports are the same.

Configure MPEG/IP Port 1

IP Address: 10.0.0.71

Subnet Mask: 255.255.255.0

Gateway: 0.0.0.0

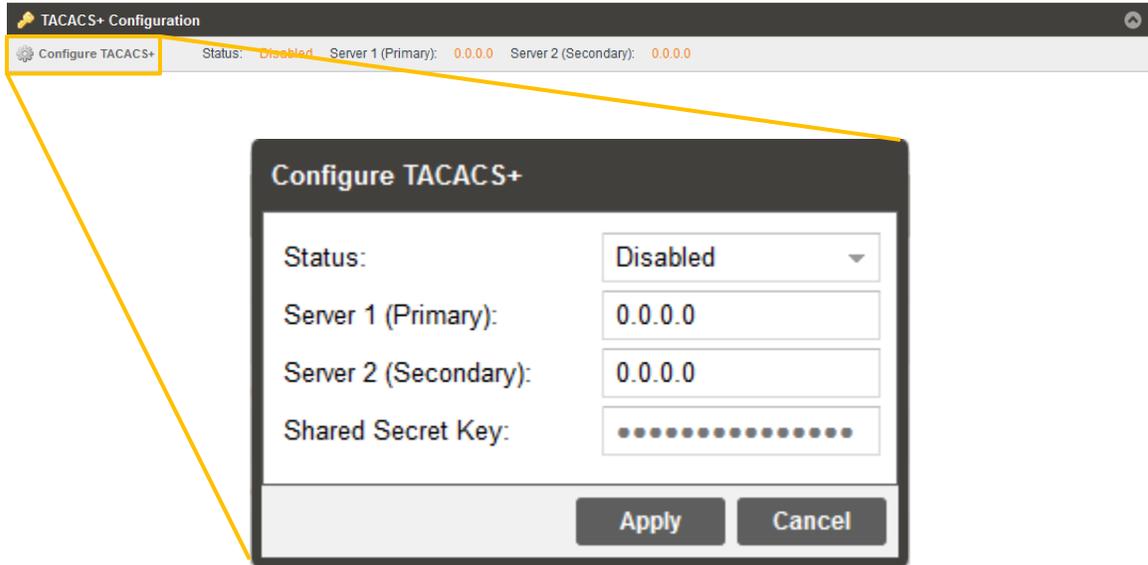
Apply Cancel

MPEG/IP Port Configuration

Setting	Range	Description
IP Address	1.0.0.0 - 126.0.0.0 128.0.0.0 - 191.255.0.0 192.0.1.0 - 223.255.255.0	This setting is the TCP/IP address assigned to the port.
Subnet Mask	255.0.0.0 – 255.255.255.254	This setting is the subnet mask assigned to the port.
Gateway	1.0.0.0 - 126.0.0.0 128.0.0.0 - 191.255.0.0 192.0.1.0 - 223.255.255.0	This setting is the gateway address assigned to the port.

3.3.6 TACACS+ Configuration

This feature is to be implemented in tandem with a primary and secondary TACACS+ server that the AG 6000 can reference. The external TACACS+ server will handle user authentication using shared keys.



TACACS+ Configuration Menu

Setting	Range	Description
Status	Enabled Disabled	Enabling this will make the “Login Type” dropdown and “TACACS+” option appear in the login prompt shown in Section 3.1.1 .
Server 1 (Primary)	1.0.0.0 - 126.0.0.0 128.0.0.0 - 191.255.0.0	The IP of the TACACS+ server(s).
Server 2 (Secondary)	192.0.1.0 - 223.255.255.0	
Shared Secret Key	Administrator defined	The shared key for all devices to be authenticated by the TACACS+ server.

3.3.7 Licensing

Certain features of the AG 6000 require licenses in order to be functional. The interface displays all licenses available as well as the following status:

- License Locked or Unlocked
- License is Supported or Unsupported by the installed hardware

Option	Supported	State	Instances
AG 60601 - Simultaneous HD/SD License	Yes	Unlicensed	0
AG 60730 - 4K/UHD Output License	Yes	Licensed	1
AG 60840 - 2x->4x Audio Service Decoding Upgrade	Yes	Licensed	1
AG 60851 - 5.1 Discrete Audio	Yes	Licensed	1
AG 60916 - DVB-S2 Advanced Feature License	Yes	Licensed	1
AG 60921 - BISS Descrambling License	Yes	Licensed	1
AG 60925 - IP FEC Output	No	Unsupported	1
AG 60928 - PID/Service Filter License	Yes	Licensed	1
AG 60991 - DVB-CI Multi-Service Descrambling License	Yes	Licensed	1
AG 60992 - SCTE 35 to 104 Output License	Yes	Licensed	1

License Information Tab

If licenses need to be applied to the AG 6000 click  **Apply License Key** button. The menu below will appear where the user can copy and paste the provided license key from Sencore.

Enter License Key

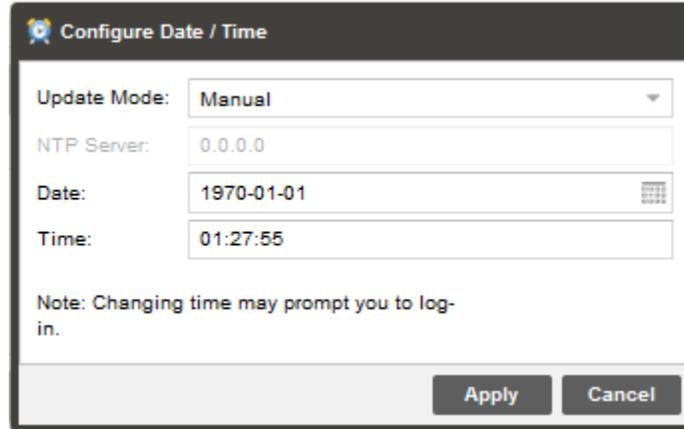
Enter a new license key here...

Apply Cancel

Updating License Key

3.3.8 Date/Time

The AG 6000 can either be set to synchronize with an NTP server or set to a manually defined date and time. Click the  **Configure Date / Time** button to configure the date and time. These values are used to timestamp entries in the Alarm and Event logs under the Reporting tab.



Date and Time Configuration

Setting	Range	Description
Update Mode	NTP Manual	Setting to <i>NTP</i> uses the local network's NTP server to synchronize date and time. <i>Manual</i> allows the user to define a date and time.
NTP Server	Four decimal octets: XXX.XXX.XXX.XXX Domain Name	This is the IP Address or Domain Name of the local NTP Server on the network. This setting is only available if Update Mode is set to NTP.
Date	YYYY/MM/DD	This setting is the user defined date. A calendar widget can be used to select the data by clicking the  button. This setting is only available if Update Mode is set to Manual.
Time	00:00:00 – 24:00:00	This setting is the user defined time. The time is based on a 24 hour clock. This setting is only available if the Update Mode is set to Manual.

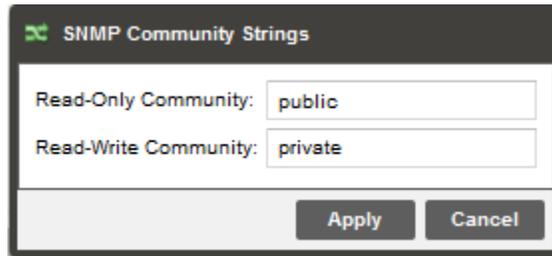
3.3.9 Configuring SNMP

3.3.9.1 SNMP Communities

SNMP Communities define whether users have read-only or read-write SNMP rights. These two communities are given unique names. The default names for these communities are:

- Read –Only Community: public
- Read- Write Community: private

To modify the names of these communities click on the  **Configure SNMP Communities** button.

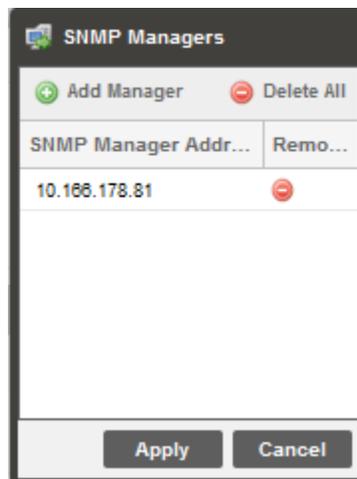


The dialog box titled "SNMP Community Strings" contains two text input fields. The first field is labeled "Read-Only Community:" and contains the text "public". The second field is labeled "Read-Write Community:" and contains the text "private". At the bottom right of the dialog are two buttons: "Apply" and "Cancel".

SNMP Community Configuration

3.3.9.2 SNMP Trap Managers

The SNMP trap managers are recipients of SNMP traps sent from the AG 6000. The following menu allows the user to configure the recipient's IP addresses. To add and remove recipients of the SNMP traps click the  **Configure SNMP Managers** button.



The dialog box titled "SNMP Managers" features a table with two columns: "SNMP Manager Addr..." and "Remo...". At the top, there are two buttons: "Add Manager" (with a green plus icon) and "Delete All" (with a red minus icon). The table contains one row with the IP address "10.166.178.81" in the first column and a red minus icon in the second column. At the bottom of the dialog are "Apply" and "Cancel" buttons.

SNMP Manager Addr...	Remo...
10.166.178.81	

SNMP Trap Configuration

Action	Button	Description
Add Manager		Clicking this button prompts the user for the IP address of the SNMP trap manager.
Delete All		Clicking this button prompts the user to confirm the deletion of all SNMP trap manager IP addresses. If the user confirms deletion all SNMP trap manager IP addresses will be removed.
Delete Single Entry		Highlight a single SNMP trap manager IP address and click this button to delete the entry. A prompt will appear confirming the deletion of IP address.

3.3.9.3 Download SNMP MIB Files

The AG 6000 stores the SNMP MIB files for the currently installed version of software on the unit. These files can be downloaded directly from the AG 6000 by clicking on the  button. The screen below will appear where the files can be downloaded and saved off of the unit.

Index of /mibs/

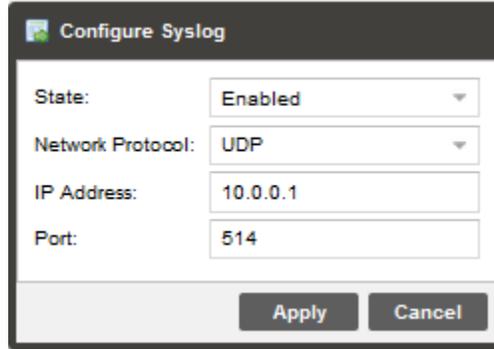
Name	Last Modified	Size	Type
Parent Directory/		-	Directory
 INET-ADDRESS-MIB.MIB	2019-Sep-06 18:59:50	16.3K	application/octet-stream
 SENCORE-AG6000-MIB.mib	2019-Sep-06 18:59:51	288.7K	application/octet-stream
 SENCORE-CSP-MIB.MIB	2019-Sep-06 18:59:50	86.7K	application/octet-stream
 SENCORE-GLOBAL-REG.MIB	2019-Sep-06 18:59:50	2.3K	application/octet-stream
 SNMP-COMMUNITY-MIB.MIB	2019-Sep-06 18:59:50	15.1K	application/octet-stream
 SNMP-FRAMEWORK-MIB.MIB	2019-Sep-06 18:59:50	21.8K	application/octet-stream
 SNMP-MPD-MIB.MIB	2019-Sep-06 18:59:50	5.3K	application/octet-stream
 SNMP-TARGET-MIB.MIB	2019-Sep-06 18:59:50	22.2K	application/octet-stream
 SNMP-USER-BASED-SM-MIB.MIB	2019-Sep-06 18:59:50	38.2K	application/octet-stream
 SNMP-VIEW-BASED-ACM-MIB.MIB	2019-Sep-06 18:59:50	33.3K	application/octet-stream
 SNMPv2-MIB.MIB	2019-Sep-06 18:59:50	28.6K	application/octet-stream
 SNMPv2-SMI.MIB	2019-Sep-06 18:59:50	8.7K	application/octet-stream
 SNMPv2-TC.MIB	2019-Sep-06 18:59:50	37.1K	application/octet-stream

To Download: Right-Click, Save Link As or Save Target As

Index of MIBs Page

3.3.10 Syslog

The AG 6000 can be configured to send error and event logs formatted in the syslog protocol to a remote user specified Syslog server. To configure the Syslog settings, click the  **Configure Syslog** button.

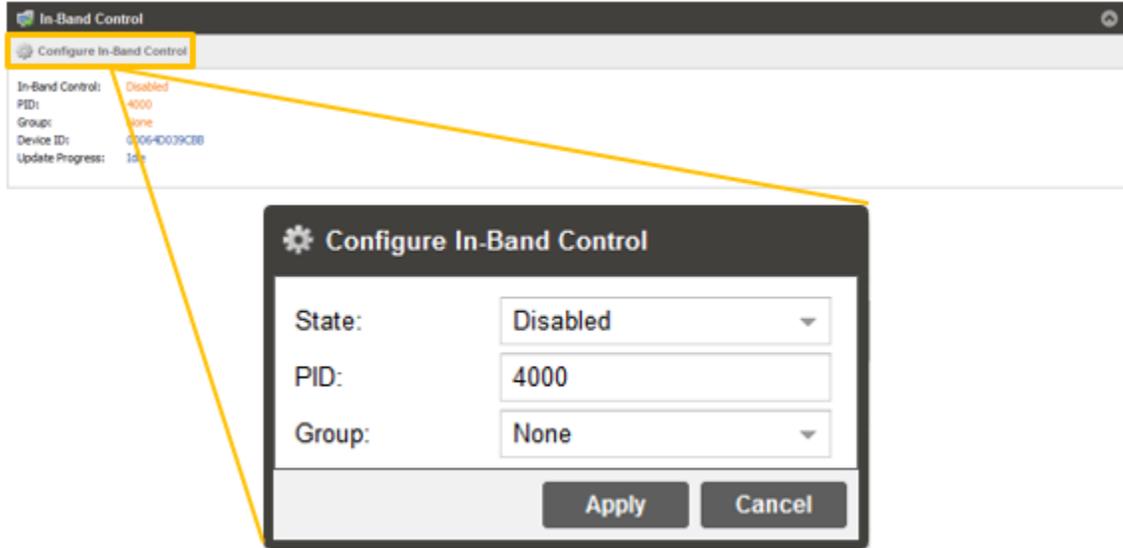


Syslog Configuration

Action	Range	Description
State	Enabled Disabled	Enable or Disable sending messages to Syslog server.
Network Protocol	UDP TCP	Select which network protocol used to transmit to the Syslog server
IP Address	Four decimal octets: XXX.XXX.XXX.XXX	IP of the Syslog server. 0.0.0.0 and 255.255.255.255 are not permitted
Port	0 – 65535	Destination port of the Syslog server

3.3.11 In-Band Control

Here a control PID can be assigned to the the outbound streams to indicate the start and stop times of local insertion points during station breaks



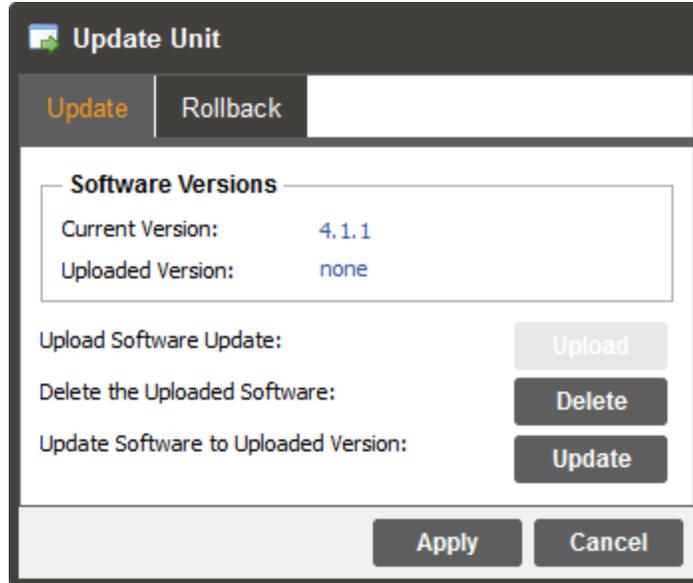
In-Band Control Configuration Menu

Action	Range	Description
State	Enabled Disabled	Enable or Disable the In-Band control PID
PID	16 – 8190	Specify the In-Band control PID
Group	None 1 – 128	Specify which group the In-Band control PID will affect

3.3.12 Updating the AG 6000

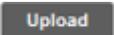
3.3.12.1 Applying Software Updates

Updates to the AG 6000 are performed through the web interface. A software update file is provided by Sencore and then uploaded to the unit. Once uploaded, the software update is applied to the unit. To upload software updates to the unit click on the  [Update Unit](#) button. The current version and uploaded version is displayed in the Software Versions section. The AG 6000 will reboot after a software update is complete.

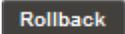


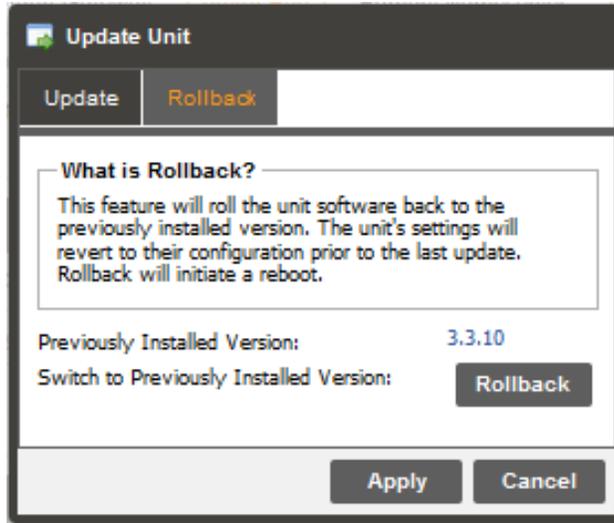
Update Unit Window

Note: When updating from software versions older than 4.3.0, the default password of <blank> will be retained.

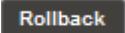
Action	Button	Description
Upload Software Update		To upload software updates to the AG 6000 click this button. The user will be prompted to navigate to an update file. The file will then upload to the AG 6000. When complete the AG 6000 will prompt the user to either apply the update or cancel
Delete the Uploaded Software		Clicking this button prompts the user to confirm the deletion of the software update from the AG 6000. This will also clear the Uploaded Version status of the Software Versions section.
Update Software to Uploaded Version		Clicking the button starts the software update process. The AG 6000 will prompt the user to confirm the update. Click Yes to continue or No to cancel.

3.3.12.2 Rollback Software Updates

The AG 6000 is capable of reverting back to a previous version of software using the Rollback feature. The AG 6000 maintains two separate software images; one is the most current version of software with all current settings and the other is the previous version of software with all settings. To perform a rollback, click the  button and then click the  tab. The AG 6000 will reboot after the rollback process is complete.



Rollback Tab of Update Unit Window

Action	Button	Description
Rollback Software		Clicking this button starts the Rollback process. The AG 6000 will prompt the user to confirm the rollback or click cancel to stop the process.

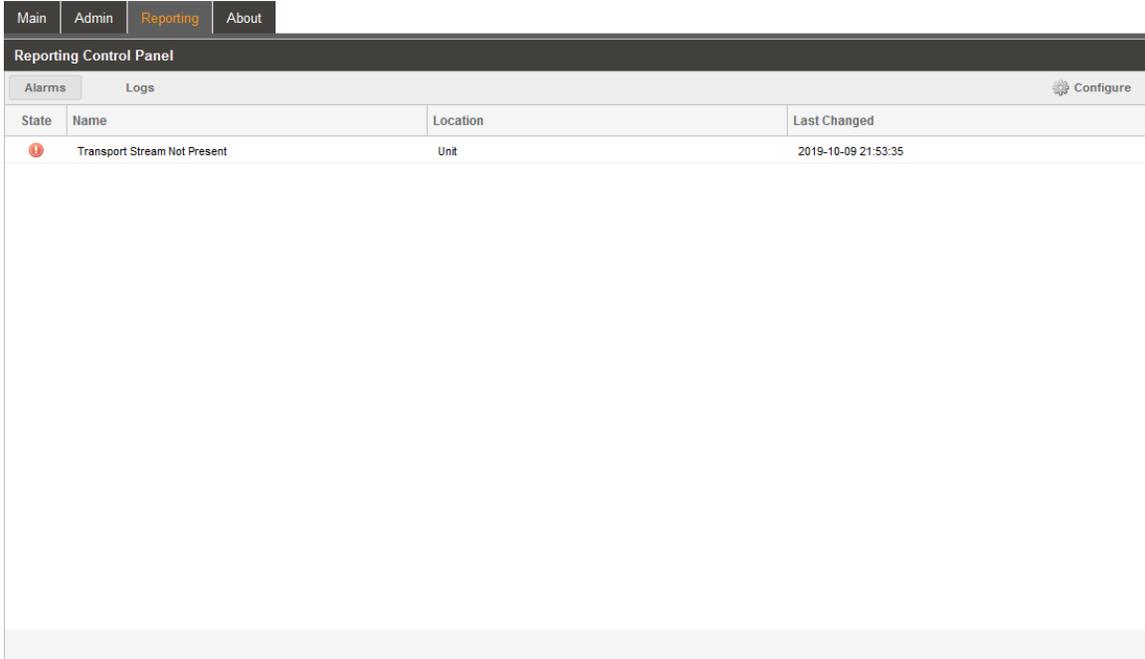
3.3.13 Reboot Unit

The AG 6000 can be rebooted from the web interface. In order to perform a reboot click the  button. The AG 6000 will prompt the user to confirm the reboot. Once the reboot is complete the login screen will appear allowing the web interface to be logged into.

3.3.14 Reset Defaults

The AG 6000 settings can be reset to factory defaults. All settings will be returned to the factory defaults except the network management ports TCP/IP settings. All event logs will be cleared. To reset all settings to default click the  button. The AG 6000 will prompt the user to confirm the reset.

3.4 Reporting Panel

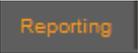


The screenshot shows the 'Reporting Control Panel' with tabs for 'Main', 'Admin', 'Reporting', and 'About'. The 'Reporting' tab is active. Below the navigation bar, there are two sub-tabs: 'Alarms' and 'Logs'. The 'Alarms' sub-tab is selected, displaying a table with the following data:

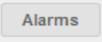
State	Name	Location	Last Changed
	Transport Stream Not Present	Unit	2019-10-09 21:53:35

There is also a 'Configure' button in the top right corner of the panel.

Reporting Tab of GUI

The  tab in the AG 6000 contains logs for active alarms currently affecting the unit and an event log. The active alarms are updated periodically in order to reflect the real-time state of the unit. Once an error is cleared it will be cleared from the active alarms window. The event log can be used to view alarm and event history. Both the active alarm and event logs can be configured to hide or change the behavior of alarms and events.

3.4.1 Active Alarms

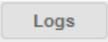
Clicking on the  button displays the Active Alarms menu. This list displays all of the active alarms currently affecting the unit. There are four columns in the log that display different types of information.

Alarms		Logs
State	Name	Location
	Transport Stream Not Present	Unit
	TS Sync Loss	Input MPEG/IP Slot 1 Stream 1
	IP Loss Error	Input MPEG/IP Slot 1 Stream 1

Alarms Tab of Reporting Panel

Title	Description
State	This column displays the nature of the alarm. The  icon means the log entry is informational and is not an error. The  icon means the log entry is an active alarm.
Name	This column displays the description of the error. The function that is experiencing an error condition is described here.
Location	This column displays the hardware or function that is experiencing the active error.
Last Changed	This column displays the date and time the error was raised. This date and time correlates with the Date and Time settings configured in Section 0.

3.4.2 Event Logs

Clicking on the  button displays the Event Log menu. This list displays all of the events and alarms that have affected the unit. The AG 6000 stores up to four thousand messages worth of logs.

If the unit is rebooted or powered off and on the event logs are cleared. The logs can be cleared manually by clicking the  button. The logs can be downloaded as a .tsv file and saved to an external location by clicking the  button. There are five columns in the log that display different types of information.

Reporting Control Panel				
Alarms		Logs		Configure
Severity	Timestamp	Transition	Location	Message
	2019-09-12 20:50:42		Input MPEG/IP Slot 1 Stream 1	IP Loss OK
	2019-09-12 20:50:42		Input MPEG/IP Slot 1 Stream 1	TS Sync Loss OK
	2019-09-12 20:50:42		Unit	Transport Stream Present
	2019-09-12 20:50:40		Input MPEG/IP Slot 1 Stream 1	TS Sync Loss Error
	2019-09-12 20:50:40		Input MPEG/IP Slot 1 Stream 1	IP Loss Error
	2019-09-12 20:50:32		Unit	Transport Stream Not Present
	2019-09-12 20:49:36		Unit	Time Updated Via NTP [Offset by -0.060083 seconds]
	2019-09-12 20:44:03		Unit	Time Updated Via NTP [Offset by -1568320892.986038 seconds]
	1970-01-01 00:01:36		Primary Video Output	Video Output Auto Format OK
	1970-01-01 00:01:35		Audio 1	Audio Decoding
	1970-01-01 00:01:35		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found
	1970-01-01 00:01:35		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found
	1970-01-01 00:01:35		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found
	1970-01-01 00:01:35		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found
	1970-01-01 00:01:34		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found
	1970-01-01 00:01:34		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found
	1970-01-01 00:01:34		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found
	1970-01-01 00:01:34		Output MPEG/IP Slot 1 Strea...	Unicast Receiver Found

Logs Tab of Reporting Panel

Title	Description
Severity	This column displays the nature of the alarm. The icon means the log entry is informational and is not an error. The icon means the log entry is an active alarm.
Timestamp	This column displays the date and time the error was raised or cleared. This date and time correlates with the Date and Time settings configured in Section 0.
Transition	This column displays when an alarm transition from a bad to good state. When an error is raised the icon is displayed. When an error is cleared the icon is displayed. When an event takes place the icon is displayed.
Message	This column displays the description of the error or event. The function or hardware that experienced the event or error is described here.
Location	This column displays the hardware or function that experienced the alarm or event.

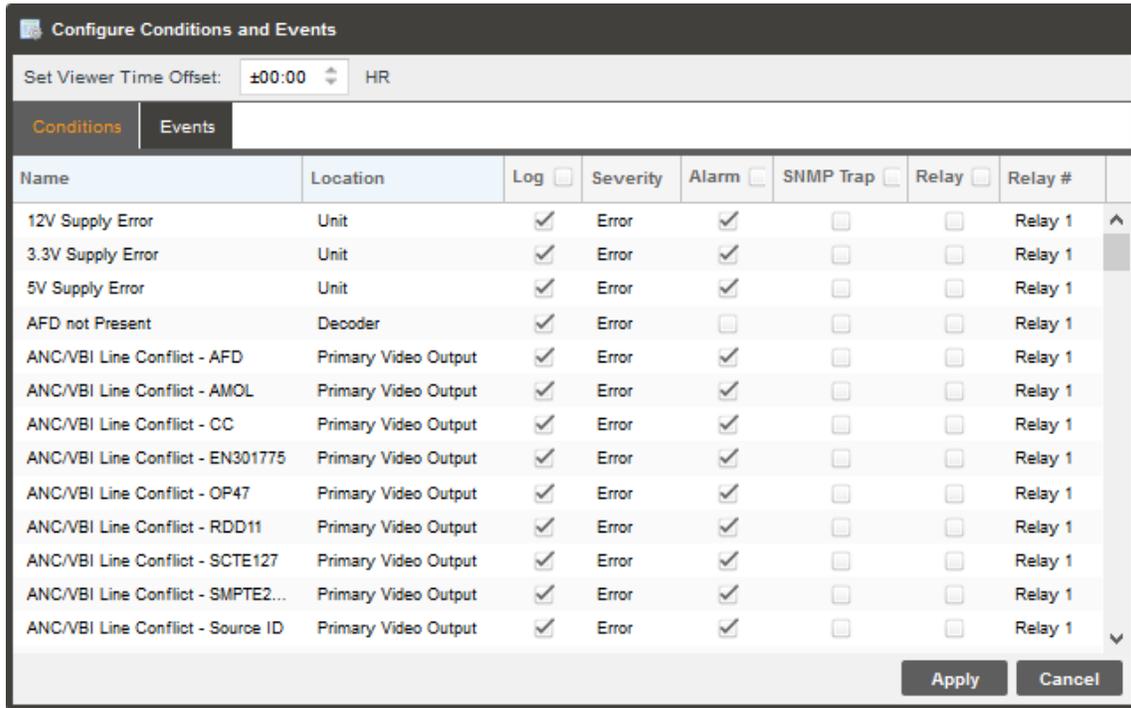
3.4.3 Configuring the Logs

The AG 6000 allows the user to configure alarms and events. Events and alarms can be hidden, set to send SNMP traps or close a relay when active. In order to configure these

options click the  button while in the  section of the  tab.

The  tab allows the user to configure the alarms reported by the AG 6000.

The  tab allows the user to configure the events reported by the AG 6000. Each column and its function are described below. A user configured time offset can also be applied to allow viewing the logs in a local time zone.



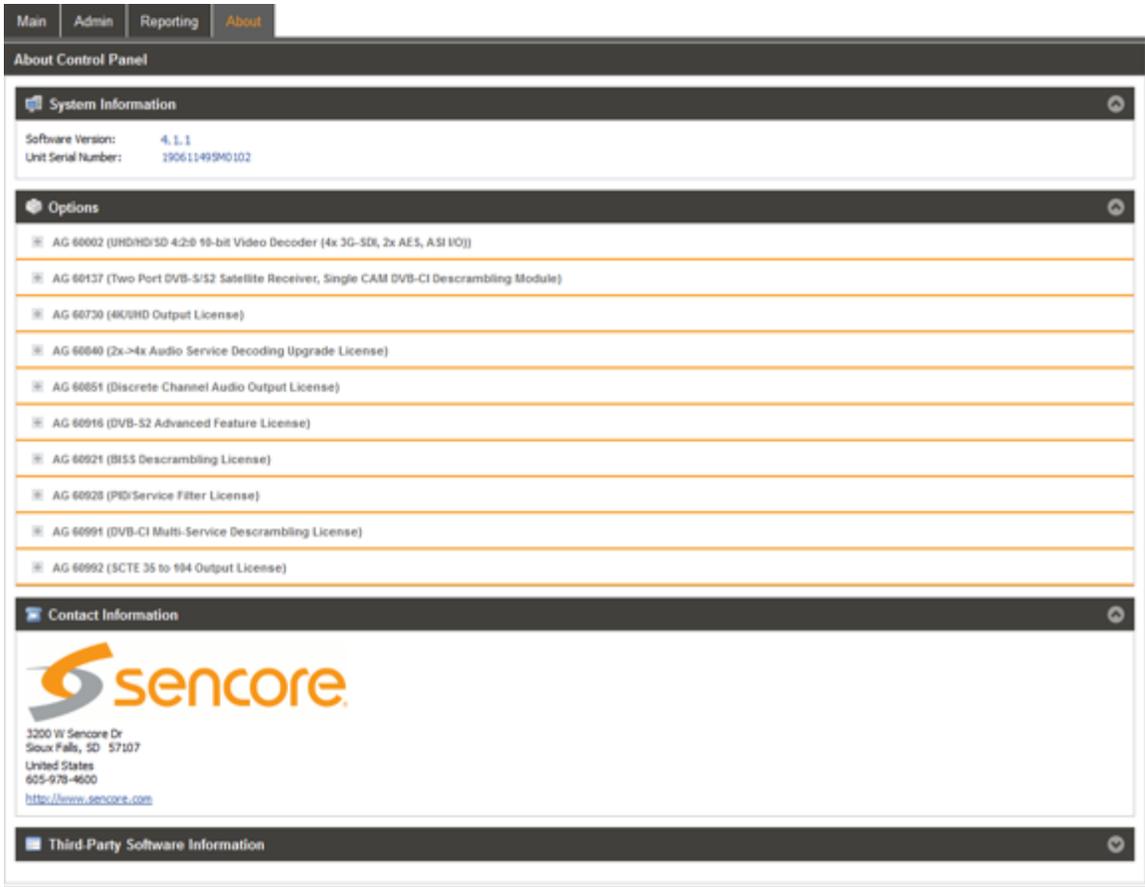
Conditions Tab of Log Configuration

Title	Description
Name	This column displays the name of the error or condition. This is informational data; no options can be set here.
Location	This column displays the hardware or function that the alarm or event applies to. This is informational data; no options can be set here.

Log	Checking the box in this column creates an entry in the event log in the case this error or event is raised. If this box is unchecked this error or event will be hidden and not logged if raised.
Log Severity	This column is only available in the Conditions tab This option allows the user to set the severity of the error to Info or Error. If Info is selected in the drop down box the  icon will displayed in the event log. If Error is selected the  icon will be displayed in the event log.
Alarm	This column is only available in the Conditions tab This option allows the user to enable or disable this alarm in the Active Alarms log. If checked the alarm will be displayed in the Active Alarms log if raised. If this box is unchecked this error will be hidden.
SNMP Trap	This column allows the user to send an SNMP Trap if this alarm is raised. If this box is checked an SNMP Trap is sent when this alarm is raised. If this box is unchecked an SNMP is not sent.
Relay	This column allows the user to set a Relay closure if this alarm is raised. If this box is checked a Relay will be closed. If this box is unchecked a Relay will not be closed.
Relay #	This column allows the user to select which of the three relays available on the AG 6000 will be closed when the alarm is raised.
Relay Duration	This column is only available in the Events tab. This option allows the user to define the length of time in milliseconds the relay will be closed after the event is logged. This setting can be configured from 100-1000 milliseconds.

3.5 About Tab

Under the **About** tab, is useful information about the unit software, serial number and licensing. There are no user definable parameters in the “About” panel. The Panel includes information about the unit software version currently installed, the unit serial and/or ID number, which licenses are installed, and how to contact Sencore. Information regarding third party software is available by clicking on the dropdown menu box.



About Tab of GUI

3.6 System Recovery

The AG 6000 has the ability to recover from a complete system software corruption. The system recovery allows a user to start the platform into a prompt where a software update will allow the system to be installed in the event all other images will not work.

To use the system recovery, before slotting the AG6000 into the OpenGear™ chassis, hold down the small black “Boot to Recovery Image” button shown in section 2.2. While holding that button down, slot the unit into the powered-on chassis and wait 30 seconds until AG6000 is powered on. Recovery mode assigns a new IP address to the card using DHCP, meaning it will have to be accessed through Dashboard as described in section 2.5 of this manual.

On the Dashboard, click on the configuration subsection of the unit being rebooted. Enter the IP address that is listed into a web browser. From there, the unit can be accessed and software can be applied.

Section 4 Appendices

Introduction

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Appendix A – Acronyms and Glossary

8VSB: Vestigial sideband modulation with 8 discrete amplitude levels.

16VSB: Vestigial sideband modulation with 16 discrete amplitude levels.

AAC: Advanced Audio Coding

AC-3: Also known as Dolby Digital

AES: Audio Engineering Society

AG: Atlas Gear

AFD: Active Format Descriptor

ASI: Asynchronous Serial Interface

ATSC: Advanced Television Systems Committee

AV: Audio Video

Bit Rate: The rate at which the compressed bit stream is delivered from the channel to the input of a decoder.

BNC: British Naval Connector

BPS: Bits per second.

CAM: Conditional Access Module

CAT: Conditional Access Table

CAT6: Category 6 – Cable standard for gigabit Ethernet

CC: Closed Caption

CI: Common Interface

CoP: Code of Practice

CRC: Cyclic Redundancy Check

CVCT: Cable Virtual Channel Table

dB: Decibel

DDPlus: Dolby Digital Plus

DHCP: Dynamic Host Configuration Protocol

DPI: Digital Program Insertion

DTVCC: Digital Television Closed Captioning

DVB: Digital Video Broadcasting

EBU: European Broadcasting Union

EIA: Electronic Industries Alliance

EIT: Event Information Table

EPG: Electronic Program Guide

ETM: Extended Text Message

ETT: Extended Text Table

Event: An event is defined as a collection of elementary streams with a common time base, an associated start time, and an associated end time.

FCC: Federal Communications Commission

FEC: Forward Error Correction

Field: For an interlaced video signal, a “field” is the assembly of alternate lines of a frame. Therefore, an interlaced frame is composed of two fields, a top field and a bottom field.

Frame: A frame contains lines of spatial information of a video signal. For progressive video, these lines contain samples starting from one time instant and continuing through successive lines to the bottom of the frame. For interlaced video a frame consists of two fields, a top field and a bottom field. One of these fields will commence one field later than the other.

HANC: Horizontal Ancillary

HD: High Definition

High level: A range of allowed picture parameters defined by the MPEG-2 video coding specification which corresponds to high definition television.

I/O: Input/Output

IP: Internet Protocol

Kbps: 1000 bit per second

LED: Light Emitting Diode

LNB: Low-Noise Block

MAC: Medium Access Control

Main level: A range of allowed picture parameters defined by the MPEG-2 video coding specification with maximum resolution equivalent to ITU-R Recommendation 601.

Main profile: A subset of the syntax of the MPEG-2 video coding specification that is expected to be supported over a large range of applications.

Mbps: 1,000,000 bits per second.

MER: Modulation Error Ratio

MGT: Master Guide Table

MIB: Management Information Base

MP@HL: Main profile at high level.

MP@ML: Main profile at main level.

MPEG: Refers to standards developed by the ISO/IEC JTC1/SC29 WG11, *Moving Picture Experts Group*. MPEG may also refer to the Group.

MPEG-2: Refers to ISO/IEC standards 13818-1 (Systems), 13818-2 (Video), 13818-3 (Audio), 13818-4

MPTS: Multiprogram Transport Stream

NTP: Networking Time Protocol

NTSC: National Television System Committee

OSD: On Screen Display

PAL: Phase-Alternating Line

PAT: Program Association Table

PCM: Pulse-Code Modulation

PCR: Program Clock Reference

PCM: Pulse-code Modulation

PID: Packet Identifier. A unique integer value used to associate elementary streams of a program in a single or multi-program transport stream.

PMT: Program Map Table

Profile: A defined subset of the syntax specified in the MPEG-2 video coding specification

Program specific information (PSI): PSI consists of normative data which is necessary for the demultiplexing of transport streams and the successful regeneration of programs.

Program: A program is a collection of program elements. Program elements may be elementary streams. Program elements need not have any defined time base; those that do have a common time base and are intended for synchronized presentation.

PTS: Presentation Time Stamp

QAM: Quadrature Amplitude Modulation

QPSK: Quadrature Phase-Shift Keying

RDS: Receiver Decoder System

RF: Radio Frequency

RGBHV: Red, Green, Blue, Horizontal, Vertical
RO: Read Only
RPM: Revolutions per Minute
RRT: Rating Region Table
RS-232: Recommended Standard. A standard for serial binary data interconnection.
RU: Rack Unit
RW: Read/Write
SD: Standard Definition
SDI: Serial Digital Interface
SFP: Small Form-Factor Pluggable
SI: System Information
SMPTE: Society of Motion Pictures and Television Engineers
SNMP: Simple Network Management Protocol
SPTS: Single Program Transport Stream
SSRC: Synchronization Source
STD input buffer: A first-in, first-out buffer at the input of a system target decoder for storage of compressed data from elementary streams before decoding.
STD: System Target Decoder. A hypothetical reference model of a decoding process used to describe the semantics of the Digital Television Standard multiplexed bit stream.
STT: System Time Table
TS: Transport Stream
TVCT: Terrestrial Virtual Channel Table
UTC: Coordinated Universal Time
VANC: Vertical Ancillary
VBI: Video Blanking Interval
VCT: Virtual Channel Table. Used in reference to either TVCT or CVCT.
XLR: Cannon “X” series connector, with a Latch, and Rubber around the contacts.
YPbPr: Component Red, Green, Blue

Appendix B – Error and Event List

Error	Description
12V Supply Error	Voltage on 12V rail has exceeded safe operational range.
3.3V Supply Error	Voltage on 3.3V rail has exceeded safe operational range.
5V Supply Error	Voltage on 5V rail has exceeded safe operational range.
ANC/VBI Line Conflict - CC	The VANC line CC is currently set to be embedded on is conflicting with another line of data in the VANC.
ANC/VBI Line Conflict – OP47	The VANC line OP47 is currently set to be embedded on is conflicting with another line of data in the VANC.
ANC/VBI Line Conflict – Teletext	The VANC line Teletext is currently set to be embedded on is conflicting with another line of data in the VANC.
ANC/VBI Line Conflict – VPS	The VANC line VPS is currently set to be embedded on is conflicting with another line of data in the VANC.
ANC/VBI Line Conflict – WSS	The VANC line WSS is currently set to be embedded on is conflicting with another line of data in the VANC.
ANC/VBI Line Conflict – RDD11	The VANC line RDD11 is currently set to be embedded on is conflicting with another line of data in the VANC.
Audio Not Decoding	Audio is corrupted in incoming stream or format is not supported.
Auto Video Format Error	AG 6000 is unable to determine the native incoming video in order to format output.
Backup Input Active Condition	Primary input is currently in a failed condition and the AG 6000 has failed over to the Backup input.
BISS Conflicting PIDs	PIDs selected to be descrambled by one BISS key are already assigned to be descrambled by another BISS key.
BISS Service Not Found	Service that BISS key is assigned to descramble is not present in the incoming stream.
Bitrate Exceeded Error	Total incoming transport stream bitrate has exceeded 213 Mbps.
CAM Not Descrambled	CAM Module is not descrambling selected PIDs or services
CAM Not Present	DVB-CI Descrambling is enabled but CAM Module is not installed.
CAM PID Not Found	PID selected to be descrambled by the CAM is not present in the incoming stream.
CAM Service Not Found	Service selected to be descrambled by the CAM is not present in the incoming stream
ES Type Mismatch	Elementary stream type does not match the stream type defined by the user.
Empty Output (PID Filter)	A PID filter with no configured service or PIDs has been selected for output.

FEC uncorrect packet counter increased	Packets in incoming IP stream cannot be repaired with forward error correction.
Fan Speed Below Lower Limit	Cooling fan in the AG 6000 has failed.
IP Loss Error	No IP packets have been received by the MPEG/IP card for two seconds.
ISI Not Found	ISI value defined by the user is not found in the incoming multistream signal.
Input Video Unsupported	Native format of incoming video is not a supported video format.
LNB Power Error	LNB Power is enabled but the AG 6000 is detecting power is being provided by another source, there is excessive current drain or an overvoltage has occurred.
Link Loss Error	Physical IP link is not present on the MPEG/IP card.
Loss of Carrier Lock	Receiver carrier lock source is lost.
Low Level	8VSB/QAM RF Level is below the user settable threshold
Low Mer	8VSB/QAM MER is below the user settable threshold
MPE Data Extraction Error	MPE Data could not be extracted from the incoming stream.
Multistream Mode Input Mismatch	Multistream Mode is enabled and input signal is not multistream capable or Multistream Mode is disabled and input signal is multistream capable.
No Services Detected	Service Lock service selection mode is enabled but no services are present in the active input transport stream.
PID Filter Overflow Error	Configured PID Filter TS rate is too low.
PID Filter Selection Not Present	Selected Service or PID is not present for inclusion in the output PID filter TS.
RTP Reception Error	Uncorrectable out of order or duplicate packets are present in incoming IP stream.
ES Sync Error Condition	One of the in-use elementary streams is not synchronized to the PCR
SCTE35 Heartbeat Timeout	The time since the last received SCTE35 message has passed the designated heartbeat timeout.
Selected Audio PID Not Present	PID Locked mode is set as service selection mode and audio PID defined by user is not present in the incoming stream.
Selected PCR PID Not Present	PID Locked mode is set as service selection mode and PCR PID defined by user is not present in the incoming stream.
Selected Video PID Not Present	PID Locked mode is set as service selection mode and video PID defined by user is not present in the incoming stream.
Service Not Found	Service Lock service selection mode is enabled but service defined by user is not present in the incoming stream.

Temperature Error	The AG 6000 has detected the internal temperature is 60 degrees Celsius or above.
Transport Error Indicator	The AG 6000 has detected that the transport stream error indicator is present on the active input.
Transport Stream Not Present	The AG 6000 has detected that the transport stream from the active input is no longer present.
TS Sync Loss	Transport stream sync for IP stream is not detected.
Unicast Receiver Not Found Error	The AG 6000 cannot discover the destination for the unicast IP stream within 10 seconds after the initial ARP is sent.
Unlicensed Modulation	Input stream on active input is either 16APSK or 32APSK and the modulations are no licensed on the AG 6000.
Unlicensed VCM/Multistream	Input stream on the active input contains a multistream signal and the AG 6000 is not licensed for multistream.
Video Not Decoding	The configured service or video PID to be decoded is not being successfully decoded by the AG 6000.

Event	Description
Active State Out of Network	The corresponding relay is experiencing a pulse event while it is configured for an out of network trigger
Active State Return to Network	The corresponding relay is experiencing a pulse event while it is configured for a return to network trigger
CAM Reset	The corresponding CAM module slot was manually reset
Date/Time Changed	The date and time was manually changed
MPEG/IP Counters Reset	The statistics for the MPEG/IP receive stream were manually reset
NTP Updated	The device has collected an updated time from the configured NTP server
SCTE 104 Message Embedded	An SCTE 35 message was converted to SCTE 104 and embedded onto the SDI output
SCTE 35 Message CRC Failure	The outbound SCTE 35 message failed the cyclic redundancy check
SCTE 35 Message Inserted	An SCTE 35 message was inserted onto the TS output by the AG 6000
SCTE 35 Message Received	An SCTE 35 message was found in the transport stream
Software Update Failed	An attempt to upgrade the software failed
Software Update Succeeded	An attempt to upgrade the software succeeded
Unit Booted	The server of the unit was booted up

Unit Shutdown	The server of the unit was shut down
----------------------	--------------------------------------

Appendix C – Specifications

AG 6000 – Base Unit

Includes –	Backplate
System –	
Configurations Allows:	Single video decoder with up to one option input.
Rear Panel:	Fixed inputs and outputs with one option input. Option input not field upgradeable.
Remote Operation/Update Interface –	
Type:	Ethernet, 10/100
Rear Panels indicators:	Link, Activity (To openGear™ frame)
Connector:	RJ45 (To openGear™ frame)
Monitor and Control Interfaces –	
Web server GUI:	HTTP via web browsing for control & monitoring
SNMP:	Control & monitoring
Operating Altitudes	0 to 10000 feet
AC Power –	
Operating Voltage:	100-240VAC
PSU Max Power:	350W (Frame)
Power Draw:	Base Unit with no option cards – 35W
	DVB-S/S2 option card with active input– 6-7W (additional)
	DVB-T2/C2/ISDB-T card with active input 5W (additional)
	DVB-S/S2 option card with active input and DVB-CI Module option with 1 CAM Module installed – 10W (additional)
	DVB-S/S2 option card with active input and DVB-CI Module option with 1 CAM Module installed – 10W (additional)
Max Power Draw:	45W

CRD 1900 – Base Unit

Interfaces –	
Card Slots:	1 Slot for
Chassis	Sencore AG
Management:	Cards
	Full control
	through web
	GUI or
	SNMP

Physical –

Chassis 1.75”H x
 Dimensions: 13.625”W x
 5”D
 Power Supply: 12VDC, 5.0A

Video Decoding Features

General –

TS Data Rate: 0.25-200 Mb/s

Video Decoder –

Video Profiles and Levels: Base Unit –
 MPEG-2: to MP@HL,
 H.264: to HP@L4.2
 HEVC : to MP@HT up to L5.1, M10P@HT up to L5.1

Video Bit Rate: MPEG-2 1-100Mb/s (dependent on profile)
 H.264 CABAC Entropy coded 1 - 80Mb/s
 CAVLC Entropy coded 1 - 100Mb/s
 HEVC 0.25 – 40 Mbps

Video Formats: Base Unit –
 1080i x 1920 (16x9) @ 25, 29.97 and 30Hz
 1080p x 1920 (16x9) @ 23.97, 24, 25, 29.97 and 30Hz
 1080p x 1920 (16x9) @ 50, 59.94 and 60Hz
 720p x 1280 (16x9) @ 50, 59.94, and 60Hz
 576i x 720 (4x3 or 16x9) @ 25Hz
 576i x 704 (4x3 or 16x9) @ 25hz
 576i x 544 (4x3 or 16x9) @ 25hz
 480i x 720 (4x3 or 16x9) @ 29.97Hz

4K/UHD Video Formats Licensed formats (AG 60730)
 Requires AG 60002 quad 3G-SDI option
 4096p x 2160 (16x9) 50, 59.94, and 60 Hz
 4096p x 2160 (16x9) 23.98, 24, 25, 29.97, and 30 Hz
 3840p x 2160 (16x9) 50, 59.94, and 60 Hz
 3840p x 2160 (16x9) 23.98, 24, 25, 29.97, and 30 Hz

SDI Link Modes: Four Quadrant
 Two Sample Interleave (SMPTE 425-5)

SDI (Serial Digital Interface)

Video Out –

SDI Standards: Base Unit –
 SD-SDI ANSI/SMPTE 259M

HD-SDI ANSI/SMPTE 292M

3G-SDI Level A ANSI/SMPTE 424M

Connector: 75Ω Female BNC (4x) (Ports: 1, 2, 3, 4)
 Return Loss: ≥15 dB, 5Mhz to 1.5GHz
 ≥10 dB, 1.5 GHz to 3.0GHz

Drive Level: 800 mVpp ±10%
 Data Bit Rate: 3G-SDI – 3.0 Gb/s
 HD-SDI – 1.5 Gb/s
 SD-SDI – 270Mb/s

Digital Video Out – AG 60001 only

Digital Video Standard: Connector:	SDA-HDMI-OM-E Rev A HDMI-type Female Type-A
ST 2110 Output (AG 60003 only) Connectors:	2x 10GB SFP+ (MSA Compliant)
IP Encapsulation:	SMPTE 2110-10 SMPTE 2110-20 SMPTE 2110-30 SMPTE 2110-40
Packet Pacing:	SMPTE 2110-21 Type N (Narrow)
PTP Synchronization:	SMPTE 2059-2
Output Redundancy	SMPTE 2022-7 Hitless Switching
Video Standards:	8-bit and 10-bit YUV 4:2:2
Video Formats:	1080p x 1920 (16x9) @ 50, 59.94 and 60Hz 1080i x 1920 (16x9) @ 25, 29.97 and 30Hz 1080p x 1920 (16x9) @ 23.97, 24, 25, 29.97 and 30Hz 720p x 1280 (16x9) @ 50, 59.94, and 60Hz 576i x 720 (4x3 or 16x9) @ 25Hz 576i x 704 (4x3 or 16x9) @ 25hz 576i x 544 (4x3 or 16x9) @ 25hz 480i x 720 (4x3 or 16x9) @ 29.97Hz
Audio Output:	Up to 8 pairs (16 channels)

Audio Decoding Features

Number of Audio Services:	Base Unit – 2 Audio Services 4 Audio Service Decode License (AG 60840) Adds – 2 Audio Services (4 total)
Audio Codecs Supported:	Dolby Digital (AC-3) & Plus (EAC-3) AAC-LC, HE-AAC, & HE-AACv2 MPEG1L2 & MPEG2L2
Output Formats:	Digital Pass-through PCM (Decoded Discrete channels for 5.1 sources or Downmixed for 5.1 Sources)

Audio Output Features

SDI Embedded Audio Output Standards:	SMPTE 272M (for SD-SDI) SMPTE 299 (for HD-SDI)
Density:	4 Audio Pairs, 8 audio channels
Sampling Frequency:	48 kHz

Ancillary Data Support

SDI VANC Data Types: Closed Captions (CEA-708)
 Teletext/WSS/VPS (SMPTE 2031)
 OP47 (SMPTE RDD-08)
 SMPTE RDD-11
 SCTE104 (SMPTE 2010)

ASI Input and Output Features

General –
 Connector: 2x BNC, Female
 Impedance: 75Ω
 Return Loss: ≥15dB, 3.5 to 270 MHz

ASI Serial TS Input / Output –
 Number of ASI Inputs: 1
 Number of ASI Outputs: 1 (non loop-through)
 Standard: EN50083-9 (V2:3/98) DVB ASI
 Data Bit Rate: 270 Mb/s
 Maximum TS Rate: 200 Mb/s
 Minimum TS Rate: 250 Kb/s
 Packet Sizes Input:188 and 204 bytes
 Output: 188 bytes

Modes Supported: Burst, Byte

DVB-CI Descrambling Module Option

CAM Decryption –
 General –
 Compatibility Standard: DVB-CI EN 50221
 Number of CAM Slots: 2
 Auto CAM insertion/removal detection: Yes
 CAM Usage: Selectable, Enable/Disable
 CAM Name Display: Yes
 Multicrypt Support: Yes

Decryption Selection –
 Elementary Stream types: Video (MPEG2 & H264), Audio
 Selection Modes: Base Unit –
 Decoded Elementary Streams

Maximum TS bitrate
 CAS Supported – Multi-Service Descrambling License (AG 60991) Adds
 – Individually selectable elementary streams
 DVB-CI – 100Mb/s
 All major CA vendors supported

BISS Descrambling Options

Supported BISS Types: Base Unit – None
 BISS 1 – Requires License (AG 60921)
 BISS 2/BISS-CA – Requires License (AG 60922)

Compatibility Standards: DVB-CSA1



	DVB-CISSA AES-128 RSA-2048
BISS 1 Modes:	Mode 0 Mode 1 with Session Word Mode E with Session Word and Injected ID
BISS 2 Modes:	Mode 0 Mode 1 with Session Word Mode E with Session Word and Injected ID Mode CA with Public Key and Injected Private Key Mode CA with Public Key and Buried Private Key
Maximum TS bitrate:	200 Mb/s
Number of Stored Keys:	Up to 12 keys
Number of Descrambled Services	No limitation to the number of services descrambled per key

IP Input/Output Module Option

General –	
Connector:	2x 10/100/1000 auto negotiate Base-T RJ-45 Ethernet Ports
Receive –	
Input Format:	UDP, RTP and RTP with extension headers Multicast and Unicast CBR, VBR, Null Stripped
Receiver Capability:	2 simultaneous MPEG over IP transport streams
FEC Receive:	Pro MPEG CoP3 SMPTE2022 Range: $L \cdot D \leq 100$ $1 \leq L \leq 20$ $4 \leq D \leq 20$ Annex B
Multicast Filtering:	Filters based on IP address
Buffer size:	1 - 4000 KB, or 1 – 4000ms, user configurable
Bitrate Range:	0.25 – 200 Mb/s
Packets/IP Frame:	1-7 MPEG Packets/IP Frame
IGMP Compatibility:	Version 2 and 3
Transmit –	
Output Format:	UDP and RTP
Bitrate Range:	0.25 – 200 Mb/s
Packets/IP Frame:	1-7 MPEG Packets/IP Frame
Number of Outputs:	2 Mirrored TS – Unicast and/or Multicast
IP FEC Output (AG 60925) Adds –	
FEC:	Columns, Columns/Rows
FEC Transmit:	Pro MPEG CoP3 SMPTE2022 Range: $L \cdot D \leq 100$ $1 \leq L \leq 20$

4≤D≤20

DVB-S/S2 Input Module Option

General –

Frequency Range:	950 MHz – 2150 MHz
Number of inputs:	2 (A, and B)
Connector:	2x BNC, Female
Impedance:	75Ω
Return Loss:	>9 dB
Separation:	>50 dB adjacent, >60 dB non-adjacent
RF frequency:	950 MHz to 2150 MHz in 100 kHz steps
Tuning:	Difference between Satellite frequency and LO frequency
Satellite frequency:	950 – 14500 MHz
LO frequency:	0 – 12000 MHz, with presets of 0, 5150, 9750, 10600, 10750 and 11250 MHz
Packet size:	188 bytes
Tuning Step Size:	125 kHz, maximum
Nyquist root filter roll-off factors:	0.05, 0.1, 0.15, 0.2, 0.25, 0.35
RF Input Level:	-65 dBm to -25 dBm
AFC Tuning Range:	± 0.5 MHz in Standard and Wide mode (with SR 0.5 ≤ 1 Msps) ± 1 MHz in Standard and Wide mode (with SR 1 ≤ 2 Msps) ± 1.5 MHz in Standard and Wide mode (with SR 2 ≤ 3 Msps) ± 2 MHz in Standard and Wide mode (with SR 3 ≤ 4 Msps) ± 2.5 MHz in Standard and Wide mode (with SR 4 ≤ 5 Msps) ± 3 MHz in Standard mode (with SR ≥ 5 Msps) ± 4 MHz in Wide mode (with SR 5 ≤ 6 Msps) ± 5 MHz in Wide mode (with SR ≥ 6 Msps) Standard / Wide modes user selectable
Input RF Spectrum:	Normal/Inverted Auto Detect
PL Scrambling Codes supported:	0-262,141
Image Rejection:	>30dB
Noise Figure:	<15dB, maximum
Max TS Bitrate:	160 Mb/s
LNB Power and 22 kHz Tone – LNB Power	Off/13/14/18/19VDC @ >450mA

LNB voltage regulation:	± 4%
22 kHz Tone:	Off/On @ 650 mV (± 250 mV) peak-peak
DVB-S –	
Standard:	EN 300 421
FEC Code:	Conv. + Reed-Solomon
Modulation:	QPSK
Modulation/Coding supported:	CCM
Code rates:	1/2, 2/3, 3/4, 5/6, 7/8
QPSK Symbol rate:	0.5-60 Msps
DVB-S2 –	
Standard:	EN 302 307
Decoding type:	LDPC and BCH
Modulation:	QPSK, 8PSK
Modulation/Coding supported:	CCM
FEC Framing Type	Short frame size (16200), Normal frame size (64800)
Supported rates:	QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
Symbol rate:	0.5-60 Msps
Pilot:	On/Off Auto Detect
DVB-S2 Advanced (AG 60916) Adds –	
Modulation:	16APSK, 32APSK
Modulation/Coding:	VCM
Supported Rates:	16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 32APSK: 3/4, 4/5, 5/6, 8/9, 9/10
Symbol Rate:	0.5-60 Msps
Multistream reception:	Single ISI (stream specified)
ISSY:	Supported

DVB-S/S2/S2X Input Module Option

General –	
Frequency Range:	950 MHz – 2150 MHz
Number of inputs:	2 (A and B)
Connector:	2x BNC, Female
Impedance:	75 Ω
Return Loss:	>9 dB
Separation:	>50 dB adjacent, >60 dB non-adjacent
RF frequency:	950 MHz to 2150 MHz in 100 kHz steps
Tuning:	Difference between Satellite frequency and LO frequency
Satellite frequency:	950 – 14500 MHz
LO frequency:	0 – 12000 MHz, with presets of 0, 5150, 9750, 10600, 10750 and 11250 MHz
Packet size:	188 bytes
Tuning Step Size:	125 kHz, maximum
Nyquist root filter roll-off factors:	0.05, 0.1, 0.15, 0.2, 0.25, 0.35
RF Input Level:	-65 dBm to -25 dBm
Input RF Spectrum:	Normal/Inverted Auto Detect
PL Scrambling Codes supported:	0-262,141
Image Rejection:	>30dB
Noise Figure:	<15dB, maximum

Max TS Bitrate:	160 Mb/s
LNB Power and 22 kHz Tone –	
LNB Power	Off/13/14/18/19VDC @ >450mA
LNB voltage regulation:	± 4%
22 kHz Tone:	Off/On @ 650 mV (± 250 mV) peak-peak
DVB-S –	
Standard:	EN 300 421
FEC Code:	Conv. + Reed-Solomon
Modulation:	QPSK
Modulation/Coding supported:	CCM
Code rates:	1/2, 2/3, 3/4, 5/6, 7/8
QPSK Symbol rate:	0.5-60 Msps
DVB-S2 –	
Standard:	EN 302 307
Decoding type:	LDPC and BCH
Modulation:	QPSK, 8PSK
Modulation/Coding supported:	CCM
FEC Framing Type	Short frame size (16200), Normal frame size (64800)
Supported rates:	QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
Symbol rate:	0.5-60 Msps
Pilot:	On/Off Auto Detect
DVB-S2X –	
Standard:	EN 302 307
Decoding type:	LDPC and BCH
Modulation:	QPSK, 8PSK
Modulation/Coding supported:	CCM
FEC Framing Type	Short frame size (16200), Normal frame size (64800)
Supported rates:	QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
DVB-S2 Advanced (AG 60916) Adds –	
Modulation:	16APSK, 32APSK, 64APSK
Modulation/Coding:	VCM
Supported Rates:	16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 32APSK: 3/4, 4/5, 5/6, 8/9, 9/10 64APSK: 32/45-L, 11/15, 7/9, 4/5, 5/6
Symbol Rate:	0.5-60 Msps
Multistream reception:	Single ISI (stream specified)
ISSY:	Supported

8VSB/QAM Input Module Option

General –	
Frequency Range:	50 MHz – 1000 MHz VHF/UHF (Ch2 – Ch69) CATV (Ch2 – Ch158)
Channel Plans:	Off Air, FCC, IRC, HRC
Number of inputs:	1
Connector:	BNC-Type, Female

Impedance:	75 Ω
Sensitivity:	-34dBmV to + 40dBmV (A74 Compliant)
Modulation:	8VSB, QAM-B
MER:	Range: 0dB to 40dB Accuracy: +/- 2dB Low Limit Alarm: User Defined Entry
RF Level:	Range: -34dBmV to +40dBmV Accuracy: +/- 5dBmV Low Limit Alarm: User Defined Entry
QAM –	
Standard:	ITU Annex B/SCTE DVS-031
QAM Mode:	64 and 256
De-interleaver:	I=1-128, J=128/1
Nyquist Roll Off (Alpha):	12%, 18%
8VSB –	
Standard:	ATSC A/53E
Decoding Levels:	8
Nyquist Roll Off (Alpha):	11.5%

DVB-T2/C2/ISDB-T Input Module Option

General –	
Frequency Range:	42 MHz – 1002 MHz
Number of inputs:	1
Connector:	F-Type, Female
Impedance:	75 Ω
Sensitivity:	-34dBmV to + 40dBmV (A74 Compliant)
Modulation:	QPSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 1024QAM, 4096QAM
MER:	Range: 0dB to 40dB Accuracy: +/- 2dB Low Limit Flag: User Defined
RF Level:	Range: -34dBmV to +40dBmV Accuracy: +/- 5dBmV Low Limit Flag: User Defined

Appendix D – AG 6000 Audio Explanation

Downmix Audio Setup

There are two primary modes of audio down mix operation for the AG 6000 receiver/decoders. These settings only affect the signal if the digital output is set to PCM. It will also affect those embedded audio channels that are set to a PCM down mix. There are no gain changes or decoding if the digital or embedded outputs are set to Pass-through. The preset modes are Monitor (the default setting) and Transmission.

The first preset, Transmission, allows no changes by the customer. Transmission is intended to provide a limited dynamic range signal to drive a set top box or a transmitter. The Transmission mode does respond to dialog normalization data. It provides a gain boost of 11 dB and has compression to prevent the signal from overdriving a modulator. The 11dB gain boost is applied to the AES digital outputs set to PCM and any embedded outputs set to PCM. It will not affect the gain of digital outputs or embedded outputs set to Pass-Through. It is intended to provide a similar audio level as a

broadcast TV station signal through an RF modulator. The down mix includes the center and surrounds channels if they are present, and is represented as Lt/Rt (left total, right total).

The second preset is Monitor. It has moderate processing, no gain boost and its down mix involves left and right channels only (Lo/Ro). The mode setting is Line as the default, but may be changed to RF, Custom 0 or Custom 1. In Line mode, the Dolby Dialog Normalization data is followed along with moderate processing. The default down mix setting for Monitor is Lo/Ro. The down mix may be changed to Lt/Rt or Lt/Rt/auto. Lt/Rt auto follows the embedded data in the stream if the producer has a preferred down mix. It will switch automatically between Lo/Ro and Lt/Rt depending on the data in the stream. If no mode is specified, the down mix will be Lt/Rt. In addition, the Dual Mono modes of operation may be selected. They will only have an effect if the stream is encoded as Dual Mono. Dual Left or Dual Right applies that signal to both left and right channels of the digital service and left and right channels of any embedded stream set to PCM. Selecting RF as the compression setting will add 11 dB of gain and the same processing as the Transmission mode to the AES digital outputs set to PCM and any embedded outputs set to PCM.

There is an additional selection at the bottom of the Dolby setup pull-down menu. This allows selection between Professional Mode and Consumer Mode. In Professional Mode the built-in latency value is 32 ms for all formats. In Consumer Mode, this latency varies depending on the format. If you wish to monitor using a consumer receiver, you should choose Consumer Mode. The output sampling rate will always be 48 kHz, even in consumer. The Consumer/Pro identification bit will be set to Consumer. Normal operation in the air chain will use the Professional setting. This setting affects both Dolby Digital (AC-3) and Dolby Digital Plus.

If you want to run with no processing, choose Custom 1, Lo/Ro, and Dynamic Range disabled. This will still allow gain changes called for in the Dolby metadata via Dial-Norm settings in the stream.

Audio Output Settings

The digital audio services may be set to PCM (AES) or Pass-through (AES data) as an output. This applies to all available sources. The PCM setting will decode and automatically down mix an AC-3 or Dolby Digital Plus stream to two channels of AES audio. Pass-through simply passes thru the Dolby AC-3 data in an AES stream to be decoded by an external decoder such as the Dolby 568. Be aware the Dolby DP-568 is a professional decoder and always has a decoding latency of 32 msec. The older Dolby DP-564 has both professional and consumer modes of operation. If it identifies the Pro/Consumer ID bit as Professional, the latency will always be 32 msec. If it identifies the Pro/Consumer bit as Consumer, the latency will vary according to the format. Check the DP-564 manual for the actual latency values for Consumer mode. The gain setting does not affect the level of either the embedded audio or the digital services. A setting of +4 dBu provides an output of +4 dBu for a digital signal level of -20 dBFS. To check the audio output level, place the audio setup in Custom1 mode, down mix set to Lo/Ro, and the Dynamic Range disabled. This will remove any signal processing in the down mix. Set the digital service output being measured to PCM. A test stream of -20dBFS will output from the digital services as -20dBFS. When you are setting the output levels it is suggested that an AC-3 stereo tone (2.0) be used as the source. Do not use a Dolby AC-3 5.1 tone source as your test signal. The five channels will down mix to a different level structure than a stereo signal depending on the down mix setting.

Downmix Reference Table

The following table is applicable for MPEG Audio (Mono and Stereo), Dolby Digital (Mono, Stereo and 5.1), Dolby Digital Plus (Mono, Stereo and 5.1) and AAC (Mono, Stereo and 5.1).

Incoming audio PID -->	Downmix Option	--> Output effect
Stereo	Lo/Ro	OUT = IN
Stereo	Lt/Rt (DS)	OUT = IN
Stereo	Lt/Rt (Auto)	OUT = IN
Stereo	Dual mono	OUT = IN
Stereo	Dual left	OUT L = OUT R = IN L
Stereo	Dual right	OUT L = OUT R = IN R
Mono	Lo/Ro	OUT L = OUT R = IN
Mono	Lt/Rt (DS)	OUT L = OUT R = IN
Mono	Lt/Rt (Auto)	OUT L = OUT R = IN
Mono	Dual mono	OUT L = OUT R = IN
Mono	Dual left	OUT L = OUT R = IN
Mono	Dual right	OUT L = OUT R = IN
5.1	Lo/Ro	OUT L = L + C + Ls

		OUT R = R + C + Rs (per ATSC A52)
5.1	Lt/Rt (DS)	OUT L = L + C – Ls - Rs OUT R = R + C + Ls +Rs (per ATSC A52)
5.1	Lt/Rt (Auto)	Lo/Ro or Lt/Rt depending on Dolby metadata
5.1	Dual mono	OUT L = front left OUT R = front right
5.1	Dual left	OUT L = OUT R = IN Lo
5.1	Dual right	OUT L = OUT R = IN Ro

Appendix E – AG 6000 Discrete Audio Configuration

With the AG 60851 license, 5.1 Discrete Audio decoding is available on one audio PID. Discrete audio decoding differs from a normal downmix in that it simply decodes selected audio channels rather than mixing multiple channels into 2 channels. Its primary use is for passing individual audio channels, such as in Dolby 5.1, to separate audio components and/or outputs.

How to set up discrete decoding:

Select the service with either PID lock as seen below. The audio PID to be decoded discretely *must* be assigned to “Audio 1” as seen below.

Configure Service Selection

Settings

Selection Mode:

On Backup:

Component	Primary	Primary Type	Backup	Backup Type
PCR	273		0	
Video	273	Auto	0	Auto
Audio 1	274	Auto	0	Auto
Audio 2	275	Auto	0	Auto
Audio 3	0	Auto	0	Auto
Audio 4	0	Auto	0	Auto
SCTE35 1	281		0	
SCTE35 2	0		0	
SCTE35 3	0		0	
SCTE35 4	0		0	

Available Services

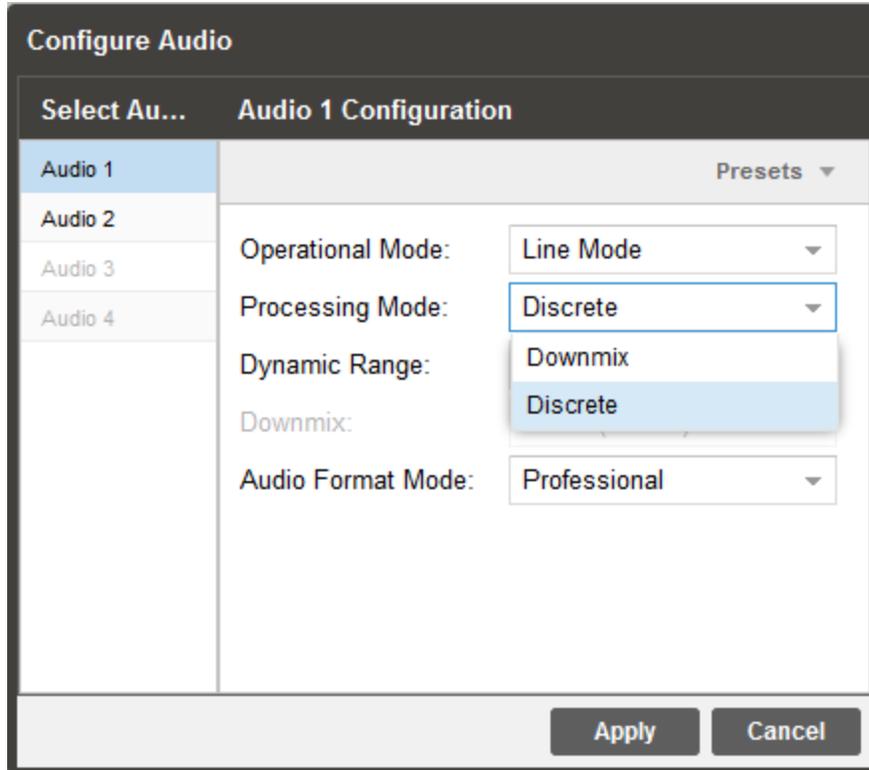
Refresh

Service/PID	Bitrate (Mbps)
Service 60	8.379
273 PCR	7.879
273 H.264	7.879
274 Dolby Digital	0.396
275 Dolby Digital	0.103
281 SCTE-35(134)	0.000
Service 61	8.239
Service 62	8.533
Service 63	8.284

Apply Cancel

Service Selection (PID Lock)

After selecting an Audio PID to assign to Audio 1, navigate to the Audio configuration window under “Baseband Processing”. Then toggle “Processing Mode” from “Downmix” to “Discrete”. There are 8 audio channels (4 pairs) available on the output. This will assign the first three pairs or six audio channels to the Audio 1 service as chosen in the service selection screen.



Audio Configuration after Choosing “Discrete”

After choosing Discrete, as seen in the figure above, “Audio 3” and “Audio 4” become grayed out and are no longer available for configuration. This is to prevent any channels from being configured for multiple services at the same time. “Audio 3” and Audio 4” can still be utilized for Passthrough, but no downmixing can be done to these channels when discrete mode is selected. “Audio 2” can still downmix another audio PID, as this only requires the last remaining two available audio channels after the first six are taken up for the discrete functionality.

Each SDI output carries two groups of two pairs of audio services. To configure for discrete, the audio is split into separate categories: Lf/Rf (Left front/Right front), C/LFE (Center/Bass “low frequency”) and Ls/Rs (Left surround/Right surround). Each of these categories must be selected for the output in order for the audio PID to be fully discretely decoded.

On the WebGUI, navigate to the “SDI Ports” configuration page under “Baseband Outputs”. Then click the “Audio” tab to configure the outgoing pairs for the SDI output. As seen in the figure on the next page, there are three pull down tabs to choose the audio PID to output. In the first pulldown tab, choose “Audio 1” for the first three pairs (group 1/pair 1, group 1/pair 2, and group 2/pair 1). In the second category, choose PCM to specify that it must be decoded. On the third pulldown tab, select Lf/Rf for one of the pairs, C/LFE for another and finally LS/RS for the last one to ensure that all audio channels are being properly utilized for discrete decoding.

Configure SDI Ports

SD | HD | UHD | **Audio**

Group 1

Pair 1 Audio 1 PCM Lf/Rf

Pair 2 Audio 1 PCM C/LFE

Group 2

Pair 1 Audio 1 PCM Ls/Rs

Pair 2 Audio 2 PCM Lf/Rf

Apply Cancel

SDI Audio Output Configuration

The AES settings can select two out of the three necessary pairs to deliver the fully decoded 5.1 audio. As it is not possible to output discrete audio through the digital audio output, it is recommended to only use the SDI outputs when using discrete decoding.

Configure Digital Audio Output

Digital Output 1 Audio 1 PCM C/LFE

Digital Output 2 Audio 1 PCM Lf/Rf

Apply Cancel

Digital Audio Output Configuration

For any additional questions regarding discrete audio decoding with the AG 6000, please refer to the Sencore Procure department.

Appendix F – Open Source Software

The AG 6000 includes:

Package	Version	License	Copyright
AT32 UC3B Software Framework	1.7.0	BSD	2009, Atmel Corporation
DejaVu Fonts	2.35	GPL Version 3, 29 June 2007	2007-2009, Active Group, Inc.
BusyBox	1.20.1	Free	2003, Bitstream; 2006, Tavmjong Bah
Cgicc	3.2.9	LGPL Version 29, June 2007	Stephen F. Booth
dfu-programmer	0.5.2	GPL Version 2, June 1991	Weston Schmidt
Dropbear	2016.74	MIT-like	2002-2015 Matt Johnston, et. al. (see license)
E2fsprogs	1.41.9	GPL Version 2, June 1991	Theodore Ts'o
ethtool	2.6.34	GPL Version 2, June 1991	David Miller, et. al.
FamFamFam Silk Icons	013	Creative Commons Attribution 2.5	Mark James
FastDB	3.71	MIT-like	Konstantin Knizhnik
FCGI	2.4.6	FastCGI	Open Market, Inc
Iproute2	3.4.0	GPL Version 2, June 1991	Stephen Hemminger, Alexey Kuznetsov
Libusb	0.1.12	LGPL Version 2.1, Feb 1999	Johannes Erdfelt, Thomas Sailer, Brad Hards
Lighttpd	1.4.30	BSD	2004, Jan Kneschke
Linux	2.6.30	GPL Version 2, June 1991	Linus Torvalds, et. al.
Log4cpp	1.0	LGPL Version 2.1 Feb 1999	Bastiann Bakker
Monit	5.1.1	GPL Version 3, 29 June 2007	2010 Tildeslash Ltd.
Net-SNMP	5.7.1	BSD	1989, 1991, 1992 by Carnegie Mellon University, et. al. (see License)
NTP	4.2.4p7	NTP License	1992-2009 David L. Mills
OpenSSL	1.0.1c	BSD-Like	1998-2008 The OpenSSL Project, 1995-1998 Eric Young

OProfile	0.9.7	GPL Version 2, June 1991	John Levon, Philippe Elie, et. al.
PCRE	8.30	BSD	1997-2012 University of Cambridge et. al. (see License)
POPT	1.14	MIT	1998 Red Hat Software
qDecoder	12.0.4	BSD	2000-2012 Seungyoung Kim
Socket-CAN	1171	BSD-like, GPL Version 2, June 1991	2002-2007 Volkswagen Group Electronic Research, et. al.
Spawn-FCGI	1.6.3	BSD	Jan Kneschke, Stefan Bahler
TCLAP	1.2.0	MIT	2003 Michael E Smoot
U-Boot	2009.11.1	GPL Version 2, June 1991	Wolfgang Denk, et. al.
USB-Utils	0.86	GPL Version 2, June 1991	Thomas Sailer, Johannes Erdfelt, David Brownell, Aurelien Jarno
Zlib	1.2.7	zlib/libpng License	1995-2005 Jean-loup Gailly and Mark Adler
OpenEmbedded	2011.03	MIT	2006-2009 Holger Hans Peter Freyther, et. al.

Appendix G – CRD 1900 Chassis

Front and Rear Panel Accessibility:

The CRD 1900 chassis has both a front panel and rear panel for accessibility of the AG 6000 card. The front panel may be removed using the screws listed below to access the front edge of the card. Three indicator LEDs on the front panel indicate the unit Identification (**BLUE**), input presence (**GREEN**), and active error (**RED**).



The rear panel allows for input and output accessibility as well as 12VDC to power the chassis and card. The following I/O connections are labeled below.



- 1) Front Panel Screws
- 2) Front Panel Indicator LED's
- 3) 12VDC Input
- 4) Management Port
- 5) MPEG/IP I/O Port
- 6) ASI I/O
- 7) Digital Video Output
- 8) Digital Audio Output
- 9) SDI Output

Default IP Address:

The CRD 1900 chassis will come configured to a static IP address that is accessible through the RJ45 management port. It is configured with the following parameter settings:

Parameter	Setting	Description
IP address	10.0.20.101	This setting is the TCP/IP address assigned to the port.
Subnet Mask address	255.255.0.0	This setting is the subnet mask assigned to the port.
Gateway	10.0.20.1	This setting is the gateway address assigned to the port.

How to Reset to Default IP Address:

If the IP of the unit is unknown the default IP address may be reset. To reset the unit to the default IP, the following steps are provided:

1. Remove the front panel of the CRD 1900 chassis to reveal the AG 6000 card.
2. Power on the CRD 1900 chassis and AG 6000 card, it will take about 3 minutes to fully power on.
 - a. Hold the black button on the card edge until the red LED turns off.
 - i. If the button is held until the blue LED blinks, the card will be sent into recovery mode. The card can be rebooted to revert this process.
 - b. The card is now processing the reboot function, this should take about 5 minutes to complete.
3. Once the card is fully rebooted, the default IP settings are configured.
 - a. Using the management port, the default IP address above will be accessible.

Appendix H – Warranty

Sencore One-Year Warranty

Sencore warrants this instrument against defects from any cause, except acts of God and abusive use, for a period of 1 (one) year from date of purchase. During this warranty period, Sencore will correct any covered defects without charge for parts, labor, or recalibration.

Appendix I – Support and Contact Information

Returning Products for Service or Calibration

The AG 6000 is a delicate piece of equipment and needs to be serviced and repaired by Sencore. Periodically it is necessary to return a product for repair or calibration. In order to expedite this process please carefully read the instructions below.

RMA Number

Before any product can be returned for service or calibration, an RMA number must be obtained. In order to obtain a RMA number, use the following steps:

1. Contact the Sencore service department by going online to www.sencore.com and select Support.
2. Select Service and Repair from the options given.
3. Fill in the following required information:
 - a. First & Last Name
 - b. Company
 - c. Email
 - d. Phone Number
 - e. Ship and Bill to Address
 - f. Unit Model and Serial Numbers
4. A RMA number will be emailed you shortly after completing the form with return instructions.

Shipping the Product

Once an RMA number has been issued, the unit needs to be packaged and shipped back to Sencore. It's best to use the original box and packaging for the product but if this not available, check with the customer service representative for the proper packaging instructions.

Note: DO NOT return any power cables or accessories unless instructed to do so by the customer service representative.

