sencore MRD 7000 Receiver Decoder Software User Manual

MRD 7000
Receiver Decoder Software
User Manual

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MRD 7000 Receiver Decoder Software

MRD 7000 – 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 bestin-class customer support.

Sencore meets the rapidly changing needs of modern media by ensuring the efficient delivery of high-quality video from the source to the home.

For more information, visit www.sencore.com.

Revision History

Date (MM/DD/YYYY)	Version	Description	Author
9/11/2017	0.1	First Draft	JDF
9/14/2017	0.2	Revisions	JDF
9/15/2017	1.0	Initial Release	JDF
11/3/2017	1.	Feature Release	JDF
1/3/2018	1.	Feature Release	ACD
4/20/2018	1.	Feature Release	ACD
5/21/2019	1.	Feature Release	BRW
10/3/2019	2.	Feature Release	JDF
5/18/2020	2.	Feature Release	JDN
5/27/2020	2.	Updated Genlock Settings	JDN
5/29/2020	2.	Updated Specifications Appendix	ACD
7/7/2020	2.	Feature Release	JDN
1/6/2021	1.10	Feature Release	JDN
5/20/2021	1.	Feature Release	JDN
3/14/2022	1.	Feature Release	JDN
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9/15/2022	1.	Feature Release	JDN
11/10/2022	1.	Feature Release	BCR
3/10/2023	1.	Maintenance Release	JDN
7/27/2023	1.	Feature Release	BCR
12/28/2023	1.	Feature Release	SJR

Safety Instructions

- Read these instructions
- Keep these instructions
- Heed all warnings
- Follow all instructions
- Do not use this apparatus near water
- Clean only with dry cloth
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions
- 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:
  o When the power-supply cord or plug is damaged.
  o If liquid has been spilled, or objects have fallen into the product.
  o If the product has been exposed to rain or water.
  o 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.
  o If the product has been dropped or damaged in any way.
  o 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 product 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 email ProCare@Sencore.com
- 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 power supply must be connected to a mains socket outlet with a protective earthing connection.
- For the mains plug, the main disconnect should always remain readily accessible and operable.
- When utilizing DC power supply, the power supply MUST be used in conjunction with an over-current protective device rated at 50 V, 5 A, type: Slow-blo, as part of battery-supply circuit.
- To reduce the risk of shock and damage to equipment, it is recommended to ground the unit to the installation's rack, the vehicle's chassis, the battery's negative terminal, and/or earth ground.

⚠ **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:

1. MRD 7000 Chassis
2. MRD 7000 Software
3. AC Power Cable
4. Breakout or Adapter Cables Depending on Option Modules
5. Quick Start Guide

If any of these items were omitted from the packaging, please email **ProCare@Sencore.com** to obtain a replacement.

Section 1 Overview

1.1 Product Introduction

The new MRD 7000 is designed to be agile, supporting new codecs and video formats through software-based updates versus traditional fixed ASIC hardware design.
The MRD 7000 maintains Sencore's long tradition of ease of use, with a straight-forward web interface accessible via all major browsers and complete control of the unit.
Support video codecs included HEVC, H.264, MPEG2 and JPEG2000.
Output resolutions and formats include UHD, FHD, HD, and SD applications with 12G- SDI, 6G-SDI, Quad 3G-SDI, 3G-SDI, HD-SDI, SD-SDI, HDMI 2.0a and SMPTE 2110 support.
Every MRD 7000 ships with the software suite pre-loaded on appropriate hardware.
There are optional output configurations that will change the physical connectors available on the back of the chassis.

Input Capabilities:

- 4x ASI
- 4x Satellite
- 2x RJ45 GigE Ethernet Ports

  - o UDP/RTP MPEG-IP Transport Streams
  - o Unicast
  - o Multicast
  - o SMPTE 2022-7 hitless switching
  - o FEC
- SRT Input
- Zixi Input
- HLS Input
- RTMP Input
- File Input Playback
  - o .ts and .trp transport stream files

Supported Codecs:

- HEVC/H.265
- MPEG-4/H.264
- MPEG-2
- JPEG 2000

Output Options:

- HDMI 2.0 up to 2160p60
- QUAD 3G-SDI for UHD outputs
- Single-Link
  - o SD-SDI 480i29.97 & 576i25
  - o HD-SDI up to 1080p/1080i30
  - o 3G-SDI up to 1080p60
  - o 12G-SDI up to 2160p60
- SMPTE 2110
  - o Dual 25GB SFP28 up to 2160p60
  - o Dual 10GB SFP up to 1080p60
  - o Redundant outputs for hitless switching of downstream devices

Power Supply:

- 120/240V Switching Power Supplies
- Redundant power design utilizing two independent cables

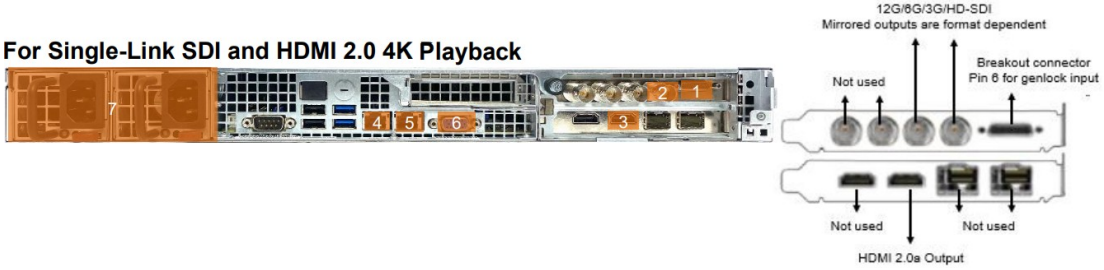
1.2 Front Panel Overview

The MRD 7000 product is a software-based solution; designed to run on a PC server chassis. Initial network configuration is done with keyboard, monitor, and mouse. Once the IP is configured all operation and setup is via web-interface over a network.
To obtain the associated documentation from the server manufacturer or detailed information regarding front of chassis indicator lights email **ProCare@Sencore.com**

1.3 Rear Panel Overview

The MRD 7000 server has multiple options for the backplane configuration. Both options include dual network ports on the motherboard. Either port can be used to access the web-interface or receive DATA/IP.

For Single-Link SDI and HDMI 2.0 4K Playback

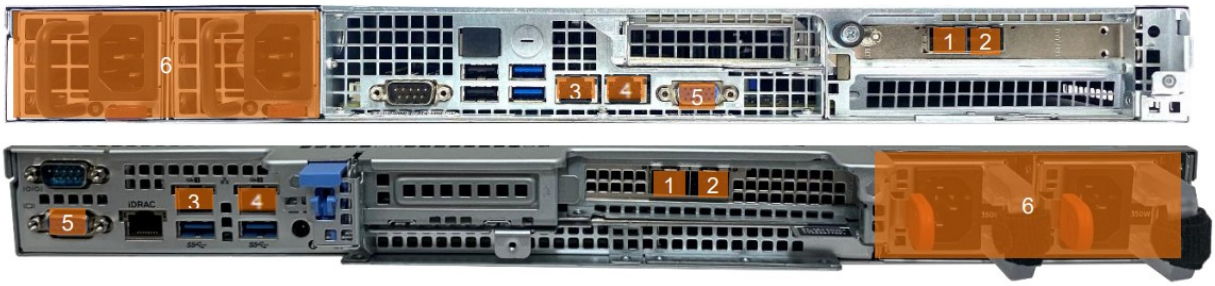


1. Breakout connector used for Genlock Input (requires breakout cable)
2. Top-left quadrant in Quad Link Mode or 12G/6G/3G/HD-SDI w/ audio in Single Link Mode
3. Top-right quadrant of 4K image (or single link copy w/out audio)
4. Bottom-left quadrant of 4K image (or single link copy w/out audio)
5. Bottom-right quadrant of 4K image (or single link copy w/out audio)
6. Eth0: One of two available RJ45 Ethernet ports for management or MPEG/IP
7. Eth1: One of two available RJ45 Ethernet ports for management or MPEG/IP
8. Local monitor output uses VGA (D-SUB) connector
9. Redundant power supplies (120/240 AC Switching PS) VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface

For Single-Link SDI and HDMI 2.0 4K Playback

1. Breakout connector used for Genlock Input (requires breakout cable)
2. 2x BNC ports for mirrored 12G/6G/3G/HD-SDI w/ embedded audio
3. HDMI 2.0 for up to 4K resolutions
4. Eth0: One of two available RJ45 Ethernet ports for management or MPEG/IP
5. Eth1: One of two available RJ45 Ethernet ports for management or MPEG/IP
6. Local monitor output uses VGA (D-SUB) connector
7. Redundant power supplies (120/240 AC Switching PS) VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface

For SMPTE 2110 Playback



1. Data Path A: One of two SFP ports for SMPTE 2110 uncompressed video over IP
2. Data Path B: One of two SFP ports for SMPTE 2110 uncompressed video over IP
3. Eth0: One of two available RJ45 Ethernet ports for management or MPEG/IP
4. Eth1: One of two available RJ45 Ethernet ports for management or MPEG/IP
5. Local monitor output uses VGA (D-SUB) connector
6. Redundant power supplies (120/240 AC Switching PS) VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface

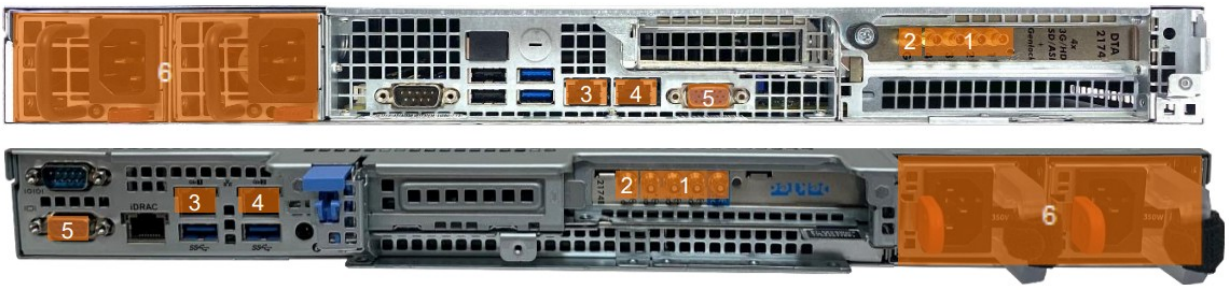
For 12G-SDI and HDMI 2.0b Playback

1. ASI input port 1

2. SDI port 2 for 12G-SDI w/ embedded audio
3. Bi-level and tri-level genlock input port
4. Eth0: One of two available RJ45 Ethernet ports for management or MPEG/IP
5. Eth1: One of two available RJ45 Ethernet ports for management or MPEG/IP
6. Local monitor output uses VGA (D-SUB) connector
7. Redundant power supplies (120/240 AC Switching PS)

VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface

For 12G-SDI and Quad 3G-SDI Playback and Genlock



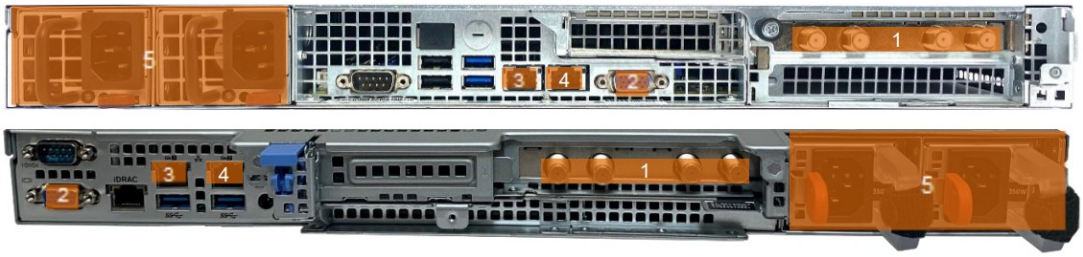
1. SDI port 1 for 12G-SDI w/ embedded audio. ASI or SD/HD/3G-SDI w/ embedded audio. SDI ports labeled 1 through 4
2. Bi-level and tri-level genlock input port
3. Eth0: One of two available RJ45 Ethernet ports for management of MPEG/IP
4. Eth1: One of two available RJ45 Ethernet ports for management or MPEG/IP
5. Local monitor output uses VGA (D-SUB) connector
6. Redundant power supplies (120/240 AC Switching PS) VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface

For Decoding 4xASI Input

1. 

4x ASI input ports. ASI ports labeled 1 through 4
2. Local monitor output uses VGA (D-SUB) connector
3. Eth0: One of two available RJ45 Ethernet Ports for management of MPEG/IP
4. Eth1: One of two available RJ45 Ethernet ports for management or MPEG/IP
5. Redundant power supplies (120/240 AC Switching PS) VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface

For Decoding 4xSatellite Input



1. 4x Satellite input ports. 4xSatellite ports 1 through 4
2. Local monitor output uses VGA (D-SUB) connector
3. Eth0: One of two available RJ45 Ethernet Ports for management of MPEG/IP
4. Eth1: One of two available RJ45 Ethernet ports for management or MPEG/IP
5. Redundant power supplies (120/240 AC Switching PS) VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface

For Added IP Input Ports (MRD 70200 IP Card)

1. Eth0: One of four available RJ45 Ethernet ports for management or MPEG/IP
2. Eth1: One of four available RJ45 Ethernet ports for management or MPEG/IP
3. *Eth2: One of four available RJ45 Ethernet ports for management or MPEG/IP
4. *Eth3: One of four available RJ45 Ethernet ports for management or MPEG/IP
5. Redundant power supplies (120/240 AC Switching PS) VGA and keyboard are only used for setting the network configuration; operation of the device is performed through the web interface
6. Slots for Input and Output Cards MRD 70200 IP Card may also be installed here

* **NOTE:** ETH2 and ETH3 orientation subject to change depending on IP input card location and orientation. Use the virtual front panel detailed in Section 2.4 to reference port identity.

Section 2 Installation

2.1 Rack Installation

The MRD 7000 software product runs on a Supermicro or Dell brand hardware.
Please consult the Supermicro 1028R-WMR(T) Revision 1.0b user manual for complete detail on the rack installation and power cable connections.
https://www.supermicro.com/manuals/superserver/1U/MNL-1723.pdf
Please consult the Dell R340 user manual for complete detail on the rack installation and power cable connections for the Dell server.
https://www.dell.com/support/manuals/en-us/poweredge-r340/per340_ism_pub/

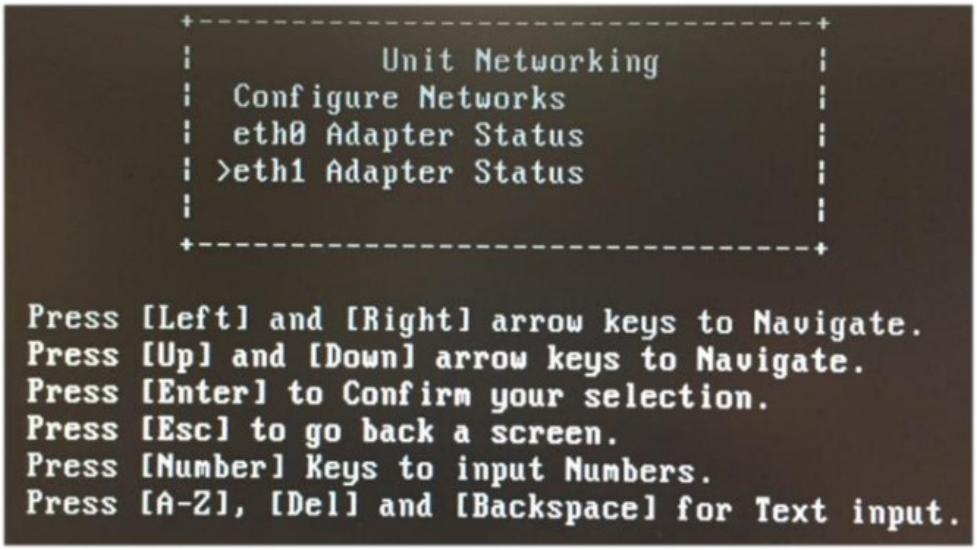
2.2 AC Dual Redundant Power Connections

The Dual Redundant option allows the MRD to be powered by two separate supplies either operating 120V or 240V systems. The power supply will automatically detect the system it is connected to. To hook up the power use the following steps:

1. Locate the AC power cords that are included.
2. Plug the female end of the power cords (end with no prongs) into the back of the unit.
3. Locate a protected outlet (usually inside of the rack) to plug the male ends of the power cables into.

2.3 Maintenance
Refer to the server manufacturer documentation for detailed information regarding server hardware maintenance. To request a copy of the latest MRD software or release notes from Sencore email **ProCare@Sencore.com**

2.4 Network Setup via KVM
Connect the VGA (D-SUB) cable to a monitor and a USB keyboard.
The VGA will display the current ethernet settings and provide a text-based menu to configure IP addressing, Subnet Mask, Gateway, and DNS settings.
Sencore recommends configuring the Eth0 port (Leftmost NIC when facing the rear of the unit) be set to a static IP for web-interface access. Ensure the user machine is also on the same network.
For additional information on initial network configuration menu see the Sencore MRD 7000 Quick-Guide documentation.



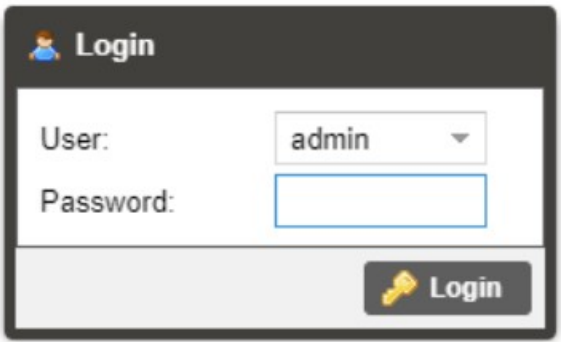
Section 3 Web-Interface Operation

3.1 MRD 7000 Web Interface Overview
3.1.1 Logging into the MRD Web Interface
To open the MRD 70000 web interface use one of the following supported browsers and navigate to the unit's IP address:

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

The user will need to login to the web interface. Press the login button to login to the web interface.

Default Credentials
Username: admin
Password: mpeg101

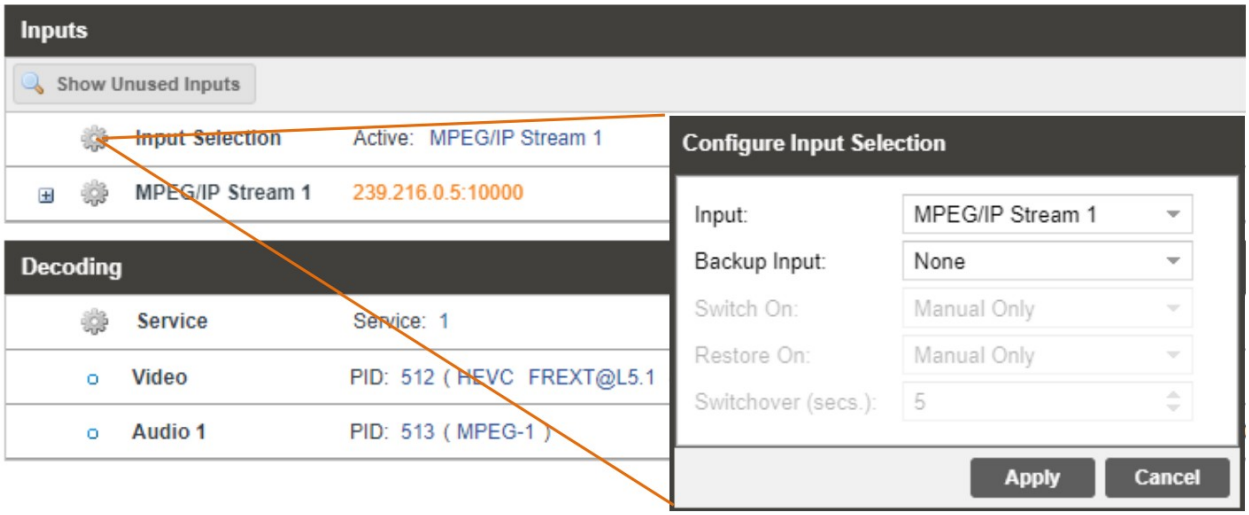


3.1.2 Hiding Unused Inputs

The MRD 7000 web interface allows the user to hide inactive inputs using the Hide Unused Inputs button or show all available inputs by click the Show Unused Inputs button. Only the selected input will be displayed when unused inputs are hidden.

3.1.3 Buttons and Status Indicators

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

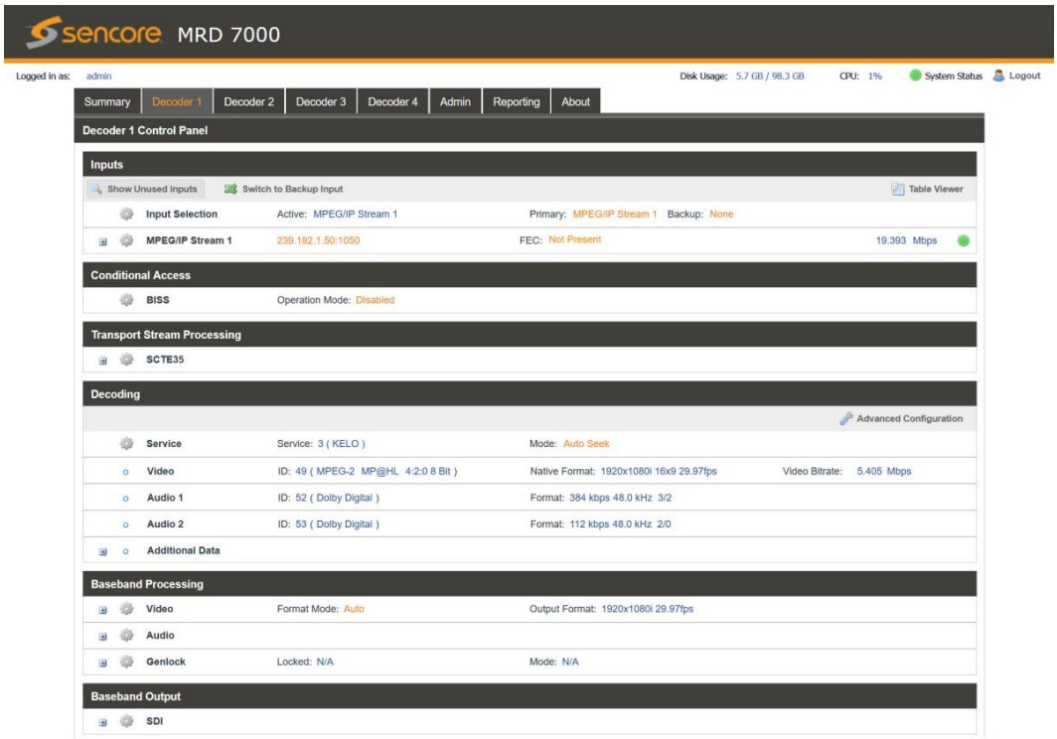


When the icon is shown additional status information can be viewed. Click this button will expand the menu to display the additional status information. All text in status menus shown in ORANGE are user configurable settings. Text shown in BLUE is not user configurable and is strictly a status or value. To minimize the status windows again click the icon.
Status in the MRD 7000 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 Ala rms panel to view Active Errors.
Grey LED		Status is inactive. Function is currently disabled or unavailable.

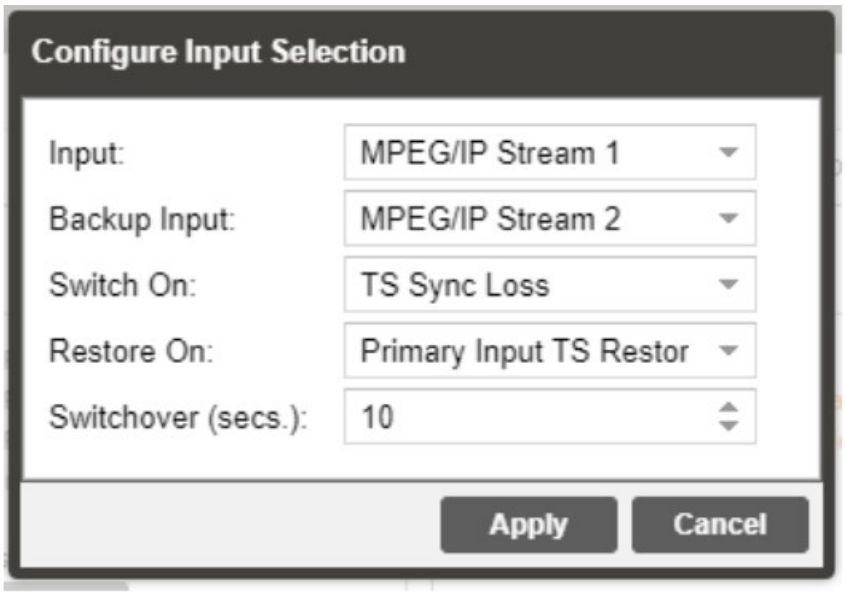
3.2 Decoder Panel

The Decoder panel of the MRD 7000 web interface is used to configure the unit to decode and select the desired output format to use. Each functional piece has a heading: Inputs, Conditional Access, Transport Stream Processing, Decoding, Baseband Processing, and Baseband Output sections are listed from the top down.



3.2.1 Configuring Active Input

This menu allows the user to configure a primary and backup input. In case there is an input failover the MRD 7000 can detect the failed state and switching to a secondary backup input to provide a continuous output. Which input is primary and backup, how the inputs switchover and restore and switchover timing is all user configurable.
Input options include File Input, MPEG/IP Stream 1, MPEG/IP Stream 2, RTMP Input 1, RTMP Input 2, ASI Port 1, ASI Port 2, ASI Port 3, ASI Port 4, SRT Input 1, SRT Input 2,
Seamless RTP, Zixi Input 1, Zixi Input 2, HLS Input 1, HLS Input 2, Satellite Port 1, Satellite Port 2, Satellite Port 3, Satellite Port 4.
Each MPEG/IP Stream Input, SRT Stream Input, Seamless RTP, HLS Input, RTMP Input and Zixi Input can be configured to use either Eth0 or Eth1 ports on the back of the chassis.
Each Satellite Input and ASI Input will follow the physical ports which the name displays in the Web GUI
Input File can play a stored .TS or. TRP transport stream file by uploading to the MRD 7000 internal storage. Files on the MRD 7000 are managed via FTP(S); FileZilla or other apps that support FTP(S) may be used to upload or download capture files.



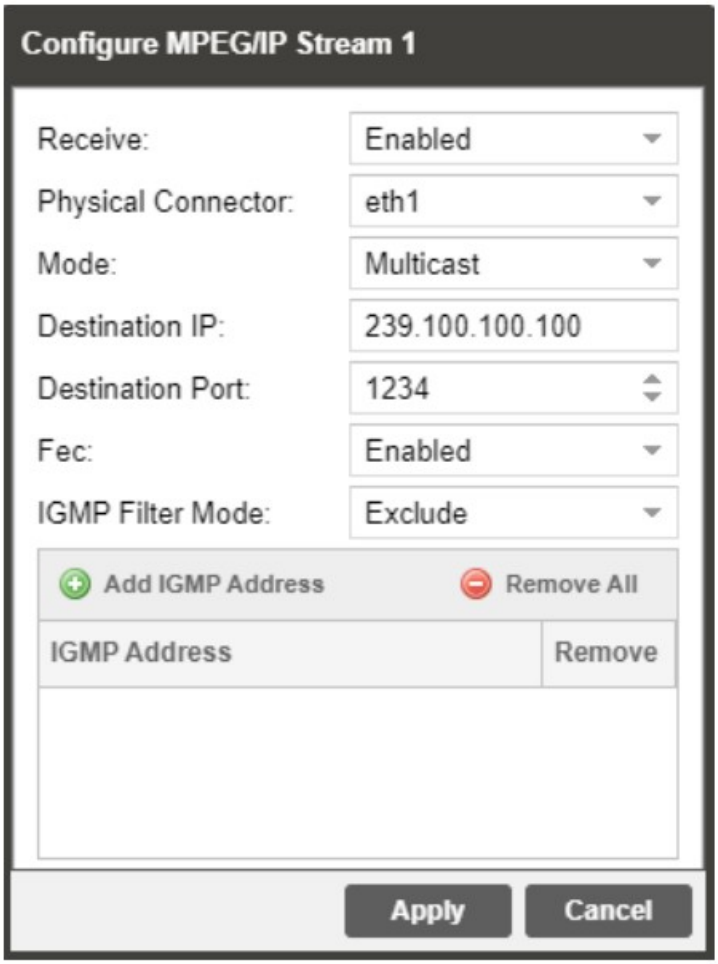
Active Input and Failover Configuration Menu

Setting	Range	Description
Primary Input	File Input MPEG/IP Stream 1 MPEG/IP Stream 2 ASI Port 1-4 RTMP Input 1 RTMP Input 2 SRT Input 1 SRT Input 2 Seamless RTP HLS Input 1 HLS Input 2 Zixi Input 1 Zixi Input 2 Satellite Port 1-4 None	Used for both normal operation and input failover settings. During normal operation this input will be the active input.
Backup Input	File Input MPEG/IP Stream 1 MPEG/IP Stream 2 ASI Port 1-4 RTMP Input 1 RTMP Input 2 SRT Input 1 SRT Input 2 Seamless RTP HLS Input 1 HLS Input 2 Zixi Input 1 Zixi Input 2 Satellite Port 1-4 None	During failover operation this input will become the active input. The catalyst for what causes the unit to switch to this input is configured in the following setting.

Switch On	Manual Only TS Sync Loss Decode Failure	Manual Only: the unit will not switch inputs automatically. The user must manually switch inputs. TS Sync Loss: the MRD 7000 will switch from the primary to the backup input if the primary stream loses synchronization for the duration of the Switchover Interval. Decode Failure: the unit will switch to the backup input when it encounters decoding errors on the primary input.
Restore On	Manual Only Primary Input TS Restored Backup Input TS Sync Loss Decode Failure	Manual Only: the unit will not restore to the primary input automatically. The user must manually switch inputs. Primary Input TS Restored: the MRD 7000 restores to primary when the Primary input regains transport stream synchronization. Backup Input TS Sync Loss: the unit will switch from backup to primary when the backup stream loses synchronization for the duration of the Switchover interval. Decode Failure: the unit restores to the Primary Input when the Backup Input experiences a decoding error.
Switchover	1-20 seconds	The time in seconds which Switch On or Restore On value must remain in the configured state before the MRD 7000 switches between the Primary Input and Backup Input or vice versa.

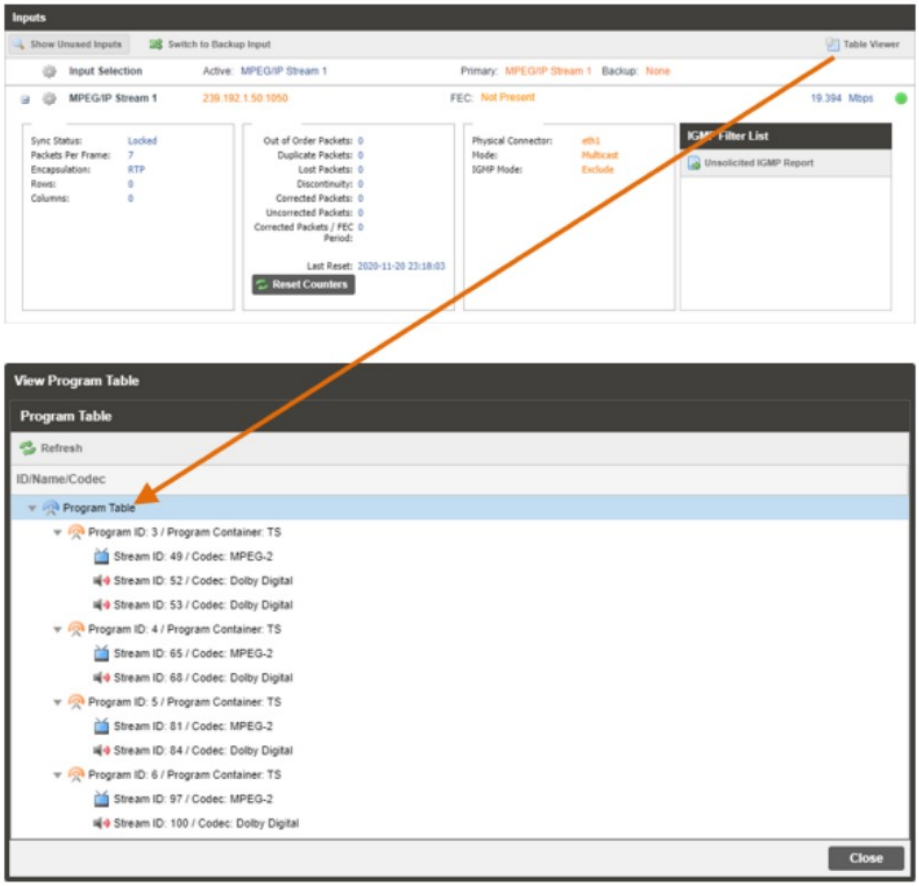
3.2.1.1 Configuring MPEG/IP Inputs

When either MPEG/IP streams are selected as the active input click on the IP address and gear icon should be visible. Clicking on the gear allows the user to configure the desired input port and network destination parameters.



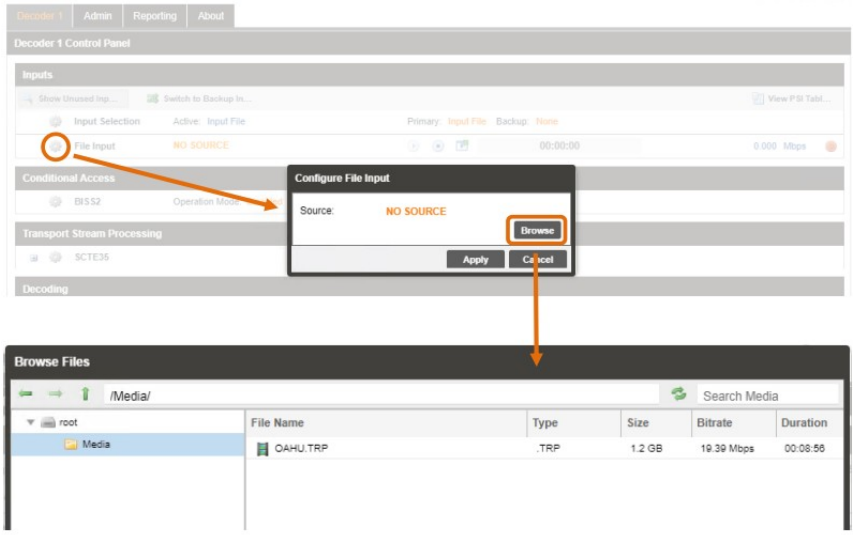
Setting	Range	Description
Receive	Enabled Disabled	This setting allows the user to enable or disable these input stream settings.
Physical C onnector	Eth0 Eth1	The physical connector on the MPEG/IP card that will be used to receive the in put.
Mode	Multicast Unicast	Multicast setting allows the unit to receive multicast streams. Multicast streams originate from the IP range 224.0.0.0 –239.255.255.255. Unicast allo ws 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 i s the IP address the source device is receiving from.
Destination Port	0 – 65535	This is the UDP port the source device is receiving from. This is the only settin g required to receive a unicast stream.
FEC	Disabled Enabled	Enabling FEC (Forward Error Correction) tells the MRD 7000 to look at Destin ation Port +2 and Destination Port +4 for a SMPTE 2022 FEC Matrix.
IGMP Filter Mode	Exclude Include	Used on networks supporting IGMPv3. If this setting is set to Exclude any stre ams originating from the user defined IP addresses will be rejected. If this setti ng is set to Include any streams originating from the user defined IP addresses will be received.

Once the MRD is locked on an MPEG/IP signal the indicator light on the right will turn green, and the received bitrate is displayed. Sync status, the number of transport stream packets inside the UDP payload, and encapsulation type are shown under Status.
Statistics are displayed representing Out of Order Packets, Duplicate Packets, Lost Packets and Discontinuity in RTP IP streams. These counters can be manual reset using the Reset Counters button. The last reset of these error counters is displayed in a date/time format.
The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.



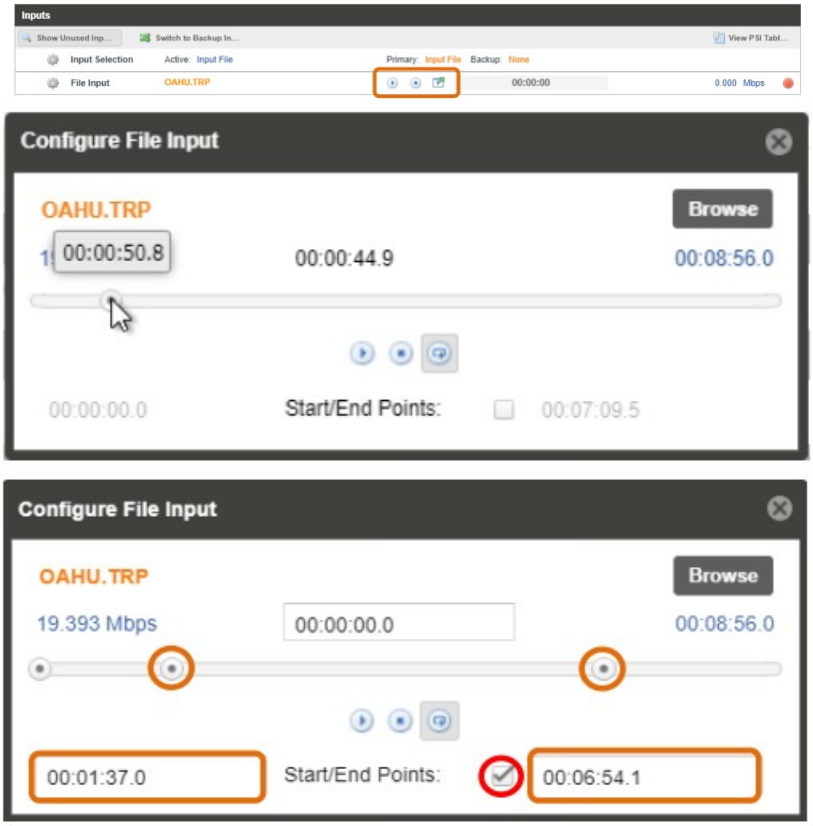
3.2.1.2 Configuring File Input

When File Input is selected as the active input, clicking on the gear icon allows the user to choose source file.



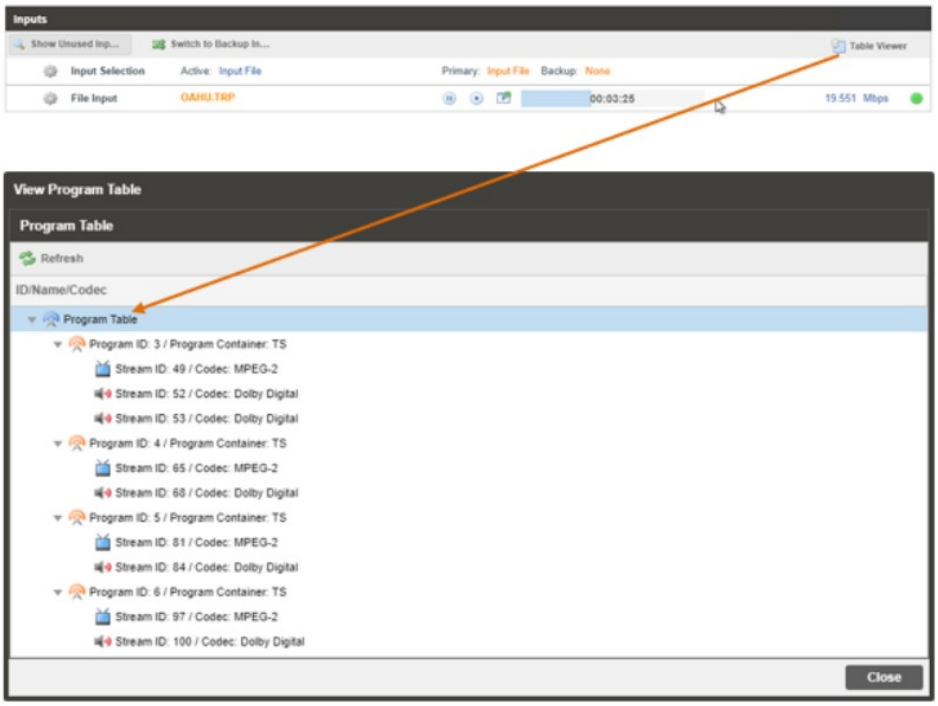
After Input File has been chosen, user has a possibility to:

- Play
- Stop
- Set Start / Stop End Points.



Once the File Input is played out the indicator light on the right will turn green, and the progress bar will be activated

The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.

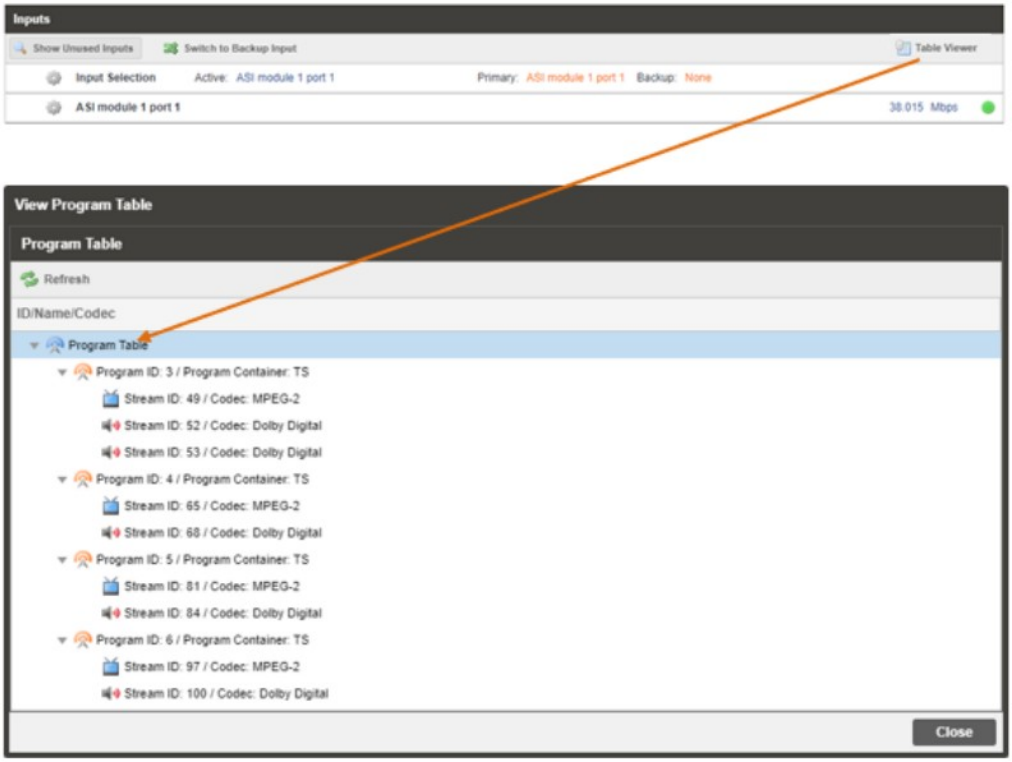


3.2.1.3 Configuring ASI Input

When ASI Input is selected as the active input, clicking on the gear icon allows the user to enable/disable ASI ports.

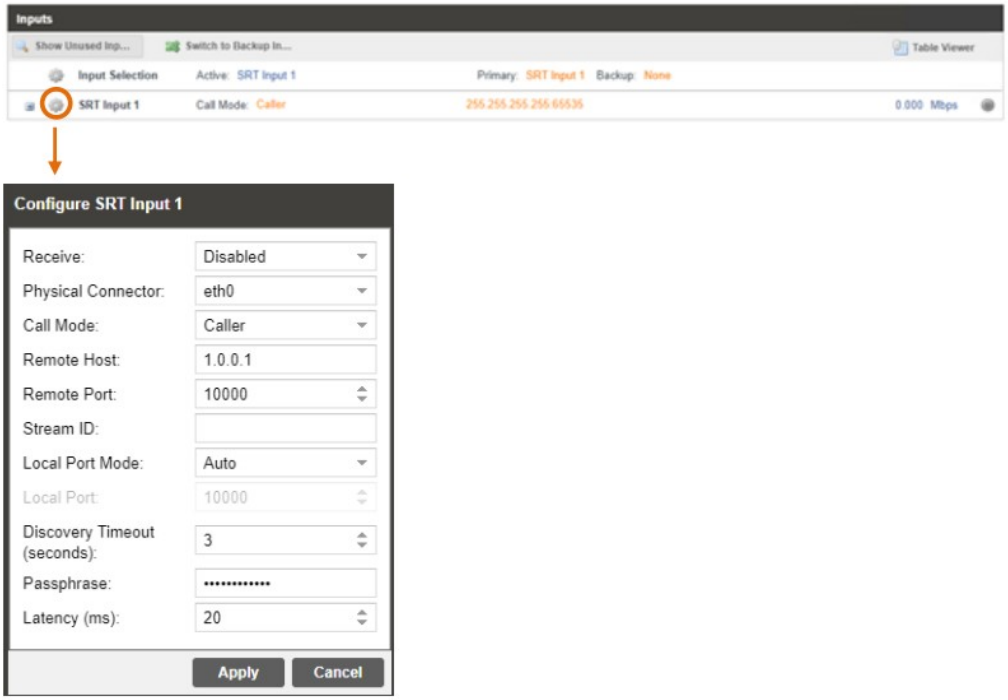
Once the MRD is locked on ASI signal the indicator light on the right will turn green, and the received bitrate is displayed.

The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.



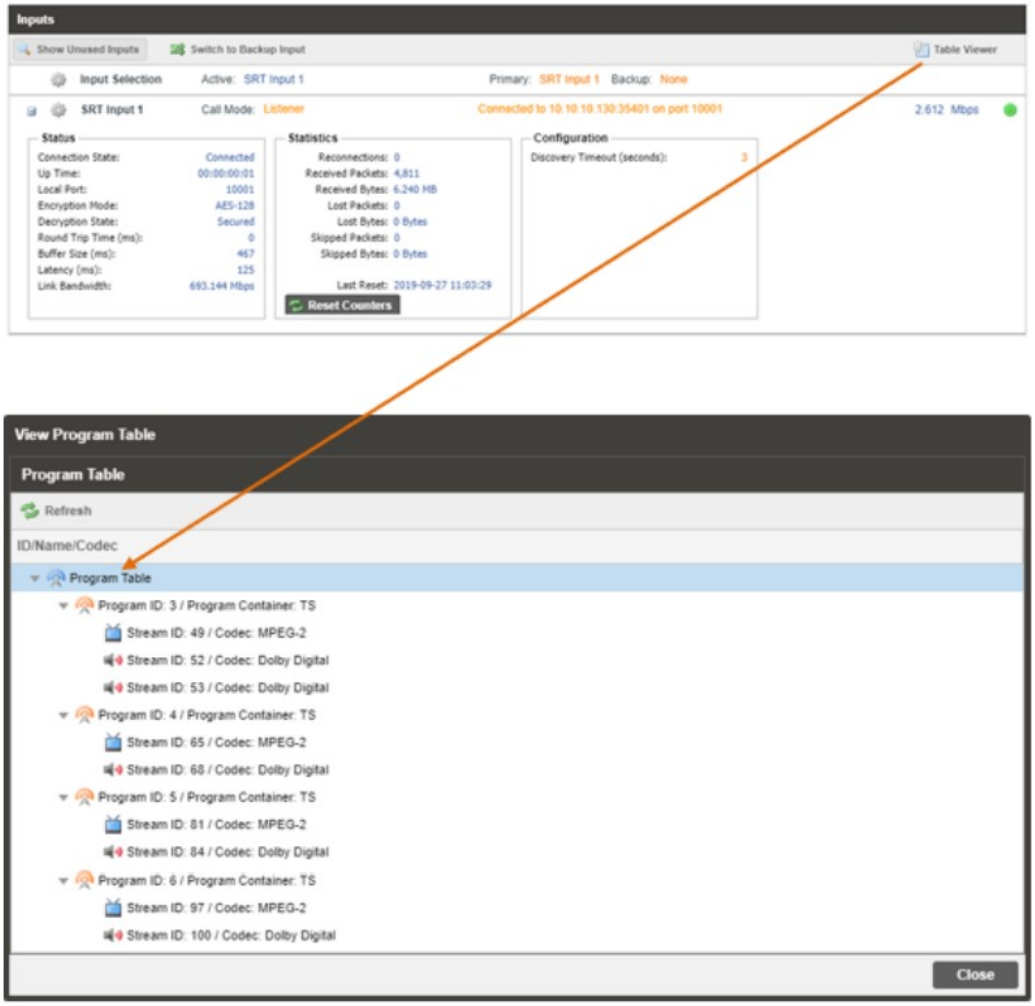
3.2.1.4 Configuring SRT Input

When SRT Input is selected as the active input, clicking on the gear icon allows the user to configure SRT dialog.



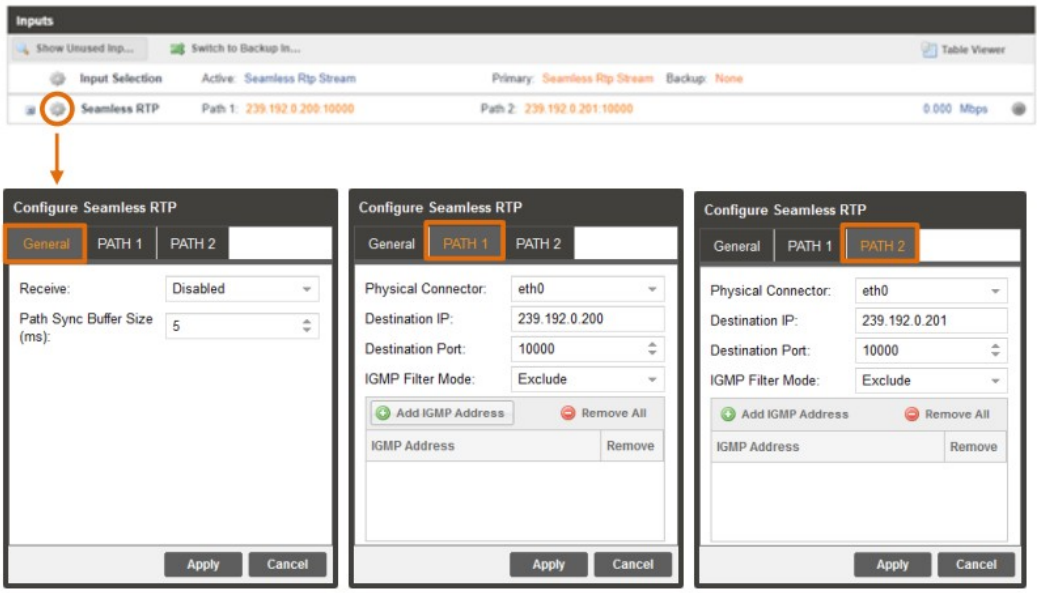
Setting	Range	Description
Receive	Enabled Disabled	This setting allows the user to enable or disable these input stre am settings.
Physical Connect or	Eth0 Eth1	The physical connector on the MPEG/IP card that will be used to receive the input.
Call Mode	Caller, Listener, Rendezvous	Defines the ‘handshake’ mechanism to be used when establishi ng connection
Remote Host	xxx.xxx.xxx.xxx or URL	Defines the IP address or domain name of the stream on the re mote device
Remote Port	1 – 65535	Defines the port of the stream on the remote device
Stream ID	0 – 512 characters	Defines the receive StreamID when used
Local Port Mode	Auto, Manual	In Auto Mode the local port number will be assigned In Manual Mode the local port number will be defined by the use r
Local Port	1 – 65535	Defines the local port number
Discovery Timeou t (seconds)	1 – 100, use 0 for infinite	Defines the length of time to wait for the stream to be discovered
Passphrase	10 – 79 characters	Defines the encryption passphrase
Latency (ms)	1 – 8000	Defines buffer size in milliseconds
Remote Port	1 – 65535	Defines the port of the stream on the remote device
Local Port Mode	Auto, Manual	In Auto Mode the local port number will be assigned In Manual Mode the local port number will be defined by the use r
Local Port	1 – 65535	Defines the local port number
Discovery Timeou t (seconds)	1 – 100, use 0 for infinite	Defines the length of time to wait for the stream to be discovered
Passphrase	10 – 79 characters	Defines the encryption passphrase
Latency (ms)	1 – 8000	Defines buffer size in milliseconds

Once the MRD is locked on an SRT signal, the indicator light on the right will turn green, and the received bitrate is displayed. Connection state, up time, local port, encryption mode, decryption state, Round Trip Time, Buffer Size, Latency and Link Bandwidth are shown under Status. Statistics are displayed representing number of Reconnections, number of Received Packets, amount of Received Bytes, number of Lost Packets, number of Uncorrected Packets, number of Recovered Packets and SRT NAKs. These
counters can be manual reset using the Reset Counters button. The last reset of these error counters is displayed in a date/time format.
The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.



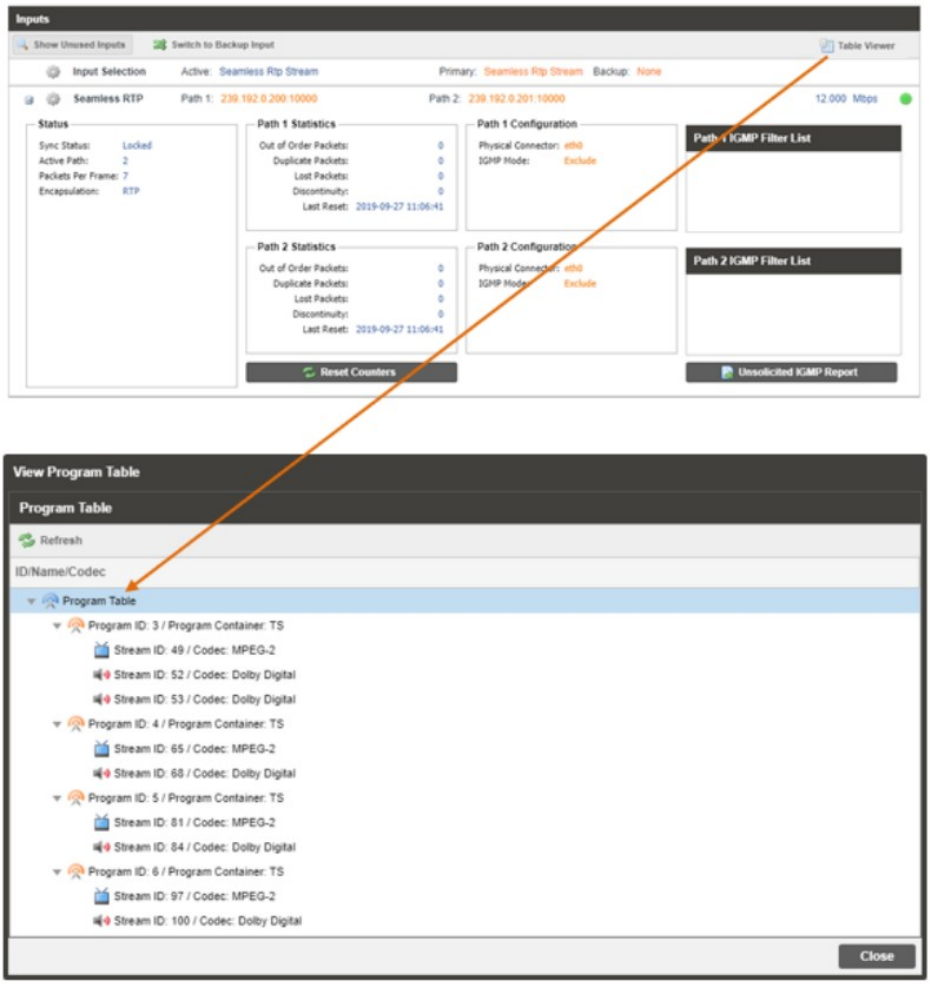
3.2.1.5 Configuring RTP Seamless Input (SMPTE 2022-7)

When RTP Seamless Input is selected as the active input, clicking on the gear icon allows the user to configure RTP Seamless dialog.



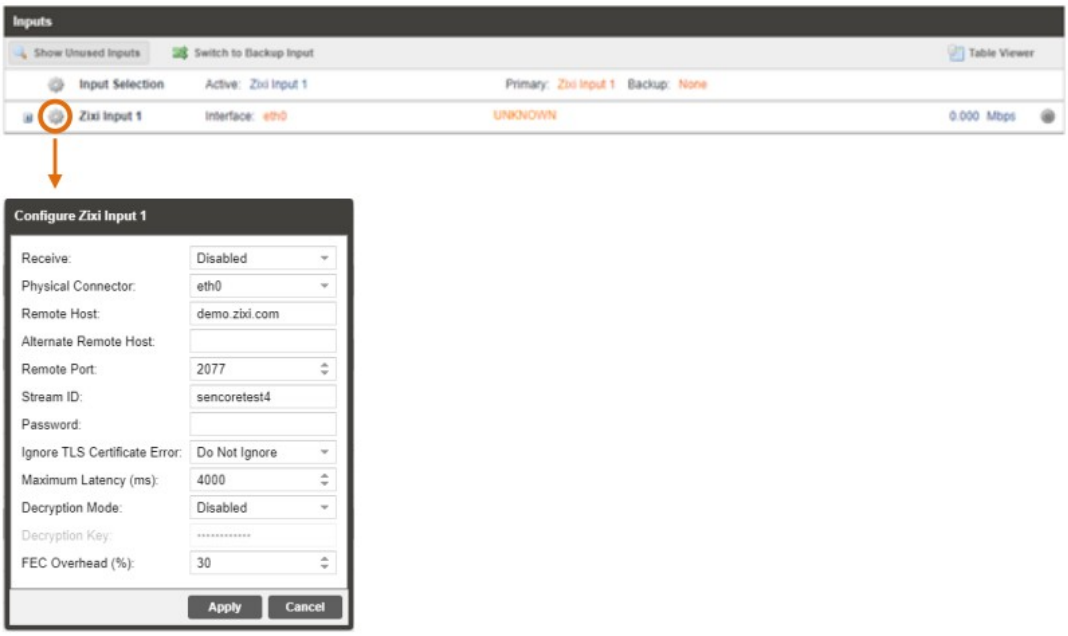
Setting	Range	Description
Physical C onnector	Eth0 Eth1	The physical connector on the MPEG/IP card that will be used to receive the in put.
Destination IP	224.0.0.0 – 239. 255.255.255	This address is the IP address the source device is receiving from.
Destination Port	0 – 65535	This is the UDP port the source device is receiving from.
IGMP Filter Mode	Exclude Include	Used on networks supporting IGMPv3. If this setting is set to Exclude any stre ams originating from the user defined IP addresses will be rejected. If this setti ng is set to Include any streams originating from the user defined IP addresses will be received.

Once the MRD is locked on an RTP Seamless signals the indicator light on the right will turn green, and the received bitrate is displayed. Sync status, number of active paths, the number of transport stream packets inside the UDP payload, and encapsulation type are shown under Status. For both paths statistics are displayed representing Out of Order Packets, Duplicate Packets, Lost Packets and Discontinuity in RTP IP streams.
These counters can be manual reset using the Reset Counters button. The last reset of these error counters is displayed in a date/time format.
The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.



3.2.1.6 Configuring Zixi Input

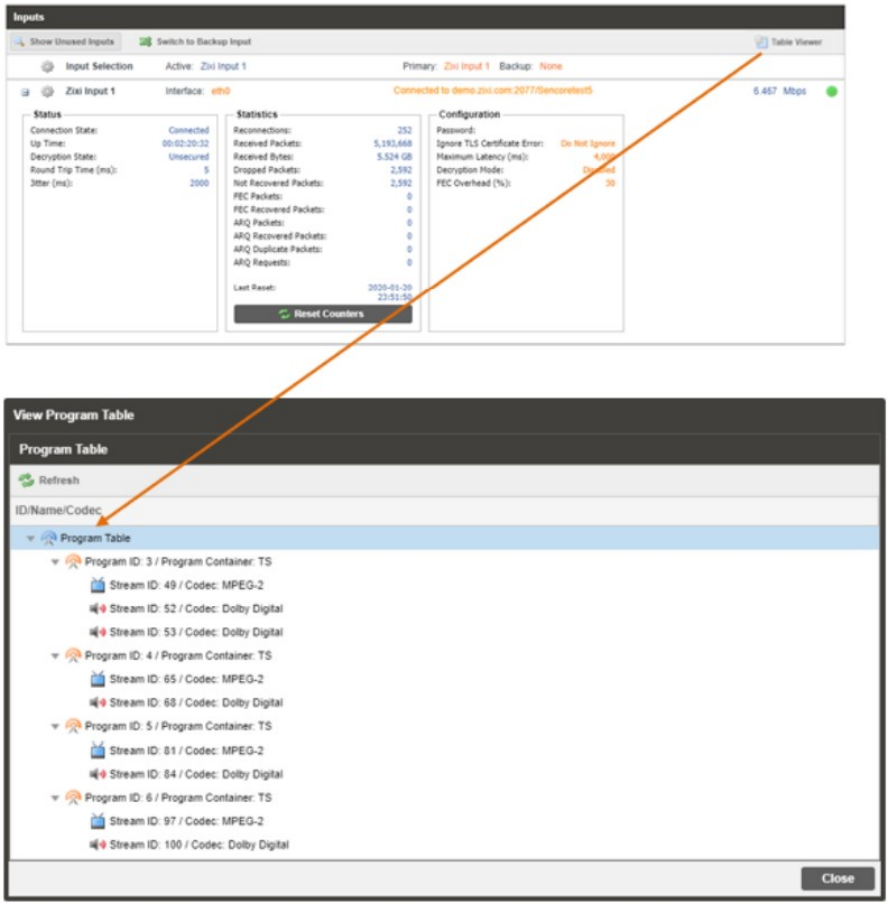
When Zixi Input is selected as the active input, clicking on the gear icon allows the user to configure Zixi dialog.



Setting	Range	Description
Receive	Enabled Disabled	Enable/Disable the Zixi Input
Physical Connector	Eth0 Eth1	The physical Ethernet connector on which to receive t he Zixi traffic
Remote Host	xxx.xxx.xxx.xxx or URL	The IP address or domain name of the remote host br oadcaster
Alternate Remote Host	xxx.xxx.xxx.xxx or URL	The alternate IP address or domain name of the remo te host broadcaster
Remote Port	1 – 65535	Defines the port of the stream on the remote device
Stream ID	Specified by Zixi broadcaster	Zixi stream ID
Password	1 – 128 characters	Password to protect the stream.
Ignore TLS Certificate Error	Ignore Do Not Ignore	Zixi Ignore TLS Certificate Error
Maximum Latency	30 – 10000 ms	Maximum latency or buffer size in milliseconds
Decryption Mode	Disabled AES-128 AES-192 AES-256 Automatic	Select the type of Decryption Mode
Decryption Key	User entry *AES-128 = 32 characters *AES-192 = 48 characters *AES-256 = 64 characters	Provides the key to allow signal processing if decrypti on is to be done.
FEC Overhead	0 – 50%	Defines the amount of processing overhead to be use d to accommodate FEC

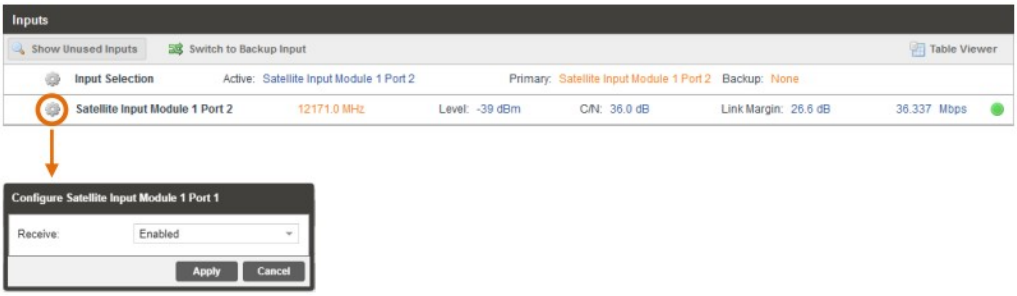
Once the MRD is locked on a Zixi signal the indicator light on the right will turn green,
and the received bitrate is displayed. Connection state, up time, local port, decryption state, Round Trip Time, Jitter are shown under Status. Statistics are displayed representing number of Reconnections, number of Received Packets, amount of Received Bytes, Dropped Packets, Not Recovered Packets, Not Recovered Packets, FEC

Packets, FEC Recovered Packets, ARQ Packets, ARQ Recovered Packets, ARQ Duplicate Packets, ARQ Requests. These counters can be manually reset using the Reset Counters button. The last reset of these error counters is displayed in a date/time format.
The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.

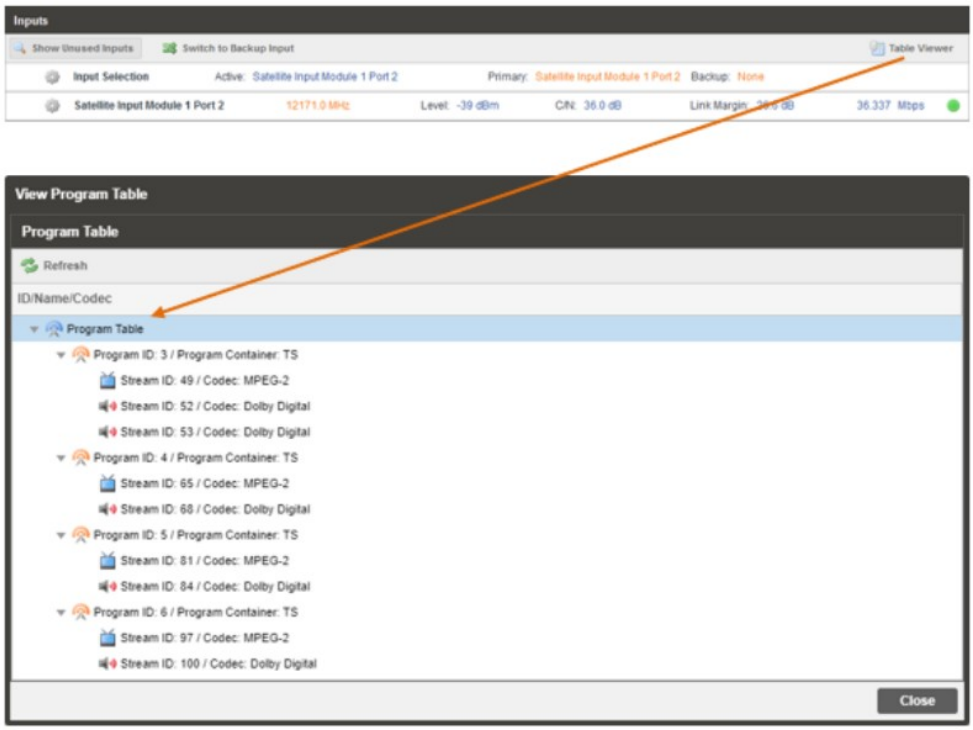


3.2.1.7 Configuring Satellite Input

Only available when the MRD 70191 Satellite Input Module is installed. When Satellite Input is selected as the active input, clicking on the gear icon allows the user to enable/disable Satellite ports.

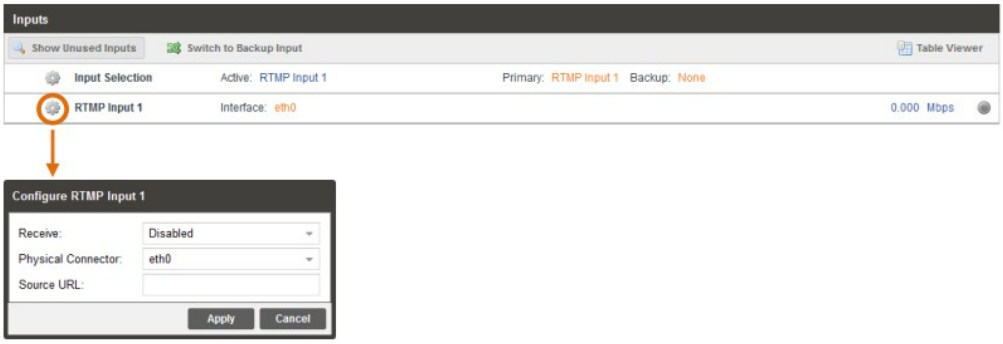


Once the MRD is locked on a Satellite signal, the indicator light on the right will turn green, and the received bitrate is displayed.
The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.



3.2.1.8 Configuring RTMP Input

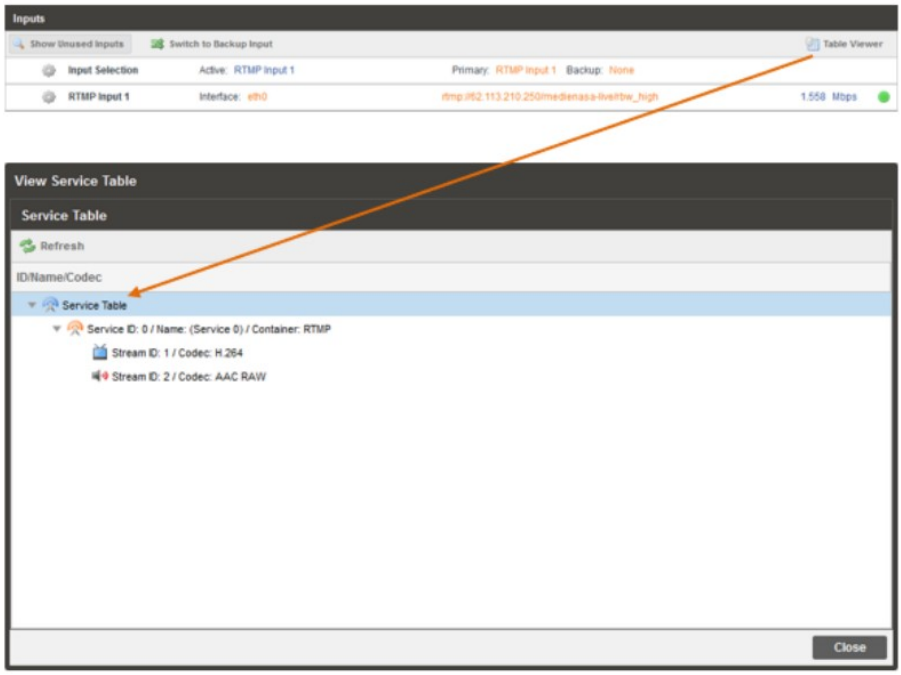
When RTMP Input is selected as the active input, clicking on the gear icon allows the user to configure RTMP Input using the pop-up configuration box.



Setting	Range	Description
Receive	Enabled Disabled	Enable/Disable the RTMP Input
Physical Connector	Eth0 Eth1	The physical Ethernet connector on which to receive t he RTMP traffic
Source URL	xxx.xxx.xxx.xxx or URL	The IP address or domain name of the remote host br oadcaster

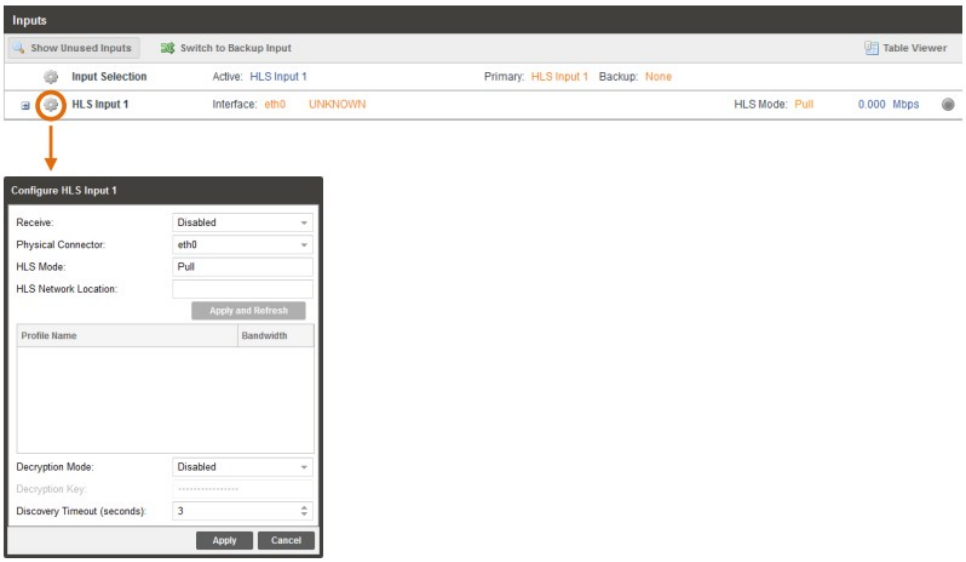
Once the MRD is locked on a RTMP signal the indicator light on the right will turn green, and the received bitrate is displayed.

The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.



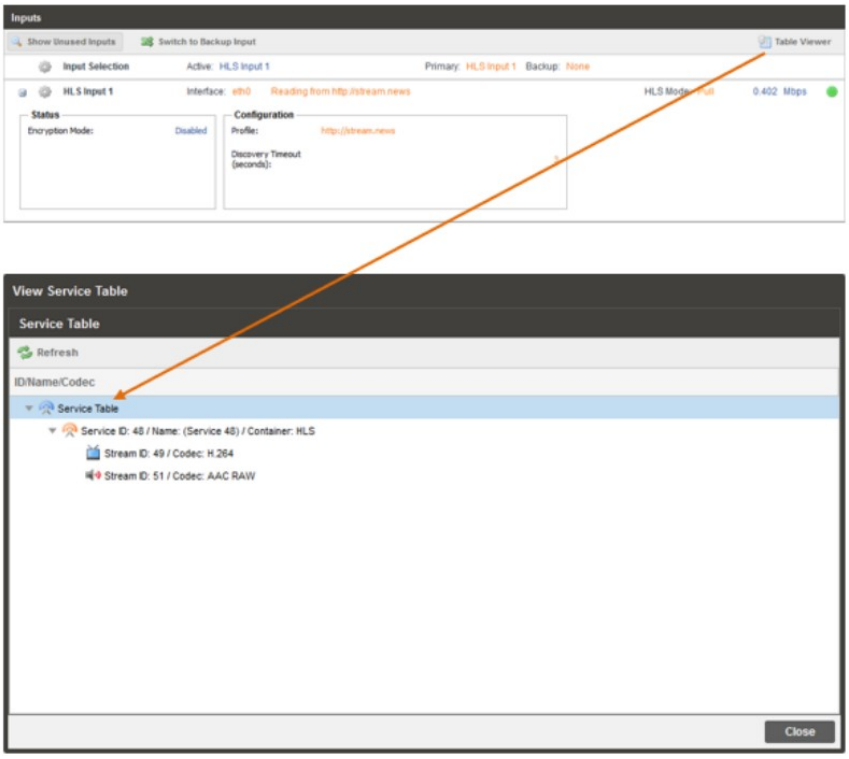
3.2.1.9 Configuring HLS Input

When HLS Input is selected as the active input, clicking on the gear icon allows the user to configure HLS Input using the pop-up configuration box.



Setting	Range	Description
Receive	Enabled Disabled	This setting allows the user to enable or disable these i nput stream settings.
Physical Connector	Eth0 Eth1	The physical connector on which to receive the HLS tr affic.
HLS Mode	Pull	Sets HLS to receive through a network location.
HLS Network Location	XXX.XXX.XXX.XXX or URL	Defines address of the HLS stream to be received.
Decryption Mode	Disabled AES128	Defines if a decryption of the received signal is needed , AES 128 standard
Decryption Key	User Entry	Provides the key to allow signal processing if decryptio n is to be done
Discovery Timeout	0 (infinite) 1 – 100 (seconds)	Defines the length of time to wait for the stream to be d iscovered

Once the MRD is locked on an HLS signal the indicator light on the right will turn green, and the received bitrate is displayed. The Encryption Mode is shown under Status.
Configurations are displayed representing the Profile and Discovery Timeout.
The MRD 7000 can also display the individual Program/Service numbers by clicking on the Table Viewer hyperlink.

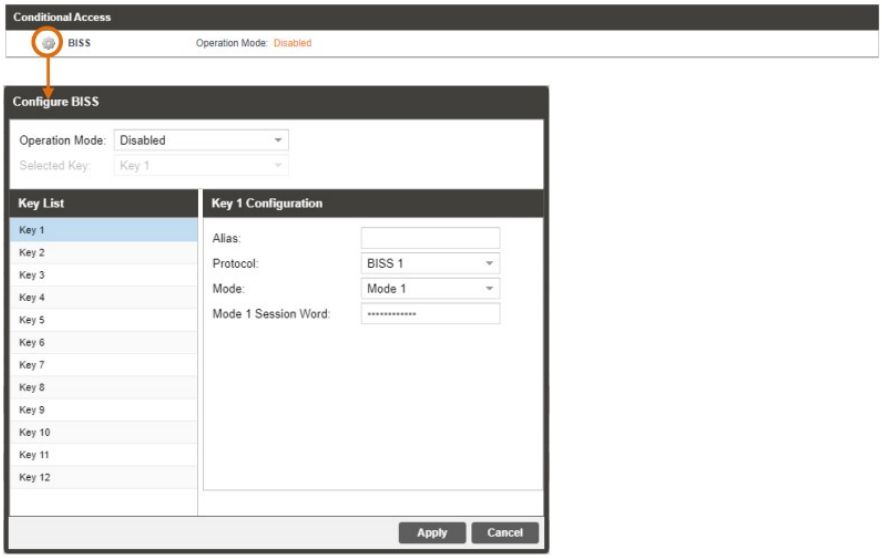


3.2.2 Configuring Conditional Access

This section will describe how to configure descrambling in the MRD 7000. The MRD 7000 allows descambling of BISS1 and BISS2.

3.2.2.1 BISS1 Descrambling

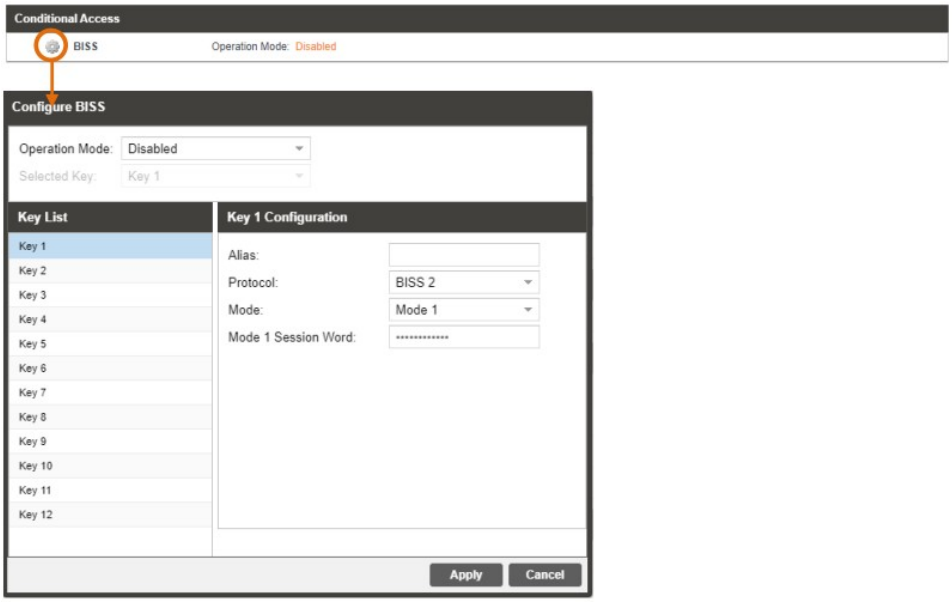
This menu allows the user to configure BISS descrambling. 12 unique BISS keys can be entered. Clicking on the gear icon allows the user to configure BISS1.



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 scramb led the transport stream.
Mode 1 Session Word	N/A	If Mode 1 is selected the user enters the BISS session wor d here.
Mode E Session Word	N/A	If Mode E is selected the user enters the BISS session wor d here
Mode E Injected ID	N/A	If Mode E is selected the user enters the BISS injected ID here.

3.2.2.2 BISS2 Descrambling

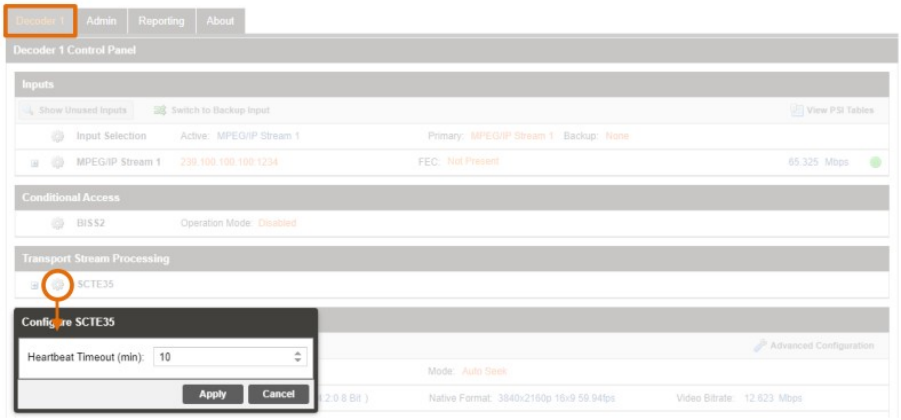
This menu allows the user to configure BISS descrambling. 12 unique BISS keys can be entered. Clicking on the gear icon allows the user to configure BISS2.



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 C A	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 wor d here.
Mode E Session Word	N/A	If Mode E is selected the user enters the BISS session wor d here
Mode E Injected ID	N/A	If Mode E is selected the user enters the BISS injected ID h ere
Mode CA Key Pair	Buried Injected	If Mode CA is selected the user will then select the type of c onditional access. Buried or Injected
Mode CA Public Key	Download	If Mode CA Buried is selected, the user can download the P ublic Key from the MRD 7000. 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 t han 20 characters. The supported file types are .txt or .priv

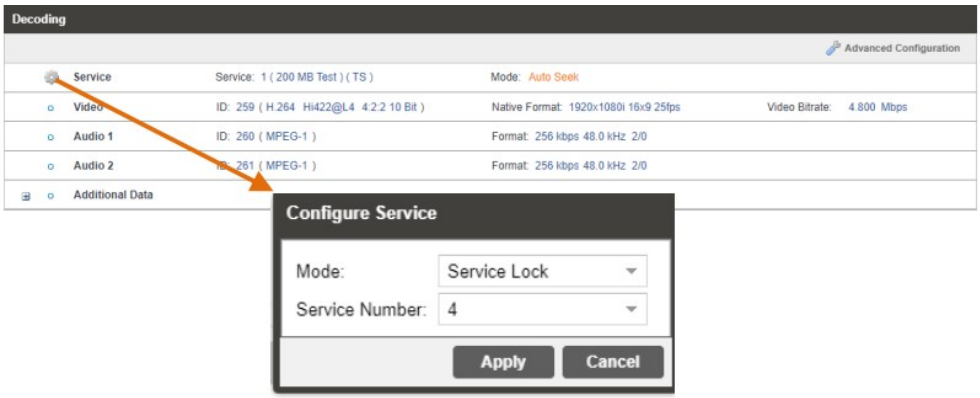
3.2.3 Configuring Transport Stream Processing

Setting Heartbeat timeout will determine the time in minutes between SCTE35 messages before the MRD 7000 will report an error. Timeout can be configured in the following way:



3.2.4 Configuring Decoding and Service Selection

This menu allows the user to configure which service the MRD 7000 will decode. There are two editable fields in this menu.

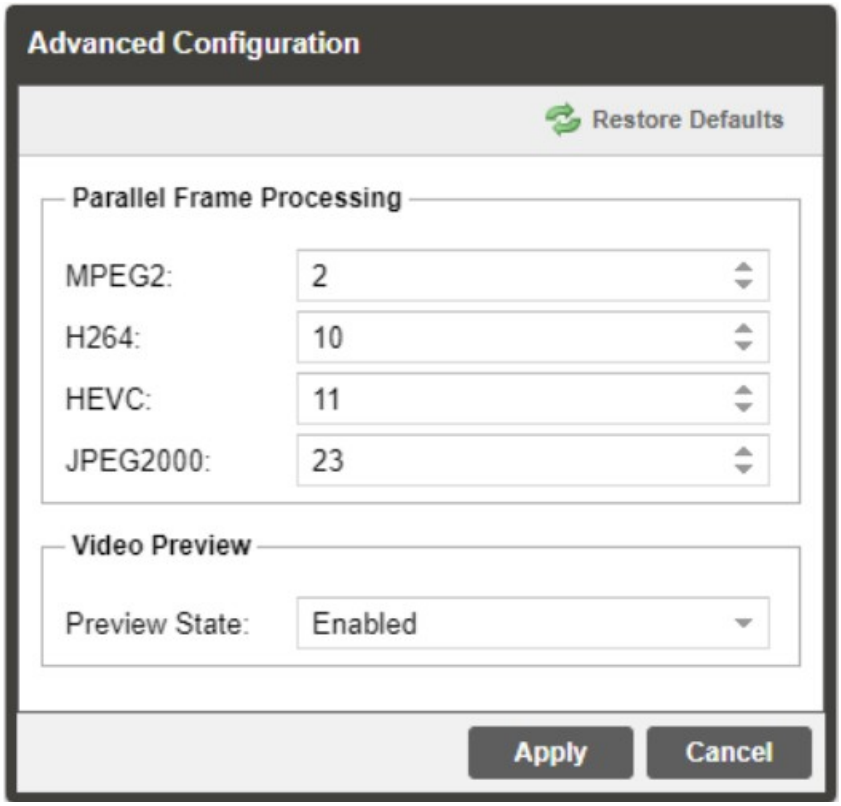


Setting	Range	Description
Mode	Auto Seek Service Lock	The MRD will decode the first service found Locks the decoder to defined service number
Service Number	#	Click the drop-down to select a service number. This list wil l be populated by all services in the incoming transport stre am. This will also include the Service Name and the Servic e Type.

When the MRD 7000 begins decoding a service, the Additional Data status will report HDR metadata, SMPTE 2038, Closed Captions, SCTE35 and Subtitles presence.

3.2.4.1 Advanced Configuration

This section allows the user to configure advanced settings of the MRD 7000.
Parallel Frame Processing allows the user to tune the decode latency of the MRD 7000.
Lower Parallel Frames results in lower latency. Setting these values too low can result in dropped video frames.
Default settings are recommended unless minimal latency is crucial to the application.
Clicking the Restore Defaults button will reset all values to the default values.



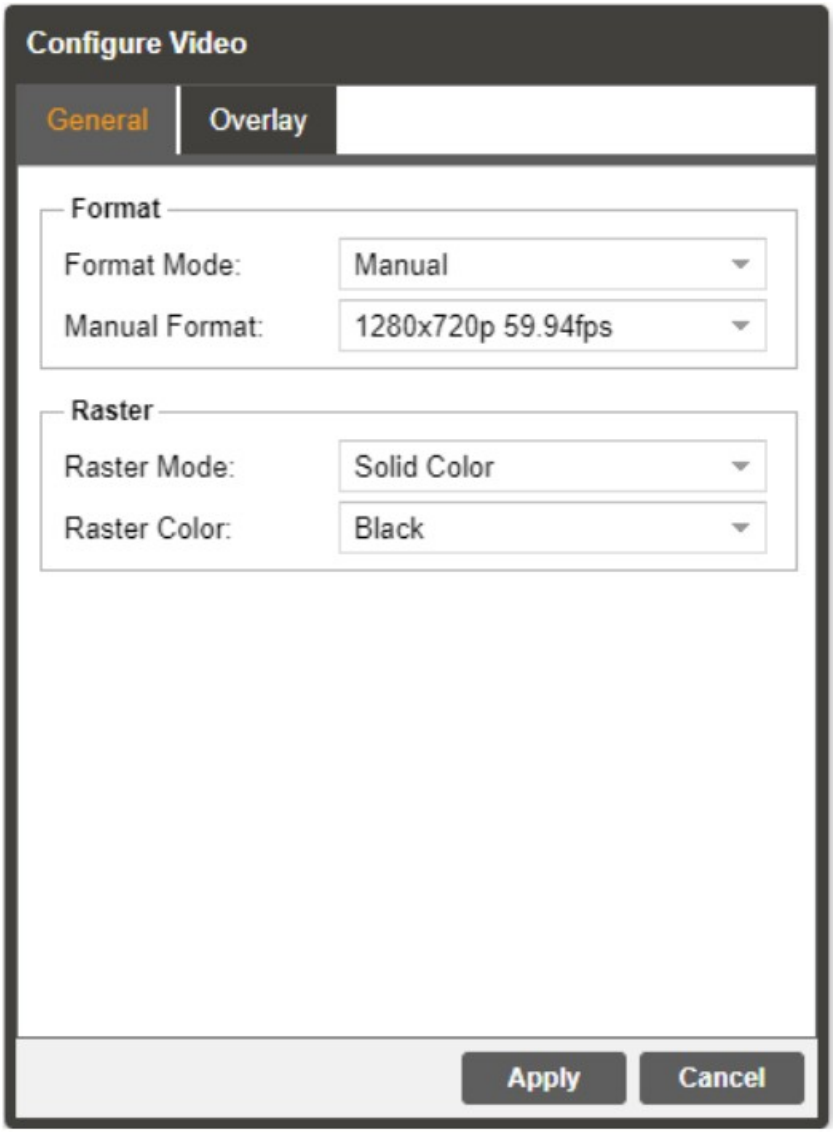
Setting	Range	Description
MPEG2	1-50	The parallel frames processed when decoding MPEG2 video.
H264	1-50	The parallel frames processed when decoding H264 video.
HEVC	1-50	The parallel frames processed when decoding HEVC video.
JPEG2000	1-50	The parallel frames processed when decoding JPEG2000 video.
Preview State	Enabled/Disabled	Enabling the Preview State will cause the MRD 7000 to display a thumbnail in the Decoding section.

3.2.5 Configuring Baseband Processing

The section of the main tab allows the user to configure the video, audio, and genlock baseband processing.

3.2.5.1 Configuring Video Baseband Processing

The Configure Video menu is opened by clicking on the gear icon just under the Baseband Processing section title.

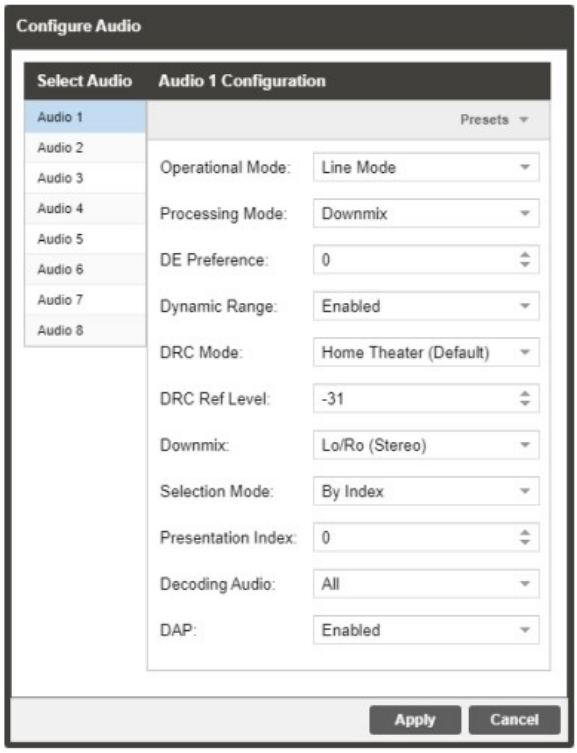


Setting	Range	Description
Format Mode	Auto Manual	The MRD will match output format to input MRD uses specified Manual Format value
Manual Format	3840x2160p 60fps 1280x720p 59.94fps	Refer to Specification for complete list
Raster Mode	Solid Color Last Frame	Selected color outputs if no input is locked Last decoded frame is shown when no input
Raster Color	Black White Yellow Cyan Magenta Red Blue Green Gray	Choose color to display when raster mode is set to Solid Color

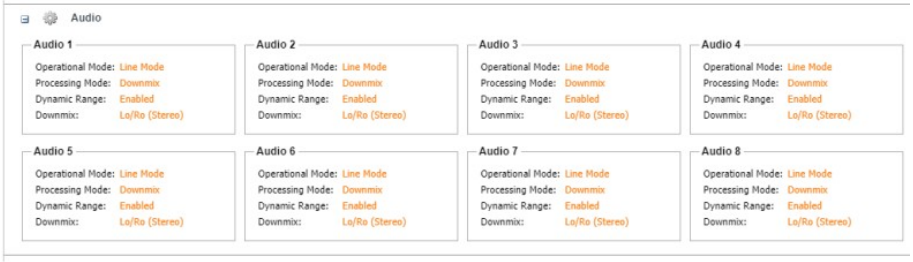
Setting	Range	Description
Overlay Type	None Teletext Subtitles DVB Subtitles Closed Caption	Select subtitle overlay type
Teletext Subtitles	100 to 8FF	Select Teletext page for Overlay
DVB Subtitles	Language Codes	Select Subtitles for Overlay
Closed Caption	NTSC DTVCC	Select subtitle overlay CC type
NTSC Service	CC1–CC4	Select subtitle overlay NTSC type
DTVCC Service	SERVICE 1–SERVICE 6	Select subtitle overlay DTVCC type

3.2.5.2 Configuring Audio Baseband Processing

The audio menu allows the user to configure the audio processing mode (decode / discrete) settings of the MRD 7000. Up to 8 audio PID's inside of the decoded service can be processed.



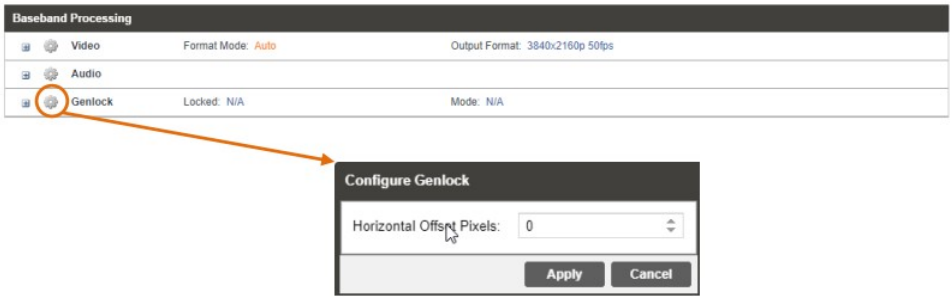
The configured settings are displayed when expanding the audio status by clicking the + button.



Setting	Range	Description
Operational Mode	Line Mode RF Mode Custom 1 Custom 0	This setting allows the user to select the audio compression Monitor mode
Processing Mode	Downmix Discrete	Downmix will convert the full PID (be it 3/2 or 2/0) to Lt/Rt Stereo. Discrete is part of configuration for Surr ound Sound Decoding and Embedding (refer to Secti on 3.2.6.2, Configuring SDI Audio, for more details)
DE Preference	-12 to 12	Set the gain in dB to be applied to the dialog compon ents in the signal
Dynamic Range	Enabled Disabled	Use dynamic range for AC-3 and AC-4 downmix.
DRC Mode	Home Theater (Default) Flat Panel Portable – Headphones Portable – Speakers	AC-4 audio mode of Dynamic Range Control. The dif ferent modes allow for different levels of audio.
DRC Ref Level	-31 to -27 -26 to -17 -16 to -7 -16 to -7	Dynamic Range Control reference level for AC-4 audio. This following audio level ranges correlate to t he mode of AC-4 audio selected.
Downmix	Lo/Ro (Stereo) Lt/Rt (Dolby Surround) Lt/Rt (Auto) Dual Mono/Stereo Dual Left Dual Right Head Phone Speaker Virt	When the audio is downmixed in the MRD 7000 two audio channels are created. The channels can be co nfigured using the settings available in the drop-dow n menu.
Selection Mode	Preference Based By Index	The AC-4 audio presentation stream mode can be se t to Preference Based or By Index. Preference Based selects the first available audio presentation s tream and By Index allows the user to select which a udio presentation stream to begin decoding.
Presentation Index	0-100	The first decoded AC-4 audio presentation stream ca n by selected by entering the index number of that st ream.
Decoding Audio	All Main Associate	The type of AC-4 audio can be set to All, Main, or As sociate. Main and Associate audio contain different c ontent such as music, effects, scene descriptions or director’s comments.
DAP	Enabled Disabled	Dolby Audio Processing can be enabled or disabled with this setting.

3.2.5.3 Configuring Genlock Processing

The Genlock menu allows the user to configure Horizontal Offset Pixels. The configure menu is opened by clicking on the gear icon.



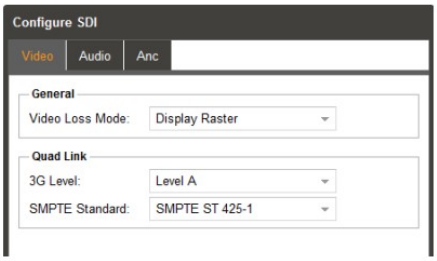
Genlock status is reported as Locked/Unlocked (reference source enabled) or N/A (refence source disabled) and Mode status.

3.2.6 Configuring Baseband Output

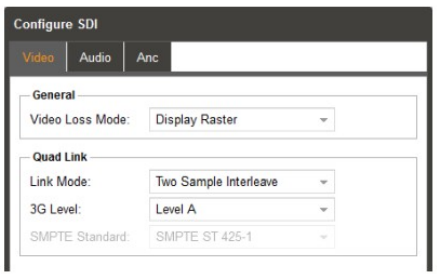
This menu allows the user to configure the SDI output settings for the MRD 70130, MRD 70140, MRD 70141, and MRD 70150 modules.

3.2.6.1 Configuring SDI Video

The MRD 7000 comes with the ability to decode SDI Level A or SDI Level B, to disable the SDI in an error state, and to set the Quad link mode. The MRD 70140 and MRD 70141 are the two output cards that support SDI disabling. The MRD 70140 and 70141
modules can select Two Sample Interleave or Square Division for the SDI Link Mode when they are configured for Quad 3G-SDI (UHD). Picture below displays how SDI video can be configured depending on the output module.



SDI Video Output for MRD 70130 and MRD 70150



SDI Video Output for MRD 70140 and MRD 70141 (UHD mode)

General

Setting	Range	Description
Video Loss Mode	Disable SDI Display Raster	Setting to *Disable SDI* disables the SDI output of the MRD 7 000 in case of an error state. Setting to *Display Raster* the M RD 7000 will display the raster color selected in Section 3.2.5.1

Quad Link

Setting	Range	Description
Link Mode	Two Sample Interleave Square Division	This setting changes the SDI link mode.
3G Level	A or B	This setting changes the SDI output level.
SMPTE Standard:	SMPTE ST 425-1 SMPTE ST 425-5	SMPTE ST 425-1: The Quad Link SDI output will follow SMPTE ST 425-1 mapping. This mapping format is generally designated as legacy formatting. SMPTE ST 425-5: The Quad Link SDI output will follow SMPTE ST 425-5 mapping. This mapping format is generally designated as standard formatting.

3.2.6.2 Configuring SDI Audio

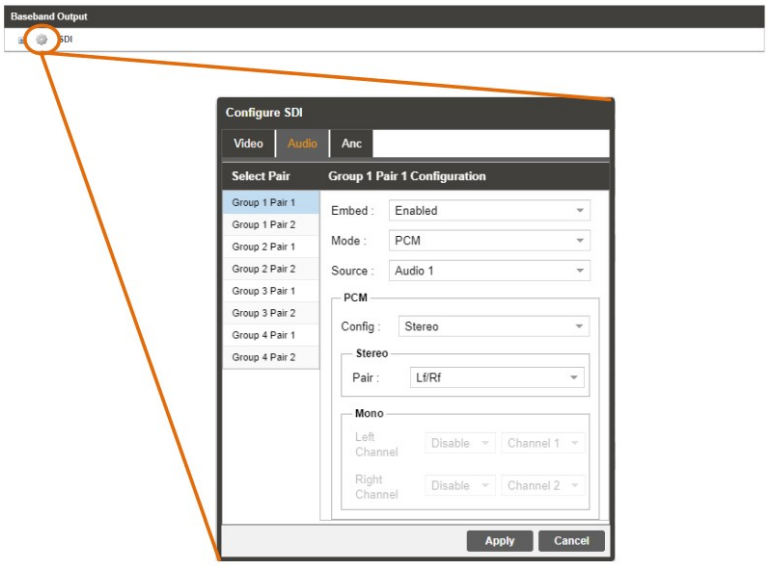
This menu allows the user to configure the SDI embedded audio settings. Each decoder on the MRD 7000 can decode and output up to eight embedded SDI audio pairs. Eight audio pairs can be embedded into four Group Pairs. Each Group Pair may be set for

PCM Mode (either downmixed or discrete decode), Passthrough Mode (compressed Dolby E, Dolby ATMOS) or Auto Mode.

This menu will interact differently depending upon which options are chosen for the “Mode” section (PCM, Passthrough, Auto). This section will also cover two distinct PCM configurations for either Stereo Downmix or Discrete Surround Sound decode that interact with the “Processing Mode” option from Section 3.2.5.2, Configuring Audio Baseband Processing.

Overview of Audio Menu

After clicking the Gear Icon next to “SDI” choose the “Audio” tab to expose settings for the individual SDI Group Pairs as shown below



Select Pair

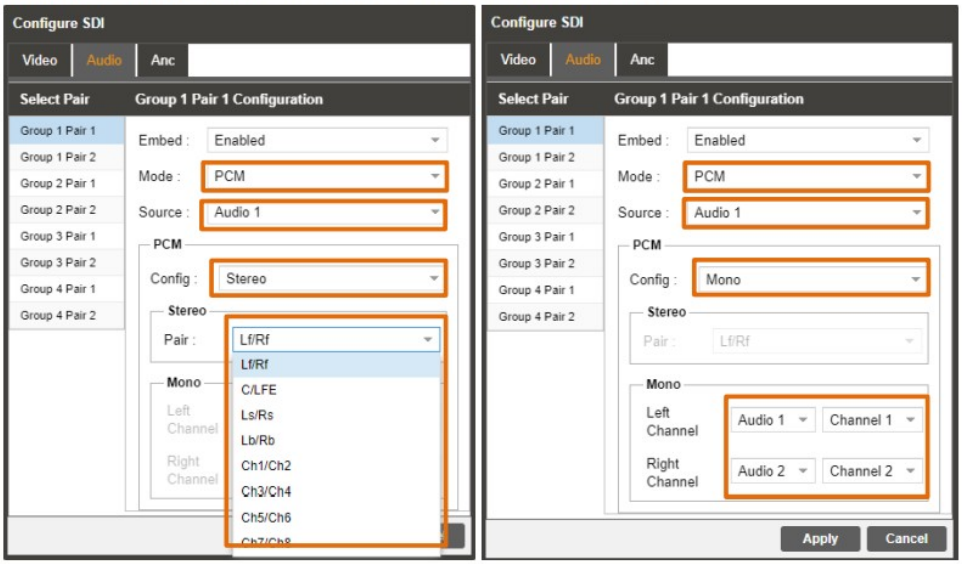
Setting	Range	Description
Select Pair	Group 1 Pair 1 Group 1 Pair 2 Group 2 Pair 1 Group 2 Pair 2 Group 3 Pair 1 Group 3 Pair 2 Group 4 Pair 1 Group 4 Pair 2	Each Group/Pair combination represents a different physical pair on the embedded SDI Audio (8 total pairs available). Each physical pair may be assigned to pass a full Stereo Downmix, portion of Discrete Surround or full Compressed Passthrough By default, each physical pair is enabled and set to output PCM Stereo Downmix for the corresponding Audio Source (Audio 1 goes to Group 1 Pair 1, Audio 2 goes to Group 1 Pair 2, and so on).

After selecting the Group/Pair, that physical pair's Group M Pair N Configuration will be eligible for Mode and Source Selection.

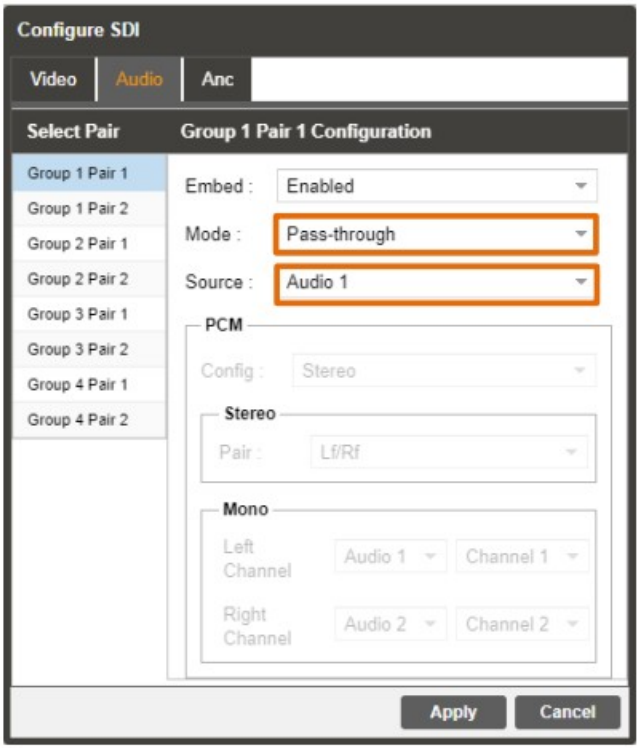
Group M Pair N Configuration

Setting	Range	Description
Embed	Enabled Disabled	When Enabled, the SDI Physical Pair will output the configured source material. When Disabled, the SDI Physical Pair will output no level.
Mode	PCM Pass-through Auto	PCM will always output the decoded Audio Source as discrete or downmixed (as per “Processing Mode” option from Section 3.2.5.2). *Pass-through* will always output the compressed Audio Source (from the unmodified input before the decoder). *Auto* will first read the Audio Source’s CODEC before deciding how to output. Should it detect Dolby E or another undecodable Audio CODEC, the pair will pass-through the audio. Should it detect Dolby Digital or another decodable CODEC, it will decode and output the Decoded PCM audio.
Source	Disabled Audio 1 – 8	Choose the Audio Source to be referenced for output. This field corresponds to the “Select Audio” tab from Section 3.2.5.2. If set to *Disabled*, the physical pair will output no level. If set to Audio 1 – 8, it will use that source for reference when outputting the compressed or uncompressed audio.
Config	Stereo Mono	Only available if “Mode” is set for PCM or Auto. *Stereo* will enable the “Pair” option under Stereo and output a full stereo pair. *Mono* will enable the “Left Channel” and “Right Channel” options under Mono.
Pair	Lf/Rf C/LFE Ls/Rs Lb/Rb Ch1/Ch2 Ch3/Ch4 Ch5/Ch6 Ch7/Ch8	Only available if “Mode” is PCM or Auto and “Config” is Stereo. Select a pair from the sourcing Audio PID to embed on the SDI. If “Processing Mode” (Section 3.2.5.2) for the selected “Source” above is PCM, the output will take the Left-Total/Right-Total of the full PID and output as Stereo regardless of this setting. If the Processing Mode field is Discrete, the output will source the selected pair as part of the Surround Sound output. Later in this section there is a description on configuring Discrete Surround Sound output.
Left Channel Right Channel	Disable / Channel 1 – 8 Audio 1 – 8	Only available if “Mode” is PCM or Auto and “Config” is Mono. Advanced Audio embedding allows to embed mono audio channels from multiple audio PIDs in the same group/pair, i.e., a user can use mono audio left from Audio 1 and mono audio right from Audio 2 and embed them as Group 1 Pair 1.

Available Config Options when “Mode” is set to PCM or Auto:



Available Config Options when “Mode” is set to Pass-through:



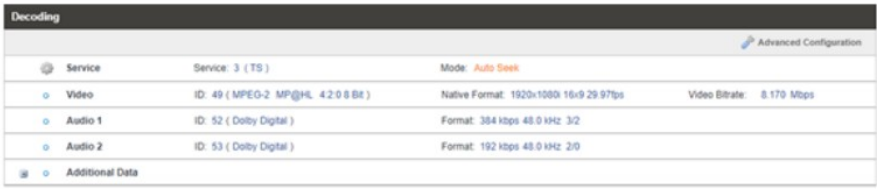
3.2.6.3 Configuring Discrete Surround Decode and Output

Configuring Discrete Decode and output is performed in three main steps:

1. Confirm one or more Audio PIDs are receiving at least 3/2.
2. Configure the 3/2 Audio PID for Discrete Decode
3. Configure the SDI Output to send each of the at least three group/pairs

Confirming one or more Audio PIDs are receiving at least 3/2

After locking to the input and selecting the incoming service, review the “Decoding” status (as per Section 3.2.4).

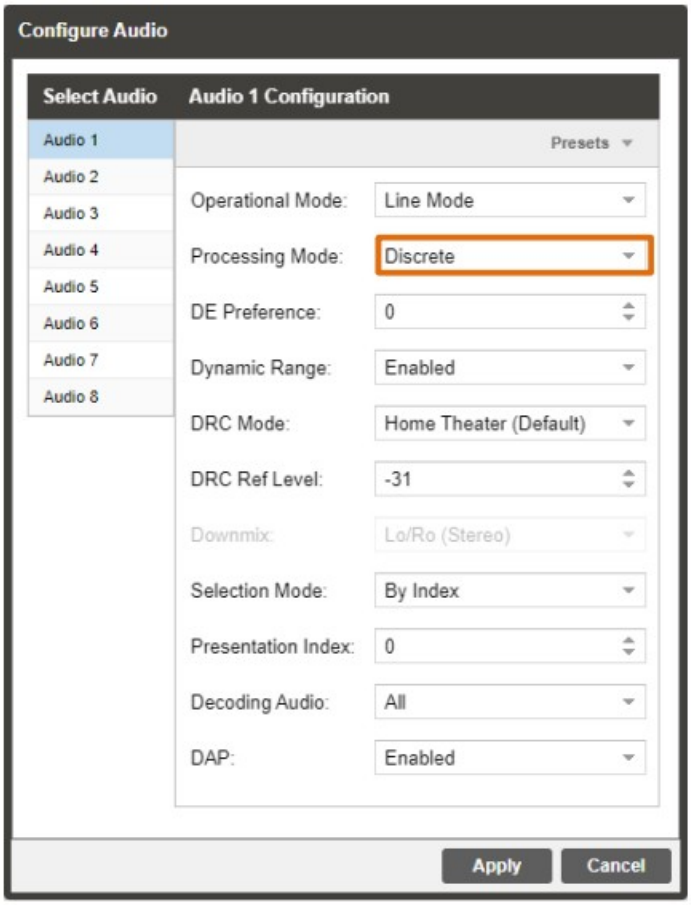


Under Decoding Status, view the available Audios.

For this above example, Audio 1 (PID 52) is eligible for Discrete Surround decode and output, as it is 3/2. Audio 2 (PID 53) is only eligible for Downmix, as it is only 2/0, though it is still capable of PCM stereo or Pass-through.

Configuring the 3/2 Audio PID for Discrete Decode

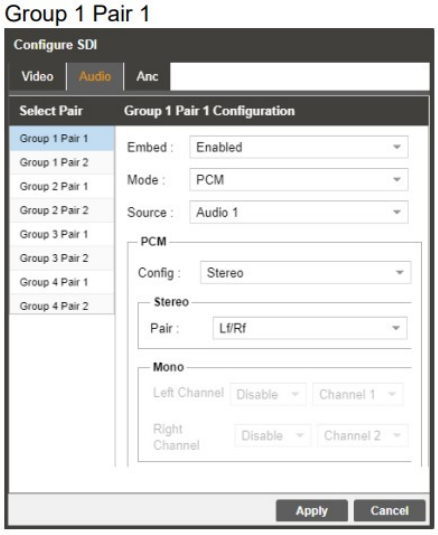
After confirming which Audio PIDs have 3/2 payload, open the Audio Baseband Processing settings (see Section 3.2.5.2) and select the corresponding Audio.



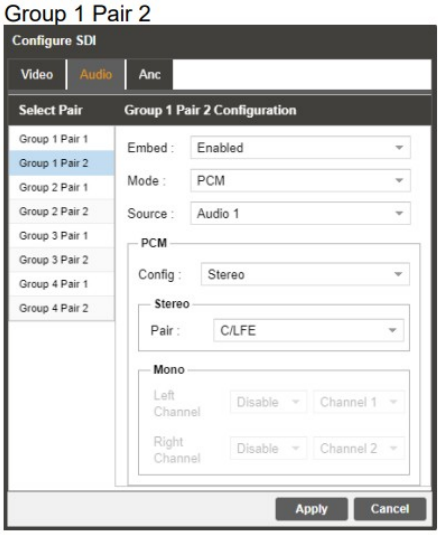
In this sample case, Audio 1 is chosen, as it carries the 3/2. The only necessary setting change is “Processing Mode” as “Discrete”. This ensures the Audio PID is being decoded with splitting the six channels into groups of two for embedded SDI output.

Configuring the SDI Output to Send the Discretely Decoded Pairs Navigate to the SDI Audio configuration (as per Section 3.2.6.2).

Group 1 Pair 1

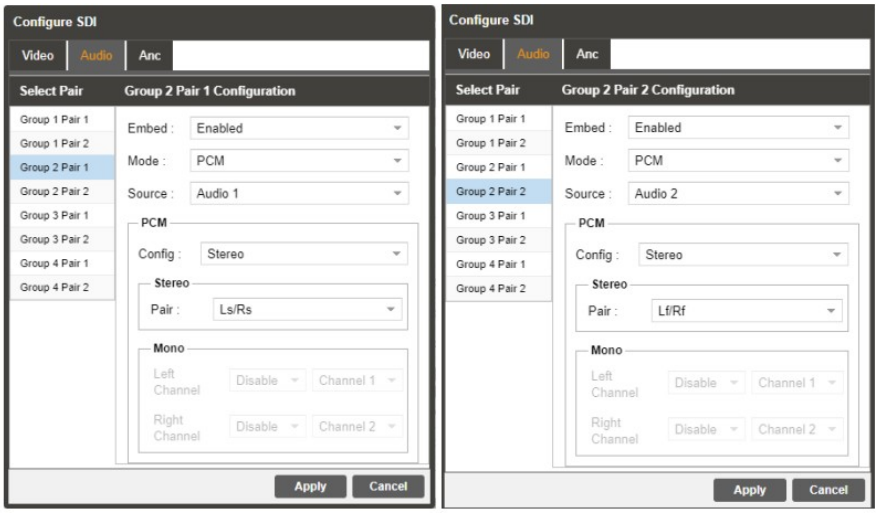


Group 1 Pair 2

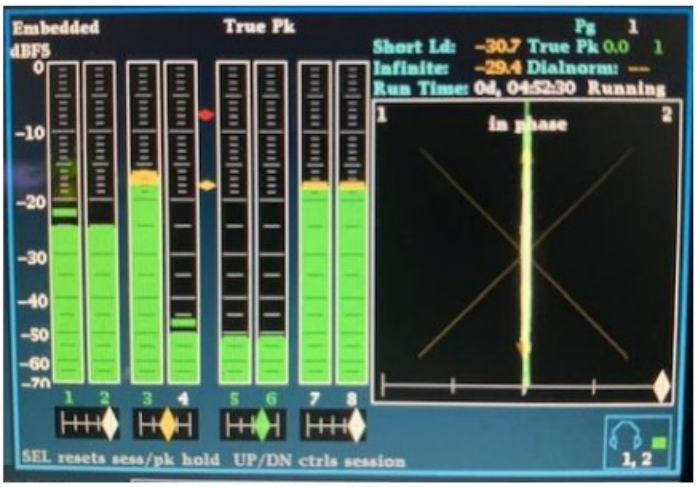


Group 2 Pair 1

Group 2 Pair 2



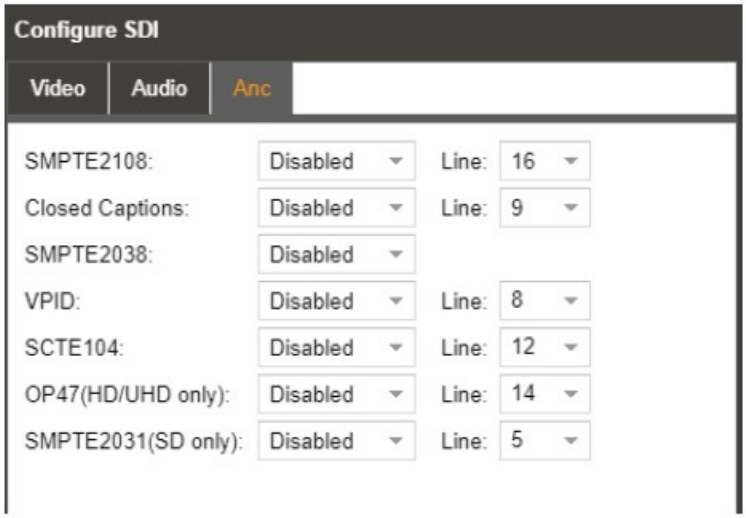
For this sample, each of the first three Group/Pair combinations have the “Source” field configured for “Audio 1”, indicating they all reference the same source PID 52. Each of the three pairs will output a different stereo component of the surround (Lf/Rf goes to
Group 1 Pair 1, C/LFE goes to Group 1 Pair 2 and Ls/Rs goes to Group 2 Pair 1). In this case, as there is PID 53 on Audio 2, Group 2 Pair 2 is simply configured as stereo with downmixed “Audio 2” chosen as the “Source”.



Resulting SDI Output

3.2.6.4 Configuring SDI ANC

The Configure SDI menu also allows for the ability to enable or disable ANC data.



Setting	Range	Description
SMPTE2108	Enabled Disabled	This setting enabled SMPTE 2038 embedding on a selected lin e.
Closed Captions	Enabled Disabled	This setting enables Closed Captions embedding on a selected line.
SMPTE2038	Enabled Disabled	This setting enables SMPTE 2038 embedding
VPID	Enabled Disabled	This setting enables VPID embedding on a selected line
SCTE104	Enabled Disabled	This setting enables SCTE104 embedding on a selected line
OP47	Enabled Disabled	This setting enables OP47 embedding on a selected line
SMPTE2031	Enabled Disabled	This setting enables SMPTE2031 embedding on a selected line

SMPTE 2108 VANC Embedding

The MRD 7000 supports extraction of SMPTE 2108 metadata from the input video PID and embedding in SDI. User configuration is needed for enabling SMPTE 2038 data to be embedded in SDI. Presence of the incoming SMPTE 2108 data is reported in the
Additional Data status in the Decoding section (Transfer Characteristics).

Closed Captions VANC Embedding

The MRD 7000 supports extraction of EIA-608 and EIA-708 subtitles from the input PID and embedding in SDI. User configuration is needed for enabling Closed Captioning data to be embedded in SDI. Presence of the incoming Closed Captioning data is
reported in the Additional Data status in the Decoding section

SMPTE 2038 VANC Embedding

The MRD 7000 supports extraction of SMPTE 2038 metadata from the input video PID and embedding in SDI. User configuration is needed for enabling SMPTE 2038 data to be embedded in SDI. Presence of the incoming SMPTE 2038 data is reported in the
Additional Data status in the Decoding section.

VPID VANC Embedding

The MRD 7000 supports extraction of VPID metadata from the input video PID and embedding in SDI. User configuration is needed for enabling VPID data to be embedded in SDI.

SCTE35/104 VANC Embedding

The MRD 7000 extracts SCTE 35 messages from the transport stream then converts them to SCTE104 messages and embeds them as VANC packets on the SDI output.
User configuration is needed for enabling SCTE104 data to be embedded in SDI.
Presence of the incoming SCTE35 data is reported in the Additional Data status in the Decoding section.

OP47 VANC Embedding

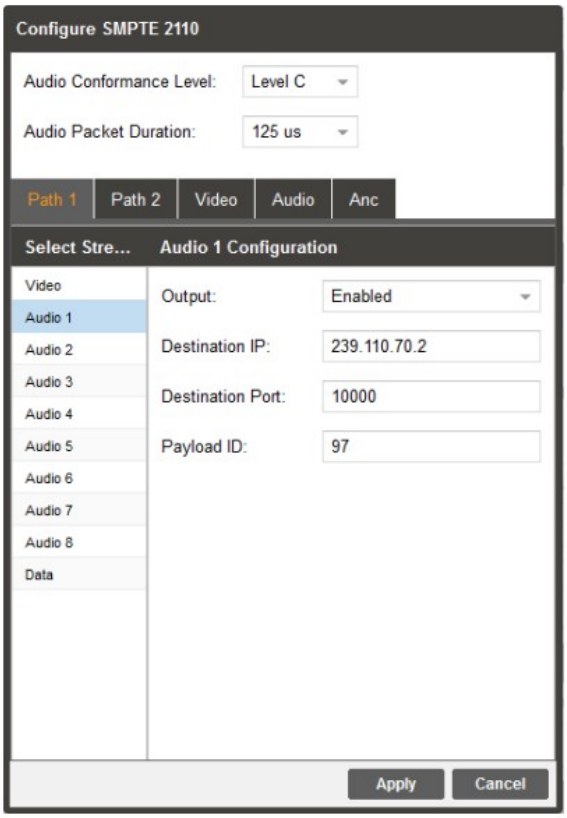
The MRD 7000 supports extraction of OP47 subtitles (UHD/HD) from the input PID and embedding in SDI. User configuration is needed for enabling OP47 data to be embedded in SDI. Presence of the incoming OP47 data is reported in the Additional
Data status in the Decoding section

SMPTE2031 VANC Embedding

The MRD 7000 supports extraction of SMPTE2031 subtitles (SD only) from the input PID and embedding in SDI. User configuration is needed for enabling SMPTE2031 data to be embedded in SDI. Presence of the incoming SMPTE2031 data is reported in the
Additional Data status in the Decoding section.

3.2.6.5 Configuring SMPTE 2110 Path 1 and Path 2

This menu allows the user to configure the SMPTE 2110 output settings. The MRD 7000 comes with the ability to configure two separate paths for SMPTE 2110. Also, with SMPTE 2110 is the ability to configure eight audio pairs. Video, Audio 1-8, and Data Streams are all configurable to enable or disable the output, set Destination IP, and Destination Port.



Setting	Range	Description
Audio Conformance Level	Level A Level B Level C	The user may select the desired audio conformance level for the 2110 output. Level A conformance consists of 1 to 8 audio channels with a packet time of 1 ms Level B conformance consists of 1 to 8 audio channels with a packet time of 125 µs or 1 ms Level C conformance consist of 1 to 16 audio channels with a packet time of 125 µs and of 1 to 8 audio channels with a packet time of 125 µs.
Audio Packet Duration	125 us 1 ms	This selection will change the arrival delay of the 2110-30 audio flow. The 2110-30 audio flows can have a delay of 125 µs or 1 ms depending on the conformance level. If *Level A* conformance is selected, the audio packet timing will default to 1 ms. When configured to *Level B or Level C* audio conformance, the user may select 125 µs or 1 ms for the duration. A 125 µs Audio Packet Duration allows up to 8 pairs of audio to be active per 211-30 flow. A 1 ms Audio packet duration allows up to 4 pairs of audio to be active per 2110-30 flow.
Output	Enabled Disabled	This setting allows the user to enable or disable the output.
Destination IP	224.0.0.0 – 239.255.255.255	This setting allows a user to configure the output destination IP address.
Destination Port	0-65535	This is the UDP port the source device is sending to.
Payload ID	96 – 127	The RTP payload ID specifies the value for the RTP packet header. The value distinguishes between video, audio, and ancillary data for 2110. The default values are 96 for 2110-20, 97 for 2110-30, and 100 for 2110-40.

3.2.6.6 Configuring SMPTE 2110 Video

This tab can be used to configure the output's video behavior in the event of loss of input or other failure to decode.

Setting	Range	Description
Video Loss Mode	Disable ST 2110 Display Raster	When set to *Disable ST 2110,* if the video fails to decode, t his will cease all outbound IP bitrate from the 2110 card on both paths (Video, Audio and Anc). When set to *Display R aster,* the MRD 7000 will continue to output bitrate and the video will display the raster color selected in Section 3.2.5. 1

3.2.6.7 Configuring SMPTE 2110 Audio

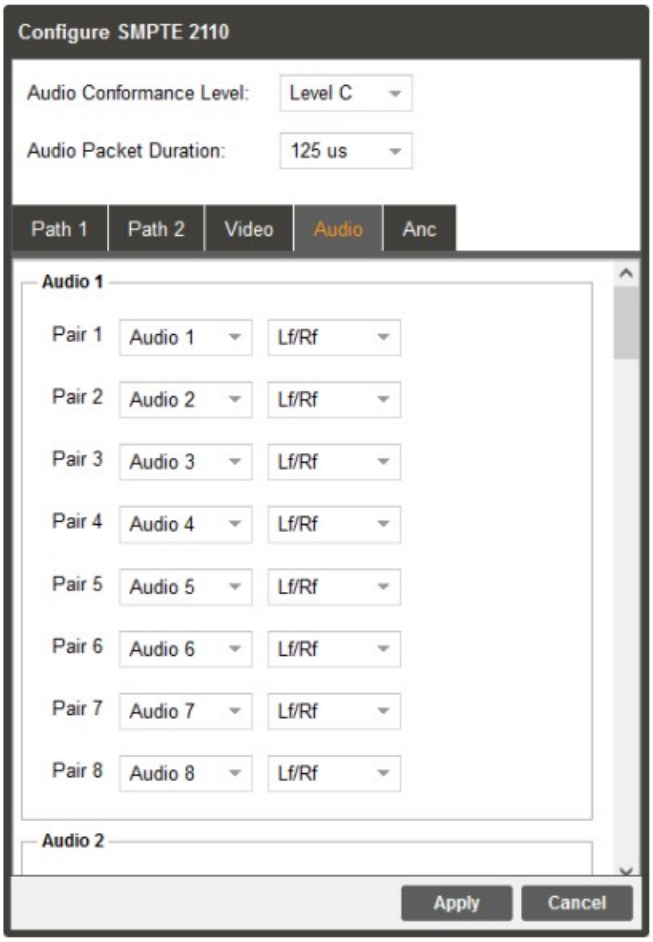
This menu allows the user to configure the SMPTE 2110 embedded audio settings. The MRD 7000 comes standard with the ability to handle up to eight audio services. Eight audio pairs can be embedded to contain a PCM (either downmixed or discrete decode).

In the case where a discrete audio pair is being embedded, the channel pair in the column must be selected. For audio services that indicate the specific channels (Lf, Rf, C, Ls, Rs, LFE) the user can select the audio channels to assign to an output using the

named discrete options. The following audio formats identify specific channels: Dolby Digital, Dolby Digital Plus, AAC-LC, HE-AAC. If the specific channels are not identified (LPCM Audio for example) than the user can use the multi-channel audio service to

select the channel pair of the audio service to output. When the user has selected a named discrete option without identifying the audio channels in the service, the unit will output Ch1/Ch2 (if present) if Lf/Rf is chosen, Ch3/Ch4 (if present) if C/LFE is chosen

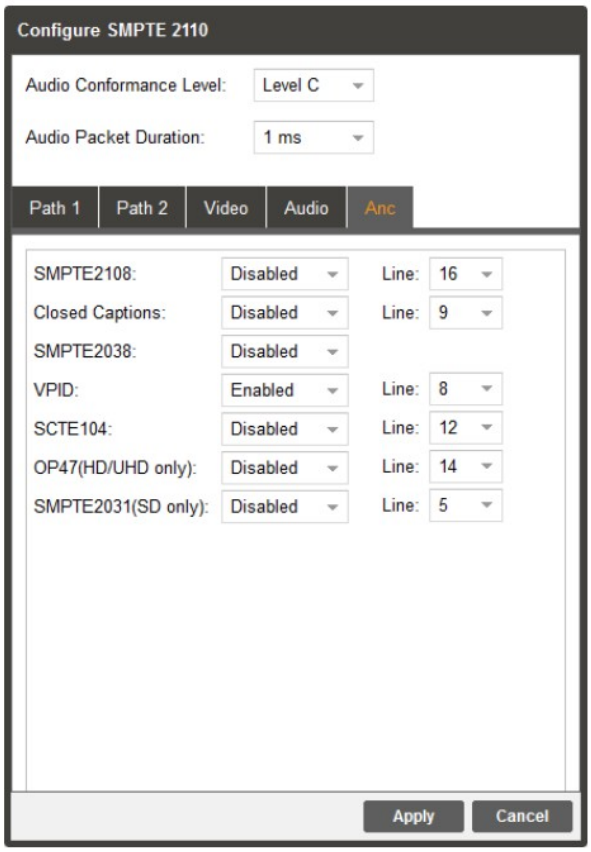
and Ch5/Ch6 (if present) if Ls/Rs is chosen.



Setting	Range	Description
Audio Source	Silence Audio 1-8 Disabled	Silence: the given audio pair on the stream will output bitrate as audio silence data. Audio 1~8: The user may select the desired audio source for each embedded audio pair. The number of audio pairs varies depending on Conformance Level and Packet Duration. See Section 3.2.6.5 for additional details. Disabled: no audio pair will be embedded on the stream for this entry.
Audio Channels	Lf/Rf C/LFE Ls/Rs Lb/Rb Ch1/Ch2 Ch3/Ch4 Ch5/Ch6 Ch7/Ch8	When the audio is downmixed in the MRD 7000 two audio channels are created. The channels can be configured using the settings available in the drop-down menu. Refer to the details above (section 3.2.6.6) for further details.

3.2.6.8 Configuring SMPTE 2110 Anc

The Configure SMPTE 2110 menu also allows for the ability to enable or disable ANC data.



Setting	Range	Description
SMPTE2108	Enabled Disabled	This setting enabled SMPTE 2038 embedding on a selected lin e.
Closed Captions	Enabled Disabled	This setting enables Closed Captions embedding on a selected line.
SMPTE2038	Enabled Disabled	This setting enables SMPTE 2038 embedding
VPID	Enabled Disabled	This setting enables VPID embedding on a selected line
SCTE104	Enabled Disabled	This setting enables SCTE104 embedding on a selected line
OP47	Enabled Disabled	This setting enables OP47 embedding on a selected line
SMPTE2031	Enabled Disabled	This setting enables SMPTE2031 embedding on a selected line

SMPTE 2108 VANC Embedding

The MRD 7000 supports extraction of SMPTE 2108 metadata from the input video PID and embedding in SDI/IP. User configuration is needed for enabling SMPTE 2038 data to be embedded in SDI/IP. Presence of the incoming SMPTE 2108 data is reported in
the Additional Data status in the Decoding section (Transfer Characteristics).

Closed Captions VANC Embedding

The MRD 7000 supports extraction of EIA-608 and EIA-708 subtitles from the input PID and embedding in SDI/IP. User configuration is needed for enabling Closed Captioning data to be embedded in SDI/IP. Presence of the incoming Closed Captioning data is reported in the Additional Data status in the Decoding section.

SMPTE 2038 VANC Embedding

The MRD 7000 supports extraction of SMPTE 2038 metadata from the input video PID and embedding in SDI/IP.

User configuration is needed for enabling SMPTE 2038 data to be embedded in SDI/IP. Presence of the incoming SMPTE 2038 data is reported in the Additional Data status in the Decoding section.

VPID VANC Embedding

The MRD 7000 supports extraction of VPID metadata from the input video PID and embedding in SDI/IP. User configuration is needed for enabling VPID data to be embedded in SDI/IP.

SCTE35/104 VANC Embedding

The MRD 7000 extracts SCTE 35 messages from the transport stream then converts them to SCTE104 messages and embeds them as VANC packets on the SDI/IP output.

User configuration is needed for enabling SCTE104 data to be embedded in SDI/IP.

Presence of the incoming SCTE35 data is reported in the Additional Data status in the Decoding section.

OP47 VANC Embedding

The MRD 7000 supports extraction of OP47 subtitles (UHD/HD) from the input PID and embedding in SDI/IP. User configuration is needed for enabling OP47 data to be embedded in SDI/IP. Presence of the incoming OP47 data is reported in the Additional

Data status in the Decoding section

SMPTE2031 VANC Embedding

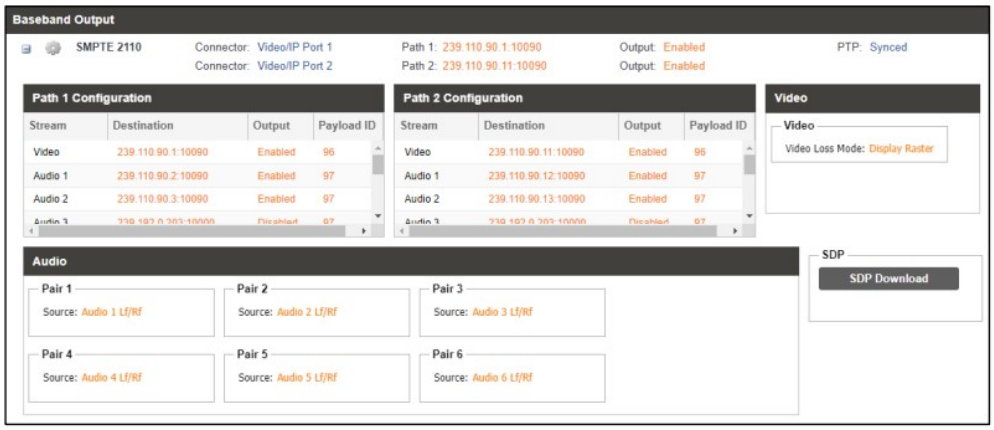
The MRD 7000 supports extraction of SMPTE2031 subtitles (SD only) from the input PID and embedding in SDI/IP. User configuration is needed for enabling SMPTE2031 data to be embedded in SDI/IP. Presence of the incoming SMPTE2031 data is reported

in the “Additional Data” status, found in Section 3.2.4.

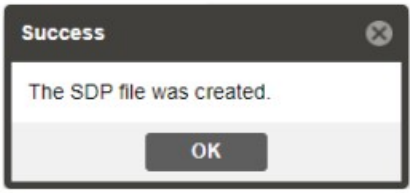
3.2.6.9 SMPTE 2110 Config Overview and SDP Download

To obtain a general overview of all currently configured SMPTE 2110 Baseband Output Settings, click the icon as shown:

This icon expands to show an overview of all currently configured settings involving the SMPTE 2110 output as set between Sections 3.2.6.4 and 3.2.6.7



With this overview exposed, clicking the “SDP Download” icon under the SDP section on the right will download an SDP file directly to the accessing PC.



While most NMOS workflows are “out-of-band”, where NMOS information is conveyed over the management network, this SDP file is for use with “in-band” workflows, over which NMOS information is communicated over the 2110 Network.

3.2.7 Configuring Data Outputs

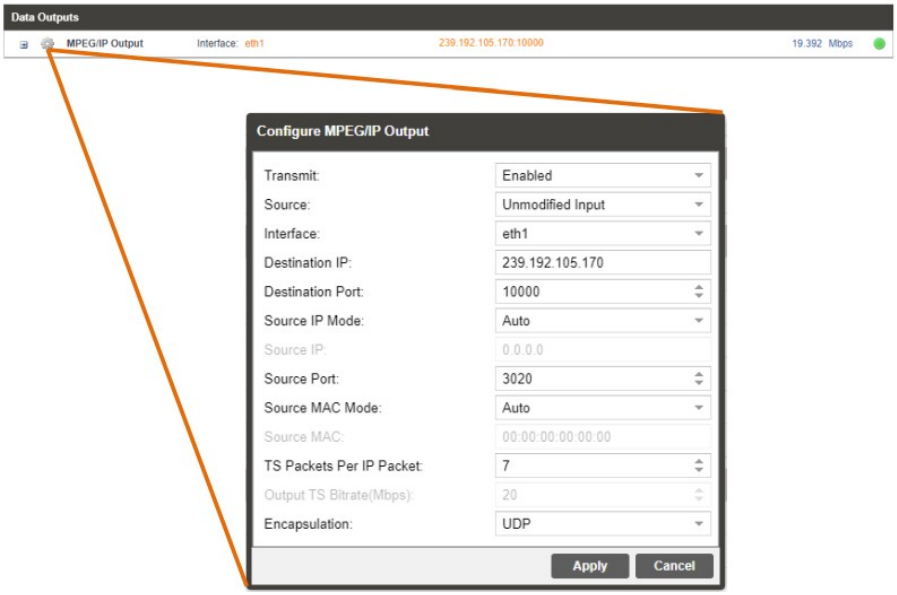
To enable data outputs, the MRD 7000 must satisfy these requirements:

1. MRD 70081 or MRD 70020 server options
2. Any MRD 70020 manufactured before 08/01/2023 must be outfitted with the MRD 70220 RAM Upgrade
3. Have the MRD 70755 MPEG/IP Output License or the MRD 70756 ASI Output License (cannot be equipped with both)
4. If using MRD 70756 ASI Output, one or more ports for the intended ASI/SDI Module must be configured for ASI Output (see Section 3.3.16 for details).

After satisfying the above criteria, either the MPEG/IP Output or the ASI Output options will be present under Data Outputs. If uncertain on any of these items, please contact Sencore ProCare at **procare@sencore.com**.

3.2.7.1 Configuring MPEG/IP Output

With the MRD 70755 MPEG/IP Output License applied, the “Data Outputs” section will show “MPEG/IP Output” at the bottom of the Decoder Menu. Click the Gear icon asshown to access the “Configure MPEG/IP Output” menu.

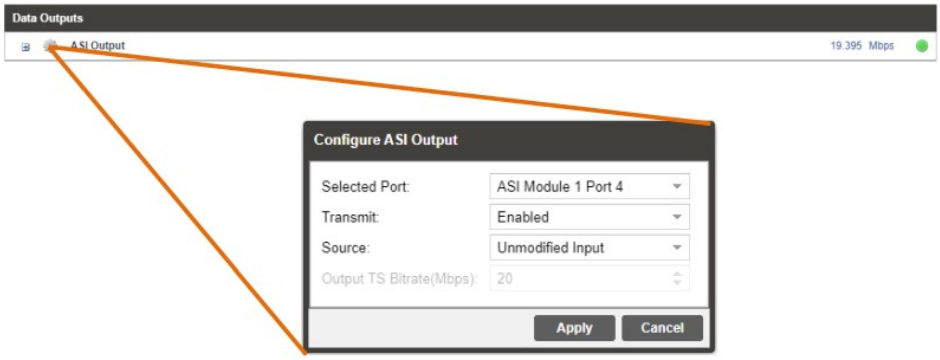


Setting	Range	Description
Transmit	Enabled / Disabled	Enable or disable the IP Output
Source	Unmodified Input Descrambled and Processed	Choose to send the current active TS input either without manipulation or after BISS Descrambling (see Section 3.2.2 for details on BISS Descrambling)
Interface	eth0 ~ eth3	Choose which NIC to transmit the MPEG/IP Output (eth2 and eth3 only available on units with MRD 70200 IP Card)
Destination IP	xxx.xxx.xxx.xxx	The destination address of the Multicast or Unicast output. The Multicast range is 224.0.0.0 – 239.255.255.255 (Class D). The Unicast range is Class A through Class C.
Destination Port	0 – 65535	The UDP destination port the source device is sending to.
Source IP Mode	Auto Manual	When set to Auto, the source IP address on the output stream will match the corresponding local interface. When set to Manual, a user entered address can be assigned to the output stream
Source IP	xxx.xxx.xxx.xxx	Defines the Source IP address to be assigned to the output stream
Source Port	0 – 65535	Defines the source IP port to be assigned to the output stream
Source MAC Mode	Auto Manual	When set to Auto, the source MAC address of the output stream will match the corresponding local interface. When set to Manual, a user entered address can be assigned to the output stream
Source MAC	xx:xx:xx:xx:xx:xx	The user defined MAC for when using Manual MAC Mode
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
Output TS Bitrate (Mbps)	0.5 to 50 Mbps	Only configurable when Active Input is RTMP or HLS (aka OTT). When receiving OTT, the MRD 7000 only collects Access Units and therefore must apply its own CBR to the egress as part of the MPEG/IP output.
Encapsulation	UDP or RTP	Sets the Encapsulation to UDP or RTP

After configuring the MPEG/IP Output, click the ⊞ / ⊟ (left of the Gear icon) to quickly expand or hide pertinent config information. Successful MPEG/IP Output will be indicated by the rightmost green status bubble and non-zero bitrate.

3.2.7.2 Configuring ASI Output

With the MRD 70756 ASI Output Enabled, the “Data Outputs” section will show “ASI Output” at the bottom of the Decoder Menu. Click the Gear icon as shown to access the ASI Output” menu.

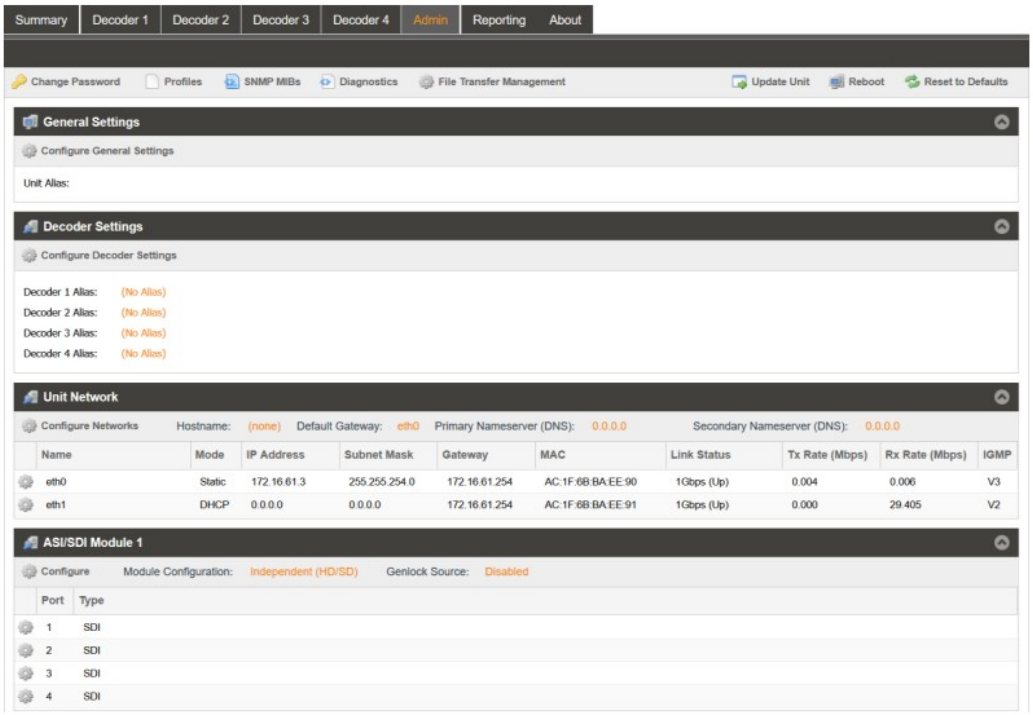


Setting	Range	Description
Selected Port	None ASI Module 1 Port 1-4 ASI Module 2 Port 1-4	Options available here are dependent upon Port Configurat ion as assigned in Section 3.3.15. After choosing a given ASI Port for one Decoder, it will no l onger be available for selection on other Decoders. If an A SI/SDI Port is being used elsewhere for ASI Input or SDI O utput it will no longer be eligible for selection on this menu.
Transmit	Enabled / Disabled	Enable or disable the ASI Output
Source	Unmodified Input Descrambled and Proc essed	Choose to send the current active TS input either without m anipulation or after BISS Descrambling (see Section 3.2.2 f or details on BISS Descrambling)
Output TS Bitrate (Mbp s)	0 to 50 Mbps	Only configurable when Active Input is RTMP or HLS (aka OTT). When receiving OTT, the MRD 7000 only collects Ac cess Units and therefore must apply its own CBR to the egr ess as part of the ASI output.

After configuring the ASI Output, click the ⊞/⊟ (left of the Gear icon) to expand or hide pertinent status information. Successful ASI Output will be indicated by the rightmost green status bubble and non-zero bitrate.

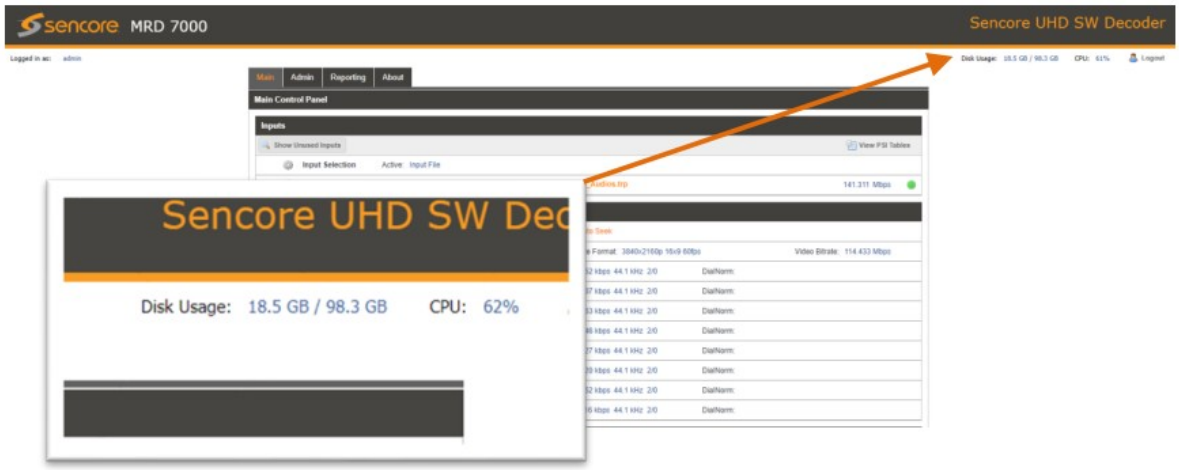
3.3 Admin Panel

To access the Admin Control Panel, click on the Admin tab. This menu allows the user to control many global settings and maintenance tasks on the MRD 7000.



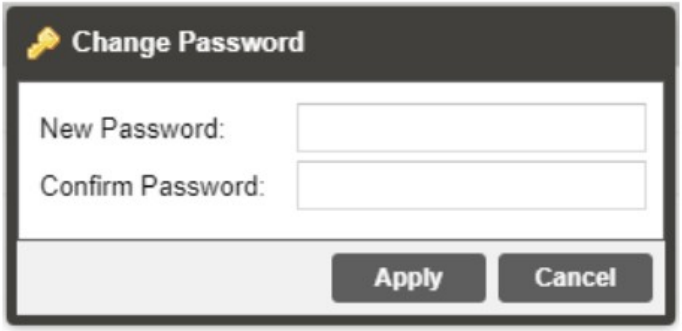
3.3.1 Disk Usage Statistics

The current available and used disk space of the server is shown throughout the userinterface on the top right corner of the page



3.3.2 Changing Unit Password

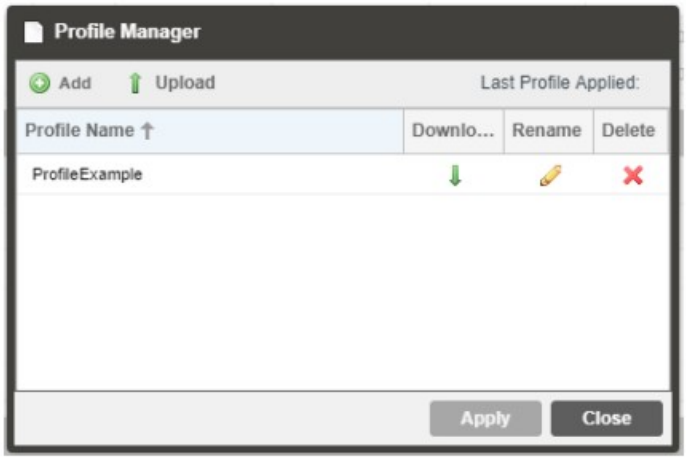
The MRD can be assigned an access password and the current access password can be changed. To make changes to passwords, click the change password button. A window will appear to enter the current password and new password. Note: the username for MRD web-login is always admin



3.3.3 Profiles

The MRD 7000 can save all configured settings to multiple profiles. Profiles can be saved locally, renamed, and saved to external storage to be used on other MRD 7000s.

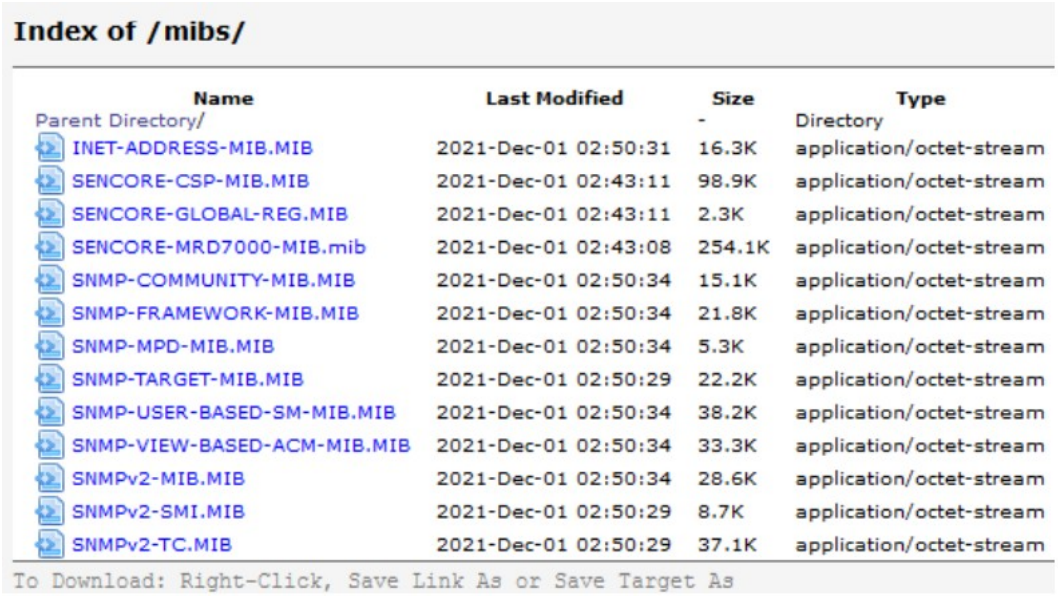
Profiles can be used to quickly and easily change the configuration of an MRD to suit different inputs and decoding requirements.



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 MRD.
Apply Profile	Apply	Select a profile from the drop-down menu and click this button. The MRD will apply all settings contained in the profile selected.
Rename Profile		Select a profile from the drop-down menu and click this button. The user will be prompted for a new name for the profile.
Delete Profile		Select a profile from the drop-down menu and click this button. The user will be prompted to confirm deletion of the profile.
Download Profile		Select a profile from the drop-down menu and click this button. The user will be prompted to select a directory to download the profile.

3.3.4 Download SNMP MIB Files

The MRD 7000 stores the SNMP MIB files for the currently installed version of software on the unit. These files can be downloaded directly from the MRD 7000 by clicking on the SNMP MIBs button. This will open http://<IPAddress>/mibs. The browser screen below will appear where the files can be downloaded and saved from the unit.

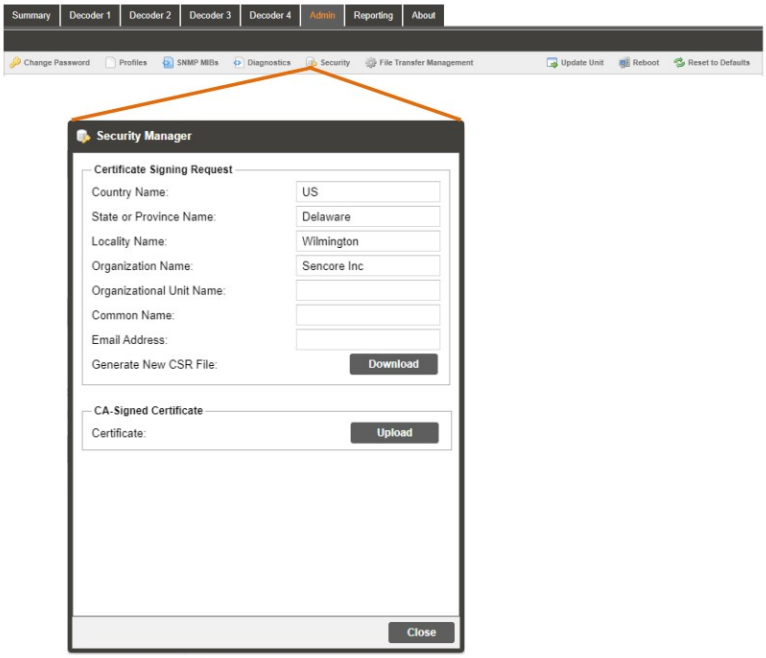


3.3.5 Diagnostics

The MRD 7000 provides the user the ability to take a snapshot of ALL current unit settings, reported values, active alarms, and the alarm and log file history. This snapshot will be downloaded as a .XML format file that can be sent to Procare at Sencore for analysis.
Click the ‘Diagnostics’ button and a window will open showing the diagnostic file creation progress.
This window is replaced with a download file window when file creation is complete.
The user will be asked to ‘Open’ or ‘Save’ the file.

3.3.6 Security Manager

The Security Manager is used to configure certificate information for FTPS and Samba access.



Setting	Range	Description
Country Name	User entry	Country Name for generated CSR file

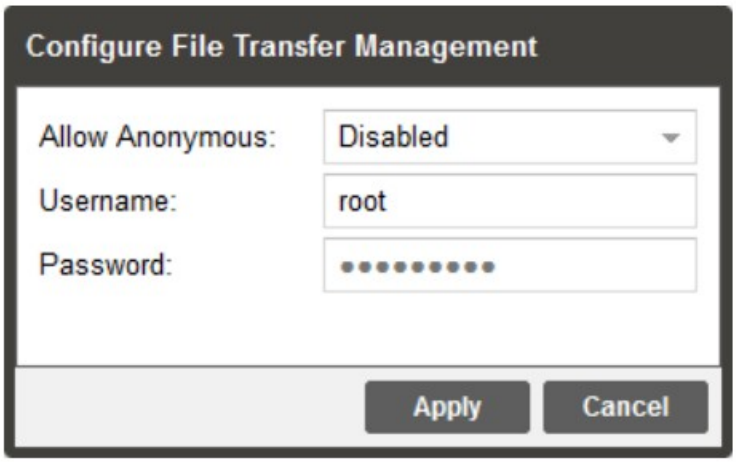
State or Province Name	User entry	State/Province Name for generated CSR file
Locality Name	User entry	Locality Name for generated CSR file
Organization Name	User entry	Organization Name for the generated CSR file
Organizational Unit Name	User entry	Organizational Unit Name for the generated CSR file
Common Name	User entry	Common Name for the generated CSR file
Email Address	User entry	Email Address for reference on the generated CSR file
Generate New CSR File		This icon will generate a new Certificate Signing Request file (CSR) using the configured IP from eth0 for the CSR file name. Additionally, the Security Manager will generate a local private key file that can be sent to a certificate agency to have a CA-signed certificate created.
Certificate		Use this icon to upload the externally CA- signed certificate file.

After uploading a Certificate to the unit, it may be removed with the red minus icon.

Upon removing the uploaded file, it will revert to using its own on-board self-signed certificate.

3.3.7 File Transfer Management

The File Transfer Management configuration button opens a menu in which you can enable or disable authentication for uploading pre-recorded media files. Any changes made to the File Transfer Management will affect the FTP(S) access and the PC File Manager access to the MRD 7000.



Setting	Range	Description
Allow Anonymous	Enabled Disabled	*Enabled* allows access to media storage without a user name or password. Any app capable of FTP may access the capture repository. Disabled allows access to media storage with a username and password required. Only apps capable of FTPS may access the capture repository.
Username	Alpha-Numeric Entry Up to 32 characters	User-defined username for access to media storage
Password	Alpha-Numeric Entry Up to 32 characters	User-defined password for access to media storage

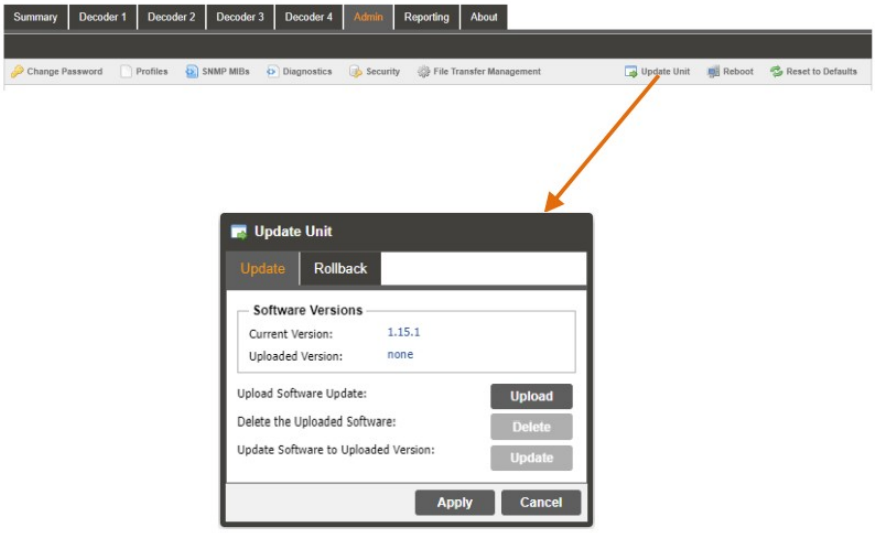
3.3.8 Updating the MRD 7000

Updates to the MRD are performed through the web interface. A software update file is provided by Sencore and then uploaded to the unit

To request the latest software version or a copy of the release notes email ProCare@Sencore.com.

3.3.8.1 Applying Software Updates

Once the software file is downloaded the update can be performed under the Admin tab of the MRD 7000 Web-Interface. Click on the Update Unit button in the top right of the page.

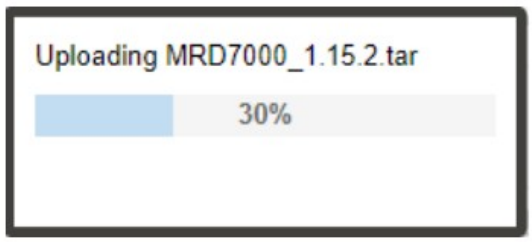


The current uploaded versions are displayed in the “Software Versions” section.

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

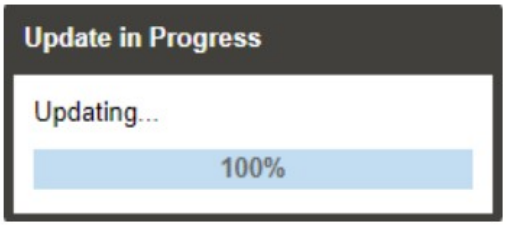
Update Procedure:

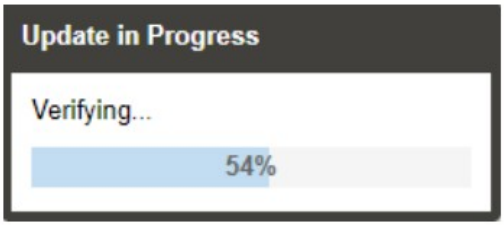
1. Click Upload button and browse to the appropriate software file
2. A progress bar will show uploading status

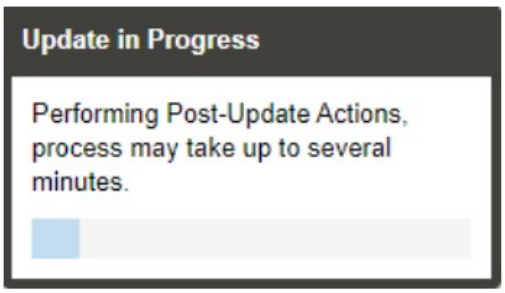


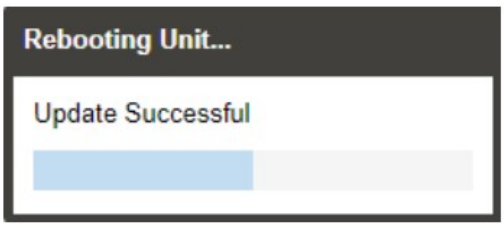
3. Once the file is uploaded click on Yes when prompted to update. Doing this will prompt an automatic reboot of the system, so plan accordingly if a maintenance window is required.

4. After clicking 'Yes', these steps run automatically, left to right, top to bottom. Do not power cycle or otherwise interfere with the unit as it proceeds with the upgrade. The MRD will reboot after the software update is complete.

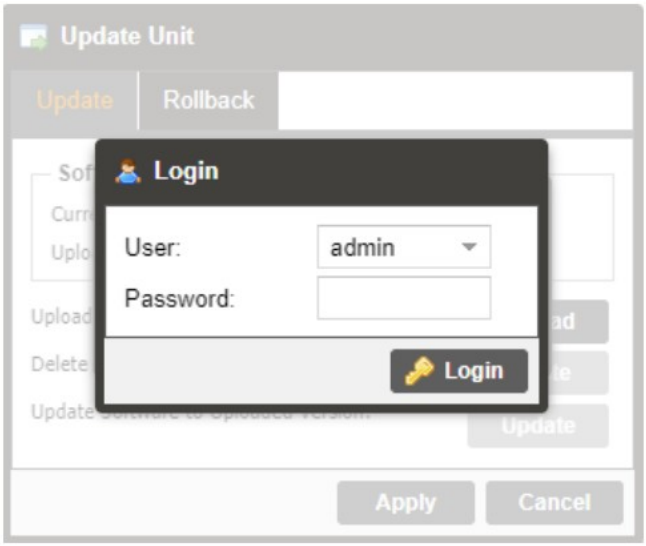








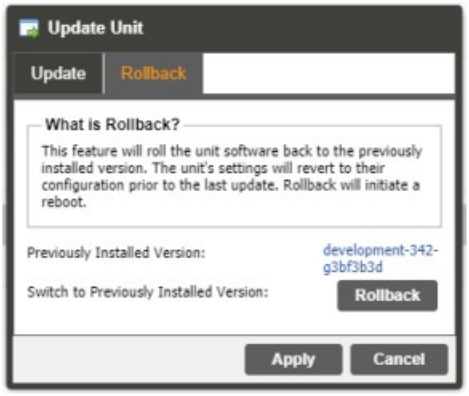
5. When the upgrade is complete, the login prompt will be presented as indicated below. It is recommended to clear the browser cache between upgrades, as some front-end options are subject to change between versions.



3.3.8.2 Rollback Software Updates

The MRD stores two partitions, one with the current software and settings as well as a backup image of the last software version with settings from before the upgrade. The MRD can be reverted to that backup partition using the “Rollback” feature.

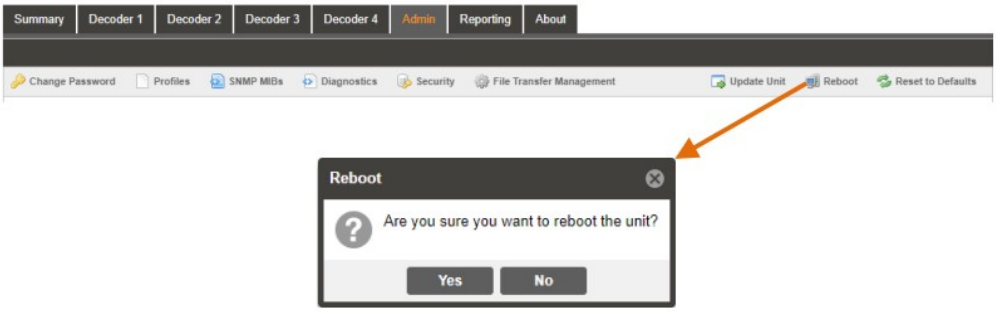
To perform a rollback, click the Update Unit button and then click the Rollback tab. The MRD will reboot after the rollback process is complete.



Action	Button	Description
Rollback	Rollback	Clicking this button starts the Rollback process. The MRD wi ll prompt the user to confirm the rollback or click cancel to sto p the process.

3.3.9 Reboot Unit

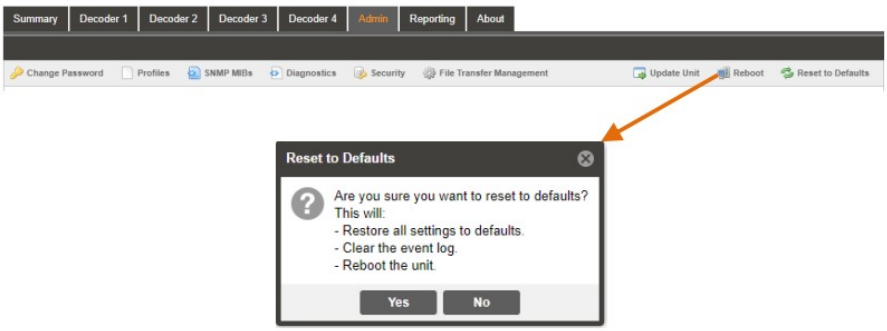
The MRD can be rebooted from the web interface Admin page. To perform a reboot, click the reboot button. The MRD will prompt the user to confirm the reboot. Once the reboot is complete the login screen will appear allowing the web interface to be logged into.



3.3.10 Reset to Defaults

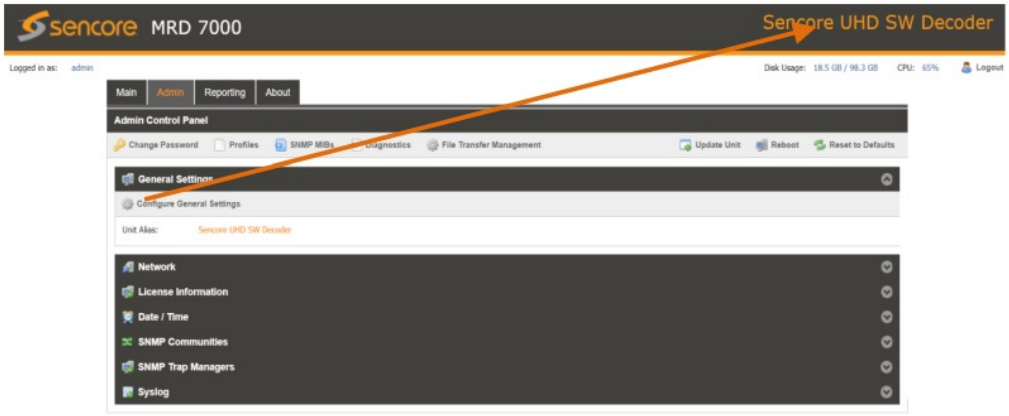
The MRD settings can be reset to factory defaults. All settings will be returned to the factory defaults except the

network management ports TCP/IP settings. All event logs will be cleared. To reset all settings to default, click the Reset to Defaults button on the Admin page. The MRD will prompt the user to confirm the reset.



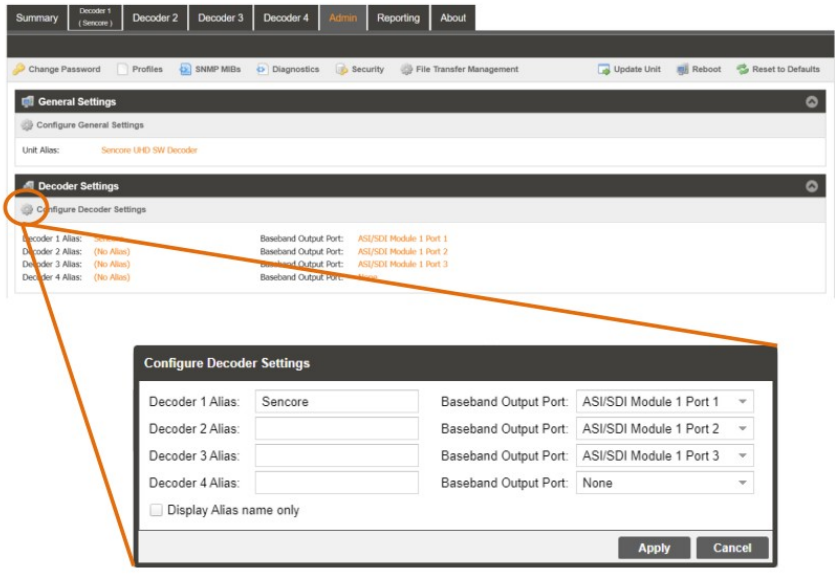
3.3.11 Unit Alias

The Unit Alias allows a unique name or description to be entered which shows on the web-interface title pane. This is configured inside the Admin page.



3.3.12 Decoder Settings

Decoder Settings are for options that affect the “Decoders” (Decoder 1, Decoder 2, Decoder 3, Decoder 4). Options here are for aliasing on the individual Decoders and for choosing which Baseband Output ports will carry the given decoded signal.



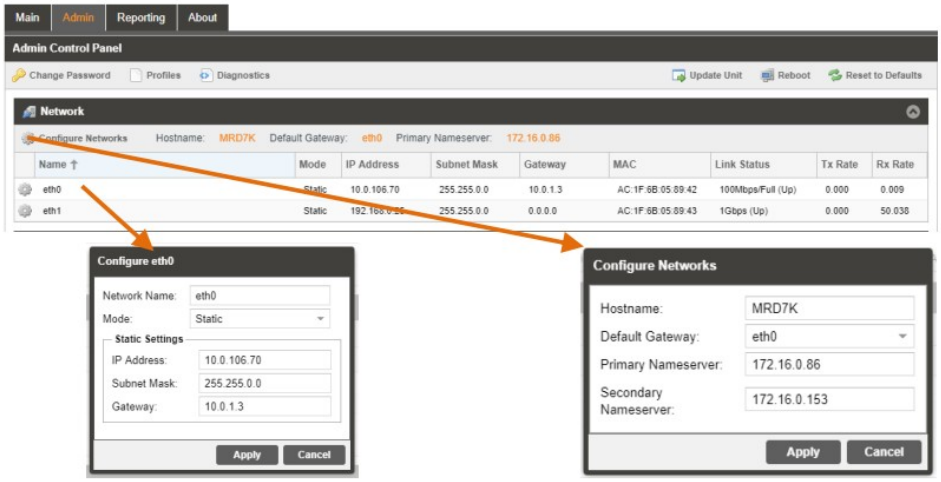
Setting	Range	Description
Decoder X Alias	Up to 32 Characters	Allows a user to have a desired name linked to the specified decoder tab
Display Alias Name Only	Checkbox	If selected, only the user entered Decoder Alias will be displayed for the Decoder tab.
Baseband Output Port	None ASI/SDI Module 1 Port 1-4 ASI/SDI Module 2 Port 1-4 SMPTE2110 Module 1 SMPTE2110 Module 2	Options available here are dependent upon Port Configuration as assigned in Section 3.3.15. After choosing an SDI Port or SMPTE2110 Module for one Decoder, it will no longer be available for selection on other Decoders. If an ASI/SDI Port is being used elsewhere as an ASI Input or Output, it will not be available for selection on this menu. If *None* is selected, the Decoder will enter “Gateway Mode”, where all Decode and Baseband related settings are removed and only the Data Output is used.

After configuring the Decoder Settings, if any changes were made to Baseband Output Ports, a reboot will be required to fully apply those settings. After the reboot, the changes will become apparent under the “Baseband Output” section (see Section 3.2.6) for the modified Decoder(s).

3.3.13 Configure Unit Networks

The MRD 7000 can be assigned a Hostname and DNS servers. To access this menu, click on the Configure Networks gear icon in the Admin page.

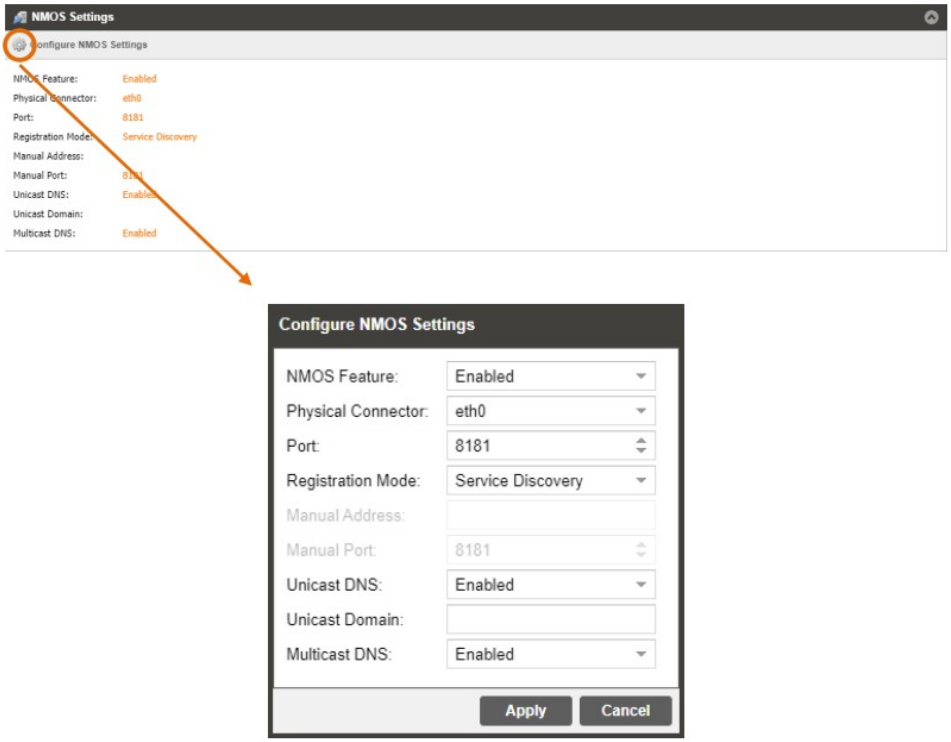
The Default Gateway of the web-interface can also be pointed at a chosen network port (Eth0 or Eth1). The web-interface is accessible from the IP address of either Ethernet port; however, be sure to configure the two ports for separate subnets.



Setting	Range	Description
Network Name	Alphanumeric, no spaces allowed	This setting allows the user to define an optional unit Hostname.
Mode	Static DHCP	IP is entered by user and will not change IP is assigned to MRD by network/router
IP Address	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. This setting will need to match your NMOS handshake port. Refer to section 3.3.14.

3.3.14 NMOS Settings

With the SMPTE 2110 module and the MRD 70760 NMOS license, a user can configure NMOS connections. To access this menu, click on the Configure NMOS Settings gear icon under the NMOS Settings section in the Admin page.

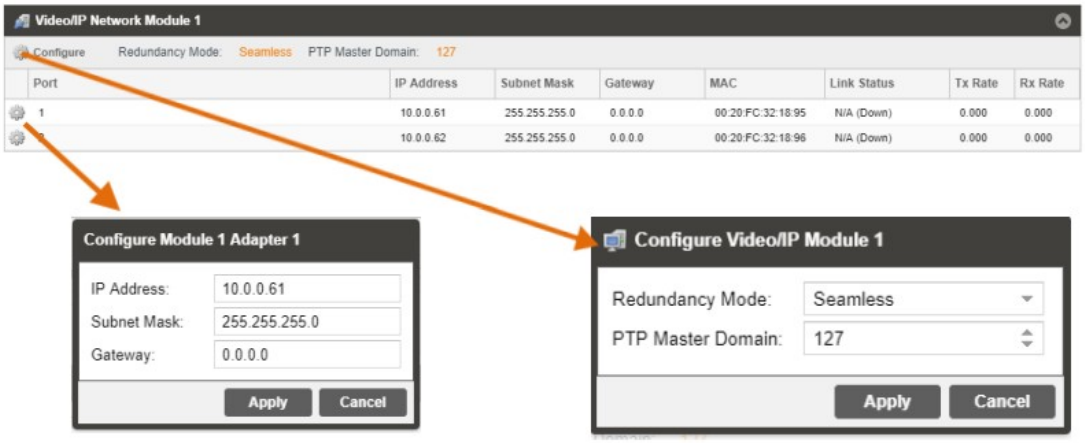


Setting	Range	Description
NMOS Feature	Enable/Disable	Enable or Disable NMOS feature.
Physical Connector	eth0-ethX	The physical ethernet port that NMOS will communicate through. NMOS communication occurs only on the interface chosen as the Default Gateway, under “Unit Network settings”. See Section 3.3.12.
Port	1-65535	The port that NMOS will make the initial connection handshake on. Ports 21, 22, 80, 445, and 5353 are not supported as they are reserved ports.

Registration Mode	Service Discovery Manual	Service Discovery obtains an NMOS RDS IP address from a DNS. Manual bypasses a DNS and connects directly to an NMOS RDS.
Manual Address	Four decimal octets: XXX.XXX.XXX.XXX	The hostname or IP address of an NMOS RDS
Manual Port	1-65535	The port number the NMOS RDS is listening on
Unicast DNS	Enabled Disabled	Enable or Disable whether to connect to an NMOS RDS using Unicast DNS
Unicast Domain		The domain of the NMOS DNS. Leave blank for the system to attempt the connection as default.
Multicast DNS	Enabled Disabled	Enable or Disable whether to connect to an NMOS RDS using Multicast DNS

3.3.15 Configure SMPTE 2110 Video/IP Networks

With the SMPTE 2110 module, a user can configure the Video/IP Redundancy Mode. To access this menu, click on the Configure gear icon under the Video/IP Network Module 1 section in the Admin page.
The PTP Master Domain can also be adjusted to synchronize the grand master PTP clock.



Module Adapter

Setting	Range	Description
IP Address	Four decimal octets: XXX.XXX.XXX.XXX	This is the IP address assigned to the SFP port on the selected SMPTE 2110 port.

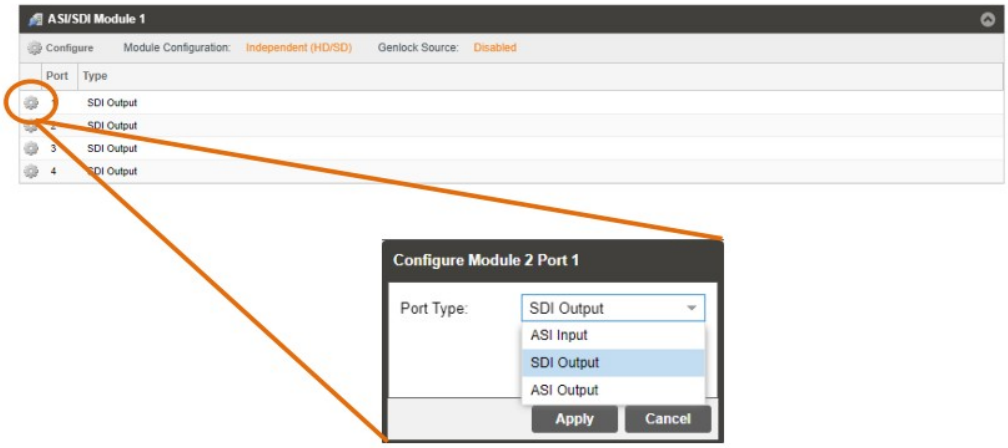
Subnet Mask	255.0.0.0 – 255.255.255.254	This is the Subnet Mask assigned to the SFP port on the selected SMPTE 2110 port.
Gateway	Four decimal octets: XXX.XXX.XXX.XXX	This is the Gateway address assigned to the SFP port on the selected SMPTE 2110 port.

Video/IP Module

Setting	Range	Description
Redundancy Mode	Seamless Disabled	When seamless is selected, the MRD 7000 will operate wit hin the SMPTE 2110 standard mode. This mode will provid e primary and redundant paths for configuration in the sep arate stream processing paths. When disabled the MRD 7 000 will provide a single IP path for input and output strea ms and the user will determine the appropriate
PTP Master Domain	0-127	The Domain identified used to sync to the PTP source.
Output Mode	1x UHD/HD/SD 4x HD/SD	This option changes the Decoder Output Modes. See
Reference Format	See Genlock supported for mats in Appendix C	The Reference Format must be set to match the decoded Video Format. This can also be used to sync your video ou tput to a Genlock reference device.

3.3.16 Configuring ASI/SDI Ports

These menus are used to orient the decode mode of the unit and allocate purpose to each of the BNC connectors on the MRD 70140 and MRD 70141 cards. Setting changes made here will potentially affect options available on the Decoder Settings (Section 3.3.11) and Data Outputs (Section 3.2.7). A reboot must be applied for the changes to take effect. Review the possible Decoder and Output Mode combinations in Section 3.3.18.

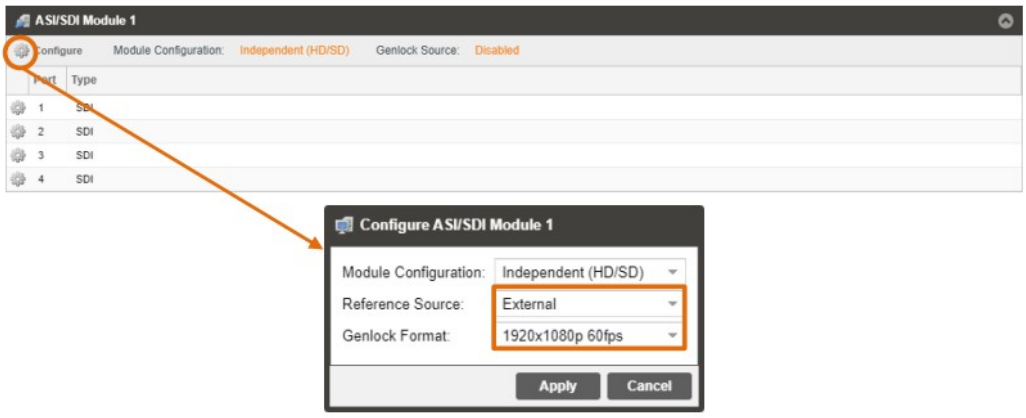


3.3.17 Configuring Genlock

SDI Output modules with the “Reference Source” configured as External must manually define the Genlock Format for the card to lock to the Genlock signal. SDI over IP (2110) modules require the “Reference Format” to always be configured to properly output video. In Multichannel decode applications, the same Genlock reference is used for all SDI outputs.

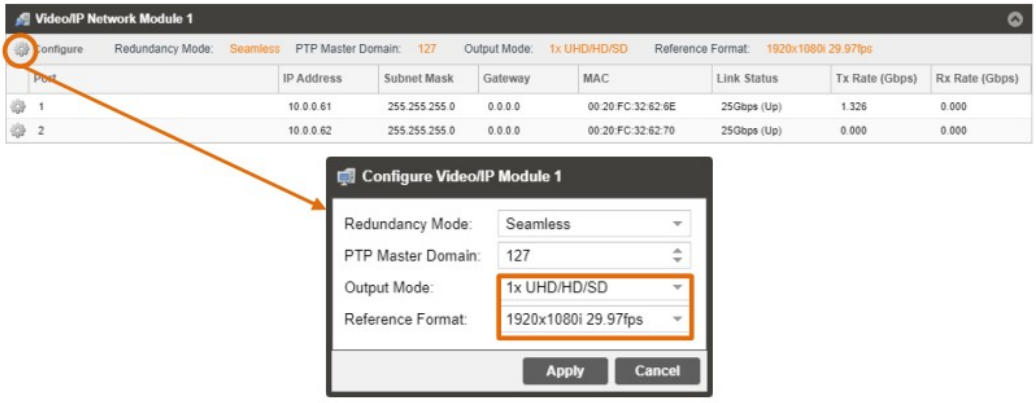
3.3.17.1 Genlock SDI Output Module

SDI Output Module Genlock settings can be activated in the Admin panel under the ASI/SDI module.



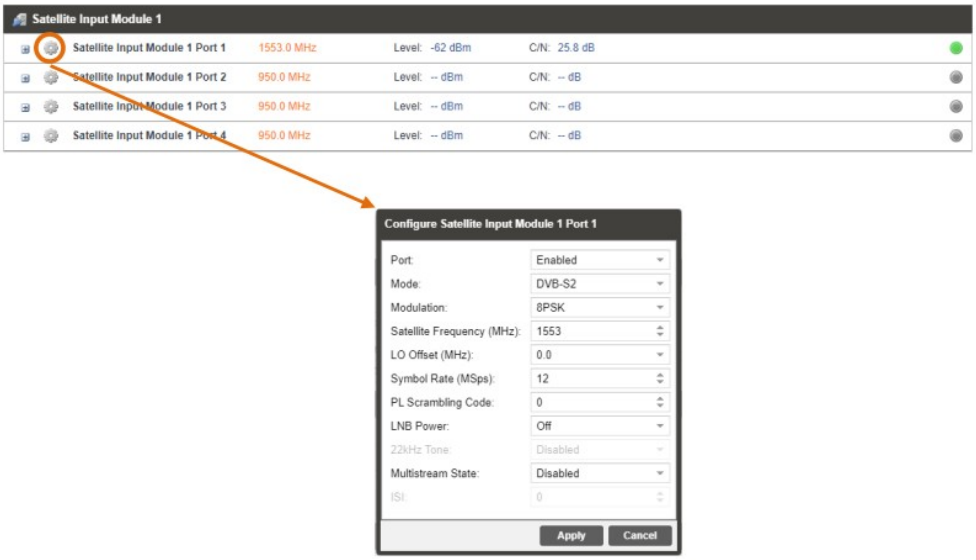
3.3.17.2 Genlock 2110 Output Module

SDI over IP (2110) Output Module Genlock settings can be activated in the Admin panel under the Video/IP module.



3.3.18 Configuring Satellite Ports

To make changes to lock onto the satellite signal click on the configure button next to the Satellite Module.



The Satellite Module can be configured within the port menu. This allows the user to lock onto the input signal by changing the port, mode, modulation, frequency, offset, symbol rate, and scrambling code. The module can supply LNB power and provide multi-stream.

Setting	Range	Description
Port	Enabled Disabled	Enable/Disable the Satellite Input
Mode	DVB-S DVB-S2/DVB-S2X	Select which modulation mode to receive for the Satell ite input
Modulation	QPSK 8PSK/8APSK-L 16APSK/16APSK-L 32APSK/32APSK-L 64APSK/64APSK-L 128APSK 256APSK/256ASPK-L	Select the modulation type
Satellite Frequenc y	950 – 14500	The carrier frequency in MHz of the input signal
LO Offset	0 5150 9750 10600	Choose or enter the frequency offset in MHz based on the current input signal and the above Satellite Freque ncy value

	10750 11250	
Symbol Rate	0.5 – 60	The symbol rate in MSps of the modulated input signal
PL Scrambling Code	0 – 262141	The PL Scrambling code value of the modulated signal
LNB Power	Off 13 VDC 18 VDC	Chose to enable LNB Power and specify the output voltage t hat match the application
22kHz Tone	Enabled Disabled	Enable/Disable the 22kHz tone based on LNB Power configu ration
Multi-stream State	Enabled Disabled	Enable/Disable the Multi-stream state based on your current DVB-S2 input signal
ISI	0 – 255	The unique ID of the input signal within the DVB-S2 multi-stre am input signal

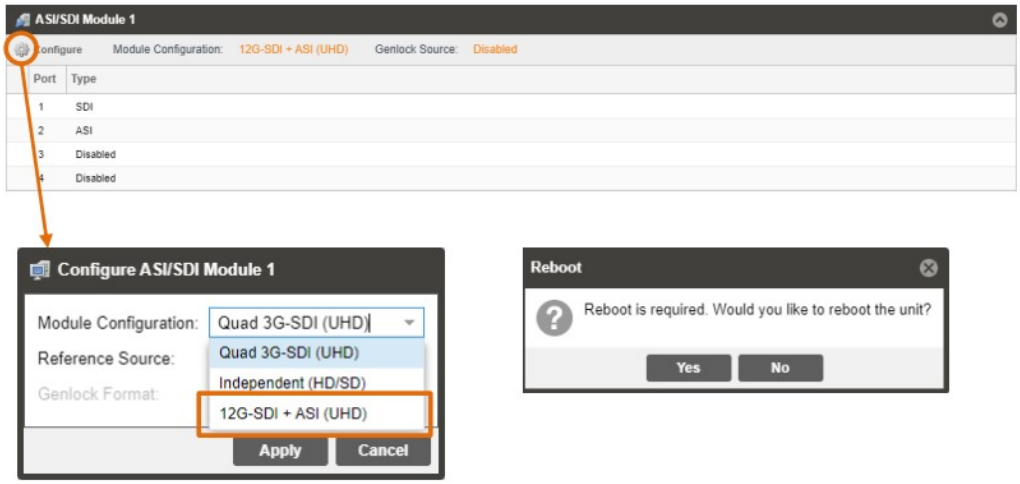
3.3.19 Configuring Decoder Output Modes

MRD 7000 allows a user to decode single UHD or Multichannel HD/SD outputs. The two output types are SDI or SDI over IP (SMPTE 2110). The mode of operation for the MRD 7000 will depend on the licensing and output card installed.

Multichannel mode (4 Independent HD/SD channels) is configurable when unit is equipped with the MRD 70120, MRD 70140, MRD 70141, MRD 70180 or MRD 70182 module. Single Port/Link UHD for MRD 70141, MRD 70180 or MRD 70182. Quad Link UHD for MRD 70140 or MRD 70141.

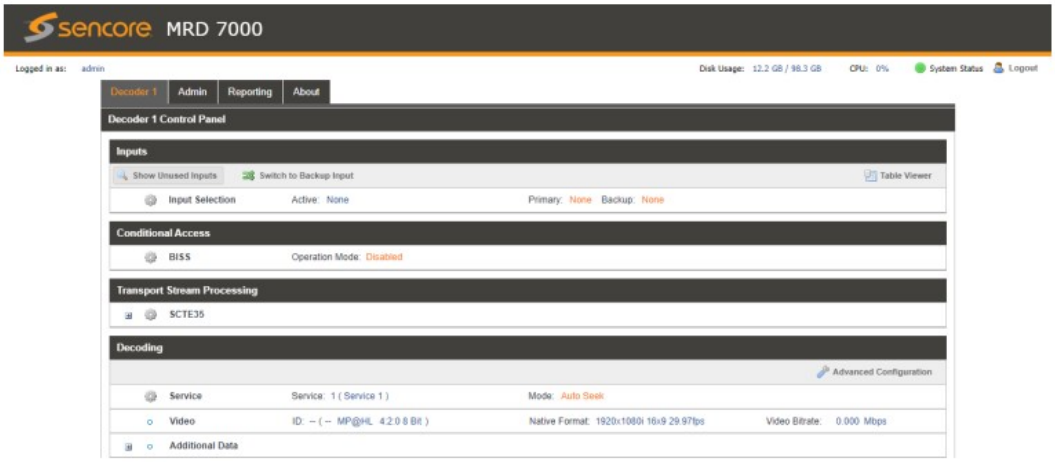
3.3.19.1 Configuring SDI Single Port UHD Decoder Outputs

To change from Quad Link UHD or Multichannel mode to Single Port UHD mode, the user needs to select 12G-SDI + ASI (UHD) from the Module Configuration list. After reboot, confirm Port 1 is set to SDI and Port 2 is set to ASI. Ports 3 and 4 should be disabled.



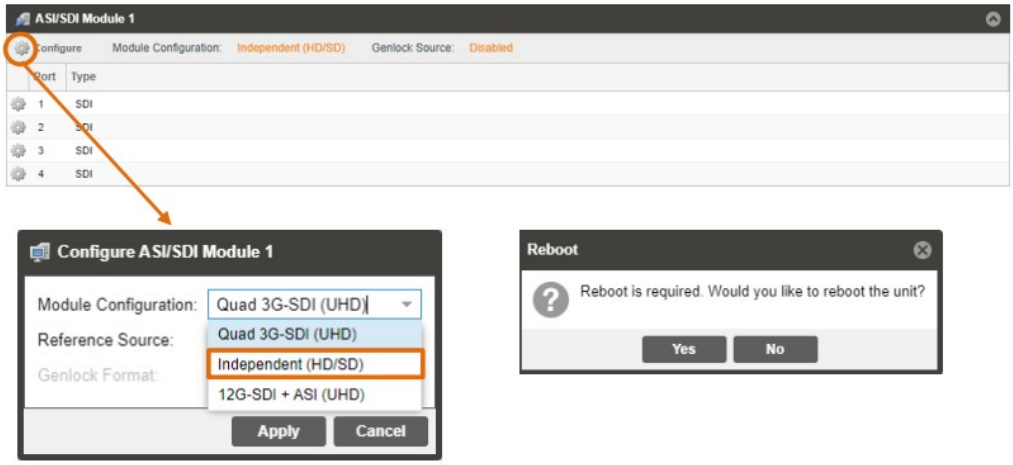
When unit completes boot up, clear the browser cache by pressing Ctrl+Shift+R to remove any front-end memory of the previous config. Verify the configuration now matches the image below. Port 1 are set to SDI, while Port 2 is set to ASI. Ports 3 and 4 will be disabled.

When 12G-SDI + ASI (UHD) mode is successfully applied, the user can then configure a Single Port UHD decoder via Decoder 1 as shown below.

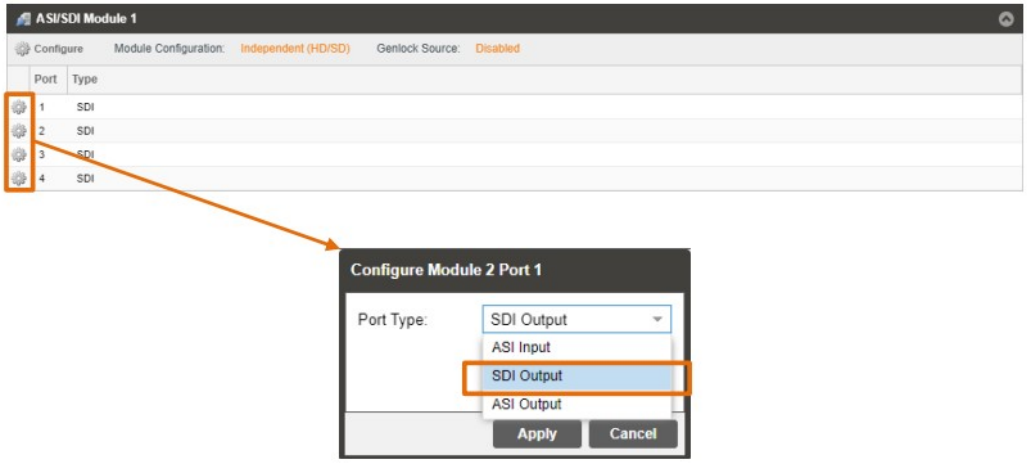


3.3.19.2 Configuring SDI Multichannel Decoder Outputs

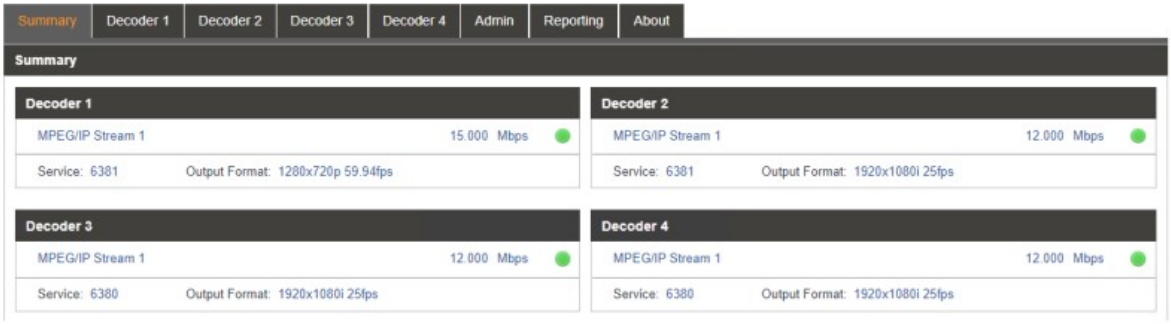
To change from Quad Link UHD or Single Port UHD mode to Multichannel mode, the user needs to select Independent (HD/SD) from the Module Configuration list. After reboot, confirm Ports 1 through 4 are set to SDI.



When unit completes boot up, clear the browser cache by pressing Ctrl+Shift+R to remove any front-end memory of the previous config. Verify the configuration now matches the image below. All ports are set to SDI, and cogs to configure each of them are now available.

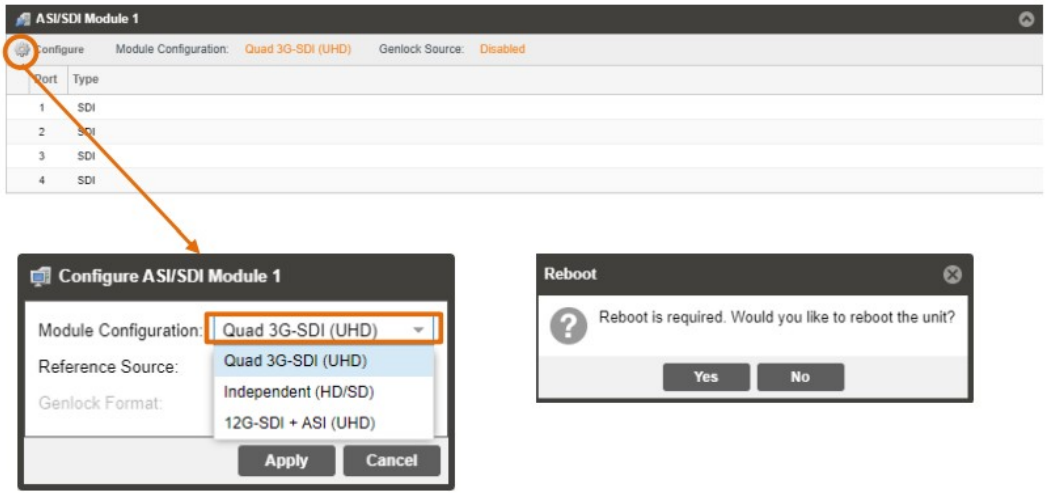


When Independent (HD/SD) mode is successfully applied, Multichannel decoding is available via Decoder 1, Decoder 2, Decoder 3, and Decoder 4 tabs. The Summary tab displays overall status for all decoders.



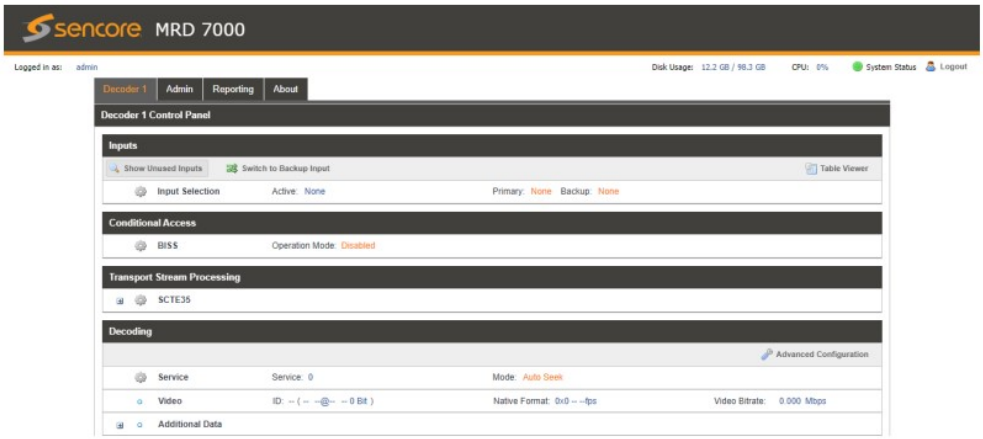
3.3.19.3 Configuring SDI Quad Link UHD Decode Outputs

To change from Multichannel mode or Single Port UHD mode to Quad Link UHD mode, select Quad 3G-SDI (UHD) from the Module Configuration list. After reboot, confirm Ports 1 through 4 are set to SDI and no configuration cog is available. Also confirm only 1 decoder tab is available in the Web GUI.



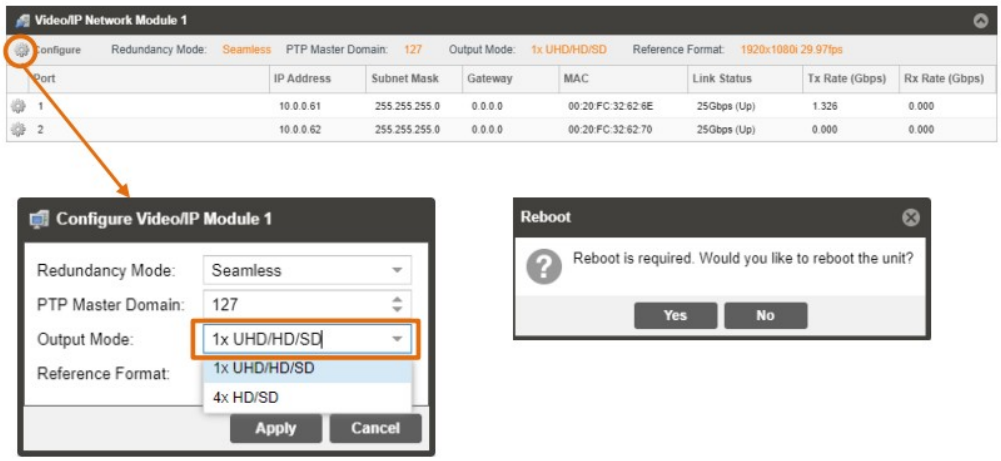
When unit completes boot up, clear the browser cache by pressing Ctrl+Shift+R to remove any front-end memory of the previous config. Verify the configuration now matches the image below. All ports are set to SDI, and no configuration cogs present.

When Quad 3G-SDI (UHD) mode is successfully applied, the Quad Link UHD decode will now be available via Decoder 1.

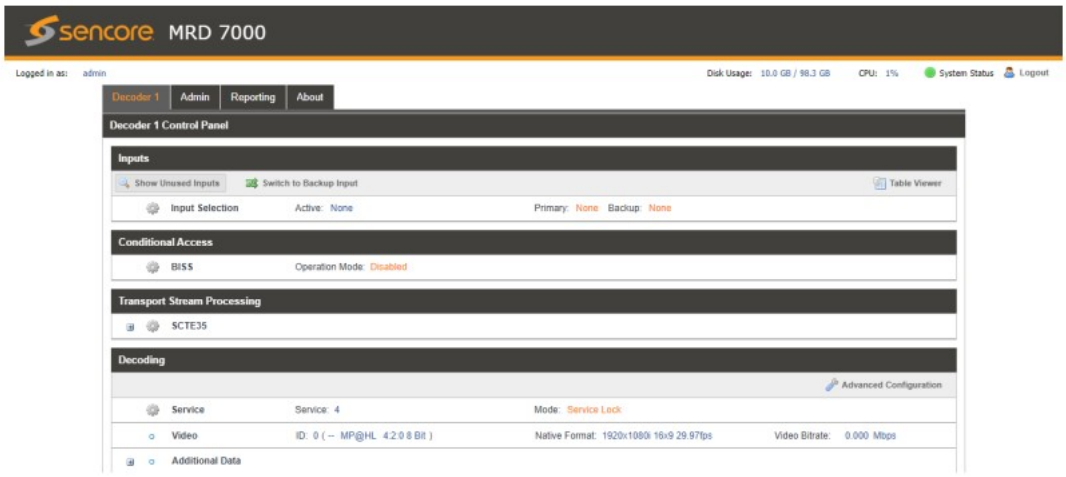


3.3.19.4 Configuring 2110 Single Link UHD Decode Outputs

To change from Multichannel Mode to Single Link UHD mode, select 1x UHD/HD/SD from the Output Mode list. Click ‘Apply’ and then ‘Yes’ to commit the setting and reboot.

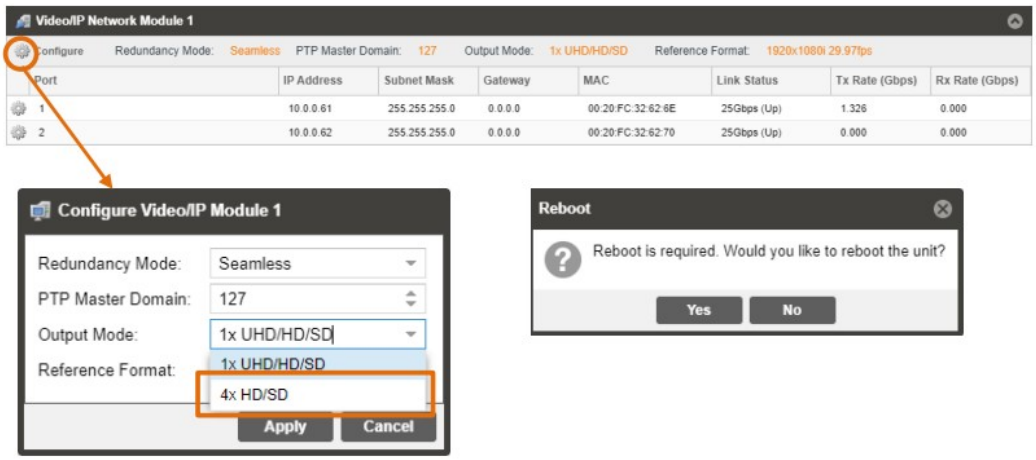


When unit completes boot up, clear the browser cache by pressing Ctrl+Shift+R to remove any front-end memory of the previous config. Verify there is now only one Decoder tab as shown in the image below. In 1x UHD/HD/SD mode, the user can configure a Single Link UHD decoder via Decoder 1.

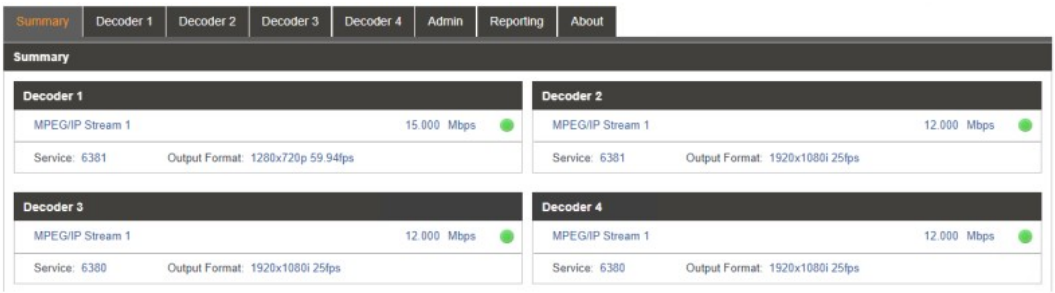


3.3.19.5 Configuring 2110 Multichannel Decoder Outputs

To change from Single Link UHD mode to Multichannel mode, the user needs to select 4 HD/SD from the Output Mode list. After reboot, confirm Decoders 1 through 4 are available.



When unit completes boot up, clear the browser cache by pressing Ctrl+Shift+R to remove any front-end memory of the previous config. Verify there are now four Decoder tabs as shown in the image below.



When 4x HD/SD mode is successfully applied, the user can then configure Multichannel decoding available via

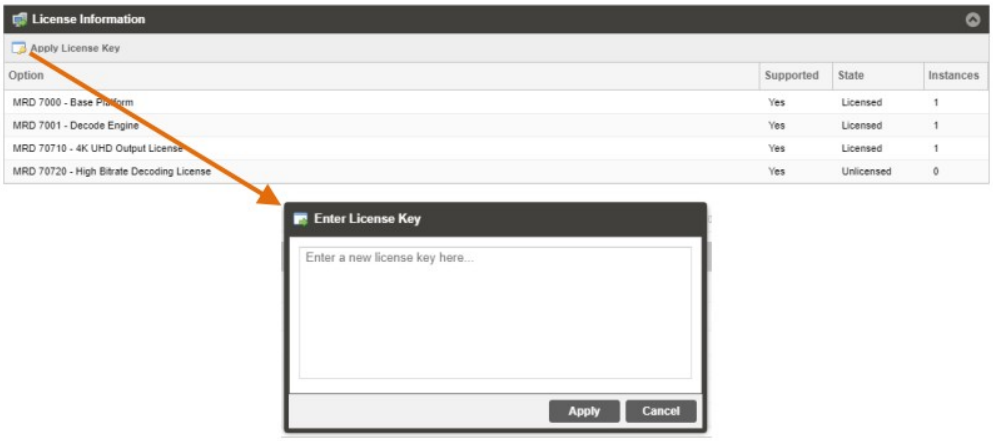
Decoder 1, Decoder 2, Decoder 3, Decoder 4 tabs. Summary tab displays overall status for all decoders.

3.3.20 Licensing

Certain features of the MRD require licenses 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

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



3.3.20.1 Software Support Agreements

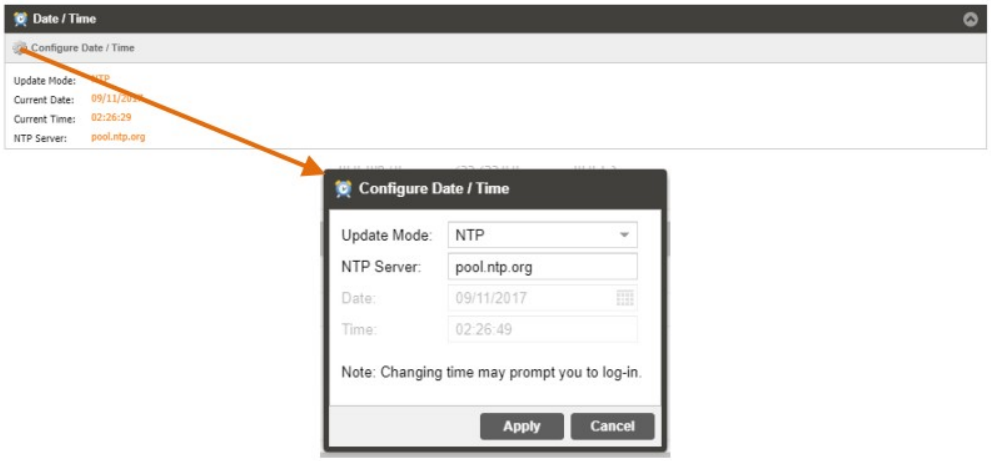
Purchase of the MRD 7000 software includes one year of software support. This provides access to the latest software versions throughout that one-year period. These software versions include:

- Bug fixes
- General updates
- Maintenance releases

The MRD 7000 will only accept software files which were released before or during the active SSA period. Software updates released following the expiration of the SSA will be rejected on upload, until the product's SSA has been re-activated. The actual SSA information is maintained on the product itself and can be updated by applying a license key via the web user interface. The product's user interface displays the end date to ensure the user is always informed of their SSA status. Regardless of the status of the software subscription agreement, Sencore offers phone and email technical support during regular business hours for all products.
Once the SSA period has expired, customers are free to keep using the software version hey already have or other versions from before the expiration date but applying newer versions will require an extended SSA.

3.3.21 Date/Time

The MRD can be set to synchronize with an NTP server, or a manual data and time can be defined by the user. Click the Configure Date / Time button to configure the date and time. These values are used to timestamp entries in the Alarm and Event logs under the Reporting tab.

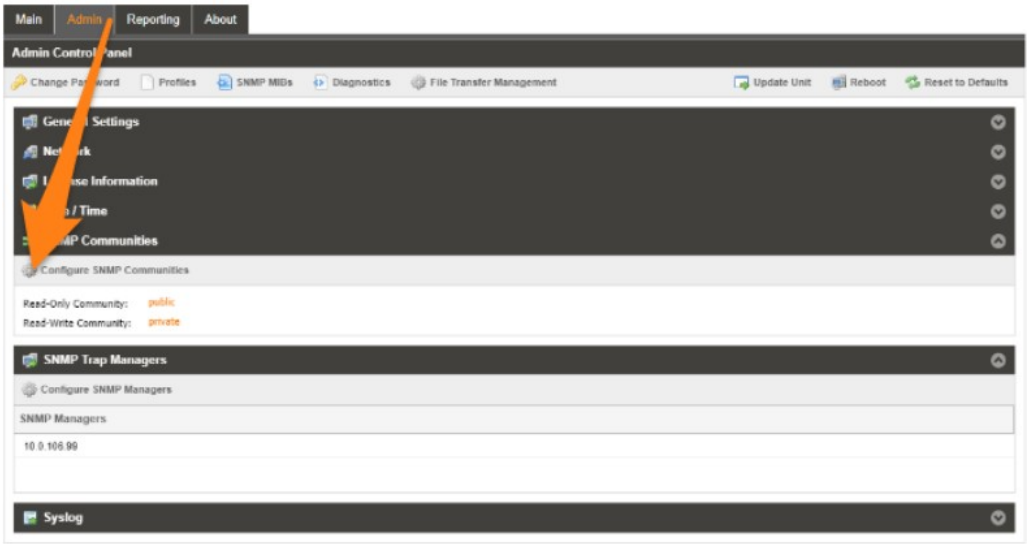


Setting	Range	Description
Update Mode	NTP Manual	Setting to *NTP* uses the local network's NTP server to synchronize date and time. Manual allows the user to define a date and time.

NTP Server	Four decimal octets: XXX.XXX.XXX.XXX Domain Name	This is the IP Address or Domain Name of the local NTP Se rver 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 settin g 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 M ode is set to Manual.

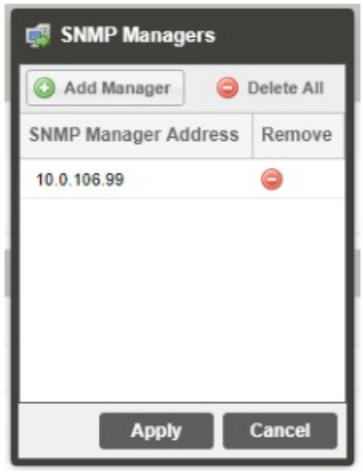
3.3.22 SNMP Communities

Click on the SNMP Community configuration under the Admin tab for manual entry of the read and write communities.



3.3.23 SNMP Trap Managers

Click on the SNMP Trap Manager configuration icon to adjust the IP address of the SNMP trap destination. An example is provided below.



3.3.24 Syslog

The MRD 7000 can be configured to send error and event logs formatted in the syslog protocol to a remote user specified Syslog server.

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

3.4 Reporting Panel

The Reporting tab in the MRD 7000 contains logs for active alarms currently affecting the unit and an event log. The active alarms are updated periodically to reflect the realtime state of the unit.
Once an error is cleared it will be cleared from the active alarms window.
The event log can be used to view alarm and event history. Both the active alarm and event logs can be configured to hide or change the behavior of alarms and events.

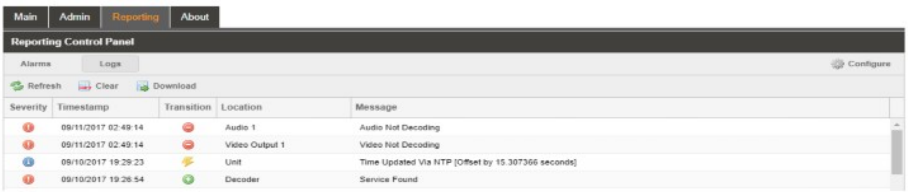
3.4.1 Active Alarms

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

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 data and time the error was raised. This date and time correlates to the Date and Time settings configured in Section 3.3.20.

3.4.2 Event Logs

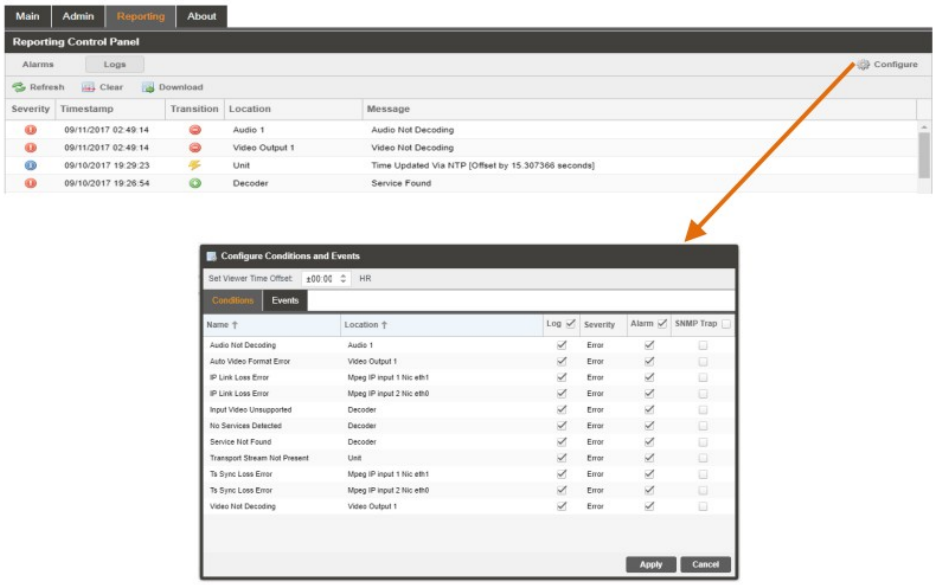
Clicking on the Logs button displays all the events and alarms that have affected the unit. If the unit is rebooted or powered off/on, the event logs are cleared. The logs can also be cleared manually by clicking the Clear button. The logs can be downloaded as a ".csv" file and saved to an external location by clicking the Download button.



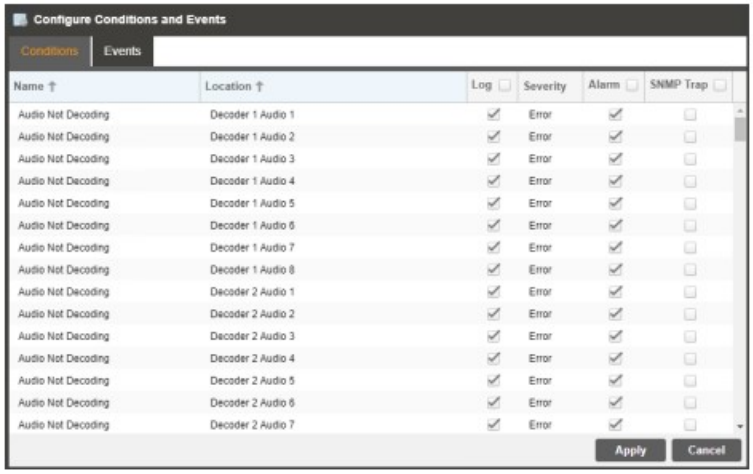
Title	**Description**
Severity	This column displays the nature of the alarm. The icon means the log entry is informational and is not an error. The icon means the log entry is an active alarm.
Timestamp	This column displays the data and time the error was raised or cleared. This date and time correlates to the Date and Time settings configured in Section 3.3.20.
Transition	This column displays when an alarm transition from a bad to good state. When an error is raised the icon is displayed. When an error is cleared the icon is displayed. When an event takes place the icon is displayed.
Message	This column displays the description of the error or event. The function or hardware that experienced the event or error is described here.
Location	This column displays the hardware or function that experienced the alarm or event.

3.4.3 Configuring the Logs

The MRD 7000 allows the user to configure alarms and events. Events and alarms can be Logged, Hidden, or have the Severity adjusted. To configure these options, click the Configure button while in the Reporting tab.



When multi-channel decoder option is enabled, the logs and events are configured separately for each individual decoder.

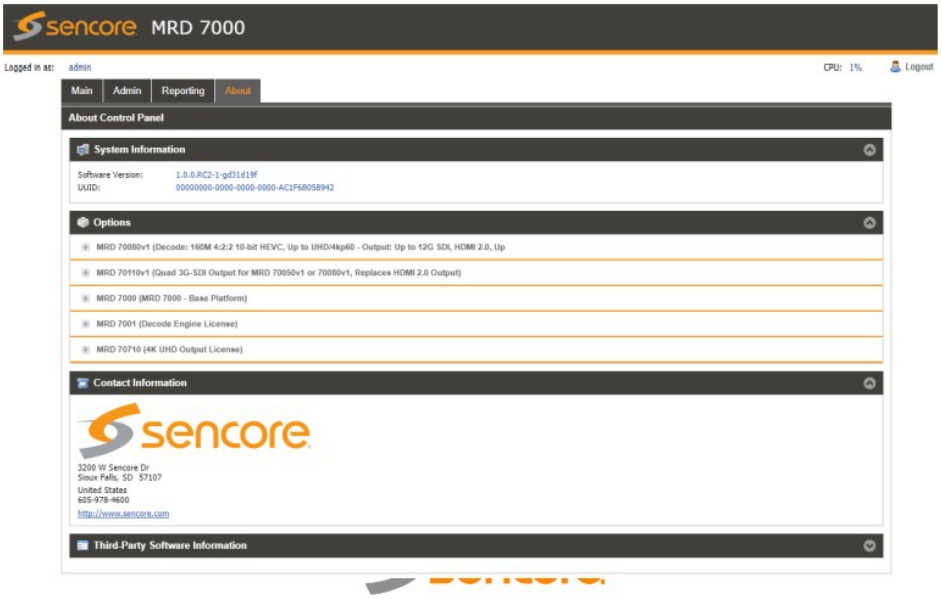


Each column and its function are described below. A user configured time offset can also be applied to allow viewing the logs in a local time zone.

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 inform ational 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 display in the eve nt 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 l og if raised. If this box is unchecked this error will be hidden.

3.5 About Panel

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

This section includes the following appendices:

Appendix A – Acronyms and Glossary

AAC: Advanced Audio Coding
AC-3: Also known as Dolby Digital
AES: Audio Engineering Society
ATSC: Advanced Television Systems Committee
BISS: Basic Interoperable Scrambling System
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
dB: Decibel
DHCP: Dynamic Host Configuration Protocol
DVB: Digital Video Broadcasting
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
HD: High Definition
I/O: Input/Output
IP: Internet Protocol
Kbps: 1000 bit per second
LED: Light Emitting Diode
Mbps: 1,000,000 bits per second.
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
NMOS: Networked Media Open Specifications
NTP: Networking Time Protocol
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.
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.
RDS: Registration and Discovery Server
RU: Rack Unit
SD: Standard Definition
SDI: Serial Digital Interface
SI: System Information
SMPTE: Society of Motion Pictures and Television Engineers
SNMP: Simple Network Management Protocol
SRT: Secure Reliable Transport
TS: Transport Stream

Appendix B – Error and Event List

Error	Description
Audio Not Decoding	Indicates selected service is not decoding an audio PID.
Auto Video Format Error	The MRD encountered an error when automatically choosing the output f ormat.
Closed Caption Line Conflict	The VANC line Closed Captions are currently set to be embedded on are conflicting with another line of data in the VANC.
Date/Time Changed	The Date/Time setting of the system was changed.
Decoder Latency Too Low	The parallel frames processing setting is too low for the decoded video co dec. Recommended action is to set parallel frame processing to default o r increase the number of frames.
Firmware Unsupported	The uploaded software is not supported by the MRD 7000.
HLS Link Connection Error	The system encountered a connection error when receiving an HLS trans mission.
HLS Link Loss Error	HLS stream sync is not detected.
Incompatible Reference Format	The system has detected that the genlock frame rate does not match the video output frame rate
Input Video Unsupported	The video source format or codec is unsupported.
Insufficient Decoder Performanc e	The unit does not have enough processing power to decode the transport stream. Contact **ProCare@sencore.com** for support.
IP Link Loss Error	MPEG/IP or Seamless RTP stream sync is not detected.
Loss of Carrier Lock	Receiver carrier lock source is lost.
Network Interface Link Down	Triggers an alarm if the physical interface is not detected as active
NMOS Registration Server Not F ound	Unable to connect to the NMOS RDS the unit is configured to contact.
No Services Detected	There are no service detected on the active input.
NTP Server Unreachable	The NTP serve was unable to be reached.
NTP Updated	The NTP Date/Time was updated.
OP47 Line Conflict	The VANC line OP47 is currently set to be embedded on is conflicting wit h another line of data in the VANC.
Private Key file Not Valid	The uploaded file does not match the necessary Private Key file to descra mble the stream content.
Reboot Required for HTTPS Certi ficate To Be Removed	An External Security certificate that was added (per Section 3.3.6) has sin ce been removed, and a reboot is required to revert to using Self-Signed Certificates for FTPS/Samba.
RTMP Link Connection Error	The system encountered a connection error when receiving an RTMP tra nsmission.
RTMP Link Loss Error	RTMP stream sync is not detected.

RTP Reception Error	RTP IP statistics has detected an out of order, duplicate, or lost packet or discontinuity in the incoming MPEG/IP or Seamless RTP stream.
SCTE 104 Line Conflict	The VANC line SCTE 104 is currently set to be embedded on is conflicting with another line of data in the VANC.
SCTE 104 Message Embedded	The SCTE 104 message was successfully embedded into the stream.
SCTE 35 Message Received	The SCTE 35 message was received on the input
SCTE35 Heartbeat Timeout	The user settable time limit has been exceeded between SCTE35 messages.
Service Not Found	No services were found on the configured input.
SMPTE2031 Line Conflict	The VANC line SMPTE2031 is currently set to be embedded on is conflicti ng with another line of data in the VANC.
SMPTE2038 Line Conflict	The VANC line SMPTE2038 is currently set to be embedded on is conflicti ng with another line of data in the VANC.
SMPTE2108 Line Conflict	The VANC line SMPTE2108 is currently set to be embedded on is conflicti ng with another line of data in the VANC.
Software Update Failed	An attempted software update was unsuccessful.
Software Update Succeeded	An attempted software update succeeded.
SRT Receive Connection Error	The system encountered a connection error when receiving SRT transmis sion.
SRT Receive Decryption Wrong Passphrase	The system has errors when trying to decrypt a SRT signal with the incorr ect passphrase.
SRT Receive Lost Packets Error	The system has detected lost packets in the received SRT signal.
SRT NAK Transmit Error	The system has sent a NAK resend request back to the transmitter
SRT Receive Uncorrected Packet s Error	The system has requested a retransmission of packets which were not re ceived
Stream Not Present	The decoder is not receiving a transport stream from the configured input.
TS Sync Loss Error	Active input transport stream lost sync. (ETR Priority 1 Error)
Unicast Receiver Not Found	There is no connection between Unicast Transmitter and Receiver on the configured Destination Address and Port
Unit Booted	The system completed a boot process.
Video Not Decoding	The video payload in the selected service cannot decode.
Vpid Line Conflict	The VANC line Vpid is currently set to be embedded on is conflicting with another line of data in the VANC.
Zixi Receive Connection Error	The system encountered a connection error when receiving Zixi transmiss ion.

Zixi Receive Decryption Error	The system has errors when trying to decrypt Zixi signal
Zixi Receive Dropped Packets Error	The system has detected dropped packets in the received Zixi signal
Zixi Receive Not Recovered Packets Error	The system is reporting that retransmitted packets were not recovered in the received Zixi signal

Appendix C – Specifications

MRD 7000 Minimum Requirements

For H.264 1080P60 Decode	
CPU: RAM: HDD:	Intel Xeon D-1520, 2.2GHz 16GB DDR4 2133MHz 256GB SSD
For HEVC 4K UHD 60MB Decode	
CPU: RAM: HDD:	Intel Xeon E-2176G, 6-core, 3.7Ghz 32GB DDR4 2666MHz 256GB SSD
For HEVC 4K UHD 160MB Decode	
CPU: RAM: HDD:	Intel Gold 6212U, 24-core, 2.4GHz 64GB DDR4 2933MHz 256GB SSD

Base Video Decoding Features

General –	
TS Data Rate:	.25-200 Mb/s
Video Decoder –	
Video Profiles and Levels:	Base Software – Up to MPEG-2 422P@HL (HD Formats) Up to H.264 **Hi422P @4.2** (HD Formats) Up to HEVC Main 4:2:2 10 (HD Formats) Up to JPEG2000 (HD Formats)
Video Bit Rate:	MRD 70081: MPEG-2 1-160Mb/s H.264 1-160Mb/s HEVC 1-160Mbps MRD 70080: MPEG-2 1-100Mb/s

	H.264 1-100Mb/s HEVC 1-160Mbps MRD 70050 MPEG-2 1-100Mb/s H.264 1-100Mb/s HEVC 1-50Mbps MRD 70020 MPEG-2 1-100Mb/s H.264 1-100Mb/s HEVC 1-70Mbps
Video Formats:	Base Software – 1080p x 1920 (16×9) @ 50, 59.94 and 60Hz 1080i x 1920 (16×9) @ 25, 29.97 and 30Hz 1080p x 1920 (16×9) @ 23.97, 24, 25, 29.97 and 30Hz 720p x 1280 (16×9) @ 50, 59.94, and 60Hz 576i x 720 (4×3 or 16×9) @ 25Hz 576i x 704 (4×3 or 16×9) @ 25hz 576i x 544 (4×3 or 16×9) @ 25hz 480i x 720 (4×3 or 16×9) @ 29.97Hz SD-SDI – 270Mb/s MRD 70706 License Adds – 2160p x 3840 (16×9) @ 23.97, 24, 25, 29.97, 30, 50, 59.94, and 60Hz NOTE: This license adds UHD resolutions and 4x channel decoding. Some MRD 7000 output modules do not support UHD output but do support 4x HD/SD channel output.
HDR Formats:	HDR10 (SMPTE 2084 & SMPTE 2086) HLG (ARIB STD B67)

Base Audio Decoding Features	
Number of Audio Services:	8 Audio Services per video

Audio Codecs Supported:	Dolby Digital (AC-3) & Plus (EAC-3) Dolby AC-4 Dolby ATMOS and Dolby E AAC-LC, HE-AAC, & HE-AACv2 MPEG1L2 & MPEG2L2 SMPTE 302M Linear PCM (Pass-through)
Output Formats:	Digital Pass-through PCM (Decoded Discrete channels for 5.1 Sources or Downmixed for 5.1 Sources)

Video Overlay Support	
Closed Caption Overlays:	CEA-708
DVB Subtitle & Teletext Overlays:	HD/SD with Auto Scaling (EN 300743)
Conditional Access	
Descrambling Options:	BISS1 BISS2
Compatibility Standard:	DVB-CSA1 DVB-CISSA AES-128 RSA-2048
Supported Modes:	
BISS1:	Mode 0 Mode 1 with Session Word Mode E with Session Word and Injected ID
BISS2:	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

MRD 7000 Input Features	
IP Input (included with MRD 7000)	
General –	
Connector:	2x 100M/1000M auto negotiate Base-T RJ-45 for MRD 70020, 70050, 70080 2x 1000M auto negotiate Base-T RJ-45 for MRD 70081 (100M auto n egotiate support with MRD 70200 installed) Ethernet Ports
Receive –	
Input Format:	UDP, RTP and RTP with extension headers Multicast and Unicast CBR, VBR SMPTE 2022-7 Hitless switching
Multicast Filtering:	Filters based on IP address
Bitrate Range:	.25 – 200 Mb/s
Packets/IP Frame:	1-7 MPEG Packets/IP Frame
IGMP Compatibility:	Version 2 and 3
FEC Receive:	Pro MPEG CoP3 SMPTE2022 Range: L*D≤100 1≤L≤20 4≤D≤20 Annex B

MRD 70750 – SRT Input License	
General –	
Connector:	2x 100M/1000M auto negotiate Base-T RJ-45 for MRD 70020, 70050, 70080 2x 1000M auto negotiate Base-T RJ-45 for MRD 70081 (100M auto negotiate support with MRD 70200 installed)
Receive –	
Protocol and IP Range:	UDP, Unicast
Negotiation Modes:	Caller, Listener, Rendezvous
Latency:	20-8000ms, user configurable
Bitrate Range:	.25 – 50 Mb/s
Decryption:	AES-128, AES-256 10-79 UTF-8 characters
Packets/IP Frame:	Auto detect
MRD 70751 – Zixi Input License	
General –	
Connector:	2x 100M/1000M auto negotiate Base-T RJ-45 for MRD 70020, 70050, 70080 2x 1000M auto negotiate Base-T RJ-45 for MRD 70081 (100M auto negotiate support with MRD 70200 installed)
Receive –	
Protocol and IP Range:	UDP, Unicast
Mode:	Connect (Pull) Mode
Latency:	30-10000ms, user configurable
Bitrate Range:	1 – 50 Mb/s
FEC Overhead:	0-50% of content bitrate
Decryption:	AES-128, AES-192, AES-256 10-79 UTF-8 characters
Packets/IP Frame:	Auto detect
MRD 70753 – RTMP Input License	
General –	

Connector:	2x 100M/1000M auto negotiate Base-T RJ-45 for MRD 70020, 70050, 70080 2x 1000M auto negotiate Base-T RJ-45 for MRD 70081 (100M auto negotiate support with MRD 70200 installed)
Receive –	
Protocol and IP Range:	TCP, Unicast
Payload:	MP4, FLV containing H.264 and AAC or MP3 Audio
Mode:	Pull
Bitrate Range:	0.25 – 50 Mb/s
MRD 70754 – HLS Input License	
General –	
Connector:	2x 100M/1000M auto negotiate Base-T RJ-45 for MRD 70020, 70050, 70080 2x 1000M auto negotiate Base-T RJ-45 for MRD 70081 (100M auto negotiate support with MRD 70200 installed)
Receive –	
Protocol and IP Range:	HTTP, HTTPS, TCP, Unicast
Payload:	Chunked transport stream
Mode:	Pull Profile Reception Single profile selection
Bitrate Range:	0.25 – 50 Mb/s
FEC Overhead:	0-50% of content bitrate
Decryption:	AES-128
Packets/IP Frame:	1-7 MPEG Packets/IP Frame

MRD 70170 – 4x ASI Input Module (1 slot)

General –	
Connector:	4x BNC, Female
Impedance:	75Ω
Return Loss:	≥15dB, 3.5 to 270 MHz
ASI Input –	
Standard:	EN50083-9 (V2:3/98) DVB ASI

Data Bit Rate:	214 Mb/s per port
Maximum TS Rate:	200 Mb/s per port
Minimum TS Rate:	250 Kb/s per port
Packet Sizes	188 bytes
Modes Supported:	Burst, Byte and Inverted
MRD 70191 – 4x DVB-S/S2 Satellite Input Module (1 slot)	
DVB-S/S2X tuner	4 satellite-inputs Up to 8 multi-standard demodulators F-81 Type, 75 Ohms Female (4) connectors Short Frames ACM (Adaptive Coding and Modulation) VCM (Variable Coding and Modulation) MIS (Multiple Input Streams)
Satellite characteristics –	
Modulation:	QPSK
	8PSK/8APSK-L
	16APSK/16APSK-L
	32APSK/32APSK-L 64APSK/64APSK-L 128APSK 256APSK/256APSK-L
Specifications:	LNB Power: 4 * max. 19V, 1A pulse current, 500mA continuous current o vercurrent protection short-circuit protection
	L-Band: 950 MHz to 2150 MHz
	DVB FEC: (Auto Spectral Detection) 188-byte packet size
Symbol rates –	
QPSK:	95 MSym

8PSK/8APSK:	86 MSym
16APSK:	64.5 MSym
32APSK:	51.6 MSym
64APSK:	43 Msym
128APSK:	36.85 Msym
256APSK:	32.25 Msym
Sensitivity (@25MSym) –	
QPSK 11/45:	-89 dBm (20 dBµV)
QPSK 1/2:	-86 dBm (23 dBµV)
8PSK 9/10:	-77 dBm (32 dBµV)
256APSK 3/4:	-69 dBm (40 dBµV)
Additional features –	
Strong signal immunity:	> 106dbµV (-6dBm)
Isolation:	65dB – 80dB depending on signal strength

MRD 7000 Output Features
MRD 70130 – 12G-SDI and HDMI 2.0b Output Module, Genlock (1 slot)

Ports:	1x 1xASI in 1x 12G-SDI out 1x HDMI 2.0 out 1x Genlock in
Connectors:	3x 75-Ω BNC 1x HDMI type A receptacle
Video Standards:	SD-SDI – SMPTE 259M HD-SDI – SMPTE 292M 3G-SDI – SMPTE 424M 12G-SDI – SMPTE 2082 HDMI 2.0B

Video Formats:	480i, 525i, 576i, 625i, 720p, 1080i, 1080p, 1080psf, 2160p. All common formats supported.
Audio Output:	Up to 8 pairs of audio streams
ANC Data Support:	708 Closed Captions SMPTE 2038 SCTE 104 OP47 SMPTE 2031 VPID SMPTE 2108
Genlock Interface –	
Genlock Connector:	75Ω Female BNC
Input Impedance:	10kΩ
Return Loss:	≥20 dB, 0Mhz to 8 MHz
Drive Level:	1.0 Vpp ±10%
Supported Genlock References:	Tri-sync and Black Burst 1080i x 1920 @ 25, 29.97 and 30fps 1080p x 1920 @ 23.97, 24, 25, 29.97, 30, 50, 59.94 and 60fps 720p x 1280 @ 50, 59.94 and 60fps

MRD 70140 – Quad 3G-SDI Output Module, Genlock (1 slot)

Ports:	4x 3G-SDI out / ASI in / ASI out 1x genlock in
Connectors:	5x 75-Ω DIN 1.0/2.3 Shipped with 5x converter cable 1.0/2.3 to BNC
Video Standards:	SD-SDI – SMPTE 259M HD-SDI – SMPTE 292M 3G-SDI – SMPTE 424 M
4K multi-link	SMPTE 425-5 4 quadrant and two sample interleave Level A/B

Video Formats:	480i, 576i, 525i, 625i, 720p, 1080i, 1080p, 1080psf, 2160p. All com mon formats supported.
Audio Output:	Up to 8 pairs of audio streams
ANC Data Support:	708 Closed Captions SMPTE 2038 SCTE 104 OP47 SMPTE 2031 VPID SMPTE 2108
Genlock Interface –	
Genlock Connector:	75-Ω DIN 1.0/2.3
Input Impedance:	10kΩ
Return Loss:	≥20 dB, 0 MHz to 8 MHz
Drive Level:	1.0 Vpp ±10%
Supported Genlock References:	Tri-sync and Black Burst 1080i x 1920 @ 25, 29.97 and 30fps 1080p x 1920 @ 23.97, 24, 25, 29.97, 30, 50, 59.94 and 60fps 720p x 1280 @ 50, 59.94 and 60fps

MRD 70141 – Quad 3G-SDI Output Module, Genlock (1 slot)

Modes:	1x 12G-SDI output with genlock, 1x ASI input/output 4x 3G-SDI output with genlock 4x independent 3G-SDI or ASI ports (input or output
Connectors:	5x 75-Ω HD-BNC Shipped with 5x converter cable HD-BNC to BNC
Video Standards:	SD-SDI – SMPTE 259M HD-SDI – SMPTE 292M 3G-SDI – SMPTE 424M

	12G-SDI – SMPTE 2082
4K multi-link	SMPTE 425-5 two sample interleave or square division Level A/B
Video Formats:	480i, 576i, 525i, 625i, 720p, 1080i, 1080p, 1080psf, 2160p. All com mon formats supported.
Audio Output:	Up to 8 pairs of audio streams
ANC Data Support:	708 Closed Captions SMPTE 2038 SCTE 104 OP47 SMPTE 2031 VPID SMPTE 2108
Genlock Interface –	
Genlock Connector:	75-Ω HD-BNC
Input Impedance:	10kΩ
Return Loss:	≥20 dB, 0Mhz to 8 MHz
Drive Level:	1.0 Vpp ±10%
Supported Genlock References:	Tri-sync and Black Burst 1080i x 1920 @ 25, 29.97 and 30fps 1080p x 1920 @ 23.97, 24, 25, 29.97, 30, 50, 59.94 and 60fps 720p x 1280 @ 50, 59.94 and 60fps

MRD 70150 – Basic 12G-SDI and HDMI 2.0a Output Module, Genlock (2 slots)

x1 SDI (Serial Digital Interface) Video Output –	
SDI Standards:	HD-SDI ANSI/SMPTE ST 292M Single 3G-SDI ANSI/SMPTE ST 424M Quad 3G-SDI ANSI/SMPTE ST 425-5 (Quadrant) 6G-SDI ANSI/SMPTE ST 2081

	12G-SDI ANSI/SMPTE ST 2082
SDI Level:	Level A or Level B (user selectable)
Connector:	75Ω Female BNC
Return Loss:	≥15 dB, 5Mhz to 1.5GHz ≥10 dB, 1.5 GHz to 3.0GHz
Drive Level:	800 mVpp ±10%
Data Bit Rate:	12G-SDI – 12 Gb/s 6G-SDI – 6 Gb/s 3G-SDI – 3.0 Gb/s HD-SDI – 1.5 Gb/s

HDMI 2.0 Output –	
Digital Video Standard:	SDA-HDMI-OM-E Rev A
Connector:	HDMI-type Female Type-A

Genlock Interface –	
Genlock Connector:	Requires breakout cable, Pin 6 75Ω Female BNC
Input Impedance:	10kΩ
Return Loss:	≥20 dB, 0Mhz to 8 MHz
Drive Level:	1.0 Vpp ±10%
Supported Genlock References:	Tri-sync and Black Burst 1080i x 1920 @ 25, 29.97 and 30fps 1080p x 1920 @ 23.97, 24, 25, 29.97, 30, 50, 59.94 and 60fps 720p x 1280 @ 50, 59.94 and 60fps

MRD 70120 – SMPTE 2110 Output Module, HD, 2x 10GB SFP (1 slot)

Connectors:	2x 10GB SFP+ (MSA Compliant)
IP Encapsulation:	SMPTE 2110-10 SMPTE 2110-20 SMPTE 2110-30

	SMPTE 2110-40
Packet Pacing:	SMPTE 2110-21 Type N (Narrow)
PTP Synchronization:	SMPTE 2059-2
Output Redundancy	SMPTE 2022-7 Hitless Switching
Video Standards:	8-bit and 10-bit YUV 4:2:2 SMPTE 292M, and SMPTE 425-AB
Video Formats:	1080p x 1920 (16×9) @ 50, 59.94 and 60Hz NOTE: In multi-channel decoder applications, outputting more than 3x FHD streams on a 10GB link will exceed bandwidth. 1080i x 1920 (16×9) @ 25, 29.97 and 30Hz 1080p x 1920 (16×9) @ 23.97, 24, 25, 29.97 and 30Hz 720p x 1280 (16×9) @ 50, 59.94, and 60Hz
Audio Output:	Up to 8 pairs (16 channels)
ANC Data Support:	708 Closed Captions SMPTE 2038 SCTE 104 OP47 SMPTE 2031

MRD 70180 / MRD 70182 – SMPTE 2110 Output Module, UHD/HD, 2x 25GB SFP (1 slot)

Connectors:	2x 25GB SFP28 (MSA Compliant)
IP Encapsulation:	SMPTE 2110-10 SMPTE 2110-20 SMPTE 2110-30

	SMPTE 2110-40
Packet Pacing:	SMPTE 2110-21 Type N (Narrow)
PTP Synchronization:	SMPTE 2059-2
Output Redundancy:	SMPTE 2022-7 Hitless Switching
Video Standards:	8-bit and 10-bit YUV 4:2:2 SMPTE 292M, and SMPTE 425-AB
Video Formats:	2160p x 3840 (16×9) @ 23.97, 24, 25, 29.97, 30, 50, 59.94, and 60Hz 1080p x 1920 (16×9) @ 50, 59.94 and 60Hz 1080i x 1920 (16×9) @ 25, 29.97 and 30Hz 1080p x 1920 (16×9) @ 23.97, 24, 25, 29.97 and 30Hz 720p x 1280 (16×9) @ 50, 59.94, and 60Hz
Audio Output:	Up to 8 pairs (16 channels)
ANC Data Support:	708 Closed Captions SMPTE 2038 SCTE 104 OP47 SMPTE 2031

MRD 70755 – MPEG/IP Output License

Physical Interface	2x 1000 Auto-Negotiate Base-T RJ45 for MRD 70020 2x 1000 Auto-Negotiate Base RJ45 for MRD 70081 (100M Auto negotiate Support with MRD MRD70200 Installed)
Output Format	UDP or RTP
IP Encapsulation	1 to 7 TS Packets per IP Packet

Addressing	Unicast or Multicast
CBR or VBR	(for HLS and RTMP inputs, input stream must be CBR)
IGMP Compatibility	Version 1, 2 & 3
Per TS Bitrate:	Bypass from input (manual bitrate settings for RTMP and HLS inputsC

MRD 70756 – ASI Output License (Requires MRD 70141 or MRD 70140 Module)

Physical Interface	Physical Interface: 4x BNC, Female , 75Ohm
Number of ASI Outputs	Maximum of one per Decoder engine (for HLS and RTMP inputs, inp ut stream must be CBR)
Standard	DVB-ASI EN50083-9
Maximum TS Rate	200Mbps
Minimum TS Rate	250Kbps
Packet Size	188 Bytes
Per TS Bitrate:	Bypass from input (manual bitrate settings for RTMP and HLS inputs

Appendix D – Open-Source Software
The MRD 7000 includes

Package	Version	License	Copyright
avahi	0.8	LGPL Version 2.1, February 1999	1999 Free Software Foundation, Inc.
BusyBox	1.24.2	GPL Version 2, June 1991	Erik Anderson, et. al.
cairo	1.12.0	LGPL Version 2.1, Feb 1999	Josh Aas, et. Al.
ccid	1.5.2	GPL Version 3	Copyright (c) 2001-2011 Ludovic Rousseau
cjson	1.7.15	MIT	Dave Gamble and cJSON contributors
Dropbear	2022.83	MIT-like	2002-2015 Matt Johnston, et. al (see license)
dOpenSSL	3d6c942	MIT-like	Copyright (c) 2013, infinit.io
e2fsprogs	1.45.4	GPL Version 2, June 1991	Theodore Ts'o
ethtool	4.13	GPL Version 2, June 1991	David Miller, et. al.
expat	2.5.0	MIT	2001-2006 Expat maintainers.
FastDB	3.71	MIT-like	Konstantin Knizhnik
FCGI	2.4.6	FastCGI	Open Market, Inc
FFmpeg	5.0.1	LGPL Version 2.1 Feb 1999	Fabrice Bellard
fontconfig	2.10.0	MIT	2001-2003 Keith Packard
freefont	20120503	GPL Version 3, 29 June 2007	Primoz Peterlin
freetype	2.9	GPL Version 2, June 1991	David Turner, et. al.
gmp	6.2.1	GPL Version 2, June 1991	Copyright 1991, 1996, 1999, 2000, 2007 Free Software Foundation, Inc.
gnutls	3.6.16	GPL Version 3, 29 June 2007	Copyright (C) 2007 Free Software Foundation, Inc.
gptfdisk	1.0.3	GPL Version 2, June 1991	Roderick W. Smith
grub	2.00	GPL Version 3, 29 June 2007	Copyright (C) 1994 – 2011 Free Software Foundation, Inc.

Heimdal	7.1.0	MIT-like	Copyright (c) 1995 – 2014 Kungliga Tekniska Hogskolan
httpparser	2.9.4	MIT	Joyent, Inc. and other Node contributors
ipmitool	1.8.18	BSD	Sun Microsystems, Inc.
JSON	4.10	GPL Version 2, June 1991	Copyright 2005-2013 by Makamaka Hannyaharamitu
libcurl	7.80.0	MIT	1996 – 2021, Daniel Stenberg and contributors
libdvbcsa		GPL Version 2, June 1991	Linus Torvalds, et. al.
libevent	2.1.12	BSD	2007-2012 Niels Provos and Nick Mathewson
LIBPCAP	1.8.1	BSD	Copyright (c) 1993, 1994, 1995, 1996, 1997 The Regents of the University of California
libp11	0.4.12	GPL Version 2, June 1991	Linus Torvalds, et. al.
libpng	1.2.59	zlib/libpng License	2006-2017 Glenn Randers-Pehrson, et. al.
libusb	1.0.19	BSD	Copyright(C) 1994-1996, 1999-2002, 2004-2016 Free Software
Lighttpd	1.4.69	BSD	2004, Jan Kneschke
Linux	5.3.5	GPL Version 2, June 1991	Linus Torvalds, et. Al.
Linux-PAM	1.3.1_2020-0	GPL Version 2, June 1991	Copyright (c) 2005, 2006, 2009 Thorsten Kukuk
Log4cpp	1.1.3	GPL Version 2.1 Feb 1999	Bastiaan Bakker
Monit	5.33.0	GNU AFFERO GENERAL PUBLIC LICENSE	Copyright (C) 2001-2022 by Tildeslash Ltd.
Net-SNMP	5.7.1	BSD	1989, 1991, 1992 by Carnegie Mellon University, et. al. (see license)
nettle	3.8.1	GPL Version 2, June 1991	Copyright (C) 1989, 1991 Free Software Foundation, Inc.
Nlohmann	3.10.4	MIT	2013-2021 Niels Lohmann
NTP	4.2.4p7	NTP License	1992-2009 David L. Mills

OpenSC	0.23.0	GPL Version 2, June 1991	Copyright (C) 1991, 1999 Fre e Software Foundation
OpenSSL	3.1.1	Apache License 2.0	1998-2022 The OpenSSL Pro ject, 1995- 1998 Eric Young a nd Tim Hudson
parse-yapp	1.21	GPL Version 2, June 1991	Copyright (C) 1998, 1999, 2000, 2001, Francois Desarmenien. Copyr ight (C) 2017 William N. Bras well, Jr.
PCRE	8.30	BSD	1997-2012 University of Cam bridge, et. al. (see license)
pcsc	2.0.0	GPL Version 3	Copyright (c) 2001-2011 Ludo vic Rousseau
pixman	0.30.0	MIT	2004-2010 Red Hat, Inc.
POPT	1.16	MIT	1998 Red Hat Software
pureftpd	1.0.51	BSD	Frank Denis
qDecoder	12.0.4	BSD	2000-2012 Seungyoung Kim
rapidjson	b16cec1a	MIT	2015 THL A29 Limited, a Ten cent company, and Milo Yip
samba	4.18.0	GPL Version 3, 29 June 2007	Andrew Tridgell, et. al.
sdptransform	1.2.9	MIT	2017 Iñaki Baz Castillo.
FamFamFam Silk Icon s	013	Creative Commons Attribution 2.5	Mark James
Spawn-FCGI	1.6.3	BSD	Jan Kneschke, Stefan Bahler
srt	1.4.2	MPLv2.0 License	2018 Haivision Systems Inc.
TACACS+	master_2020	GPL Version 2, June 1991	Copyright (C) 2010, Pawel Kr awczyk and Jeroen Nijhof
TCLAP	1.2.0	MIT	2003 Michael E. Smoot
Uuid	1.0.3	BSD	Robert Boehne
Zlib	1.2.7	zlib/libpng License	1995-2005 Jean-loup Gailly a nd Mark Adler

Appendix E – How to Reboot the Unit without Web Server Access
If access to the Web Server is lost but ping response remains, the unit may be rebooted via CURL using this command: curl “http://<ipaddress>/webservice.fcgi?user=<username>&pass=<password>&action=csf.reboot”
To execute this command, open a command prompt.

- <ipaddress>, enter the management IP address that’s responding to the ping
- <username>, enter “admin”
- <password>, enter “mpeg101” as the default (or user configured password)

```
H:\>curl "http://10.0.105.172/webservice.fcgi?user=admin&pass=&action=csf.reboot"
<?xml version="1.0" encoding="iso-8859-1"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
 <head>
  <title>500 Internal Server Error</title>
 </head>
 <body>
  <h1>500 Internal Server Error</h1>
 </body>
</html>

H:\>
```

This sample is for a unit at 10.0.105.172 with no configured password

Appendix F – Warranty

Sencore Hardware One-Year Warranty
Sencore warrants this instrument against defects from any cause, except acts of God and abusive use, for a period of 1 (one) year from date of purchase. During this warranty period, Sencore will correct any covered defects without charge for parts, labor, or recalibration.
Appendix G – Support and Contact Information
Returning Products for Service or Calibration
The MRD 7000 server is a delicate piece of equipment and needs to be serviced and repaired by Sencore. Periodically it is necessary to return a product for repair or calibration. To expedite this process please carefully read the instructions below.
RMA Number
Before any product can be returned for service or calibration, an RMA number must be obtained. To obtain an 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. An RMA number will be emailed you shortly after completing the form with return instructions.

Shipping the Product
Once an RMA number has been issued, the unit needs to be packaged and shipped back to Sencore. It's best to use the original box and packaging for the product but if this not available, check with the customer service representative for the proper packaging instructions.
Note: DO NOT return any power cables or accessories unless instructed to do so by the customer service representative

1.605.978.4600
Sencore Inc.
3200 W Sencore Drive
Sioux Falls, SD 57107 USA
www.sencore.com

Documents / Resources

	sencore MRD 7000 Receiver Decoder Software [pdf] User Manual MRD 7000 Receiver Decoder Software, MRD 7000, Receiver Decoder Software, Decoder Software, Software

References

- Sencore - Video Broadcast Equipment Suppliers, Equipment Manufacturers
- Sencore - Video Broadcast Equipment Suppliers, Equipment Manufacturers
- User Manual