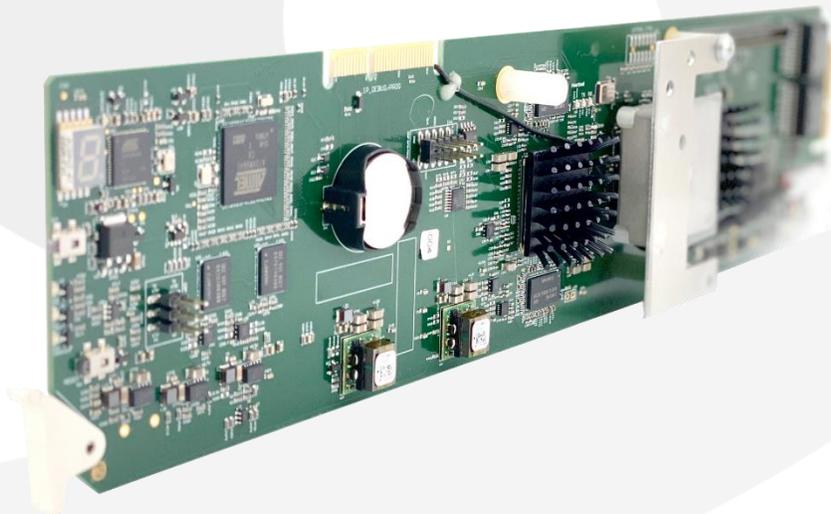




AG 2600 Receiver Card

User Manual



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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	Version	Description	Author
11/11/2014	1.0	Initial Release (2.2.0 software)	NDM
3/30/2015	1.1	Update for 2.3.0 Release	CDP
6/16/2015	1.2	Update for 2.3.3 Release	CDP
7/20/2015	1.3	Update for 2.4.0 Release	CDP
11/1/2015	1.4	Update for 2.5.0 Release	CDP
3/2/2016	1.5	Update for 3.0.0 Release	CDP
6/6/2016	1.6	Update for 3.1.0 Release	CDP
9/28/2016	1.7	Update for 3.2.0 Release	CDP
4/07/17	1.8	Update for 3.3.0 Release	ACD
1/27/2020	1.9	Appending to S2X Module Specs	BCR
07/27/2020	1.10	Update for 4.2.3 Release	RAG
09/02/2020	1.11	Updated screenshots for new GUI	RAG
12/01/2020	1.12	Update for 4.3.0 Release	JDN
02/01/021	1.13	Update for 4.4.0 Release	RAG

Safety Instructions

- Read these instructions
- Keep these instructions
- Heed all warnings
- Follow all instructions
- 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 2600 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 2600 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 2600 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.

Package Contents

The following is a list of the items that are included along with the AG 2600:

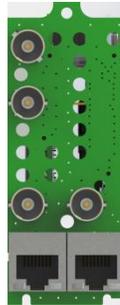
1. Declaration of Conformity
2. Backplate
3. Quick Start Guide

Note: If any option cables were ordered with the AG 2600, they will be included in the box as well.

If any of these items were omitted from the packaging of the AG 2600 please call 1-800-SENCCORE to obtain a replacement. Manuals for Sencore products can be downloaded at www.sencore.com



1) Declaration of Conformity



2) Backplate



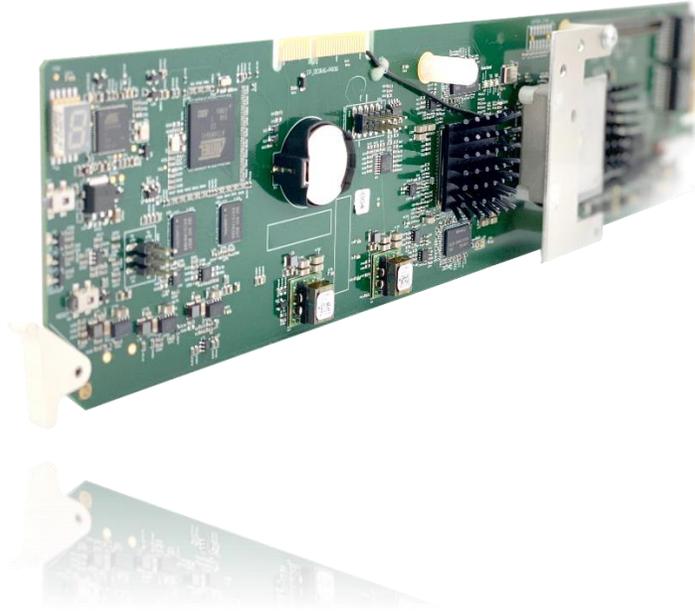
3) Quick Start Guide

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Section 1 Overview



Introduction

This section includes the following topics:

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1.3	Rack Information.....	11

1.1 Product Introduction

The AG 2600 is a Receiver card used as a turnaround product capable of receiving a transport stream from the following interface types:

- 1) ASI
- 2) IP
- 3) DVB-S/S2

and converting it to ASI and/or IP out.

The AG 2600 also has the ability to descramble BISS and DVB-CI scrambling (the CAM option needs to be purchased to descramble DVB-CI). This manual describes how to install, configure, and operate the AG 2600 Receiver card. It is written for professional operators of video distribution systems and assumes a prerequisite level of technical knowledge.

With built-in ASI input/output capability, as well as available satellite and IP interfaces, the AG 2600 is adaptable to most turnaround use cases. The card also maintains Sencore's long tradition of ease of use, with a web interface accessible via all major browsers once an IP address is assigned to the card using the chassis Web GUI, and is backed by Sencore's best-in-class ProCare support.

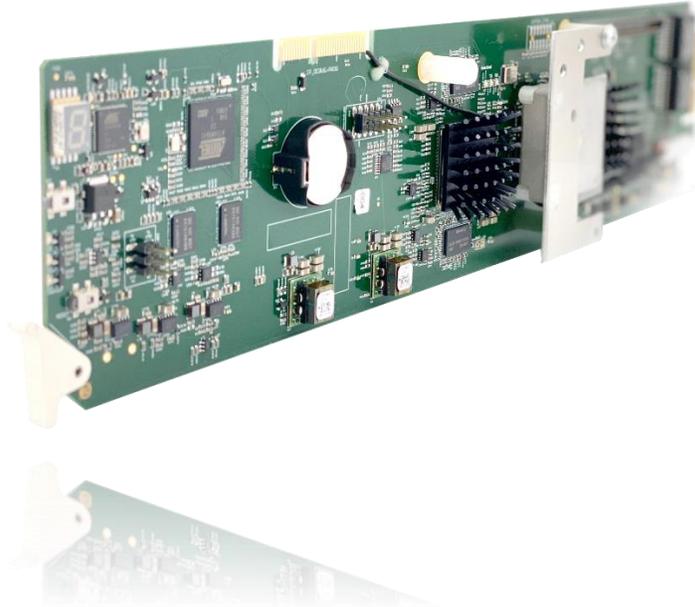
1.2 Cooling

The AG 2600 is cooled via forced induction through the front of the frame and exhausted through the vents in the rear of the backplate. The AG 2600 is equipped with a temperature-controlled status indicator. If the external temperature of the card exceeds 50° 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 2600 is intended to be mounted in a CRD 4900, CRD 1900 or AG-4800A openGear™ frame (or equivalent). The card takes up two slots in the two 20 slot chassis (10 card maximum).

Section 2 Getting Started



Introduction

This section includes the following topics:

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2.3	Backplate	15
2.4	Maintenance	15
2.5	Setting up the AG 2600 using Dashboard™.....	15
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2.1 Installation

Carefully unpack the AG 2600 card and inspect it for any signs of damage. Do not insert the card into the chassis if any damage is evident, and if so, please contact Sencore.

The AG 2600 occupies two slots in the chassis, allowing up to 10 cards to be inserted into the frame.

Fit the rear panel PCB supplied with the AG 2600 card at the selected slot location, removing the blanking plate if necessary. The rear panel PCB is fixed to the rear panel of the chassis using a single screw. Figure 1 shows the chassis mounting system.

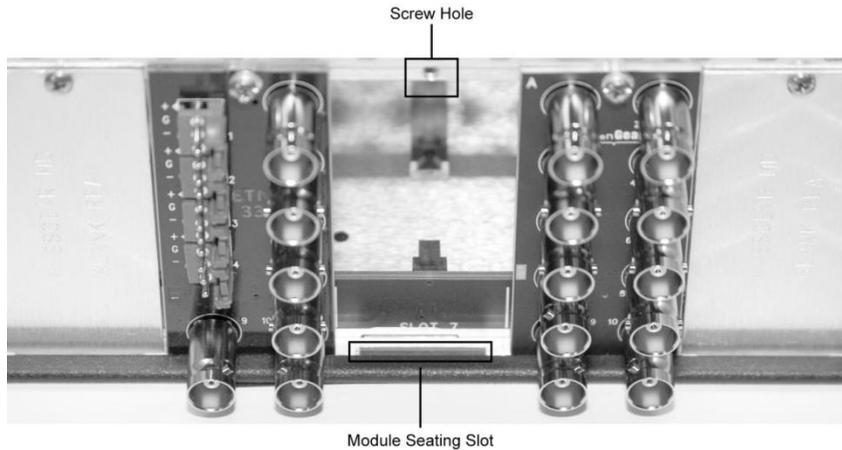


Figure 1: Chassis mounting system

Open the chassis front panel and slide the AG 2600 card carefully into place. As the card slips home, 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 chassis 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 chassis 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 chassis controller card. The chassis 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 chassis can be found in the AG-4800A, AG 4800X/XS, CRD 4900, CRD 1900 chassis manuals. The CRD 1900 chassis information can be found in [Appendix E](#).

2.2 Onboard Controls and LEDs

The AG 2600 decoder card uses a combination of button controls and LED's to reboot/recover the card and provide local status information. *Figure 2* shows these controls and LEDs, and they are also briefly described in this section.

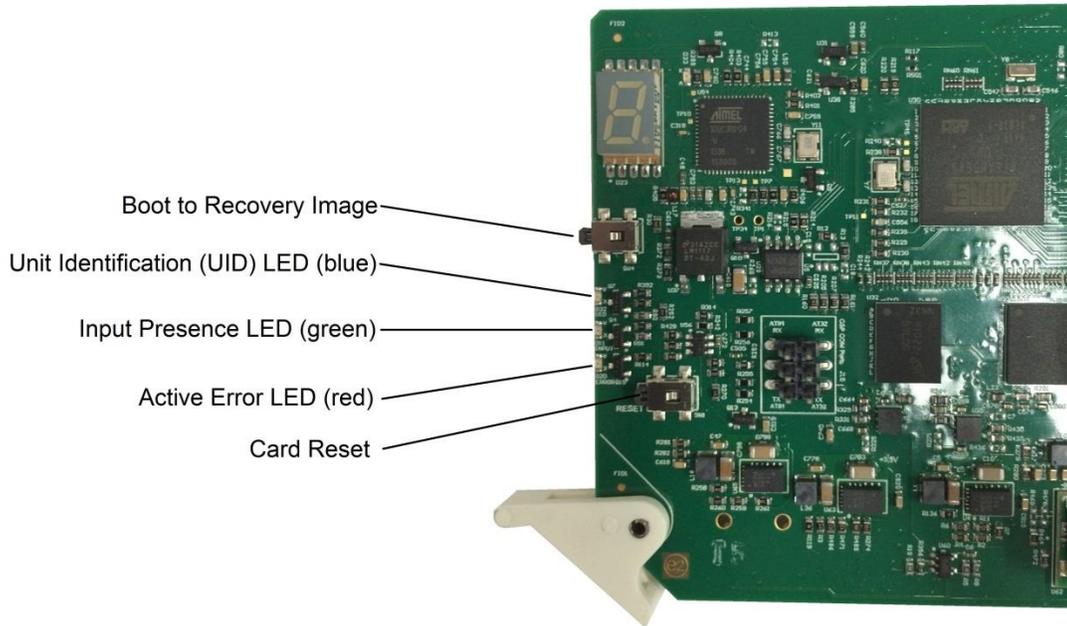


Figure 2: View of card edge controls and LEDs

Button Controls

There are two button controls available on the AG 2600:

- **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.
- **Card Reset:** The user can press this button to reset 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 2600.

2.3 Backplate

Each AG 2600 card comes paired with a compatible backplate. Figure 3 shows the backplate for an AG 2600 card with the DVB-S2 input option.

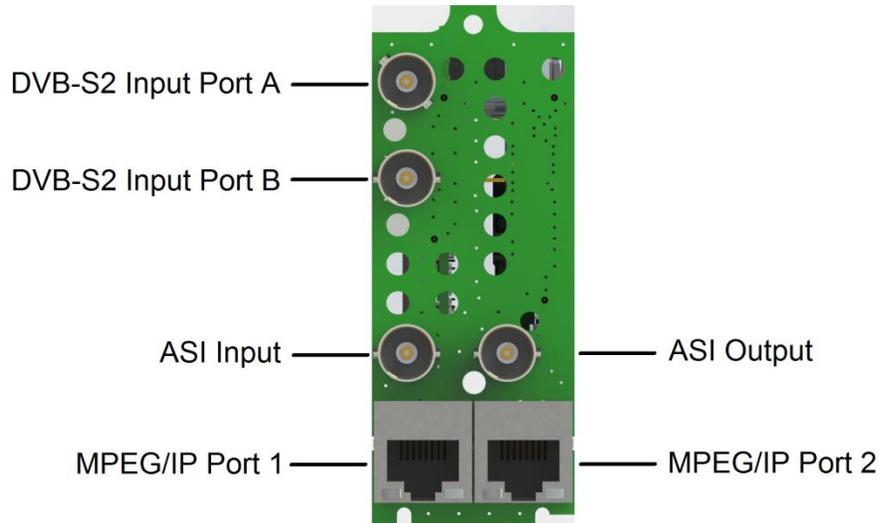


Figure 3: Backplate with DVB-S2 Input Option

2.4 Maintenance

The AG 2600 is virtually a maintenance-free piece of equipment. There are no user serviceable parts on the card.

2.5 Setting up the AG 2600 using Dashboard™

If the AG 2600 is used with the AG-4800A or AG 4800X/XS, the card IP addresses should be set using the openGear DashBoard™ software. This section provides step-by-step operating instructions for configuring the IP address of the AG 2600 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
1. Visit <https://www.opengear.tv/control-monitoring/dashboard-control-system/> to download the DashBoard™ setup file.
2. 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

Figure 4 shows the startup Dashboard™ screen. Dashboard™ has discovered an accessible frame. Note the “Sencore 4800A 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.

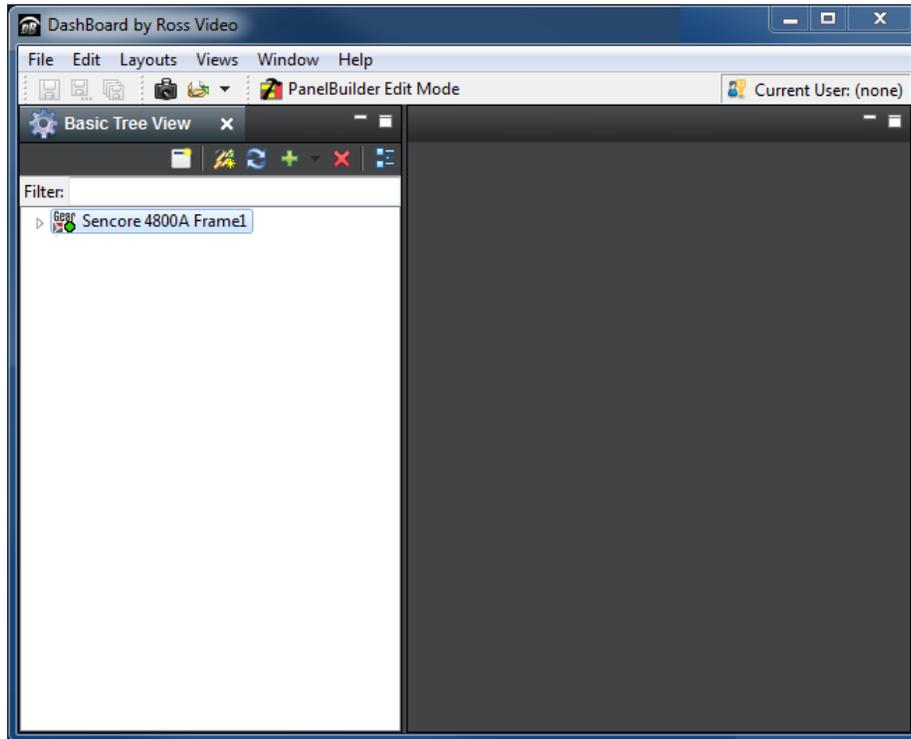


Figure 4: Dashboard™ opening window view

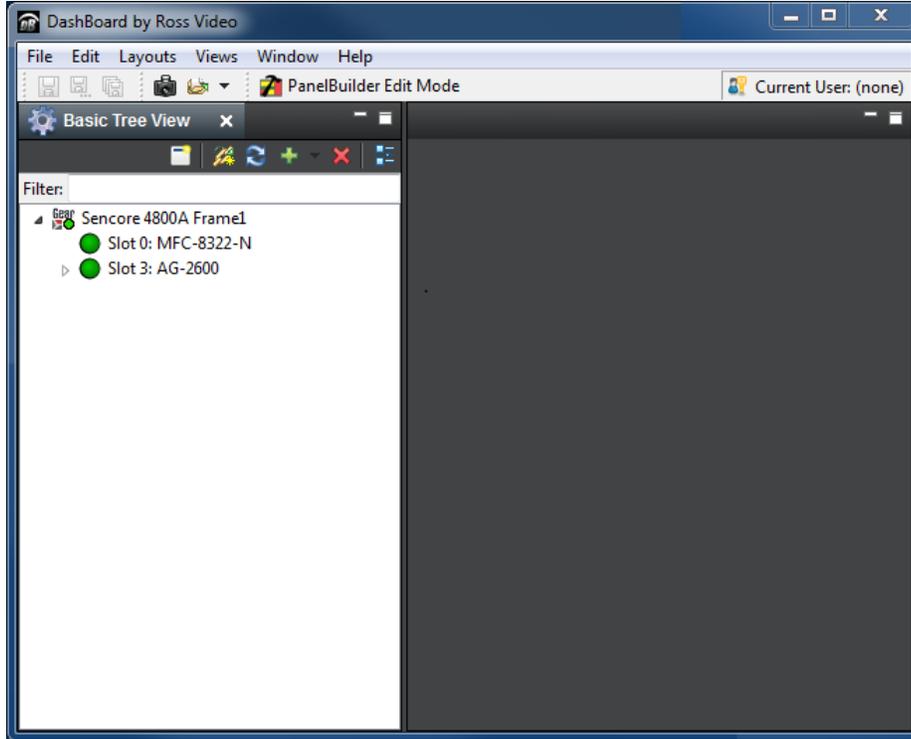


Figure 5: Available cards window view

Figure 5 shows that the Master Frame Controller (MFC) card, and the Sencore AG 2600 cards that are available in slots 0 and 3, 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 2600 card will display the “Configuration” and “Web Interface” selections for that card (see Figure 6).

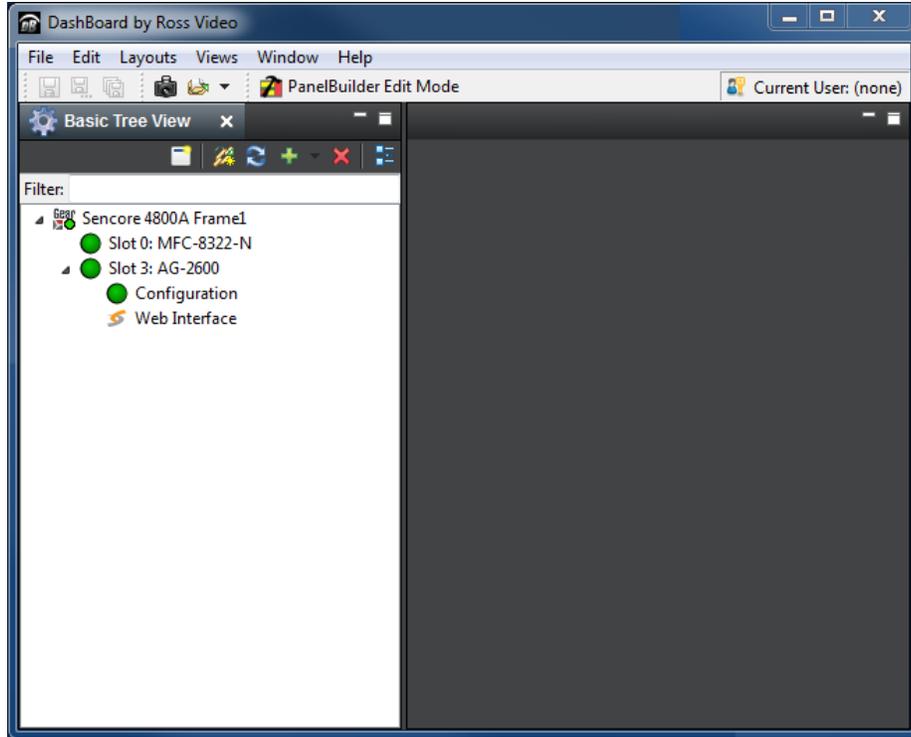


Figure 6: Configuration and Web Interface in Basic Tree View

Network setup using DashBoard™

Double clicking “Configuration” will launch the setting and status window panes for the AG 2600 card shown in Figure 7.

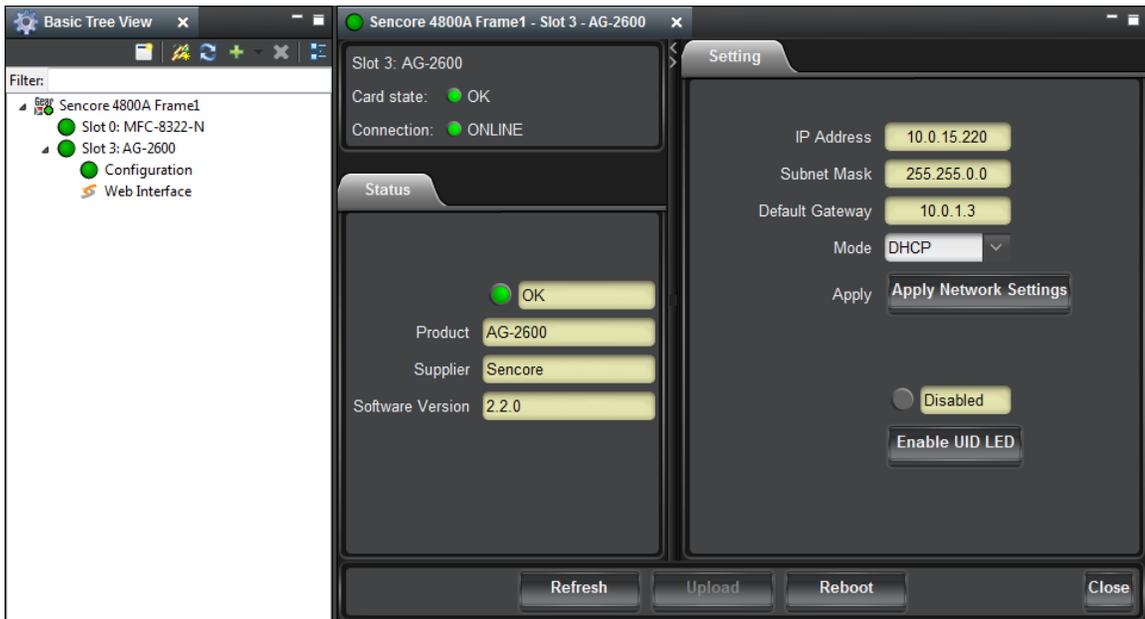


Figure 7: Configuration

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 2600 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 2600 to obtain an IP address.

2.6 Setting up the AG 2600 using the CRD 4900

This section provides step-by-step operating instructions for configuring the IP address of the AG 2600 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 "AGXXXXX" 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.

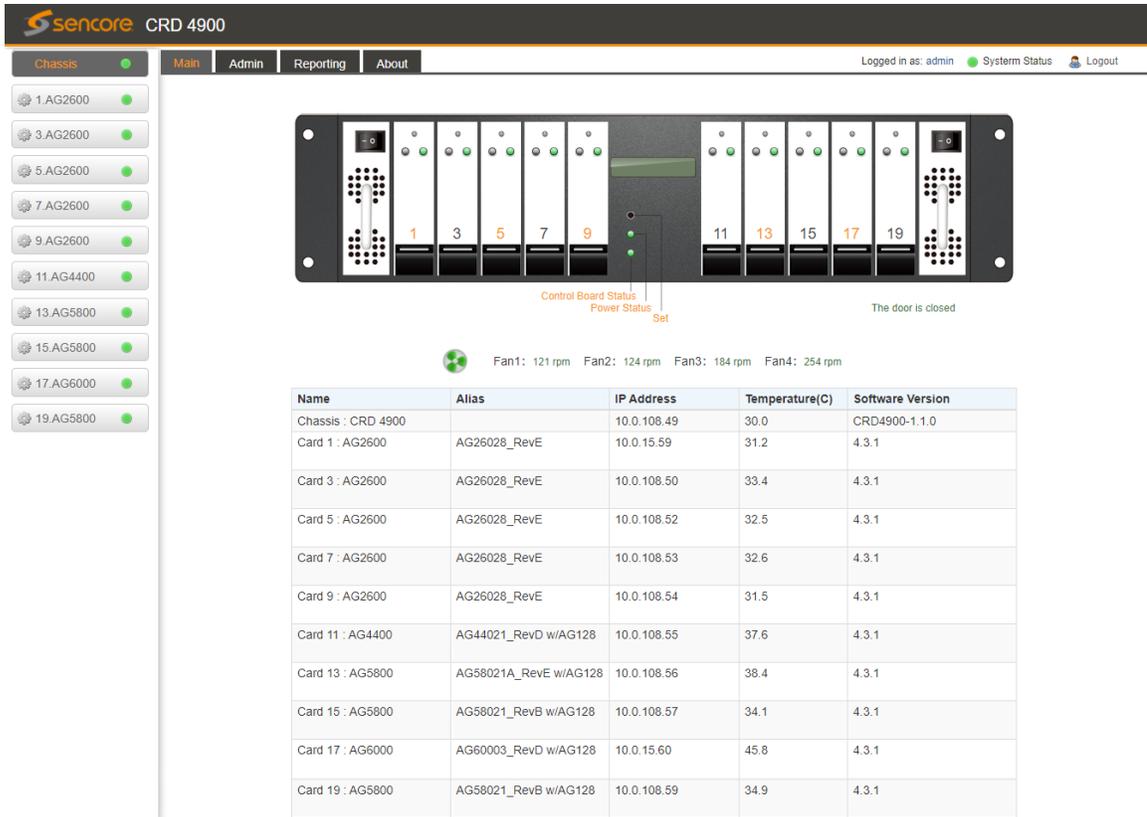


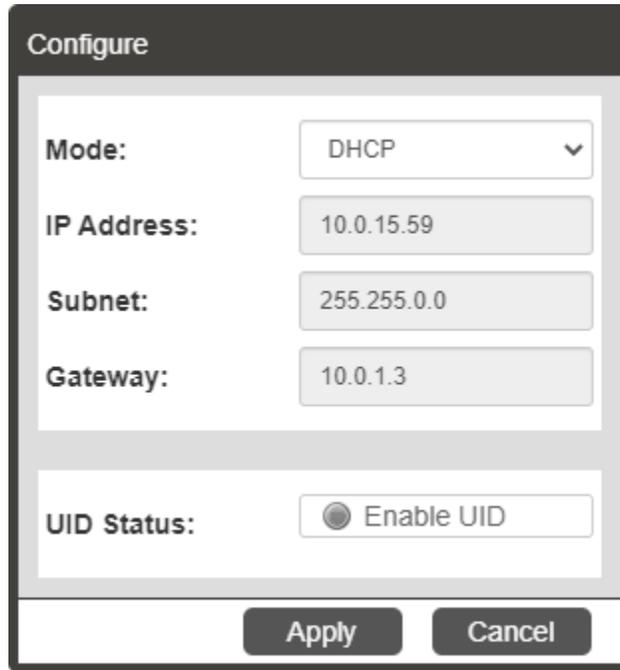
Figure 8: CRD 4900 main screen

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 2600 card shown in Figure 10.



The screenshot shows a 'Configure' dialog box with the following fields and values:

- Mode: DHCP (dropdown menu)
- IP Address: 10.0.15.59
- Subnet: 255.255.0.0
- Gateway: 10.0.1.3
- UID Status: Enable UID

Buttons at the bottom: Apply, Cancel

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 2600 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:

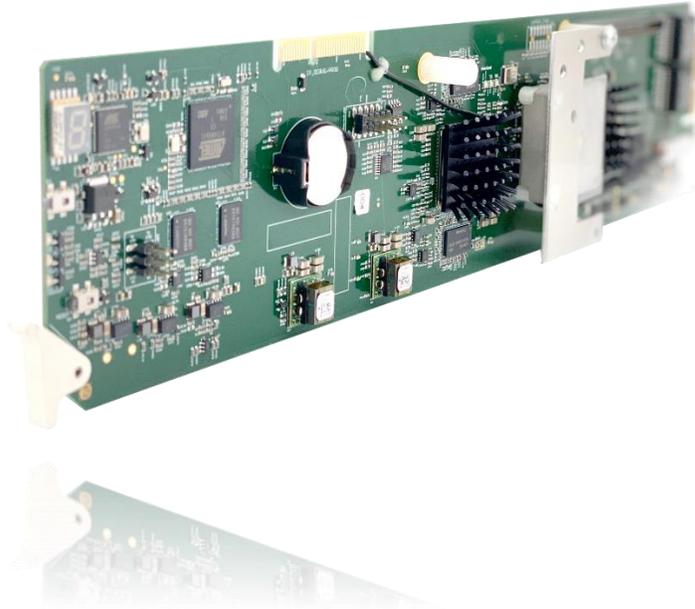
- 1) In the setting pane, change 'Mode' to "Static".
- 4) Set the 'IP Address', 'Subnet Mask', and 'Gateway' to the desired settings.
- 5) Click 'Apply'.

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 2600 to obtain an IP address.

Section 3 Operating the Web Interface



Introduction

This section includes the following topics:

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3.4	Reporting Panel	65
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3.1 AG 2600 Web Interface Overview

Logging into the AG 2600 Web Interface

Once an IP address is set, each of the cards can be independently controlled via the web interface. To open the AG 2600 web interface, use one of the following supported browsers and navigate to the card's IP address:

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

The web interface can also be launched within DashBoard™ by double-clicking “Web Interface” in the basic tree view of DashBoard™.

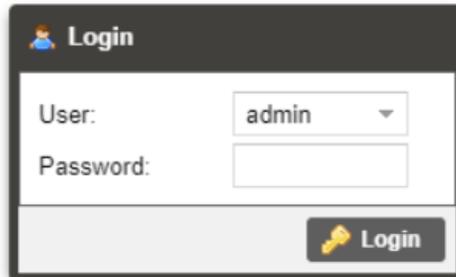
The web interface can also be launched in the CRD 4900 Web GUI by clicking on the desired AG XXXX button on the left side menu.

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



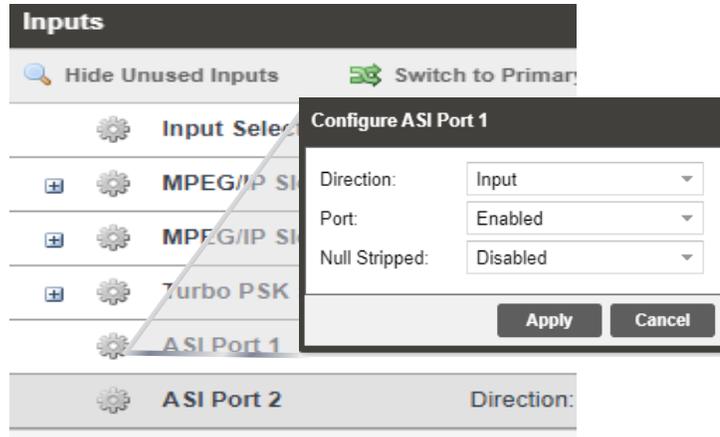
3.1.2

Hiding Unused Inputs

- 3.1.3 The AG 2600 web interface allows the user to hide inactive inputs using 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.

Buttons 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.



When the  icon is shown additional status information can be viewed. Click this button will expand 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.

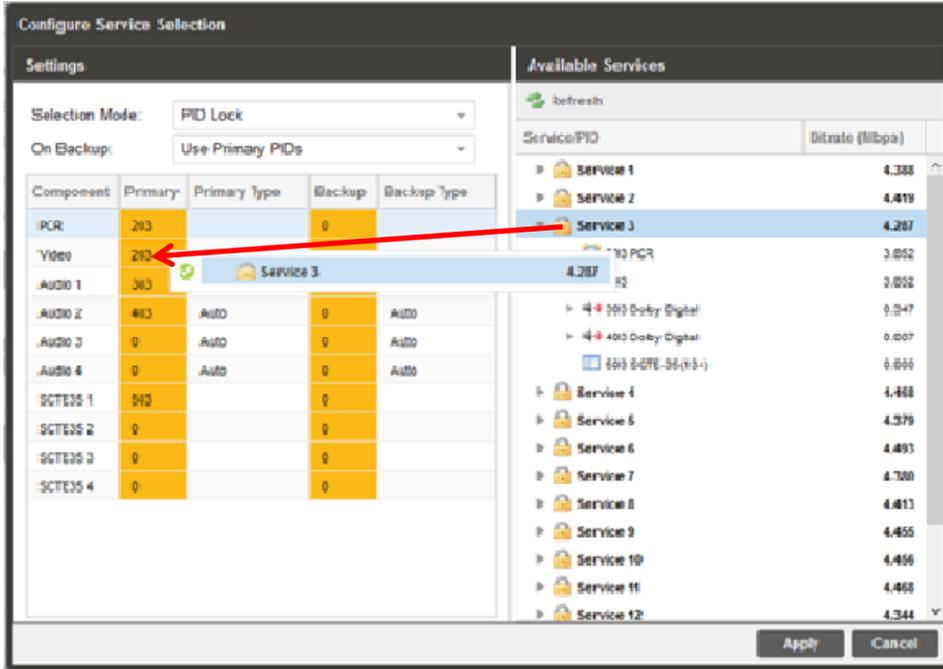
Status in the AG 2600 web interface is shown with LED status indicators:

- 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 2600 allow the user to drag and drop items to auto populate fields. Conditional Access is an example of a menu 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 Service and PIDs in the Conditional Access section.



3.2 Main Panel

The Main panel of the AG 2600 web interface is used to configure the unit to route an input to an output. When configuring the AG 2600 the user begins at the top of the menu and works down. The inputs are configured, then descrambling (if present), then outputs are configured. Figure 11 below is a fully populated card with all options licensed.

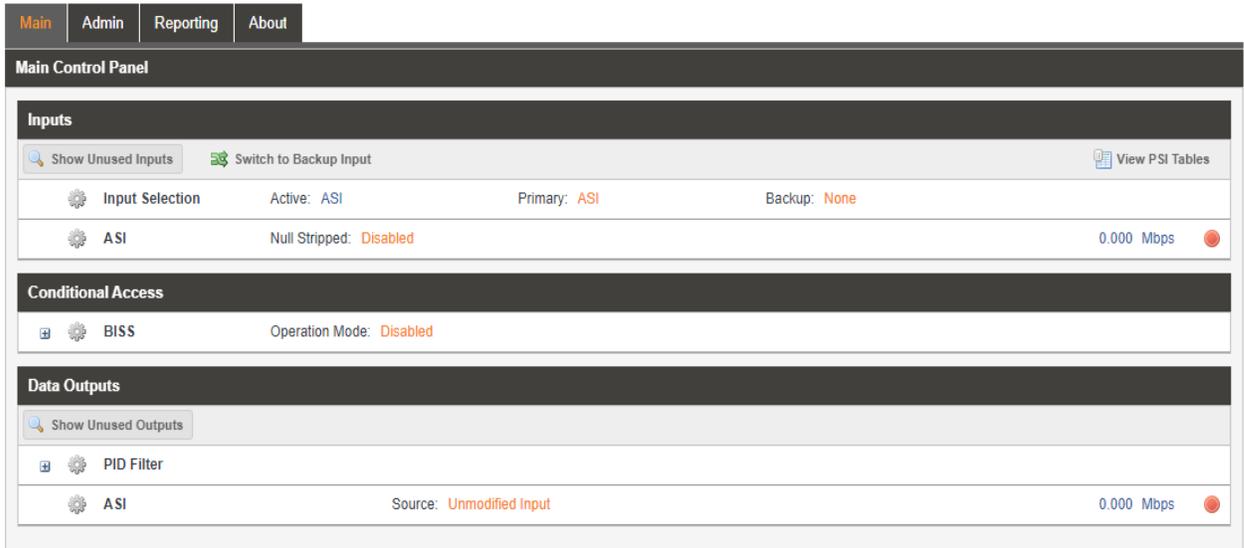


Figure 11: Main Panel

Configuring Active Inputs

This menu allows the user to configure a primary and backup input. In case there is a TS sync loss on the primary input the AG 2600 is capable of detecting the failed state and switching to a secondary backup input in order to provide a continuous output. Which input is primary and backup, how the inputs switchover and restore and switchover timing is all user-configurable. The user can force the AG 2600 to

- 3.2.1 switch between the Primary and Backup Inputs by clicking the  button. To change the active input and failover settings click the  icon next to Input Selection as shown in Figure 12 and Figure 13 below.

Inputs			
	Hide Unused Inputs		Switch to Backup Input
	Input Selection	Active: ASI	Primary: ASI Backup: MPEG/IP Stre
	 MPEG/IP Stream 1	239.192.108.70:10070	Packet Status: Not Present FEC: Not Present
	 MPEG/IP Stream 2	239.192.0.201:10000	Packet Status: Not Present FEC: Not Present
	ASI	Null Stripped: Disabled	

Figure 12: Active Input Indicator

Configure Inputs

Primary Input:

Backup Input:

Switch On:

Restore On:

Switchover (secs.):

Figure 13: Active Input and Failover Configuration Menu

Setting	Range	Description
Primary Input	ASI MPEG/IP Stream X 8VSB/QAM Slot X DVB-S2 Port X	Used for both normal operation and input failover settings. During normal operation this input will be the active input.

	DVB-T2/C2/ISDB-T Slot X None	
Backup Input	ASI MPEG/IP Stream X 8VSB/QAM Slot X DVB-S2 Port 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	<i>Manual Only:</i> the unit will not switch inputs automatically. The user must manually switch inputs. <i>TS Sync Loss:</i> the AG 2600 will switch from the primary to the backup input if the primary stream loses synchronization for the duration of the Switchover Interval.
Restore On	Manual Only Primary Input TS Restored Backup Input TS Sync Loss	<i>Manual Only:</i> the unit will not restore to the primary input automatically. The user must manually switch inputs. <i>Primary Input TS Restored:</i> the AG 2600 restores to primary when the Primary input regains transport stream synchronization. <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.
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 2600 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 2600 as well as set the Null Stripped setting, as shown in Figure 14. No other configuration is necessary for the ASI Input.

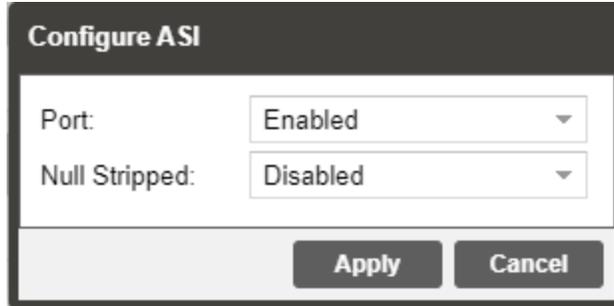


Figure 14: Configure ASI

Setting	Range	Description
Port	Enabled	This setting allows the user to enable or disable the ASI Input to the AG 2600.
	Disabled	
Null Stripped	Disabled	Enabling Null Stripped allows the AG 2600 to receive streams that do not contain null packets. (i.e. VBR Transport Streams)
	Enabled	

Configuring MPEG/IP Input

3.2.3

If the MPEG/IP Input card was selected as a factory installed option, the following menus and options shown in Figure 15 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.

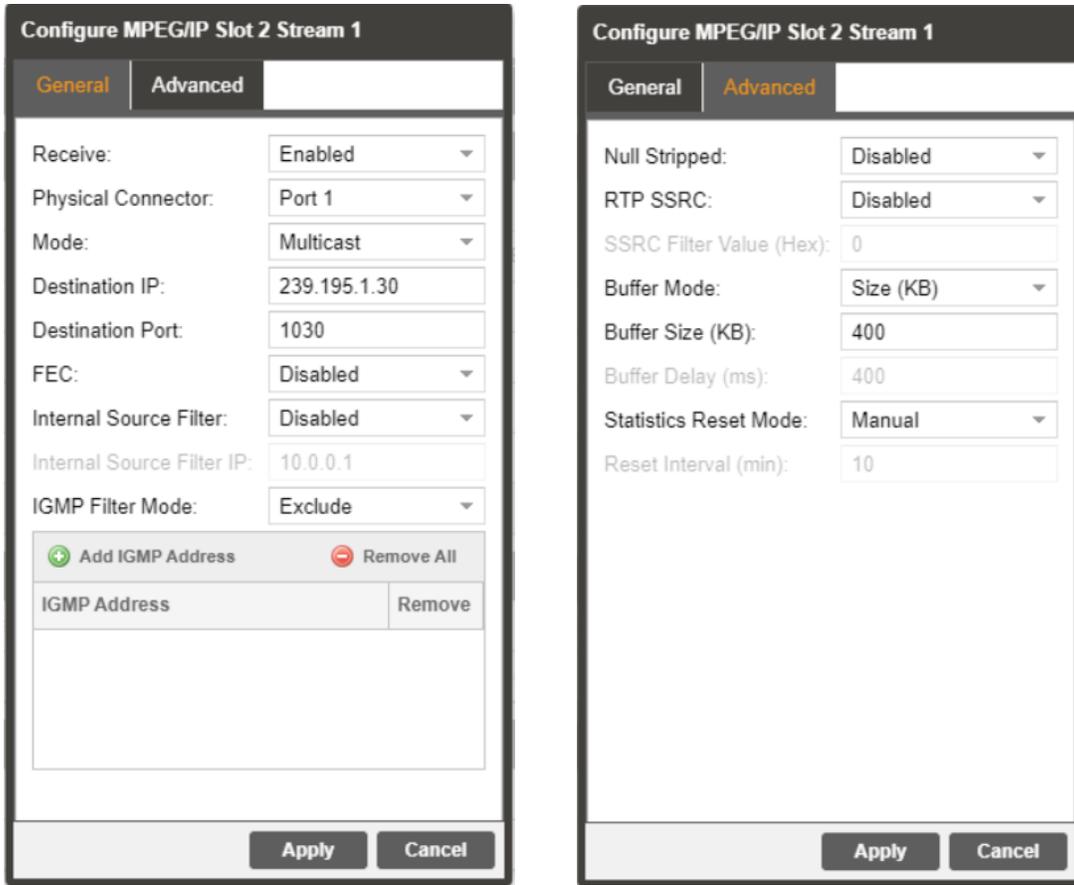


Figure 15: MPEG/IP Input Configuration Menu

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 Port 1 (Card) Port 2 (Chassis)	The physical connector on the AG 26027 MPEG/IP card that will be used to receive the input. The physical connector on the AG 26028 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 2600 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 2600 to receive streams that do not contain null packets. (i.e. VBR TS Streams)
RTP SSRC	Enabled Disabled	Enabling RTP SSRC allows the AG 2600 to filter the input by the user defined value. Only streams containing the user defined value will be received by the AG 2600.
SSRC Filter Value	0 - 4294967295	The Filter Value the AG 2600 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 2600 starts decoding. Increasing this value will allow the AG 2600 is receive streams on networks with high network jitter. Increasing this value also increases the latency of the AG 2600.
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. Selecting Auto will reset the statistics on a chosen interval. When the 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



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. This menu allows the user to configure the DVB-S/S2/S2X inputs. The input card is equipped with dual demodulators and four ports (labeled A, B, C and D). This configuration allows the card to receive two signals simultaneously for fast switching between primary and backup inputs. The menu for both demodulators have the same settings. The input card will automatically detect modulation and symbol rate during signal acquisition. LNB Power configuration for this input card is configured 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 26916 licensed feature)
LNB Power	Off 13 VDC 18 VDC	The AG 2600 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 AG 4800A supports up to 7 AG 2600 cards per chassis when enabling LNB power.
22 kHz Tone	Enabled Disabled	Enabling or disabling the 22kHz tone allows the AG 2600 to trigger the LNB to switch polarities.

Configuring DVB-S/S2 Input

If the care is equipped with the DVB-S/S2 Input option, the following menus and options shown in Figure 16 will be available for configuration. This menu allows the user to configure the DVB-S/S2 inputs. The DVB-S/S2 input option has two ports (labeled A and B) 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 and B have the same settings.

3.2.5

Figure 16: DVB-S2 Configuration Menu

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	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.

L-Band: 950MHz –
2150MHz

Dependent on LO Offset

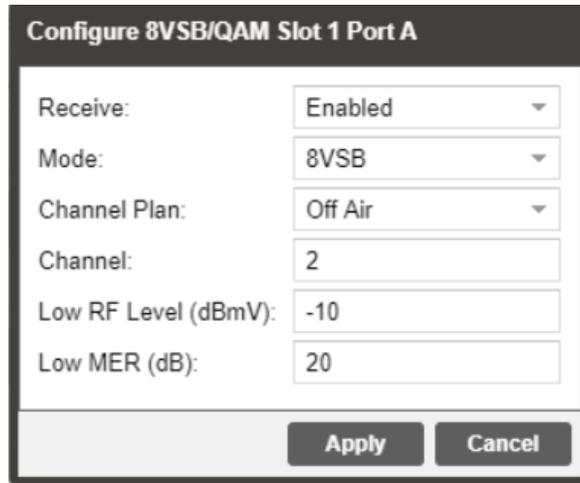
Wide Search	Enabled Disabled	When Enabled the search range may be extended depending on the symbol rate. See appendix C for more information.
LO Offset	5150 9750 10600 10750 11250	The offset in MHz that the local oscillator is operating.
Symbol Rate Mode	Manual Auto	The Manual option allows the user 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	0.5 - 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.
PL Scrambling Code	0 – 262141	The AG 2600 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 2600 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 2600 to trigger the LNB to switch polarities.
Multistream State	Enabled Disabled	The AG 2600 has the ability to receive multistream satellite signals. If the signal is multistream capable, enable this setting. This option is only available in DVB-S2 Mode. <i>NOTE: This is a licensed feature.</i>
ISI	0-255	This setting is the ISI (Input Stream Identifier) the AG 2600 uses to filter

multistream input. This option is only available if Multistream is licensed and enabled.

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.

3.2.6



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 Off Air. If either 64-QAMB or 256-QAMB 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 Low Level 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.
---------------------	--------	--

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.

3.2.7

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 Taiwan South Africa South America United Kingdom European Cable Japan Philippines	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.
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
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.

Configuring DVB-CI Descrambling

This section will describe how to configure DVB-CI descrambling in the AG 2600 (if equipped). First, the user will need to configure the CAM slots. Once this is complete the user can configure which services or PIDs to descramble.

3.2.8

3.2.8.1 Configuring DVB-CI Slots

This menu allows the user configure the DVB-CI slots in the AG 2600 as shown in Figure 17. The AG 2600 has two DVB-CI slots, a left and right, where CAM Modules can be inserted. Both slots are individually configurable. 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.

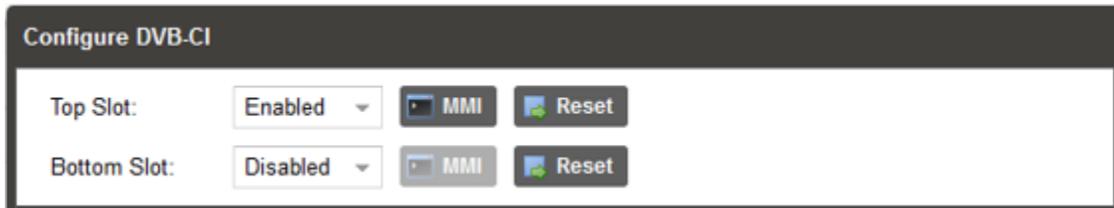
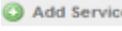


Figure 17: DVB-CI Configuration Menu

Setting	Range	Description
Mode	Descramble Selected PIDs Descramble Selected Services	<i>Selected PIDs</i> sets the AG 2600 to descramble PIDs set in the Descramble Services window (Refer to Section 0). If the PIDs change in the incoming stream the AG 2600 will not adapt to these changes and will not be able to descramble. <i>Selected Services</i> sets the AG 2600 to descramble Services set in the Descramble Services window Refer to Section 0). If the Services change in the incoming stream the AG 2600 will not be able to descramble.
Slot	Enabled Disabled	This setting allows the user to enable or disable the DVB-CI slot.

3.2.8.2 Configuring Service Descrambling

This menu allows the user to select the services the AG 2600 will descramble using the CAM Modules and Smart Cards inserted into the DVB-CI slots as shown in Figure 18. See Section 3.2.8.1 to configure these slots. 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 left or right 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 2600 to rescan the transport stream for changes.

When NOT licensed for Multiservice Descrambling, this menu will only allow the user to drag over one service for descrambling (regardless of the number of CAMs present in the unit). The  button will also not be present.

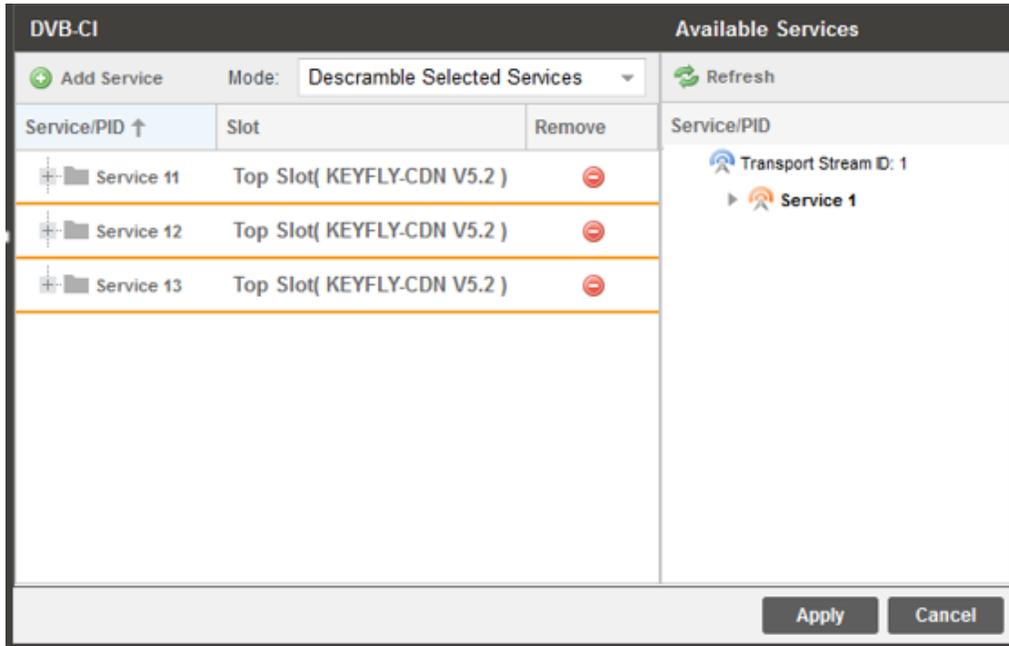


Figure 18: DVB-CI Service Descrambling Menu

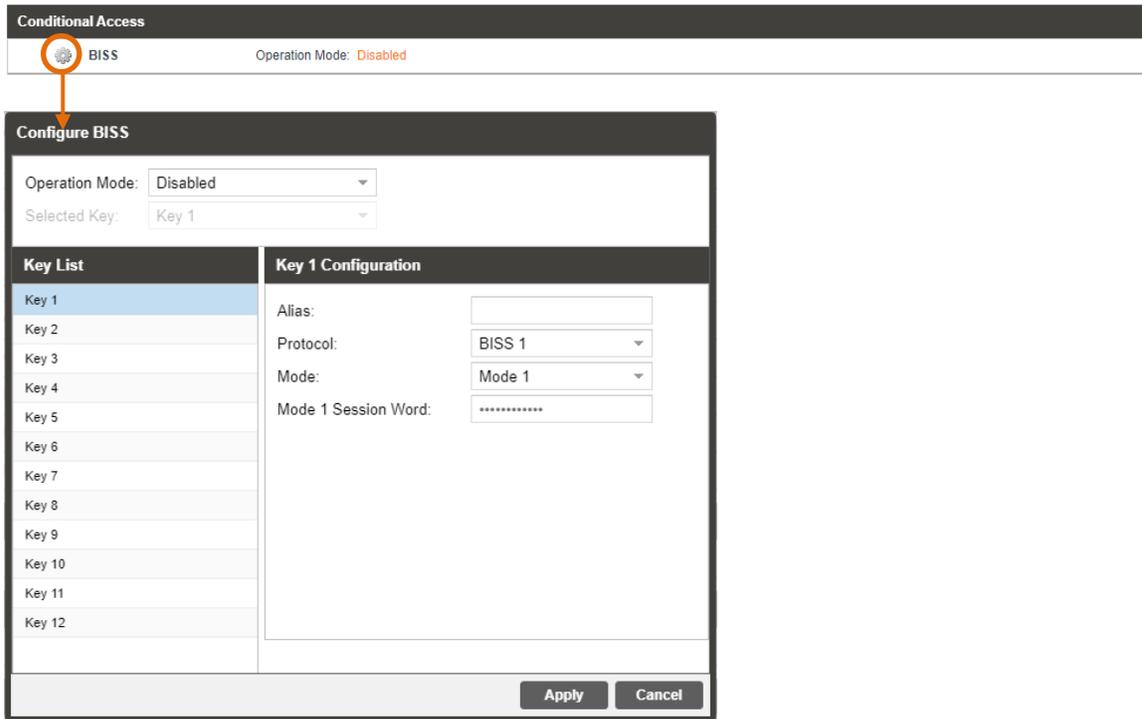
Configuring Conditional Access

This section will describe how to configure descrambling in the AG 2600. The AG 2600 allows decoding of BISS 1 and BISS 2 with additional licensing.

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

3.2.9 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.

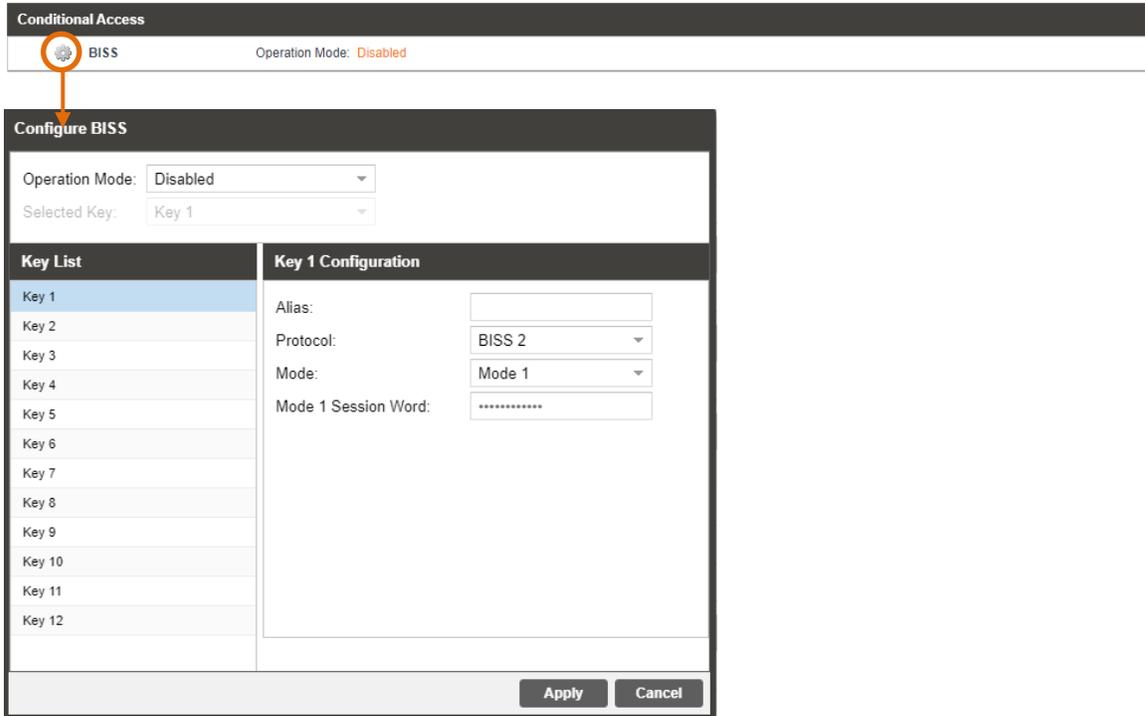


Setting	Range	Description
Operation Mode	Enabled Disabled	Enable / Disable BISS descrambling
Selected Key	Key 1 - 12	Select a key to configure
Alias	16 characters	Set an Alias for the selected key
Mode	Mode 1 Mode E	This setting sets the Mode of the BISS key that has scrambled the transport stream.
Mode 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.



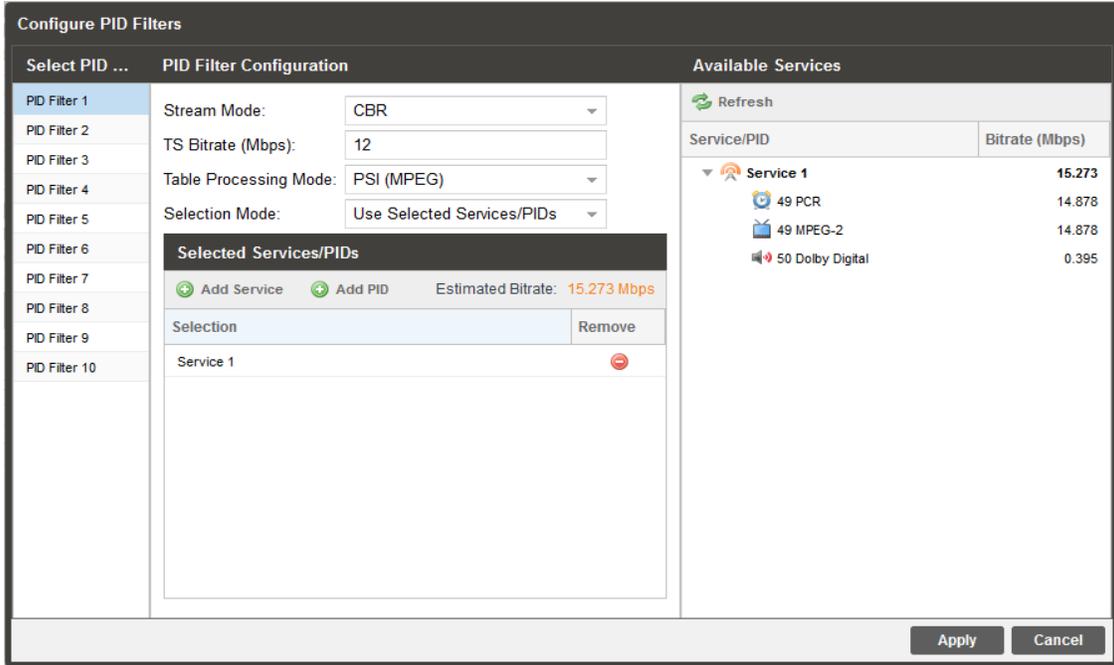
Setting	Range	Description
Operation Mode	Enabled Disabled	Enable / Disable BISS descrambling
Selected Key	Key 1 - 12	Select a key to configure
Alias	16 characters	Set an Alias for the selected key
Protocol	BISS 1 BISS 2	Select which mode of BISS descrambling
Mode	Mode 1 Mode E Mode CA	This sets the Mode 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 2600. 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

PID Filter

3.2.10

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.



Setting	Range	Description
Select PID Filter	PID filter 1-10	Select which PID filter to configure
TS Bitrate (Mbps)	.25 to 160	Configure the TS Bitrate for the PID filter stream 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
3.2.1 Selection Mode	Use Selected Services/PIDs	Use Selected Services/PIDs will allow the user to select which services are in the new TS.

Configuring ASI Output

This menu (Figure 19) allows the user to configure the ASI output of the AG 2600. 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.

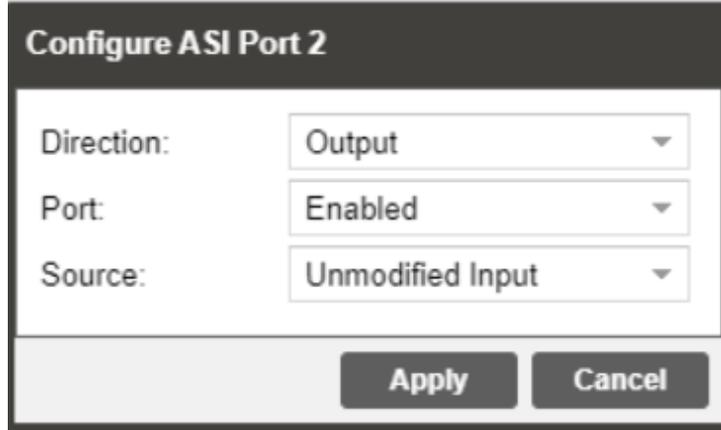


Figure 19: ASI Output Configuration Menu

Setting	Range	Description
Port	Enabled Disabled	Enable or disable the ASI output port.
Source	Unmodified Input Descrambled PID Filter 1-10	Unmodified Input will pass the incoming TS to the output without applying any BISS or DVB-CI decryption Descrambled will output the TS with any applied BISS or DVB-CI decryption. PID Filter will output the TS from the PID filter menu option.

3.2.12

Configuring the MPEG/IP Outputs

The menu in Figure 20 allows the user to configure the MPEG/IP outputs. The 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.

Figure 20: MPEG/IP Transmit Configuration Menu

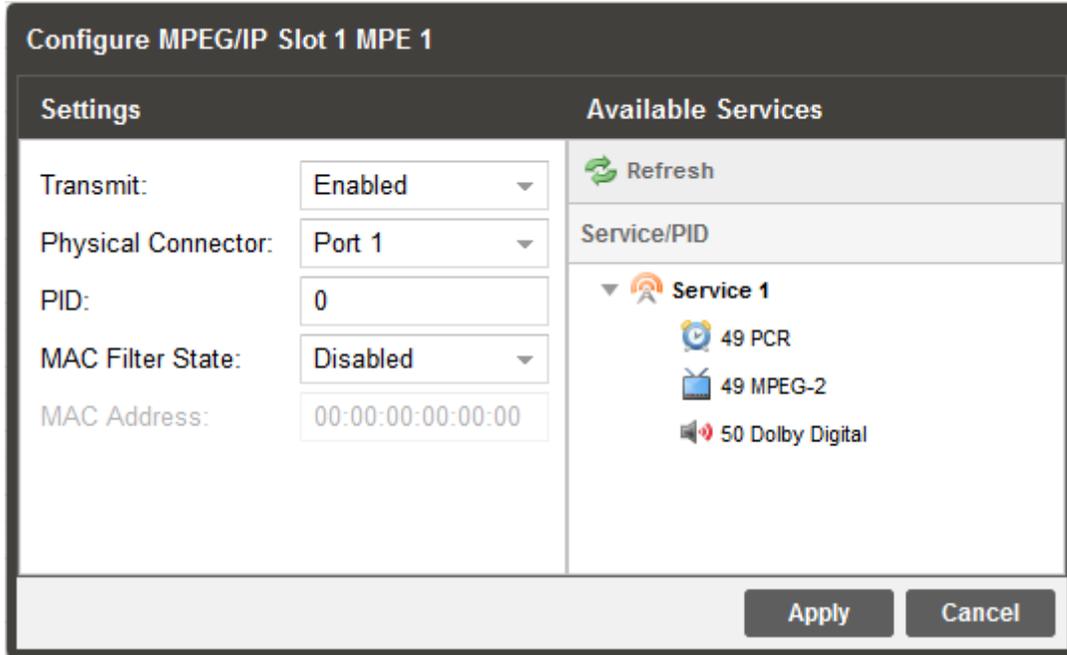
Setting	Range	Description
Transmit	Enabled Disabled	Enable or disable the MPEG/IP transmit group.
Source	Unmodified Input Descrambled Descrambled and Processed PID Filter 1-10	Unmodified Input will pass the incoming TS to the output without applying any BISS or DVB-CI decryption. Descrambled will output the TS with any applied BISS or DVB-CI decryption. PID Filter will output the TS from the PID filter menu option.
Physical Connector	Port 1 Port 2	The AG 26027 physical connector on the backplate that will be used to transmit the output.

	Port 1 (Card) Port 2 (Chassis)	The AG 26028 physical connector on the backplate 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 2600 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.
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.)

3.2.13

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.



Setting	Range	Description
Transmit	Enabled Disabled	Enable or disable transmission of de-encapsulated MPE data.
Physical Connector	Port 1 Port 2 Port 1 (Card) Port 2 (Chassis)	The physical connector on the AG 26027 MPEG/IP card that will be used to transmit the MPE data. The physical connector on the AG 26028 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

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.

3.2.14

The screenshot shows a window titled "View PSI Tables" with two main sections: "PSI Tables" on the left and "PAT Details" on the right. The "PSI Tables" section contains a "Refresh" button, a "Service/PID" list with "0 PAT" selected, and a "Close" button at the bottom right. The "PAT Details" section displays the following information:

- PID: 0
- Version: 11
- TS ID: 1
- Program Count: 1

Below this information is a table titled "PMTs" with the following data:

PID	Version	Program Number	ES Count
48	8	1	2

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

3.3 Admin Panel

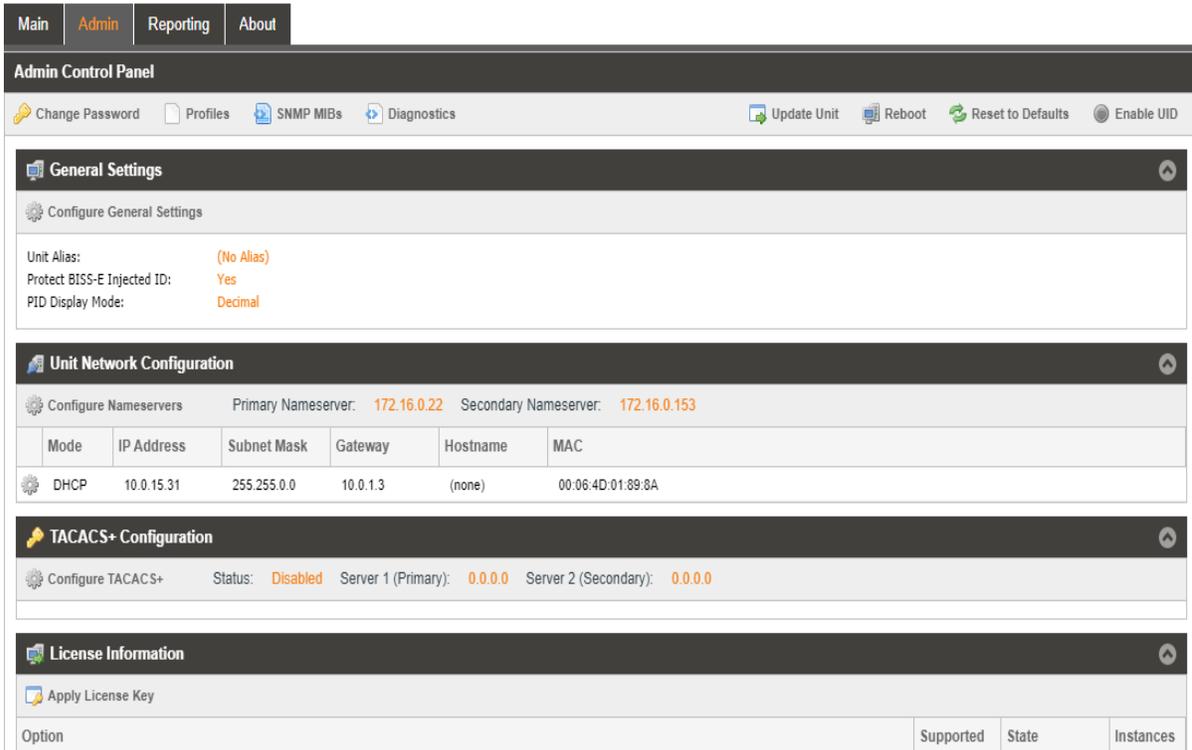


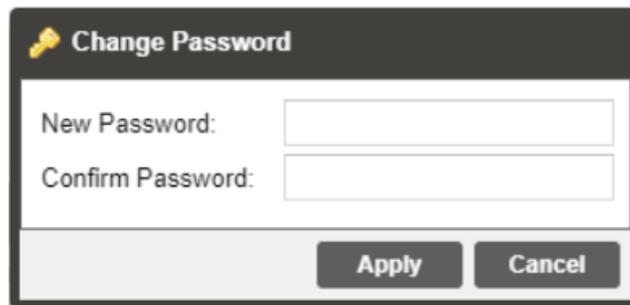
Figure 21: Admin tab

To access the Admin Control Panel, click on the **Admin** tab. This menu allows the user to control many aspects of the AG 2600.

3.3.1

Changing Unit Password

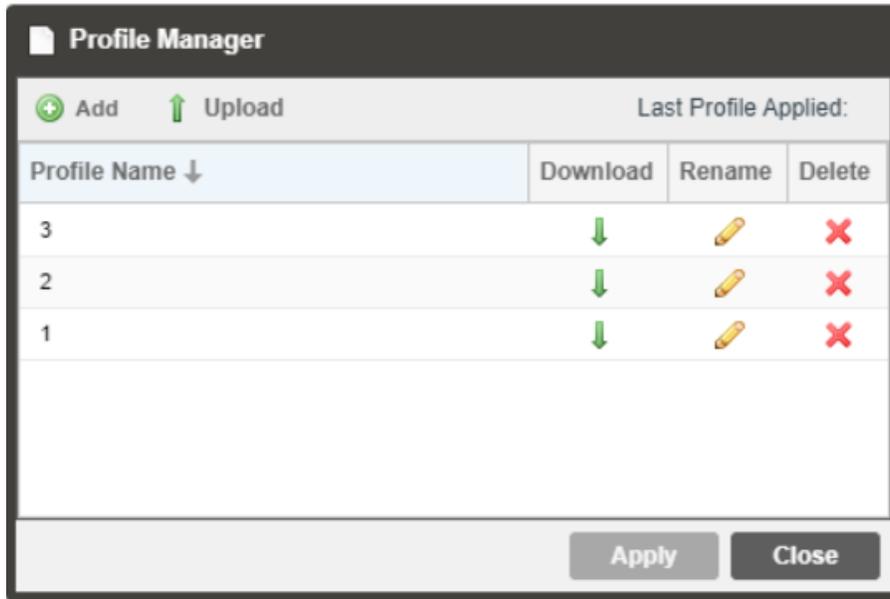
The AG 2600 can be assigned an access password and the current access password can be changed. In order to make changes to passwords, click the **Change Password** button. A window will appear to enter the new password and re-enter the new password to confirm it.



Profiles

The AG 2600 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 2600s with the same hardware, licensing, and software version. Profiles can be used to quickly and easily change the configuration of an AG 2600 to suit different turnaround requirements.

3.3.2



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 2600.
Apply Profile	 Apply	Select a profile from the drop-down menu and click this button. The AG 2600 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.

General Settings

The AG 2600 can be assigned an alias which is displayed in the upper right hand corner of the web interface as shown in Figure 23. The alias can help define which AG 2600 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. To edit the Unit Alias or protect the BISS-E Injected I D click on the  **Configure General Settings** button (Figure 22). 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. The ASI Out/Video Sync Function is for special applications purposes. This should remain set to ASI Out.

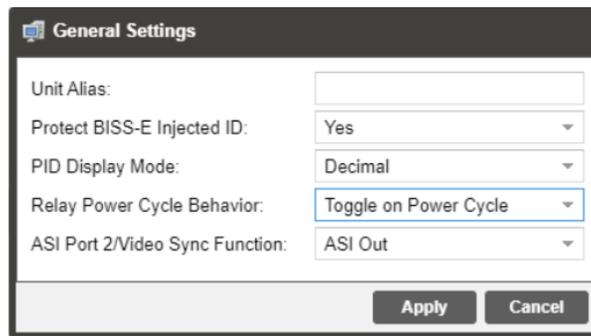


Figure 22: General Settings Configuration Menu



Figure 23: Alias Name

3.3.4

Unit Network Configuration

The management port of the AG 2600 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.

If the AG 2600 is the 26127/A or 26128 version, 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 2600.

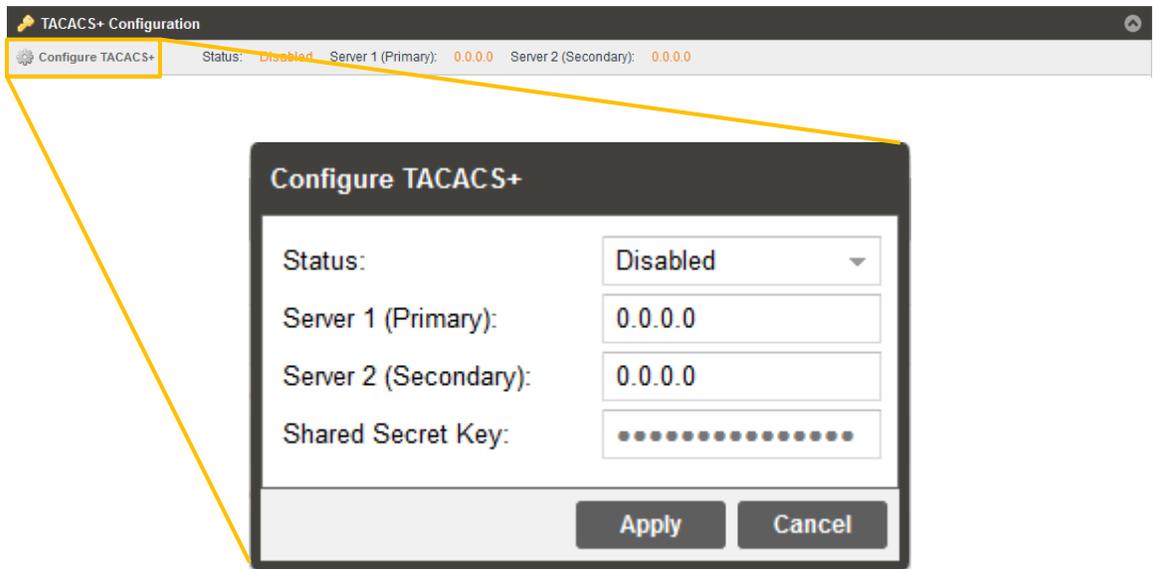
Setting	Range	Description
Mode	DHCP Static	Setting to <i>DHCP</i> will allow the network to assign an IP address automatically to the AG 2600 (if supported). Setting to <i>Static</i> allows the user to manually define all TCP/IP settings for the management port.
Hostname	Valid characters: A through Z 0 through 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 2600 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.

TACACS+ Configuration

This feature is to be implemented in tandem with a primary and secondary TACACS+ server that the AG 2600 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	The IP of the TACACS+ server(s).

Server 2 (Secondary)	128.0.0.0 - 191.255.0.0	
	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.

MPEG/IP Network Configuration

The MPEG/IP option is used to receive MPEG over IP transport streams. The MPEG/IP option supports unicast, multicast, UDP and RTP. The ports on the AG 2600 backplate can be configured from the web interface. To configure the Default Gateway and ICMP Response settings (Figure 24) click the  button.



Figure 24: MPEG/IP Configuration Menu

Setting	Range	Description
Default Gateway	Port 1	AG 26027 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.
	Port 2	
	Port 1 (Card)	AG 26028 setting to <i>Port 1 (Card)</i> uses the gateway address of port 1 as the default gateway. Setting to <i>Port 2 (Chassis)</i> uses the gateway address of port 2 as the default gateway.
	Port 2 (Chassis)	
ICMP Response	Enabled	Setting to enabled allows the AG 2600 to respond to ICMP requests (ping). If disabled the AG 2600 will not respond to these requests.
	Disabled	

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 as shown in Figure 25.

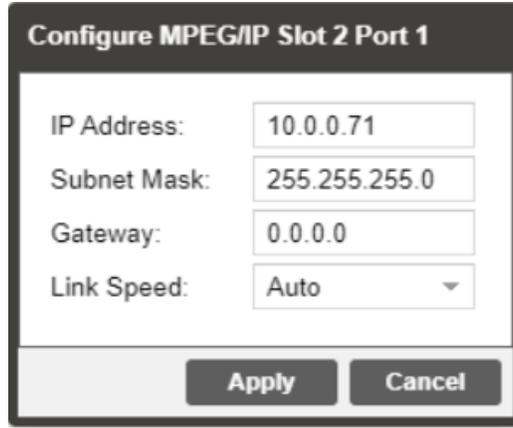


Figure 25: MPEG/IP Port Configuration Menu

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.
Link Speed	Auto 1000Mbps/Full 1000Mbps/Half 100Mbps/Full 100Mbps/Half 10Mbps/Full 10Mbps/Half	Setting Link Speed to Auto allows the AG 2600 to determine the link speed of the network. If this is not possible or the user wants to define a link speed select one of the other values available.

Licensing

Certain features of the AG 2600 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

3.3.7 If licenses need to be applied to the AG 2600 click  button. The menu in Figure 26 will appear where the user can copy and paste the provided license key from Sencore.

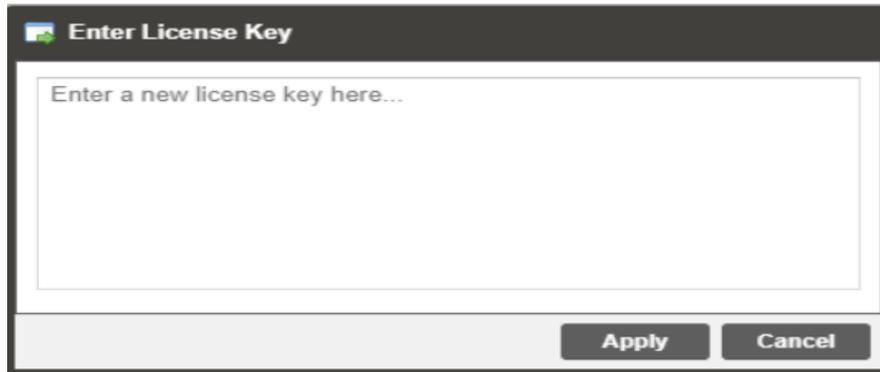
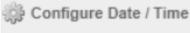
A dialog box titled "Enter License Key" with a dark header bar. The main area contains a large text input field with the placeholder text "Enter a new license key here...". At the bottom right, there are two buttons: "Apply" and "Cancel".

Figure 26: License Key

3.3.8

Date/Time

The AG 2600 can be set to synchronize with an NTP server or a manual date and time can be defined by the user. Click the  button to configure the date and time as shown in Figure 27. These values are used to timestamp entries in the Alarm and Event logs under the Reporting tab.

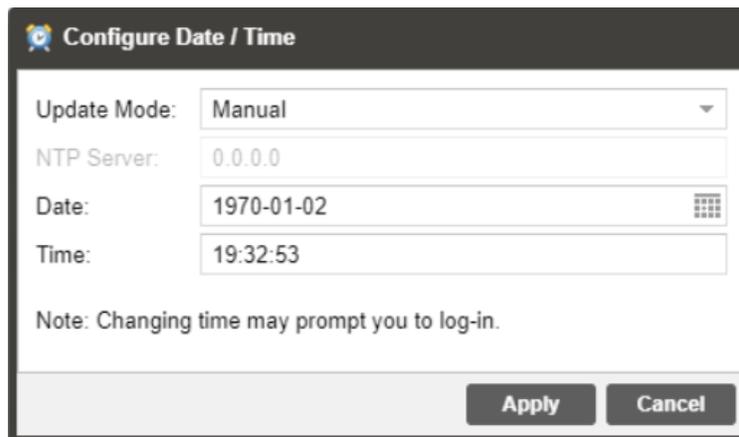
A configuration window titled "Configure Date / Time" with a dark header bar. It contains several input fields: "Update Mode:" with a dropdown menu set to "Manual"; "NTP Server:" with a text field containing "0.0.0.0"; "Date:" with a text field containing "1970-01-02" and a calendar icon; "Time:" with a text field containing "19:32:53". Below these fields is a note: "Note: Changing time may prompt you to log-in." At the bottom right, there are two buttons: "Apply" and "Cancel".

Figure 27: Date/Time Configuration Menu

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	MM/DD/YYYY	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.

Configuring SNMP

3.3.9

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 as shown in Figure 28.

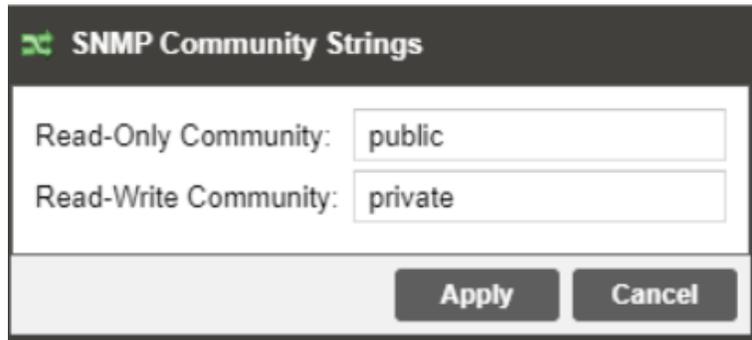


Figure 28: SNMP Community Configuration Menu

3.3.9.2 SNMP Trap Managers

The SNMP trap managers are recipients of SNMP traps sent from AG 2600. 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 Communities** button (Figure 29).

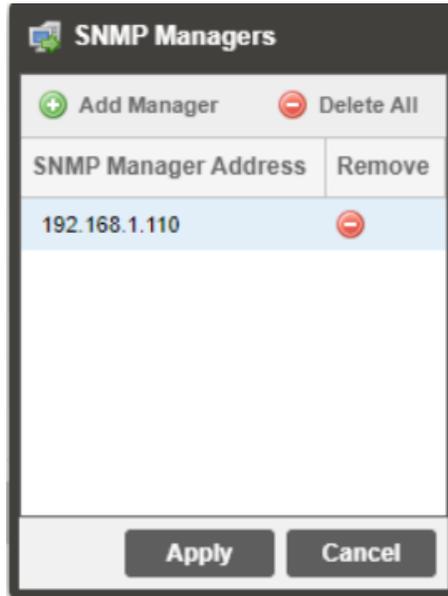
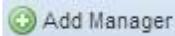


Figure 29: SNMP Managers

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 2600 stores the SNMP MIB files for the currently installed version of software on the unit. These files can be downloaded directly from the AG

2600 by clicking on the  button. The screen in Figure 30 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	2014-Nov-07 19:44:27	16.3K	application/octet-stream
 SENCORE-AG2600-MIB.mib	2014-Nov-07 19:44:28	99.8K	application/octet-stream
 SENCORE-CSP-MIB.MIB	2014-Nov-07 19:44:27	66.7K	application/octet-stream
 SENCORE-GLOBAL-REG.MIB	2014-Nov-07 19:44:27	2.3K	application/octet-stream
 SENCORE-INBAND-MIB.MIB	2014-Nov-07 19:44:27	4.3K	application/octet-stream
 SNMP-COMMUNITY-MIB.MIB	2014-Nov-07 19:44:27	15.1K	application/octet-stream
 SNMP-FRAMEWORK-MIB.MIB	2014-Nov-07 19:44:27	21.8K	application/octet-stream
 SNMP-MPD-MIB.MIB	2014-Nov-07 19:44:27	5.3K	application/octet-stream
 SNMP-TARGET-MIB.MIB	2014-Nov-07 19:44:27	22.2K	application/octet-stream
 SNMP-USER-BASED-SM-MIB.MIB	2014-Nov-07 19:44:27	38.2K	application/octet-stream
 SNMP-VIEW-BASED-ACM-MIB.MIB	2014-Nov-07 19:44:27	33.3K	application/octet-stream
 SNMPv2-MIB.MIB	2014-Nov-07 19:44:27	28.6K	application/octet-stream
 SNMPv2-SMI.MIB	2014-Nov-07 19:44:27	8.7K	application/octet-stream
 SNMPv2-TC.MIB	2014-Nov-07 19:44:27	37.1K	application/octet-stream

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

Figure 30: Available MIBs

3.3.10

Syslog

The AG 2600 can be configured to send error and event logs formatted in the syslog protocol to a remote user specified Syslog server.

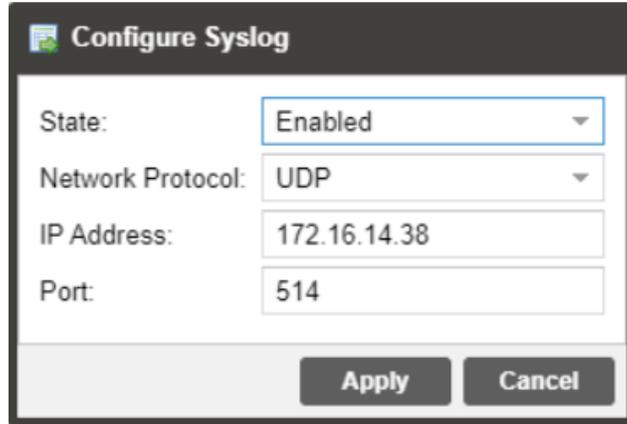


Figure 31: Syslog Configuration Menu

Action	Range	Description
State	Enabled Disabled	Enable or Disable sending messages to Syslog server.
Network Protocol	UDP TCP	Select which network protocol is 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

The In-Band Control is used to change settings and receive updates from data within a PID in the incoming TS, as injected by the Sencore CMD 4000 In-band Control Server. The menu in Figure 32 allows the user to configure the In-Band Control settings. To configure the In-Band Control settings click the

 **Configure In-Band Control** button.

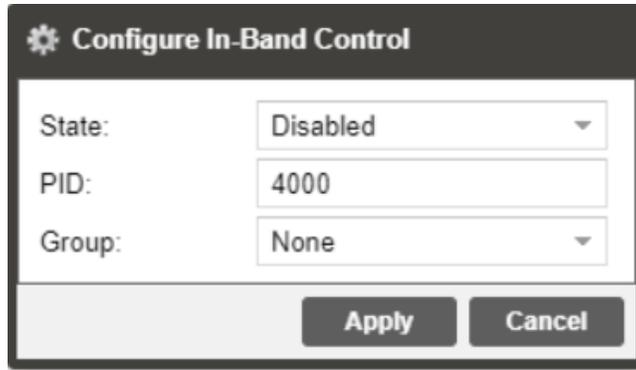


Figure 32: In-Band Control Configuration Menu

Action	Range	Description
State	Enabled	Enable or Disable the In-Band Control.
	Disabled	
PID	1-8190	Sets the unit to look for commands on the PID that is set.
Group	None	This setting assigns the unit to a corresponding Group or No Group.
	1-128	

3.3.12 Updating the AG 2600

3.3.12.1 Applying Software Updates

Updates to the AG 2600 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 are displayed in the Software Versions section as shown in Figure 33. The AG 2600 will reboot after a software update is complete.

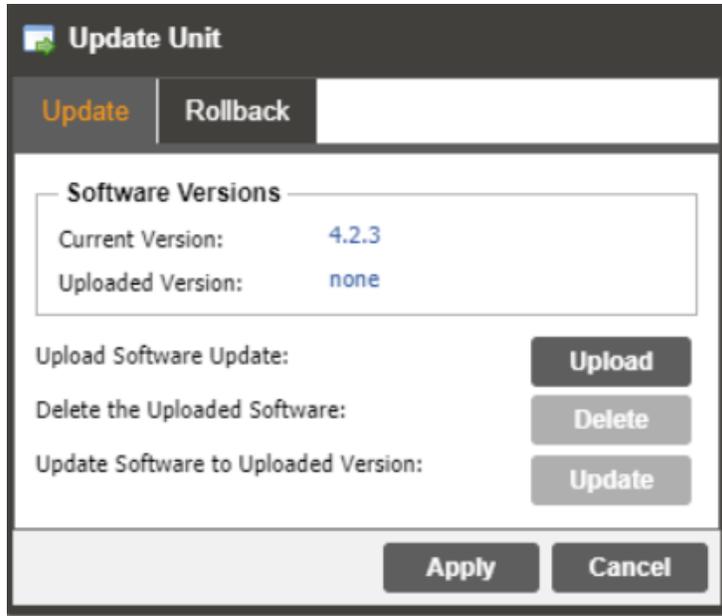


Figure 33: Update Unit Menu

Note: When updating from software versions older than 3.0.0 to 4.3.0 or newer the password may be changed to mpeg101

Note: When updating from software version 3.0.0 or newer, the existing password will be retained

Action	Button	Description
Upload Software Update		To upload software updates to the AG 2600 click this button. The user will be prompted to navigate to an update file. The file will then upload to the AG 2600. When complete the AG 2600 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 upload from the AG 2600. 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 2600 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 2600 is capable of reverting back to a previous version of software using the Rollback feature. The AG 2600 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 **Rollback** tab. The AG 2600 will reboot after the rollback process is complete.

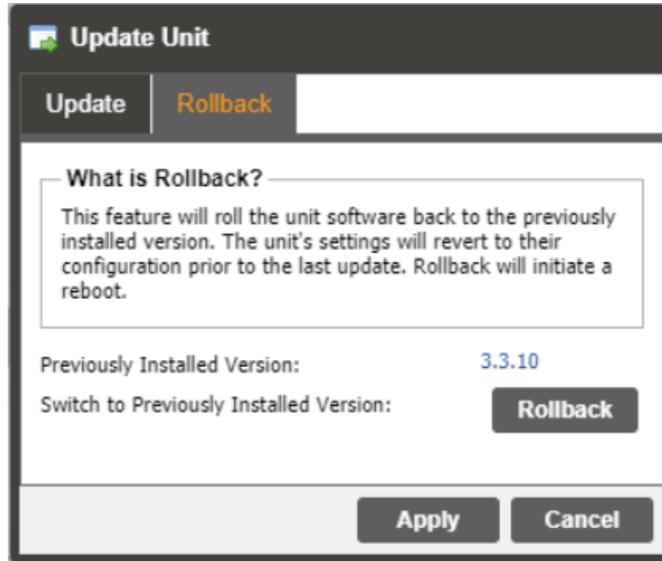
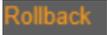


Figure 34: Rollback Unit Software Menu

Action	Button	Description
Rollback Software 3.3.13		Clicking this button starts the Rollback process. The AG 2600 will prompt the user to confirm the rollback or click cancel to stop the process.

Reboot Unit

The AG 2600 can be rebooted from the web interface. In order to perform a reboot, click the  button. The AG 2600 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.

Reset Defaults

The AG 2600 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 2600 will prompt the user to confirm the reset.

The unit will reboot once the reset is confirmed.

3.3.14

3.4 Reporting Panel

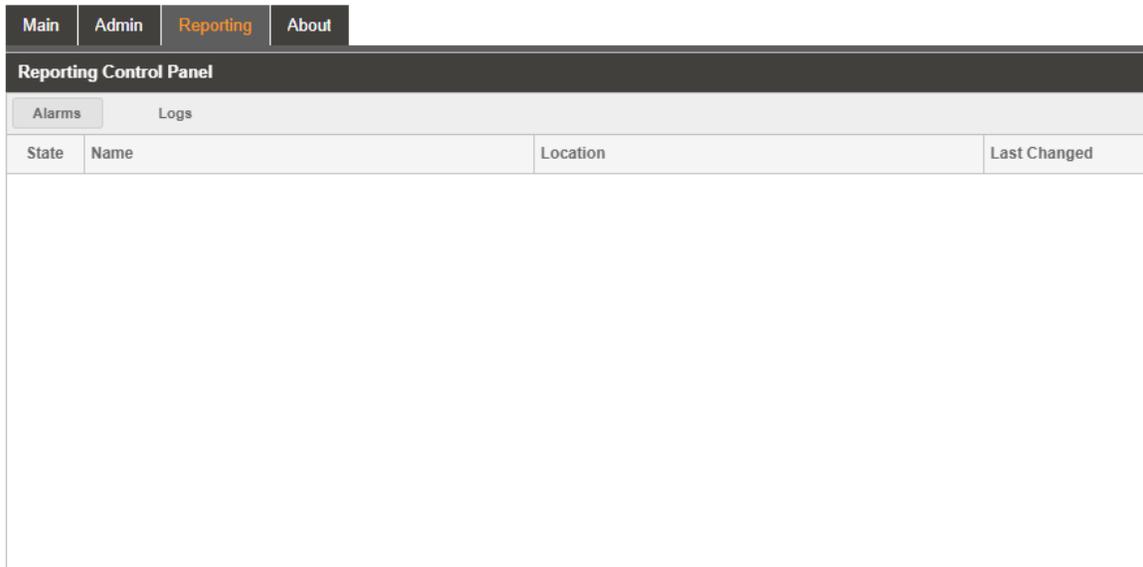
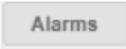


Figure 35: Error Reporting Page

The  tab in the AG 2600 contains logs for active alarms currently affecting the unit and an event log as shown in Figure 35. 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.

Active Alarms

Clicking on the  button displays the Active Alarms menu shown in Figure 36. 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.



State	Name	Location	Last Changed
	TS Sync Loss	Input ASI 1	1970-01-01 03:15:11
	Transport Stream Not Present	Unit	1970-01-01 00:01:52
	TS Sync Loss	Input Turbo PSK Slot 1	1970-01-01 03:25:33
	Loss of Carrier Lock	Input Turbo PSK Slot 1	1970-01-01 03:25:33

Figure 36: Active Alarms

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 3.3.8.

3.4.2

Event Logs

Clicking on the  button displays the Event Log menu shown in Figure 37. This list displays all of the events and alarms that have affected the unit. The AG 2600 stores up to four days' worth of logs. 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
	1970-01-01 03:25:38		Unit	Backup Input Active: Turbo PSK 1 has failed
	1970-01-01 03:25:33		Input Turbo PSK Slot 1	TS Sync Loss Error
	1970-01-01 03:25:33		Input Turbo PSK Slot 1	Carrier Unlocked
	1970-01-01 03:25:33		Input Turbo PSK Slot 1	TS Sync Loss OK
	1970-01-01 03:25:33		Input Turbo PSK Slot 1	Carrier Locked
	1970-01-01 03:24:27		Input Turbo PSK Slot 1	TS Sync Loss Error
	1970-01-01 03:24:27		Input Turbo PSK Slot 1	Carrier Unlocked
	1970-01-01 03:15:11		Input ASI 1	TS Sync Loss Error
	1970-01-01 03:14:26		Input ASI 1	TS Sync Loss OK
	1970-01-01 03:14:19		Input ASI 1	TS Sync Loss Error
	1970-01-01 03:14:18		Input Turbo PSK Slot 1	TS Sync Loss OK
	1970-01-01 03:14:18		Input Turbo PSK Slot 1	Carrier Locked
	1970-01-01 03:13:09		Input ASI 1	TS Sync Loss OK
	1970-01-01 03:13:09		Input Turbo PSK Slot 1	TS Sync Loss Error
	1970-01-01 03:13:08		Input Turbo PSK Slot 1	Carrier Unlocked
	1970-01-01 00:52:56		Input ASI 1	TS Sync Loss Error
	1970-01-01 00:52:55		Input MPEG/IP Slot 2 Stre...	TS Sync Loss OK
	1970-01-01 00:52:55		Input MPEG/IP Slot 2 Stre...	IP Loss OK

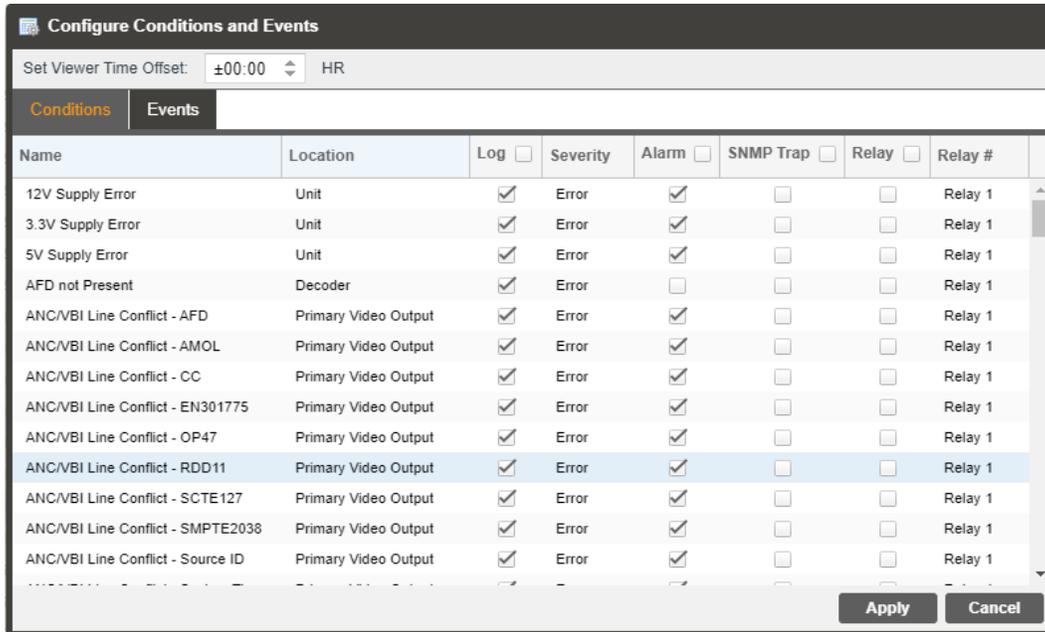
Figure 37: Condition and Event Log

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 3.3.8.
Transition	This column indicates the type of alarm transition that took place. 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.

Configuring the Logs

The AG 2600 allows the user to configure alarms and events. Events and alarms can be hidden or set to send SNMP traps. In order to configure these options, click the  button while in the **Reporting** tab. The **Conditions** tab allows the user to configure the alarms reported by the AG 2600. The **Events** tab allows the user to configure the events reported by the AG 2600. 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.

3.4.3



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 be 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 Trap is not sent.

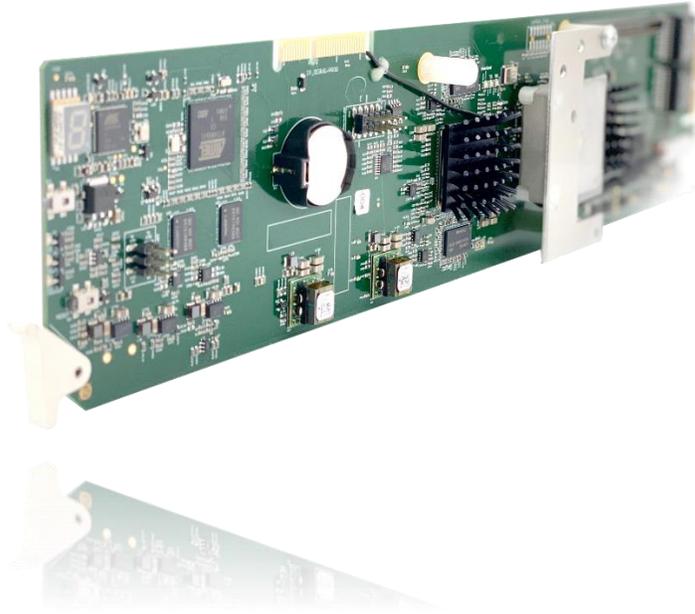
3.5 About Panel

The screenshot shows the 'About Control Panel' interface with the following sections:

- System Information:**
 - Software Version: 4.2.3
 - Unit Serial Number: 7073315 R11
- Options:**
 - AG 44021 (SD 4:2:0 H.264/MPEG-2 Video Decode Module with Genlock)
 - AG 44127A (Dual Port Gigabit MPEG/IP I/O Module)
 - AG 44710 (HD 4:2:0 Video Decoding License)
 - AG 44840 (2x->4x Audio Service Decoding Upgrade License)
 - AG 44851 (Discrete Channel Audio Output License)
 - AG 44921 (BISS Descrambling License)
 - AG 44925 (IP FEC Output License)
 - AG 44928 (PID/Service Filter License)
 - AG 44992 (SCTE 35 to 104 Output License)
 - AG 44993 (CableLabs ESAM POIS Interface License)
- Contact Information:**
 - 
 - 3200 W Sencore Dr
Sioux Falls, SD 57107
United States
605-978-4600
<http://www.sencore.com>

Under the **About** tab, there are no user definable parameters but there is information about software versions currently installed, which licenses are installed, how to contact Sencore, and third-party software information.

Section 4 Appendices



Introduction

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– 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
- 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

– 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.
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.
Backup Input Active Condition	Primary input is currently in a failed condition and the AG 2600 has failed over to the Backup input.
Bitrate Exceeded Error	Total incoming transport stream bitrate has exceeded 213 Mbps.
CAM Descramble Fail	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.
CAM Reset – Manual	CAM has been reset by the user.
FEC Reception Error	Packets in incoming IP stream cannot be repaired with forward error correction.
Fan Error	Cooling fan in the AG 2600 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.
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
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.
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.

Appe

RTP Reception Error	Uncorrectable out of order or duplicate packets are present in incoming IP stream.
Temperature Error	The AG 2600 has detected the internal temperature is 60 degrees Celsius or above.
Transport Error Indicator	The AG 2600 has detected that the transport stream error indicator is present on the active input.
Transport Stream Not Present	The AG 2600 has detected that the transport stream from the active input is no longer present.
TS Sync Loss	Transport stream sync for input component is not detected.
Unicast Receiver Not Found Error	The AG 2600 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 not licensed on the AG 2600.
Unlicensed VCM/Multistream	Input stream on the active input contains a multistream signal and the AG 2600 is not licensed for multistream.

– Specifications

AG 26000A – Base Unit (ASI Input and Output)

Includes – System –	Backplate
Configurations Allows: Rear Panel:	Single turnaround card with an input option. Fixed inputs and outputs with one option input. Option input not field upgradeable.
Appendix C	
Remote Operation/Update Interface – Type:	Ethernet, 10/100
Rear Panels indicators: Connector:	Link, Activity (To chassis) RJ45 (To chassis)
Monitor and Control Interfaces – Web server GUI: SNMP:	HTTP via web browsing for control & monitoring Control & monitoring
Operating Altitudes	0 to 10000 feet
AC Power – Operating Voltage: PSU Max Power: Current Draw:	100-240VAC 350W (Frame) Base Unit with ASI and no option cards – 6-7W
	DVB-T2/C2/ISDB-T option card with active input 5W (additional)
	Base Unit with ASI and MPEG/IP option card – 13W
	Base Unit with ASI and with MPEG/IP and DVB-S/S2 option card with LNB disabled – 17-18W
	Base Unit with MPEG/IP, DVB-S/S2 with LNB enabled and DVB-CI Module option with 2 CAM Modules installed – 26-27W
Max Power Draw:	26-27W
General – Connector: Impedance: Return Loss:	2x BNC, Female 75Ω ≥15dB, 3.5 to 270 MHz
ASI Serial TS Input / Output – Number of ASI Inputs: Number of ASI Outputs: Standard: Data Bit Rate: Maximum TS Rate: Minimum TS Rate: Packet Sizes	1 1 (non loop-through) EN50083-9 (V2:3/98) DVB ASI 270 Mb/s 200 Mb/s 250 Kb/s Input:188 and 204 bytes Output: 188 bytes
Modes Supported:	Burst, Byte and Inverted

AG 26027A – Base Unit (ASI Input and Output and IP Input and Output)

Includes –	Backplate
System –	
Configurations Allows:	Single turnaround card with an input option.
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)
Current Draw:	Base Unit with ASI and no option cards – 6-7W
	DVB-T2/C2/ISDB-T option card with active input 5W (additional)
	Base Unit with ASI and MPEG/IP option card – 13W
	Base Unit with ASI and with MPEG/IP and DVB-S/S2 option card with LNB disabled – 17-18W
	Base Unit with MPEG/IP, DVB-S/S2 with LNB enabled and DVB-CI Module option with 2 CAM Modules installed – 26-27W
Max Power Draw:	26-27W
General –	
Connector:	2x BNC, Female 2x 10/100/1000 auto negotiate Base-T RJ-45 Ethernet Ports
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 and Inverted
IP 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: $L * D \leq 100$ $1 \leq L \leq 20$ $4 \leq D \leq 20$ 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
IP 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 26925) Adds –	
FEC:	Off, Columns, Columns/Rows
FEC Transmit:	Pro MPEG CoP3 SMPTE2022 Range: $L * D \leq 100$ $1 \leq L \leq 20$ $4 \leq D \leq 20$

AG 26028 – Base Unit (ASI Input and Output and IP Input and Output)

Includes –	Backplate
System –	
Configurations Allows:	Single turnaround card with an input option.
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 CRD 4900 chassis)
Connector:	RJ45 (To CRD 4900 chassis)
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)
Current Draw:	Base Unit with ASI and no option cards – 6-7W
	DVB-T2/C2/ISDB-T option card with active input 5W (additional)
	Base Unit with ASI and MPEG/IP option card –

	13W
	Base Unit with ASI and with MPEG/IP and DVB-S/S2 option card with LNB disabled – 17-18W
	Base Unit with MPEG/IP, DVB-S/S2 with LNB enabled and DVB-CI Module option with 2 CAM Modules installed – 26-27W
Max Power Draw:	26-27W
General –	
Connector:	2x BNC, Female 2x 10/100/1000 auto negotiate Base-T RJ-45 Ethernet Ports
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 and Inverted
IP 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*D≤100 1≤L≤20 4≤D≤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
IP 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 26925) Adds –	
FEC:	Off, Columns, Columns/Rows
FEC Transmit:	Pro MPEG CoP3 SMPTE2022

Range: $L * D \leq 100$
 $1 \leq L \leq 20$
 $4 \leq D \leq 20$

CRD 1900 – Base Unit

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

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

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 –
 Individually selectable elementary streams in a single service

Multi-Service Descrambling License (AG 26991) Adds –
 Individually selectable elementary streams in multiple services

Maximum TS bitrate: DVB-CI – 100Mb/s
 CAS Supported – All major CA vendors supported

BISS Descrambling Options

Supported BISS Types: Base Unit – None
 BISS 1 – Requires License (AG 26921)
 BISS 2/BISS-CA – Requires License (AG 26922)

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

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:	≥15dB, 3.5 to 270 MHz
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:	.05, .10, .15, .20, .25, .35
RF Input Level	-65 dBm to -25 dBm
AFC Tuning Range:	± .5 MHz in Standard and Wide mode (with SR $.5 \leq 1$ MSps) ± 1 MHz in Standard and Wide mode (with SR $1 \leq 2$ MSps) ± 1.5 MHz in Standard and Wide mode (with SR $2 \leq 3$ MSps) ± 2 MHz in Standard and Wide mode (with SR $3 \leq 4$ MSps) ± 2.5 MHz in Standard and Wide mode (with SR $4 \leq 5$ MSps) ± 3 MHz in Standard mode (with SR ≥ 5 MSps) ± 4 MHz in Wide mode (with SR $5 \leq 6$ MSps) ± 5 MHz in Wide mode (with SR ≥ 6 MSps)
Input RF Spectrum:	Standard / Wide modes user selectable
PL Scrambling Codes supported:	Normal/Inverted Auto Detect 0-262,141

Image Rejection:	>30dB
Noise Figure:	20dB, 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:	.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:	.5-60 MSps
Pilot:	On/Off Auto Detect
DVB-S2 Advanced (AG 26916) 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:	.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, B)
Connector:	2x BNC, Female
Impedance:	75 Ohms
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:	.05, .10, .15, .20, .25, .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/13/18/VDC @ >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
Symbol rate:	0.5-60 MSps
Pilot:	On/Off Auto Detect
DVB-S2 Advanced (AG 26916) 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) Off Air, FCC, IRC, HRC
Channel Plans:	
Number of inputs:	1
Connector:	F-Type, Female
Impedance:	75 Ohms
Sensitivity:	-34dBmV to + 40dBmV (A74 Compliant)
Modulation:	8VSB, QAM-B
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

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:	BNC-Type, Female
Impedance:	75 Ohms
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

– Open Source Software

The AG 2600 includes:

Package	Version	License	Copyright
AT32 UC3B Software Framework	1.7.0	BSD	2009, Atmel Corporation
Appel BusyBox	1.20.1	GPL Version 2, June 1991	Erik Anderson, et. al.
DejaVu Fonts	2.35	Free	2003, Bitstream; 2006, Tavmjong Bah
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	GPL 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	Bastiaan Bakker
Monit	5.1.1	GPL Version 3, 29 June 07	2010 Tildeslash Ltd.
Net-SNMP	5.7.1	BSD	1989, 1991, 1992 by Carnegie Mellon Univsty.
NTP	4.2.4p7	NTP License	1992-2009 David L. Mills
OpenEmbedded	2011.03	MIT	2006-2009 Holger Hans Peter Freyther, et. al.
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, 2007-2008
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.

– 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 2600 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 **Appendix B** operation (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 2600 card.
2. Power on the CRD 1900 chassis and AG 2600 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.

– 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, and calibration.

Appendix F

– Support and Contact Information

Returning Products for Service or Calibration

The AG 2600 it is necessary to return a product for repair or calibration. In order to expedite this process please carefully read the instructions below.

Appendix G

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 to 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

