Haivision™
NETWORK VIDEO

hai1000™ series
High Performance Multi-Stream Encoder/Decoder
User's Guide Version 8.2

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Intelligent IP Video

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Safety Guidelines

Use the following guidelines when unsafe conditions exist or when potentially hazardous voltages are present:

- Always use caution and common sense.
- To reduce the risk of electrical shock, do not operate equipment with the cover removed.
- Repairs must be performed by qualified service personnel only.

Antistatic Precautions

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. Electrostatic discharge occurs when a person whose body contains a static buildup touches a computer component.

The equipment contains static-sensitive devices that may be easily damaged, and proper handling and grounding is essential. Use ESD precautionary measures when installing systems or cards, and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic floorpads and workbench pads.

Improper handling and/or installation practices may VOID the warranty.

CAUTION When handling components, or when setting switch options, always use an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, such as a screwdriver or a paper clip, to set switches.

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About This Guide

Welcome to the user's guide for the hai1000 series™ High Performance Multi-Stream Encoder/Decoder, Version 8.2. This user's guide describes how to install, configure, and manage the hai1000 series to send and receive audio, video, and data over an Ethernet-based IP network.

To access the online help, open the Web interface and click Help from the menu bar.

Topics In This Section

Audience

This user's guide is directed towards qualified service personnel such as technicians and network system administrators who have a basic knowledge of telecommunications equipment, and IP and LAN networking concepts and terminology.

Reliability of Information

The information contained in this user's guide has been carefully checked and is believed to be entirely reliable. However, as Haivision Network Video improves the reliability, function, and design of its products, the possibility exists that this user's guide may not remain current.

If you require updated information, or any other Haivision product information, contact:

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Document Conventions

The following document conventions are used throughout this user's guide.

TIP The light bulb symbol highlights suggestions or helpful hints.

NOTE The hand symbol indicates a note, containing special instructions or information that may apply only in special cases.

IMPORTANT Indicates an emphasized note. It provides information that you should be particularly aware of in order to complete a task and that should not be disregarded. IMPORTANT is typically used to prevent loss of data.

CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in damage to data or equipment, or minor to moderate injury. It may also be used to alert against unsafe practices.

WARNING Indicates an imminently hazardous situation which, if not avoided, could result in serious injury or death.

Safety Information

The CAUTION and WARNING notices shown above are not only preventative measures designed to uphold the safety of both the service engineer and operator, but also enhance equipment reliability.

The definitions and symbols for CAUTION and WARNING comply with ANSI Z535.2, American National Standard for Environmental and Facility Safety Signs, and ANSI Z535.4, Product Safety Signs and Labels, issued by the American National Standards Institute.

New Product Features

Version 8.2 of the hai1000 series introduces the following new features:

Still Image Insertion

Version 8.2 allows configuration of a static image to replace the encoded video stream when the stream is paused (MPEG-4 AVC/H.264 modules only). This feature is useful for applications such as blocking out sensitive content or delivering announcements.

See "Configuring Still Images" on page 127 (Web Interface) or "enc" on page 259 (CLI).

Access Control

Version 8.2 provides SNMPv3 support to manage the hai1000 series.

See "Configuring A/V Services Using SNMP" on page 209.

Network Services Configuration

The hai1000 series now supports network services configuration, including enabling and disabling FTP, HTTP, SIP, SNMP, SSH, and Telnet.

See "Enabling and Disabling Network Services" on page 168 (Web Interface) or "service" on page 281 (CLI).

Unified Web Interface and Command Line Interface Config File Format

Version 8.2 allows for unified file format and location of the configuration files between the CLI and Web Interface. Config files saved through the CLI are now visible – with their respective names – in the Web Interface.

Likewise, config files saved through the Web Interface are now visible in the CLI. Config files created over either interface are now stored in a single folder `/usr/share/haivision/config`.

Legacy config files saved from the Web Interface using previous versions of the hai1000 series may be loaded and re-saved to the unified file format.

See "Saving and Loading Configurations" on page 163 (Web Interface) or "listcfg" on page 272 (CLI).

Better CBR Streaming for 3rd party Interoperability

hai1000 series MPEG Transport streams are now compliant with CBR (Constant Bitrate) implementation.

See "OutputRateControl" on page 262 (CLI).

PART I: Installation and Setup

CHAPTER 1: Product Overview

This chapter introduces the hai1000 series and describes the key services that it provides. It then provides an overview of system and configuration management alternatives for the unit.

NOTE References to the “hai1000 series” can be taken to include the hai1020 and hai1060 products unless specifically stated otherwise.

Topics In This Chapter

Introduction

The hai1000 series is a high performance encoder/decoder system offering tightly coupled multi-stream and multi-format media compression and decompression. The hai1000 series compresses and encapsulates multiple audio, video, and data display feeds, and transmits the resulting streams across the IP network or to other industry standard devices. Leveraging the tightly coupled encoder/decoder tuning between hai1000 series systems, users can achieve extremely high performance, bi-directional, end-to-end communications systems.

Based on an extensible “frame and blade” platform architecture, each hai1000 series unit may incorporate many codec elements. Supporting MPEG-4 AVC (Advanced Video Coding/H.264) and MPEG-2 video coding, and delivering high-resolution HD or SD (Standard Definition) video, the hai1000 series is ideal for multi-camera, multi-display deployments such as collaboration suites, boardrooms, continuous presence distance education rooms and theaters, and medical procedure rooms.

The hai1000 series provides a 10/100 BaseT Ethernet LAN interface supporting full or half duplex mode, and is equipped with up to five Encoder/Decoder, Encoder only, Decoder only, or Dual-Encoder / Dual-Decoder modules (“blades”), depending on the application. These features allow the hai1000 series to quickly adapt to changing user requirements and network demands.

Figure 1-1 and Figure 1-2 show sample videoconferencing scenarios using the hai1020 and hai1060 with Mako blades.

Figure 1-1 Sample Videoconferencing Scenario (hai1020s)

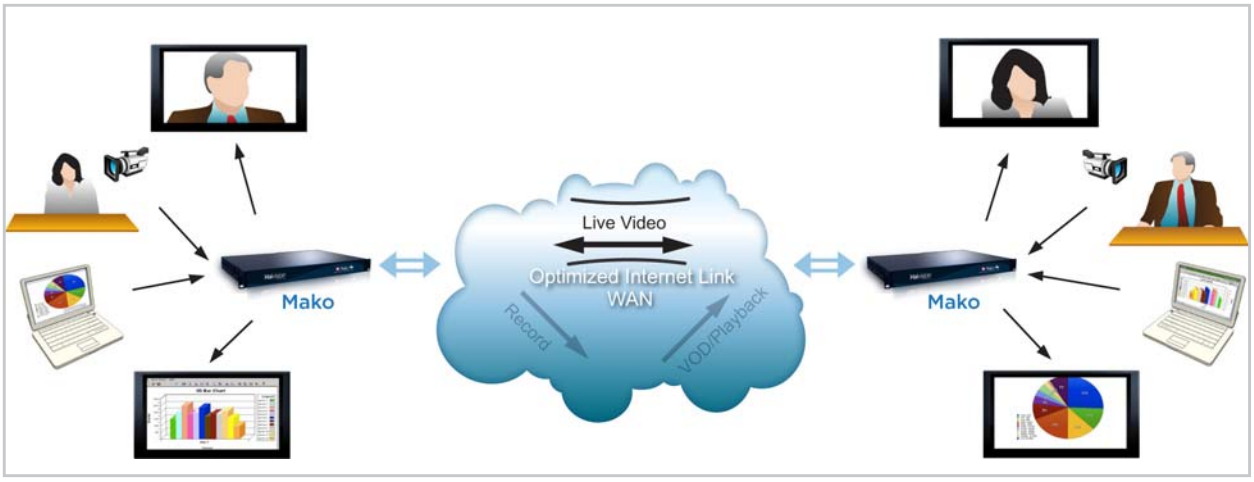


Figure 1-2 Sample Videoconferencing Scenario (hai1060s)

Chassis Options

The hai1000 series is available in two chassis options, described below:

- Six-Slot Chassis (hai1060)
- Two-Slot Chassis (hai1020)

Six-Slot Chassis (hai1060)

The hai1060 is a 3U (rack unit) system with six slots:

- The bottom System Slot is dedicated to the System module (HOST4), referred to as the HOST.
- Five Service Slots (0, 1, 2, 3 and 4) are available for the Audio/Video Service modules: either Encoder/Decoder, Encoder only, Decoder only, and/or Dual-Encoder / Dual-Decoder.

Communication among all the modules takes place through the six-slot backplane. Figure 1-3 shows the hai1060 front panel and a sample rear view.

Figure 1-3 Front and Sample Rear Views (hai1060)

Two-Slot Chassis (hai1020)

The hai1020 is a 1U (rack unit) system with two slots:

- The bottom System Slot is dedicated to the system module (HOST4), referred to as the HOST.
- The second slot contains an Audio/Video Service module: either Encoder/Decoder, Encoder only, or Decoder only.

Communication among all the modules takes place through the two-slot backplane. Figure 1-4 shows the hai1020 front panel and a sample rear view.

Figure 1-4 Front and Sample Rear Views (hai1020)

HOST System Module

The HOST4 System module (referred to as the HOST) controls the hai1000 series. The HOST4 module initializes and configures all the other modules, performs signaling, statistics gathering, error handling, and provides the interface to the management functions.

The main resources on the HOST4 module are as follows:

- PowerPC CPU
- 128 MB SDRAM
- 1GB Compact Flash memory
- 10/100 Mbps auto-sensing Ethernet port
- Serial port, for system management
- Real-time clock

Related Topics

- "HOST4 Module Connections" on page 39
- "HOST4 Module LEDs" on page 40

Encoder/Decoder Modules

The hai1000 series audio/video service modules enable high quality, interactive multi-media applications with exceptionally low video latency. The audio/video service modules include the following:

Encoder/Decoder Modules

- HM4ED MPEG-4 AVC Encoder/Decoder
- HMFED Multi-Format MPEG-2/MPEG-4 AVC Encoder/Decoder
- HM2ED MPEG-2 Encoder/Decoder

Single Encoder or Decoder Modules

- HM4D MPEG-4 AVC single Decoder
- HM4E MPEG-4 AVC single Encoder

Dual-Encoder / Dual-Decoder Modules

- HD4E2D2 “Mako” MPEG-4 AVC Dual-Encoder / Dual-Decoder

NOTE References to “Encoder/Decoder modules” can be taken to include the Encoder/Decoder modules, Multi-Format Encoder/Decoder modules, and single Encoder or Decoder modules unless specifically stated otherwise.

Encoder/Decoder Module Overview

The hai1000 series Encoder/Decoder modules perform high quality encoding and/or decoding of either MPEG-2 or MPEG-4 AVC / H.264 compliant video and audio for transmission over IP networks.

The Encoder/Decoder modules have an Encoder and a Decoder (or a Dual-Encoder and Dual-Decoder) in one service slot. The single Encoder or Decoder modules have either a single Decoder or single Encoder.

The Encoders compress video and audio signals and then transmit it over an IP network. The Decoders receive incoming data from the network and decompress the audio and video stream for playback.

The video interface consists of one user-selectable input connector and/or either one or a pair of output connectors. The available formats include Analog Component/YPbPr, SDI (Serial Digital Interface), HDMI (High-Definition Multimedia Interface, output only), RGBHV, Composite, and S-Video.

The audio interface provides four channels of either analog audio (supporting either balanced or unbalanced stereo mode of operation), or embedded digital audio (either SDI or HDMI).

For information on multimedia services provided by the hai1000 series, see "Audio/Video Services" on page 31.

Mako Dual-Encoder/Dual-Decoder

The Mako Dual-Encoder/Dual-Decoder module supports HD video standards up to and including 1080p30 at video bitrates from 256 kbps to 10.0 Mbps. hai1000 series systems equipped with Makos are designed to deliver "zero latency" high definition communications for applications such as telepresence conferencing, medical training and consultation, and interactive broadcast solutions. "Zero latency" in these applications assures hand eye coordination (below 90ms) or operations within a blink of an eye (100 ms). The Mako performs at least 5 to 10 times faster than traditional conferencing codecs and "low latency" broadcast encoders.

The Mako can share its compression power between both input and/or output ports simultaneously – each at adjusted frame rates. For example, you can encode HD-SDI video at 720p 30 and YPbPr video at 720p 30. Or you can encode video at 720p 50 frames per second and simultaneously encode RGB computer graphics at 1024x768 10 frames per second. This allows you to both conference and share content such as PowerPoint presentations, pictures, and maps in real-time using a single blade.

For more information, see "Configuring Encoder A/V Settings" on page 117 and "Configuring Decoder A/V Settings" on page 146.

Fixed vs. Carrier Codec Boards

The hai1000 series may be equipped with modular mezzanine cards for audio/video input and output. The mezzanine cards have been designed to support the increasing variety of audio/video interface standards, such as SDI In, SDI Out, and HDMI Out. Mezzanine cards are installed in carrier codec boards and are interchangeable. Note that changing a mezzanine card requires that the module be returned to the factory.

HDMI Upscaler

The HDMI Upscaler is an output mezzanine card that converts a Standard Definition video stream into a fully compliant High Definition format in one of several video signal formats. This card outputs digital audio/video over HDMI, as well as 4-channel analog audio (PCM format). The output resolution is selected automatically by the upscaler based on the native resolution of the connected display.

The HDMI Upscaler ensures high quality output by "bypassing" the display's internal scaler. In addition, it provides advantages such as the following:

- It can be used with any of the hai1000 series audio/video service modules (either MPEG-2 or MPEG-4 AVC), and with any audio/video interface standard, such as SDI In, or Component In.
- It supports full Extended Display Identification Data (EDID), i.e., to allow negotiation between the display and the HDMI Output module to agree on the best resolution and frame rate.

- It provides perfect A/V lip-sync since audio is delayed in order to match the video upscaling process.

Multi-Format Codecs

Multi-Format Encoder/Decoder modules such as the HMFED module may be switched between MPEG-2 and MPEG-4 AVC coding standards. Within a hai1000 series chassis, each multi-format card is set independently of the other cards using the CLI command interface. Changes take effect at the next system reboot. For more information, see "Switching the MPEG Coding Value for a Multi-Format Codec" on page 183.

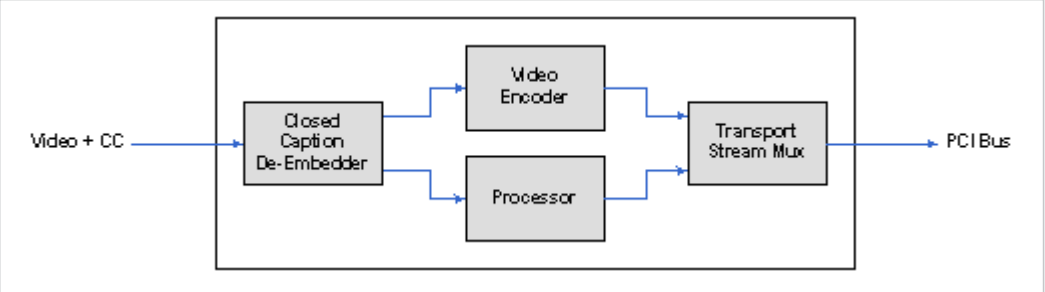
Related Topics:

- For details on the Encoder/Decoder modules, see Chapter 2: "Physical Description".
- For information on hardware installation of audio/video modules, see "Connecting the A/V Modules" on page 80.
- For information on using the Web Interface to configure and monitor services, see Chapter 6: "Configuring A/V Services From the Web Interface".
- For information on using CLI commands to configure and monitor services, see Chapter 7: "Configuring A/V Services From the CLI".
- For information on using SNMP to manage the hai1000 series, see Chapter 8: "Configuring A/V Services Using SNMP".

Line 21 Closed Captioning

The hai1000 series processes Closed Caption data from Line 21 of an NTSC analog video source into an MPEG Transport Stream. In the current hai1000 series release, Closed Caption extraction and transportation is supported only at the Encoder level (as shown in the following diagram).

Figure 1-5 Closed Caption Extraction Block Diagram

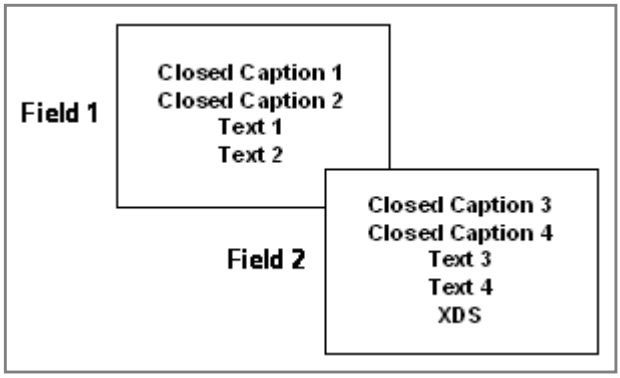


Closed Captioning Features

- Line 21 is enabled by default. No user selection is required.
- Closed Caption routing is not supported. The Closed Caption information is captured and processed by the same blade only.
- Unicast, Multicast and Multi-streaming all carry the same Closed Caption metadata.
- Extracted Closed Captioning information is embedded in the MPEG stream as per ATSC A/72 for the HM4ED and ATSC A/53 for the HM2ED.
- Full interoperability (Video/Audio/CC) is supported with the Amino AmiNET-125 and AmiNET-130.
- Closed Caption processing is only available over Composite and S-Video input interfaces (with no 7.5 IRE setup on Line 21).
- As per the EIA-608 format standard, the Closed Caption information is present on Line 21 Field 1 and Field 2 of an NTSC signal.
- The HM4ED and HM2ED Encoders support all Closed Caption services listed in the EIA-608 specification: CC1, CC2, CC3, CC4, Text1, Text2, Text3, Text4, and XDS.
- Both Closed Caption data and KLV serial data (see "Serial Data Mezzanine" on page 61) can coexist together on the Encoder stream.

The following figure shows the services available over Line 21 (as described in the EIA-608-B specification):

Figure 1-6 EIA-608 Line 21 Closed Caption Services



Audio/Video Services

The hai1000 series' multimedia services are provided by a combination of the Encoder/Decoder, single Encoder or Decoder, and Multi-Format Encoder/Decoder modules, which perform high quality encoding and/or decoding of MPEG-2 and MPEG-4 AVC video and audio for transmission over IP networks. (For details on these modules, see "Encoder/Decoder Module Overview" on page 27).

The hai1000 series provides simultaneous encoding/compression, decompression /decoding and transport of analog or digital video and associated stereo audio programs. The video encoders support High Definition video for the Mako, as well as CCIR-601 (full D1, or SD) or HHR (Half Horizontal Resolution) picture size for Standard Definition. The hai1000 series encoders use a combination of efficient sampling methods and an advanced motion compensation scheme.

A wide range of configuration parameters allows hai1000 series users to optimize quality, bandwidth utilization, and end-to-end delay by controlling settings such as the Video Frame Encoding Mode (either I, or IP, IBP or IBBP), Bitrate, and GOP Size. You can also adjust the Audio Compression Mode and Bitrate controls.

MPEG-4 AVC/H.264 Video

The MPEG-4 AVC modules incorporate the latest MPEG-4 AVC / H.264 compression technology, and are fully compliant with H.264 AVC, ISO/IEC 14496-10 (MPEG-4, Part 10). These modules transmit and receive single-program MPEG-4 AVC Transport Streams over IP consisting of:

Mako

- Single MPEG-4 AVC 4:2:0 Baseline or Main Profile up to Level 4.1 video stream from 256 kbps to 10.0 Mbps.
- Mono or Stereo MPEG AAC audio compression and decompression from 32 kbps to 384 kbps.

Standard Definition

- Single MPEG-4 AVC 4:2:0 Baseline or Main Profile up to Level 3.0, NTSC or PAL video stream from 150 kbps to 6.0 Mbps.
- Mono or Stereo MPEG AAC audio compression and decompression from 32 kbps to 384 kbps.

MPEG-2 Video

The MPEG-2 Encoder/Decoder video compression algorithm is fully compliant with ISO/IEC 13818-2 (H.262). These modules transmit and receive single-program MPEG-2 Transport Streams over IP consisting of:

- Single MPEG-2 4:2:0 Main Profile, Main Level (MP@ML) NTSC or PAL video stream from 400 kbps to 10.0 Mbps (as specified in ISO/IEC 13818-2).
- Mono or Stereo MPEG-1 audio Layer-2 compression and decompression from 32 to 448 kbps (as specified in ISO/IEC 11172-3).

Related Topics:

- For information on using the Web Interface to configure and monitor services, see Chapter 6: “Configuring A/V Services From the Web Interface”.
- For information on using CLI commands to configure and monitor services, see Chapter 7: “Configuring A/V Services From the CLI”.

Video Transport Over IP

The hai1000 series provides standards-based IP encapsulation of multimedia traffic and audio/video transmission using the Ethernet interface on the HOST module. This service can be set up either as one of the following encapsulation options: TS (Transport Stream) over RTP, TS over UDP, Direct RTP, or QuickTime.

RTP Protocol

The hai1000 series uses the Real-Time Transport Protocol (RTP) as a mechanism for encapsulating the MPEG-2 or MPEG-4 AVC Transport Stream (TS) units for video transport over IP networks. RTP encapsulation provides end-to-end network transport functions for data with real-time properties, such as interactive audio and video, over multicast or unicast network services. The RTP transport services include payload type identification, sequence numbering, timestamping and delivery monitoring.

It is also possible to send the MPEG-2 or MPEG-4 AVC TS cells within a UDP-only packet without using the RTP protocol. This mode can be used to interoperate with MPEG-2 or MPEG-4 AVC devices that do not use RTP.

Network Performance Monitoring

The hai1000 series monitors IP network performance using information provided in the RTCP reports or calculated from the RTP packet header. Network performance is sampled at 5 second intervals. The following statistics are used to evaluate the network behavior:

- packets received
- jitter at the sampling instant
- peak jitter
- maximum inter-arrival time delta
- number of packets lost
- number of packets reordered
- number of packets duplicated

Meshed Conferencing

The hai1000 series supports meshed conferencing which consists of linking each end point site with every other site within a single audio/video conference. All the sites in a meshed conference receive the audio/video streams of all the other sites in the conference (i.e., “one sees all”). Audio mixing and video selection is left to the end user sites. Typically, the end point site conference room will display all incoming video signals on separate monitors and feed the audio signals to an audio console. Meshed conferences are usually scheduled and set up by a central conference management system such as Renovo Video Scheduler.

Multicasting

The hai1000 series supports both network and multi-streaming over the IP network.

- IP (Network) Multicasting is the transmission of data over IP to a *host group* identified by a single IP destination address. IP multicasting involves sending a single data stream to a network multicast address which is then interpreted by routers. Both the source and the destinations use the same multicast address to send and receive the IP stream.

  Note that the hai1000 series uses the Internet Group Management Protocol (IGMP) to join the IP Multicast groups.

- Multi-streaming, on the other hand, sends several distinct streams (which are duplicated at the source) over the IP network to several destination IP addresses. With the hai1000 series, multi-streaming creates a clone or stream copy duplicated at the source.

  From the Web Interface, you can specify up to four Encoder stream destinations, i.e., up to four copies of the same content using the same Audio/Video parameter settings.

  Using the CLI or SNMP, copies of the same stream may be sent to up to ten or more unicast or multicast destinations. The number of destinations depends on the video content, bitrate, and other A/V parameters settings.

Related Topics:

- For more information on multicasting, see Appendix F: “Unicast, Multicast and Multi-Streaming”
- To configure multicasting using the Web Interface, see “Configuring Encoder Streams” on page 129 and “Configuring Decoder Streams” on page 154.
- To configure multicasting using the CLI, see “Creating Multicast Sessions” on page 194.

Management Overview

All hai1000 series interfaces and applications such as Audio/Video services and IP links may be configured, managed, and monitored in three ways: through the Web Interface, the Command Line Interface (CLI), or an SNMP server. All methods require access to the hai1000 series either through its management serial port or LAN port.

Management Using the Web Interface

Managing the hai1000 series from the Web Interface requires a connection from the unit's LAN port to your network.

For information on how to configure and manage the hai1000 series from the Web Interface, see Chapter 6: "Configuring A/V Services From the Web Interface".

Management through the CLI

Management through the CLI requires that you access the hai1000 series using either:

- a VT-100 terminal connected to the management (MNGT) port on the HOST module, or
- a telnet session between a terminal and the hai1000 series.

For information on how to configure and manage the hai1000 series from the CLI, see Chapter 7: "Configuring A/V Services From the CLI".

SNMP-based Management

SNMP-based management involves using a network management station (NMS) to communicate with the hai1000 series, exclusively through the exchange of SNMP messages. SNMP clients are used to monitor and control the system, and to report to registered NMSs.

For information on SNMP management of the hai1000 series, see Chapter 8: "Configuring A/V Services Using SNMP".

Configuration Management

Each hai1000 series unit is configured by users' selecting and setting values of applicable system parameters, such as Encoder/Decoder settings and the stream destination. Although these configuration parameters are not automatically saved, you can save a snapshot of the configuration as a list of text-based configuration directives in a file which is stored in the Compact Flash memory.

When the system start-up process performs the configuration autoload, you can direct it to read the configuration from memory to restore these parameter settings.

Configuration Management from the Web Interface

From the Web Interface, you can manage configurations from the Administration > Configuration page. This includes saving the current configuration, loading a saved configuration, and specifying a configuration file to load at startup.

For more information, see "Saving and Loading Configurations" on page 163.

Configuration Management from the CLI

The CLI provides commands to save the current configuration, load a saved configuration, and specify a configuration file to load at startup. For details, see "Saving and Loading Configurations" on page 207.

QuickTime SDP and Interoperability

The hai1000 series supports QuickTime and Flash interoperability (through a Flash gateway) using an SDP (Session Description Protocol) file.

hai1000 users can select QuickTime as the Stream Protocol (as per RFC 3640 for the audio and RFC 3984 for the video) and when the session starts, can generate an SDP file (compliant to RFC 2327) with both video and audio attributes. For details, see "Configuring QuickTime SDP" on page 141.

CHAPTER 2: Physical Description

This chapter describes the main hardware components of the hai1000 series.

Topics In This Chapter

HOST4 Module Connections

The HOST4 module is shown in Figure 2-1 below. This module comes with a 10/100BaseT, RJ45, LAN interface, which uses UTP CAT 5 cabling between the HOST module and the LAN.

A terminal can be connected to the HOST module's management (MNGT) serial port through its RJ45 connector using UTP cabling.

Figure 2-1 HOST4 Module, Sample Face Plate

Management (MNGT) Port RJ45 Connector

The Management port uses an RJ45 connector which has the following pinout:

Table 2-1 HOST4 Module, Management Port RJ45 Pinout

Pin	Signal	Name
1	RI	Ring Indicator
2	DCD	Receive Line Signal Detect
3	DTR	DTE Ready
4	--------	Signal Ground
5	RXD	Receive Data
6	TXD	Transmit Data
7	CTS	Clear to Send
8	RTS	Request To Send

An adaptor is required to interface with the serial port. A (grey) DB9 to RJ45 Serial Management adapter is included in the package.

Related Topics

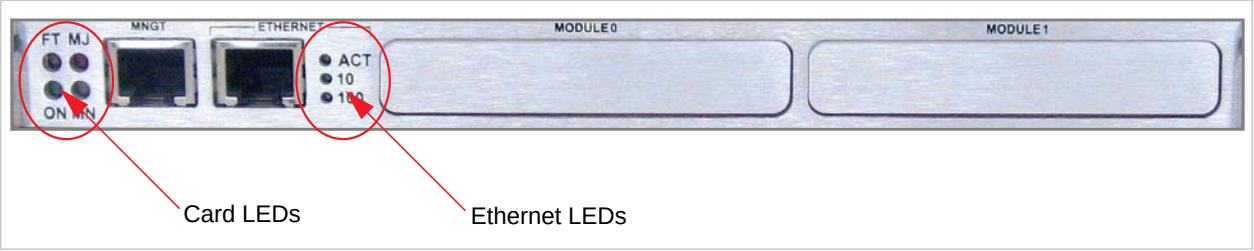
- For details on connecting the ports, see "Connecting to the Network and to a Computer" on page 78.
- For a list of system cables for the hai1000 series and Haivision part numbers, see Appendix D: "Ordering Information".

HOST4 Module LEDs

The hai1000 series' power-up and initialization sequence can be easily traced by the rapid changes in LED states on all modules. Success of the initialization sequence is indicated by the LEDs settling down to a stable normal state.

Figure 2-2 shows the LEDs on the HOST4 module.

Figure 2-2 LEDs on the HOST4 Module (Sample Face Plate)



The functions of the HOST4 module LEDs are given in Table 2-2 below.

Table 2-2 LEDs on the HOST4 Module

Abbreviation	Indication	LED Color	Function
ON	Power	Green	When lit, indicates satisfactory operation, completion of a process, or proceed. Flashing indicates that module is being initialized.
FT	Fault	Red	When lit, indicates a critical or major failure, or error.
MJ	Major Alarm	Red	When lit, indicates a system-related problem.
MN	Minor Alarm	Amber	When lit, indicates a minor failure, caution, warning, or temporary malfunction.
ACT (Ethernet)	Activity Signal	Green	Flashing or solid green when connected and active.
10 (Ethernet)	10BaseT Detection	Green	Ethernet link is established at 10 Mbps.
100 (Ethernet)	100BaseT Detection	Green	Ethernet link is established at 100 Mbps.

NOTE It takes approximately 2 ½ minutes for the hai1000 series to boot.

Mako Connections

Encoder Connections – Mako

Video Input

The Mako Encoder video interface consists of one BNC connector and one HD-15 D-Sub connector (sample faceplate shown in Figure 2-3).

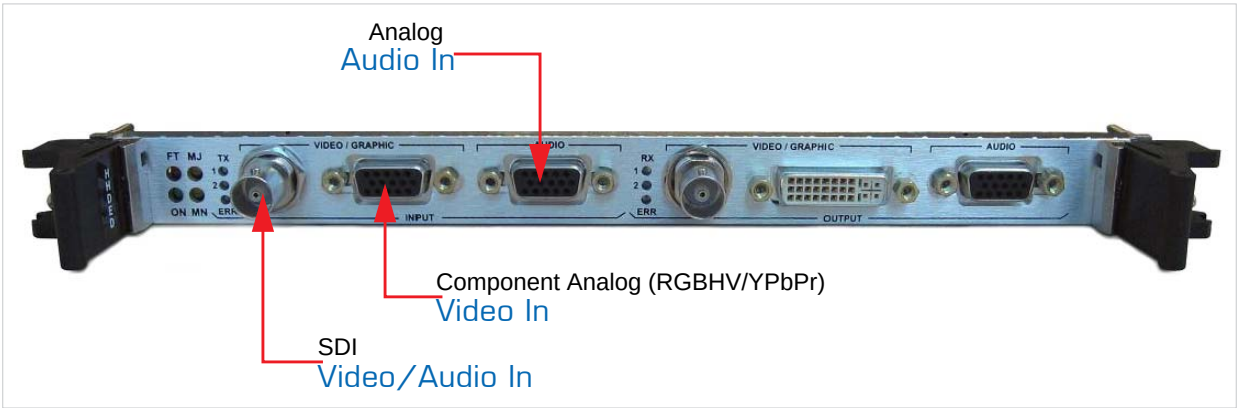
- The BNC connector is used for SDI (Serial Digital Interface) video signals. A 75Ω coaxial cable is used to connect the video source to Video In.
- The HD-15 D-Sub connector is used for Analog Component/YPbPr video signals. An HD-15 to triple RCA or triple BNC cable is used to connect the video source to Video In.

Audio Input

The Mako Encoder audio interface consists of one HD-15 D-Sub connector and (for SDI only) a BNC connector (shared with the video signal).

- The BNC (SDI) connector is used for embedded digital audio signals. A 75Ω coaxial cable is used to connect the audio source to Audio In.
- The HD-15 D-Sub connector is used for 4-channel analog audio signals (two stereo pairs). An RCA (Unbalanced) or XLR (unbalanced) cable is used to connect the audio source to Audio In.

Figure 2-3 Encoder Face Plate - Mako In



NOTE You *must* select the Audio Input connector type (i.e., Embedded Digital *or* Analog audio).

Decoder Connections – Mako

Video Output

The Mako Decoder video interface consists of one BNC connector and one DVI-I Single Link connector (sample faceplate shown in Figure 2-5).

- The BNC connector is used for SDI video signals. A 75Ω coaxial cable connects from Video Out to a video monitor.
- The DVI-I Single Link connector is used for combined Analog/Digital video signals. A DVI cable connects from Video Out to a video monitor.

Audio Output

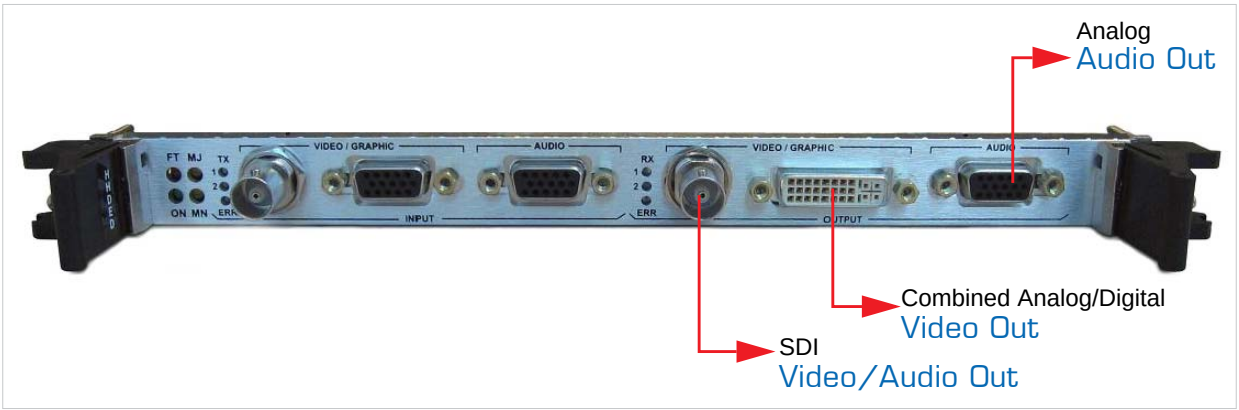
The Mako Decoder audio interface consists of one HD-15 D-Sub connector and a BNC connector (shared with the video signal, for SDI only).

- The BNC (SDI) connector is used for embedded digital audio signals. A 75Ω coaxial cable connects from Audio Out to a receiver or other sound system.
- The HD-15 D-Sub connector is used for 4-channel analog audio signals (two stereo pairs). RCA (Unbalanced) or XLR (unbalanced) cables connect from Audio Out to a receiver or other sound system.

NOTE All Video and Audio Output connectors are active. This means that the Decoder is capable of simultaneously outputting analog *and* digital audio as well as analog *and* digital video (depending on the configuration) regardless of whether the source is analog or digital.

SDI Video and Embedded Digital Audio Output use the same BNC connector.

Figure 2-4 Decoder Face Plate - Mako Out



SD (Standard Definition) Connections

Encoder Connections – SD

Video In

The Standard Definition Encoder video interface consists of a pair of input connectors: either one BNC and one 4-pin mini-DIN, or two BNC connectors (sample faceplates shown in Figures 2-5 and 2-6).

- The BNC connectors are used for Composite (CVBS) or SDI video signals. A 75Ω coaxial cable is used to connect from the video source to Video In.
- The 4-pin mini-DIN connector is used for S-Video signals. An S-Video cable (quad-shielded cables are recommended) is used to connect from the video source to Video In.

Audio In

The Standard Definition Encoder audio interface consists of one HD-15 D-Sub connector, and (for SDI only) a BNC connector (shared with the video signal).

- The BNC (SDI) connector is used for embedded digital audio signals. A 75Ω coaxial cable is used to connect from the audio source to Audio In.
- The HD-15 D-Sub connector is used for 4-channel analog audio signals (two stereo pairs). An RCA (Unbalanced) or XLR (unbalanced) cable is used to connect from the audio source to Audio In.

Figure 2-5 Encoder Face Plate - Composite/S-Video In

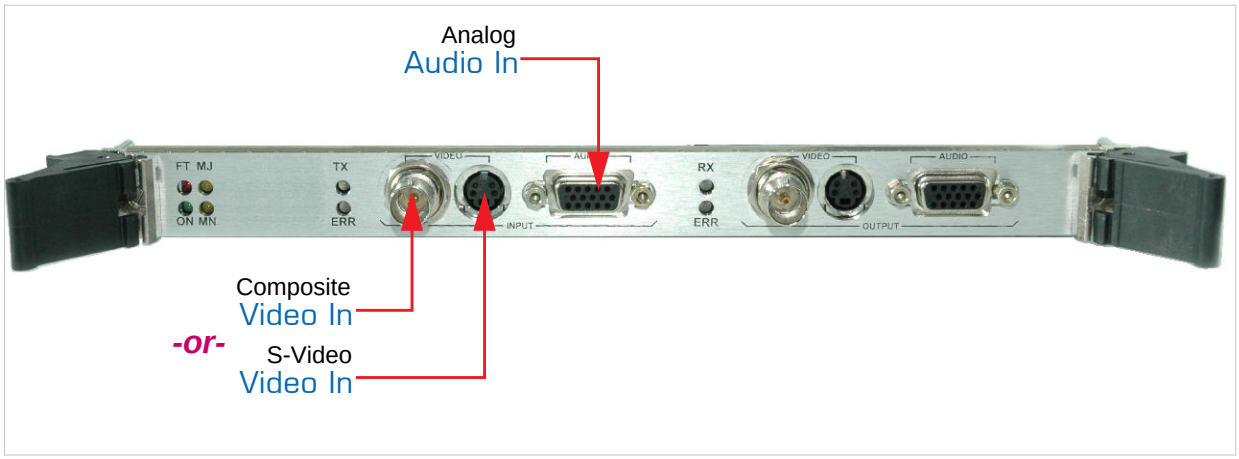
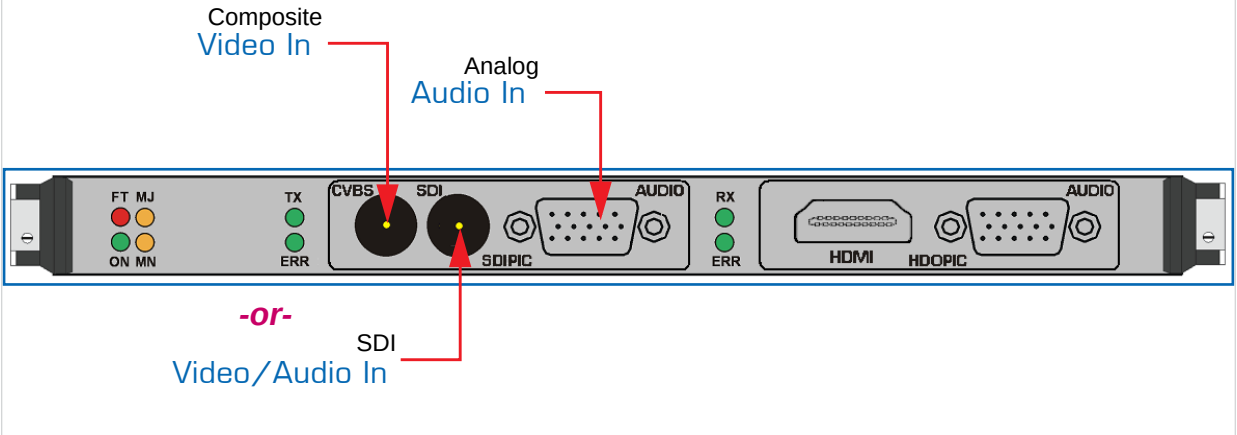


Figure 2-6 Encoder Face Plate - Composite/SDI Video In



NOTE When configuring the Encoder, you *must* select the Video Input connector type (i.e., Composite, S-Video *or* SDI video). Also, for SDI boards, you *must* select the Audio Input connector type (i.e., Analog *or* Embedded Digital audio).

Decoder Connections - SD

Video Out

The Decoder video interface consists of either a pair of connectors (either one BNC and one 4-pin mini-DIN, or two BNC connectors), or a single HDMI connector (sample faceplates shown in Figures 2-7 and 2-8).

- The BNC connectors are used for the Composite and SDI video signals. A 75Ω coaxial cable connects from Video Out to a video monitor.
- The 4-pin mini-DIN connector is used for S-Video signals. An S-Video cable (quad-shielded cables are recommended) connects from Video Out to a video monitor.
- The HDMI connector is used for the upscaled High Definition audio/video output signals. An HDMI Type-A cable connects from HDMI Out to a video monitor.

Audio Out

The Standard Definition Decoder audio interface consists of one HD-15 D-Sub connector and (depending on the card) a BNC or HDMI connector (shared with the video signal).

- The BNC (SDI) connector is used for embedded digital audio signals. A 75Ω coaxial cables connect from Audio Out to a receiver or other sound system.
- The HD-15 D-Sub connector is used for 4-channel analog audio signals (two stereo pairs). An RCA (Unbalanced) or XLR (unbalanced) cable connects from Audio Out to a receiver or other sound system.
- The HDMI connector is used for embedded digital audio signals. One HDMI Type-A cable connects from HDMI Out to a receiver or other sound system.

NOTE All Video and Audio Output connectors are active. This means that the Decoder is capable of simultaneously outputting analog *and* digital audio as well as analog *and* digital video (depending on the configuration) regardless of whether the source is analog or digital.

Figure 2-7 Decoder Face Plate - Composite/S-Video Out

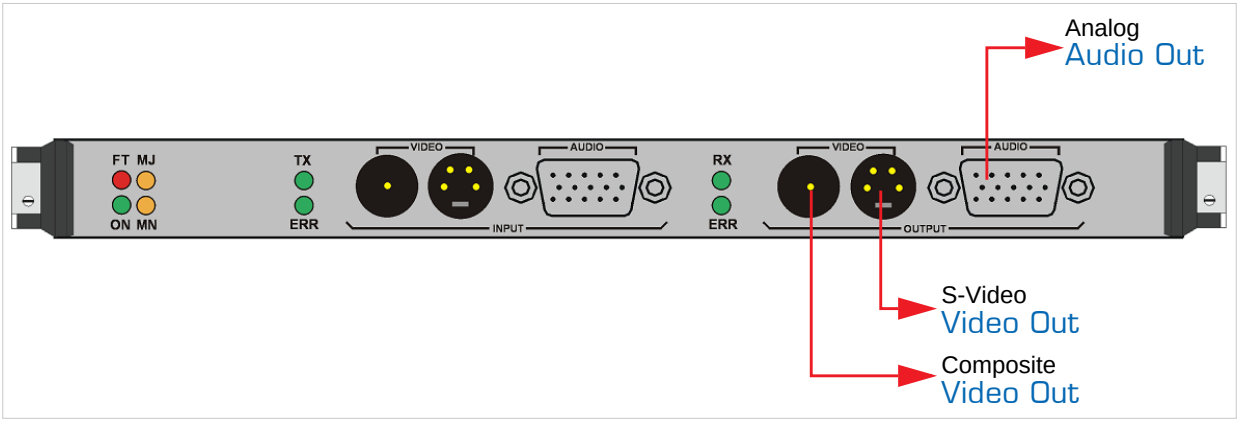
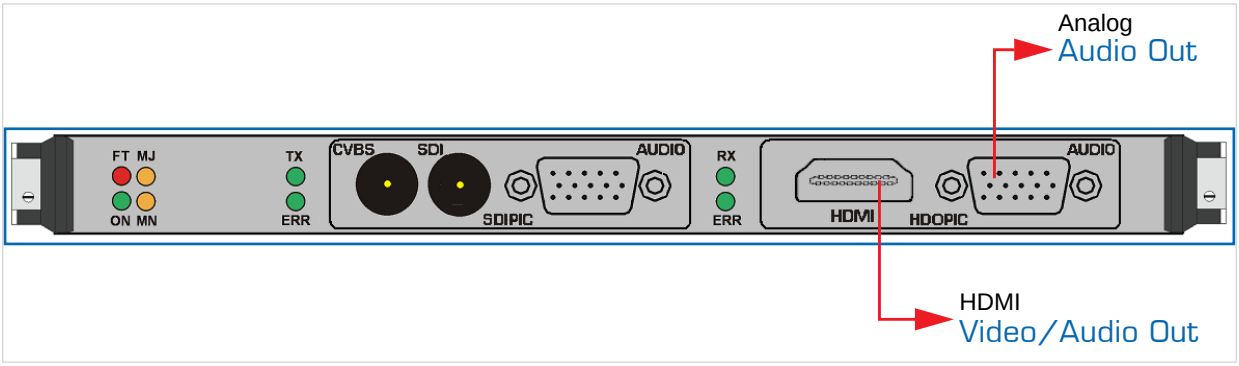


Figure 2-8 Decoder Face Plate - HDMI Out



A/V Cables and Connector Pinouts

The following table lists the cables for the Encoder/Decoder modules, including description and Haivision part numbers.

Table 2-3 Cables for the Encoder/Decoder Modules

Port	Connector	Cable Length	Part Number
Analog Component Video (YPbPr)	HD-15 DSUB to 3 x RCA Male	10 feet	027H020-010G
	HD-15 DSUB to 3 x BNC PLUG	10 feet	CV-HM-YPBPR
Composite Video SDI Video/Audio	BNC - Single Shield	10 feet 25 feet 50 feet 100 feet	CV-BNC-10 CV-BNC-25 CV-BNC-50 CV-BNC-100
S-Video	4-pin Mini-DIN	6.7 feet (2 meters)	CV-SVID-10
HDMI Video/Audio	HDMI cable with molded ferrite	6 feet 15 feet 25 feet	030H001-006G 030H001-015G 030H001-025G
DVI-I	DVI-I to DVI-I Video Cable	6ft, dual link	028H001-006G
	DVI-I to DVI-I Video Cable	10ft, dual link	028H001-010G
	DVI-I to DVI-I Video Cable	15ft, dual link	028H001-015G
NOTE: The Mako module requires a standard DVI-I cable for combined Analog/Digital Video output.			
Audio (balanced)	HD-15 DSUB to XLR Female (INPUT) Balanced Audio Cable, 4 channel	10 feet	CA-HM-4XF10
	HD-15 DSUB to XLR Male (OUTPUT) Balanced Audio Cable, 4 channel	10 feet	CA-HM-4XM10
	HD-15 DSUB to XLR Female (INPUT) Balanced Audio Cable, 2 channel	10 feet	CA-HM-2XF10
	HD-15 DSUB to XLR Male (OUTPUT) Balanced Audio Cable, 2 channel	10 feet	CA-HM-2XM10

Table 2-3 Cables for the Encoder/Decoder Modules

Port (Cont.)	Connector (Cont.)	Cable Length	Part Number
Audio (unbalanced)	HD-15 DSUB to RCA Unbalanced Audio Cable, 4 channel	10 feet	CA-HM-4RCA10
	HD-15 DSUB to RCA Unbalanced Audio Cable, 2 channel	10 feet	CA-HM-2RCA10
NOTE: For cable adaptor kits available from Haivision, for example, DVI to HD-15, see Appendix D: "Ordering Information".			

CAUTION Haivision guarantees the EMI certification of the hai1000 series using Haivision cables. Customers must meet the EMI requirements of their own country. If you do not use Haivision cables, the EMI emissions may not be within the required limits.

HD-15 Audio Connector Pinout

The HD-15 D-Sub audio connector has the following pinout:

Figure 2-9 HD-15 Audio Connector Pinout (4-Channel)

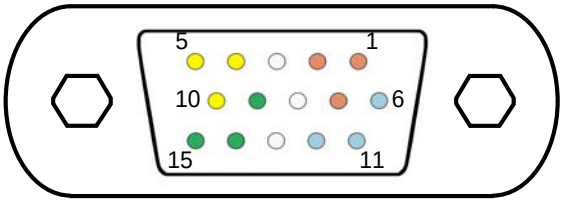


Table 2-4 HD-15 Audio Connector Pinout (4-Channel) Pinout

HD-15 Pin #	Description
1	2– (Right A)
2	2+ (Right A)
3	Chassis GND
4	Signal CH.3– (Left B)
5	Signal CH.3+ (Left B)
6	GND CH.1 (Left A)
7	GND CH.2 (Right A)
8	Chassis GND
9	GND CH.4 (Right B)
10	GND CH.3 (Left B)
11	1– (Left A)
12	1+ (Left A)
13	Chassis GND
14	Signal CH.4– (Right B)
15	Signal CH.4+ (Right B)

Figure 2-10 Balanced HD-15 Audio Cable Connection Details (4-Channel)

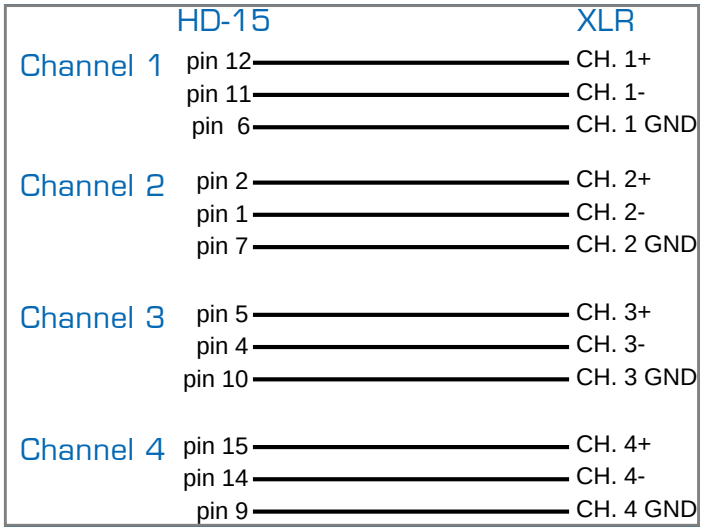
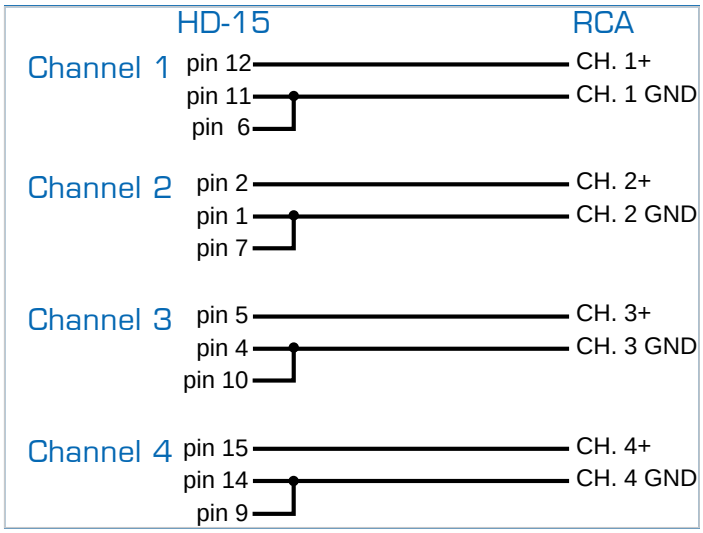


Figure 2-11 Unbalanced HD-15 Audio Cable Connection Details (4-Channel)



TIP In setups that use less than four audio channels, any of the four channels can be wired. For simplicity, we recommend that you start with Channel #1 and then #2, etc.

Also, the two-channel cable is a copy of the 4-channel cable, however, without Channels 3 and 4.

Grounding of Audio Balanced Cables

On Haivision's audio balanced cables, the shield is connected to only one end of the cable.

- On the D-Sub connector, the shield of the cable is connected to the chassis GND.
- On the XLR connector, the shield of the cable is not connected to Pin #1.

This design is to prevent any hum noise on the audio signal (current on the shield wire).

HD-15 Video Connector Pinout

The HD-15 D-Sub connector is used for interconnection to analog component video/VGA. The HD-15 D-Sub video connector has the following pinout:

Figure 2-12 HD-15 Analog Component Video (YP_BP_R) Connector Pinout

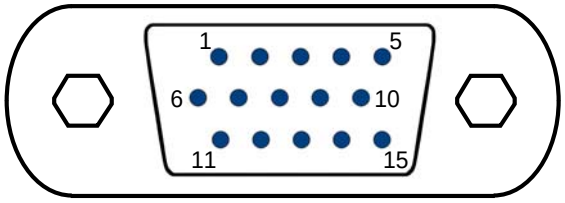


Table 2-5 HD-15 Analog Component Video Connector Pinout

HD15 Pin #	Signal Name	BNC/RCA
1	P_R	Pin
6	P_R Ground	Shell
2	Y	Pin
7	Y Ground	Shell
3	P_B	Pin
8	P_B Ground	Shell
4, 5, 9, 10, 11, 12, 13, 14,15	Reserved / Not Connected	

HDMI Audio/Video Output Connector Pinout

The Type A 19-pin HDMI audio/video output connector has the following pinout:

Figure 2-13 HDMI Connector Pinout

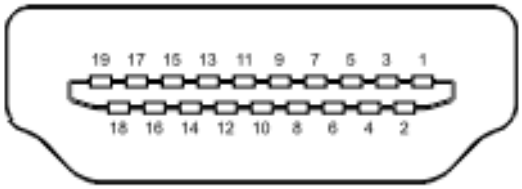


Table 2-6 HDMI Connector Pinout

HDMI Pin #	Description
1	TMDS Data2+
2	TMDS Data2 Shield
3	TMDS Data2–
4	TMDS Data1+
5	TMDS Data1 Shield
6	TMDS Data1–
7	TMDS Data0+
8	TMDS Data0 Shield
9	TMDS Data0–
10	TMDS Clock+
11	TMDS Clock Shield
12	TMDS Clock–
13	Reserved (N.C. on device)
15	SCL
16	SDA
17	DDC/CEC Ground
18	+5 V Power
19	Hot Plug Detect

IMPORTANT The HDMI Output card has been tested for compliance with appropriate FCC and CE rules and regulations. Usage of recommended HDMI cables with molded ferrite (as provided in the hai1000 series package) is required to meet requirements on the EMI/RFI interference.

DVI Video Output Connector Pinout

The Mako DVI-I Single-Link output connector has the following pinout:

Figure 2-14 DVI-I Single-Link Connector Pinout

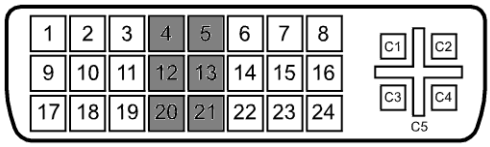


Table 2-7 DVI-I Single-Link Connector Pinout

DVI Pin #	Description
1	Transition Minimized Differential Signaling (TMDS) Data 2-
2	TMDS Data 2+
3	TMDS Data 2/4 shield
6	DDC clock
7	DDC data
8	Analog vertical sync
9	TMDS Data 1-
10	TMDS Data 1+
11	TMDS Data 1/3 shield
14	+5 V
15	Ground
16	Hot plug detect
17	TMDS data 0-
18	TMDS data 0+

Table 2-7 DVI-I Single-Link Connector Pinout (Cont.)

DVI Pin #	Description
19	TMDS data 0/5 shield
22	TMDS clock shield
23	TMDS clock+
24	TMDS clock-
C1	Analog red
C2	Analog green
C3	Analog blue
C4	Analog horizontal sync
C5	Analog ground
4, 5, 12, 13, 20, 21	Reserved / Not Connected

IMPORTANT The Mako card has been tested for compliance with appropriate FCC and CE rules and regulations. Usage of recommended DVI-I cables with molded ferrite is required to meet requirements on the EMI/RFI interference.

Encoder/Decoder LEDs

The hai1000 series' power-up and initialization sequence can be easily traced by the rapid changes in LED state on all modules. Success of the initialization sequence is indicated by the LEDs settling down to a stable normal state.

Figures 2-15 and 2-16 show the LEDs on the Encoder/Decoder and single Encoder or Decoder modules.

Figure 2-15 LEDs on a Mako Encoder/Decoder Module

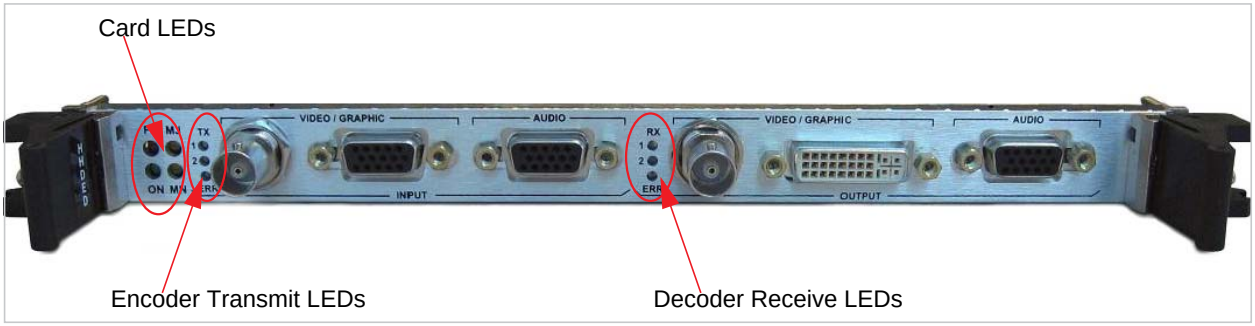
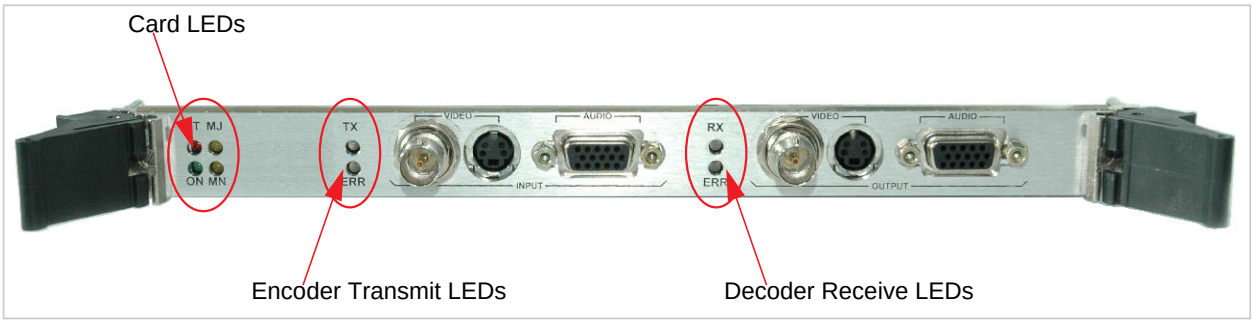


Figure 2-16 LEDs on a Standard Definition Encoder/Decoder Module



The functions of the Encoder/Decoder LEDs are given in Table 2-8 below.

Table 2-8 LEDs on the Encoder/Decoder Modules

Abbreviation	Indication	LED Color	Function
ON	Power	Green	When lit, indicates satisfactory operation, completion of a process, or proceed. Flashing indicates that module is being initialized.
FT	Fault	Red	When lit, indicates a critical or major failure, or error.
MJ	Major Alarm	Amber	When lit, indicates a system-related problem.
MN	Minor Alarm	Amber	When lit, indicates a minor failure, caution, warning, or temporary malfunction.
TX [SD] -or- TX1 / TX2 [Mako]	Encoder Transmission Signal - Primary / Secondary	Off	No data is transmitted
		Amber	One of the two signals (audio or video) is missing (e.g., A/V is muted or disconnected).
		Green	The encoder is encoding audio and video data (i.e., A/V signal is present)
ERR	Encoder Error Signal	Off	No error
		Amber	The encoder is not operating properly
		Green	The encoder is being initialized
RX [SD] -or- RX1 / RX2 [Mako]	Decoder Receive Signal - Primary / Secondary	Off	No data is received
		Amber	Video signal is missing
		Green	The decoder is receiving and decoding audio and video data
ERR	Decoder Error Signal	Off	No error
		Amber	The decoder is not operating properly
		Green	The decoder is being initialized

Related Topics:

- For information on hardware installation of audio/video modules, see "Installing a Module in a Chassis" on page 77.
- For information on using the Web Interface to configure and monitor services, see Chapter 6: "Configuring A/V Services From the Web Interface".
- For information on using CLI commands to configure and monitor services, see Chapter 7: "Configuring A/V Services From the CLI".

- For information on using SNMP to manage the hai1000 series, see Chapter 8: “Configuring A/V Services Using SNMP”

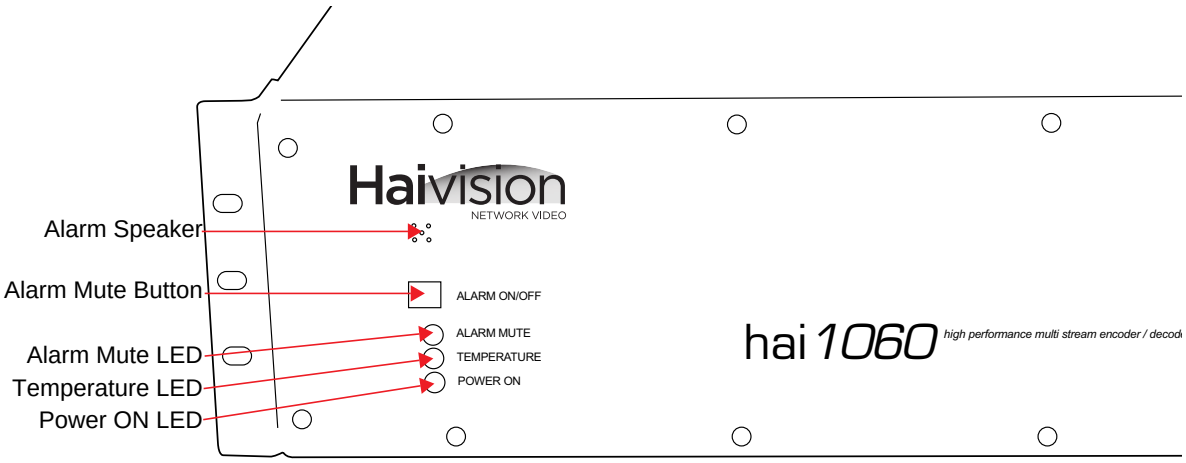
System LEDs

Front Panel LEDs (hai1060)

The hai1060 system provides three LEDs located at the left side of the front panel: Alarm Mute, Temperature and Power On (see Figure 2-17 below). Table 2-9 describes the normal state of each front panel LED after power-up.

The front panel also includes an Alarm Speaker and Alarm Mute Button. The Alarm Speaker will sound a tone when a hardware alarm is present. The tone can be silenced by pressing the Alarm Mute Button. Once this button has been pressed, the Alarm Mute LED will be lit until the alarm is unmuted by pressing the Alarm Mute Button again.

Figure 2-17 Front Panel LEDs on the hai1060



It takes about 20 seconds for the front panel LEDs to reach their normal state, as described in Table 2-9.

Table 2-9 Front Panel LEDs on the hai1060

LED Name	Color	Indication at Boot Time	Indication at Run-time
Power On	green	On indicates power available on backplane Off indicates the system has no power or the PSU is defective	Solid indicates power available

Table 2-9 Front Panel LEDs on the hai1060

LED Name	Color (Cont.)	Indication at Boot Time (Cont.)	Indication at Run-time
Temperature	red	On indicates hardware over-temperature fault (> 60 deg C)	On indicates hardware over-temperature fault (> 60 deg C)
Alarm Mute	amber	On indicates hardware Alarm Muting is activated.	On indicates hardware Alarm Muting is activated. This LED can be cleared by pressing the Alarm Mute Button.

When the front panel LED displays are not normal, refer to Chapter 10: “Troubleshooting”.

Front Panel LED (hai1020)

As shown in Figure 2-18 below, the hai1020 Power On LED is located at the right end of the front panel. Table 2-10 describes the normal state of this LED after power-up.

Figure 2-18 Front Panel LED on the hai1020

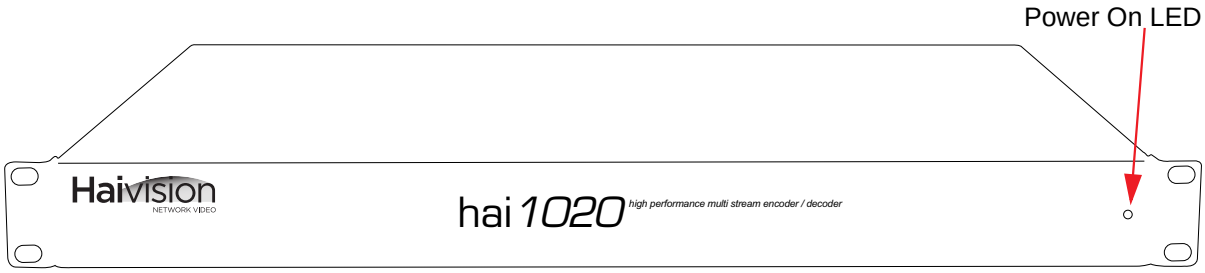


Table 2-10 Front Panel LED on the hai1020

LED Name	Color	Function
Power On	green	On indicates AC power available.

Serial Data Mezzanine

IMPORTANT The Serial Data Mezzanine is an optional feature and must be specified when ordering a hai1000 system.

The hai1000 series equipped with the Serial Data Mezzanine card supports KLV (Key Length Value) metadata capture and stream insertion. With this option, the hai1000 series captures metadata from the serial port interface and then incorporates the data information within the private data space of the standard MPEG Transport Stream. The mezzanine supports four independent serial ports for KLV metadata capture. Note that only one serial input port can be used by each Encoder and that the same serial input port cannot be used by more than one Encoder.

Figure 2-19 Sample hai1020 with Serial Data Mezzanine option

The Serial Data Mezzanine option requires the HM4ED MPEG-4 AVC Encoder/Decoder module to support the metadata insertion. Note that Metadata capture and stream insertion is supported only at the Encoder level. (This means that the adjacent HM4ED Decoder cannot extract MPEG metatdata to output over a serial port.)

The metadata insertion parameters may be controlled and managed either through the Web Interface or the Command Line Interface (CLI). SNMP is not supported.

NOTE The capture and transmission of KLV metadata can be done simultaneously with Closed Caption encoding on the same blade. These are not exclusive features.

Related Topics

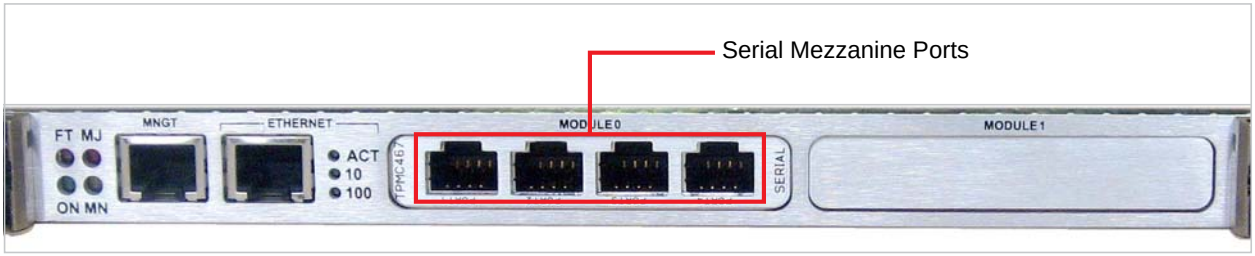
- "Serial Data Mezzanine Connections" on page 62
- "Connecting the Serial Data Mezzanine Ports" on page 86
- "Configuring Serial Metadata Capture" on page 135 (from the Web Interface)
- "KLV Data Specifications" on page 335

Serial Data Mezzanine Connections

The Serial Data Mezzanine ports (shown in Figure 2-20 below) may be connected to up to four serial sources (such as PCs) using the black RS-232 DB9 to RJ45 adapter (one is included in the package) and a standard straight Ethernet cable.

An RS-422 DB9 to RJ45 adapter is also available upon request.

Figure 2-20 HOST4 Module, Serial Data Mezzanine option



IMPORTANT The Serial Data Mezzanine ports are DCE (Data Communication Equipment).

Serial Port RJ45 Connector Pinout

The Serial Data Mezzanine ports use an RJ45 connector which has one of the following pinouts:

Table 2-11 Serial Data Mezzanine Port RS-232 RJ45 pinout

Pin	Signal	Name
1	N.C.	-
2	N.C.	-
3	N.C.	-
4	GND	Signal Ground / Common
5	RXD	Receive Data
6	TXD	Transmit Data
7	CTS	Clear to Send
8	RTS	Request To Send

Table 2-12 Serial Data Mezzanine Port RS-422 RJ45 pinout

Pin	Signal	Name
1	N.C.	-
2	N.C.	-
3	Tx+	Transmit Data +
4	GND	Signal Ground / Common
5	N.C.	-
6	Tx-	Transmit Data-
7	Rx+	Receive Data+
8	Rx-	Receive Data-

Related Topics

- "Connecting the Serial Data Mezzanine Ports" on page 86
- "Configuring Serial Metadata Capture" on page 135 (from the Web Interface)

CHAPTER 3: Hardware Installation and Setup

This chapter provides the information you need to install the hai1000 series hardware, power up the unit, and set the network parameters.

Topics In This Chapter

Site Requirements

Following are the site requirements to connect and configure the hai1000 series:

Equipment

- A computer with a serial port and HyperTerminal (or other serial communication application) to assign an IP address to the hai1000 series unit.
- An IP address that identifies the hai1000 series unit's Ethernet interface on the LAN, and the Subnet Mask for the LAN segment.
- A 10BaseT or 100BaseT network connection.
- A grounded AC power outlet or DC power source nearby (depending on the order).
- A computer or other workstation with a Web browser connected to the network to access the Web Interface to configure the unit for operation.
- Audio/Video Sources (i.e., cameras, DVD players, document cameras, computers) and Displays (i.e., plasmas, LCDs, projectors, CRT monitors, or TVs).

Environment

- Operating room temperature within a range of 0°C to 50°C (32°F to 122°F).
- A suitable location for operating the unit. The hai1000 series can be installed as a desktop or rack-mounting unit. Make sure the side air vents are unblocked.

Safety Information

Before installing the hai1000 series, please read the following information carefully.

WARNING There are no user-serviceable parts inside the hai1000 series. To prevent electric shock, do not remove the cover.

hai1000 series units are to be installed and serviced by qualified personnel only.

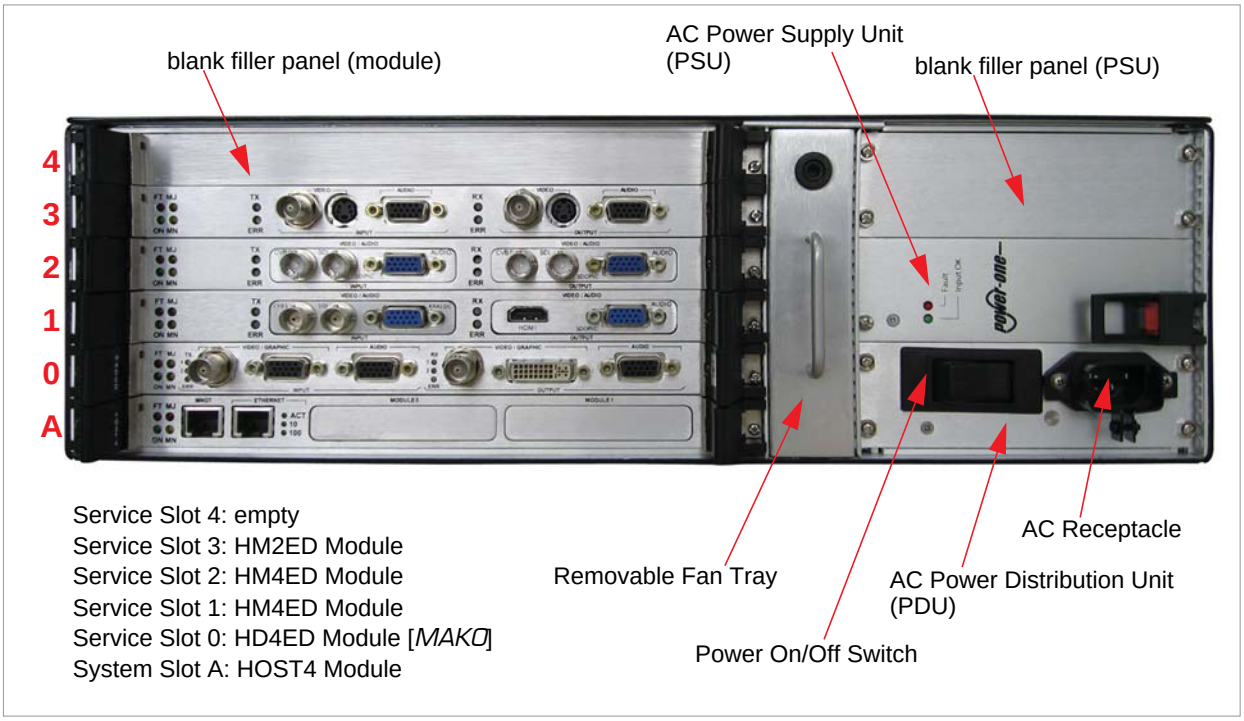
CAUTION When handling modules, always use an antistatic wrist strap to prevent damage from static discharge.

When using an AC powered configuration, always use the three-prong AC power cord supplied with the equipment. Failure to ensure adequate earth grounding by not using this cord may cause equipment malfunction or create a hazardous condition.

Installing the hai1060

Figure 3-1 below illustrates a sample rear view of the hai1060 (AC powered configuration). This figure also indicates the slots in which the different modules must be inserted.

Figure 3-1 Sample Rear View (hai1060)



The operating temperature range for the hai1060 is 0 to 50 degrees centigrade.

The hai1060 can be installed as a desktop unit (see Deskmount Configuration on page 68), or as a 19-inch rack-mounting unit (see Rackmount Configuration on page 69). It can optionally be installed as a 23-inch rack-mounting unit with special mounting brackets.

Deskmount Configuration

To use the deskmount configuration, install the four rubber feet provided with the chassis by removing the backing tape on the rubber feet and installing the feet on the underside of the hai1060 chassis at the four corners.

If a DC PSU/PDU is installed in the hai1060, the chassis must be grounded by attaching a ground wire to the PDU chassis ground post as shown in Figure 3-4 on page 72.

Rackmount Configuration

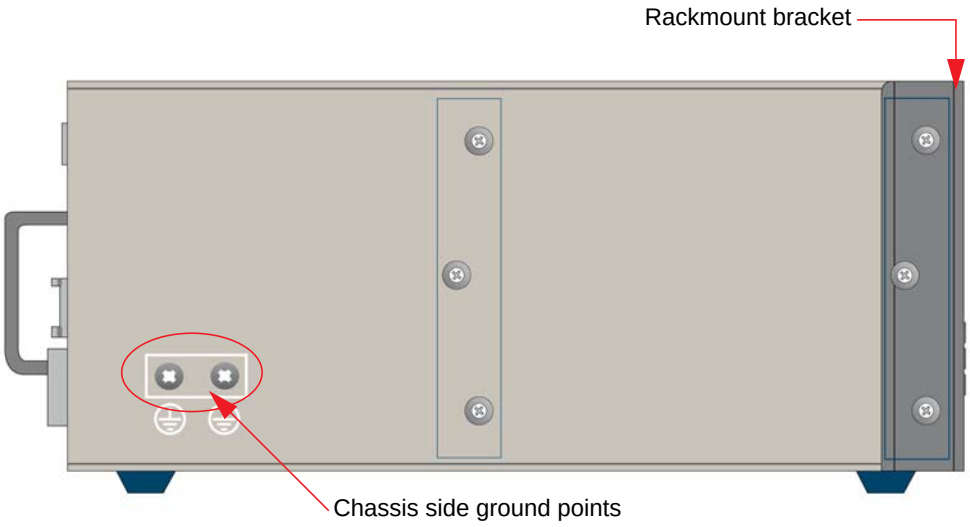
Two rackmount configurations are possible for the hai1060:

- One is for closed cabinet style mounts where the mounting brackets are attached to the front sides of the chassis.
- The second mounting option uses the side center mount points to attach the mounting brackets. The hai1060 can then be mounted in an open telecom style rack in a balanced configuration.

The hai1060 chassis may be grounded by using the rack ground and the physical contact of chassis to rack.

The hai1060 chassis (DC power supply) may also be grounded by using the chassis ground points on the side of the chassis. Grounding wires may be installed at these points using 1/4” diameter x 20 threads/inch screws. In order to have redundant grounding connectivity, be sure to connect both screws using different wires.

Figure 3-2 Ground Points for DC powered configurations



Installation Procedure (hai1060)

To install the hai1060 as a rackmount or desktop unit:

1. Select the mounting location in the rack or on the desktop.
2. For a rack-mounting unit, install the mounting brackets to the rack frame (if they are not already there). (See “Rackmount Configuration” on page 69.)

-or-

For a desktop unit, install the four rubber feet as directed. (See "Deskmount Configuration" on page 68.)

3. Place and secure the equipment in the selected location.
4. If necessary, install any modules which have not been pre-installed. (See "Installing Modules" on page 77.)

NOTE This step is typically not required since hai1000 series units are shipped with the HOST and audio/video modules installed.

---

5. Attach the various cables between the HOST and Encoder/Decoder module connectors and the equipment to which they connect. (See "Connecting the HOST Module" on page 78 and "Connecting the A/V Modules" on page 80.)

   Make sure the power is *off* when you are attaching connectors.
6. Connect the power supply cord(s) to an AC outlet or a DC source.

   For details on the AC and DC power supplies, see "Power Supplies and Distribution Units for the hai1060" on page 71.
7. Turn on the power to the unit. (See "Powering Up the Unit" on page 88.)

TIP If the hai1060 is to be installed as a rack-mounting unit, be sure to read the information on maintaining the removable fan tray and air filter prior to mounting the system in its rack. See Chapter 5: "Hardware Maintenance".

Power Supplies and Distribution Units for the hai1060

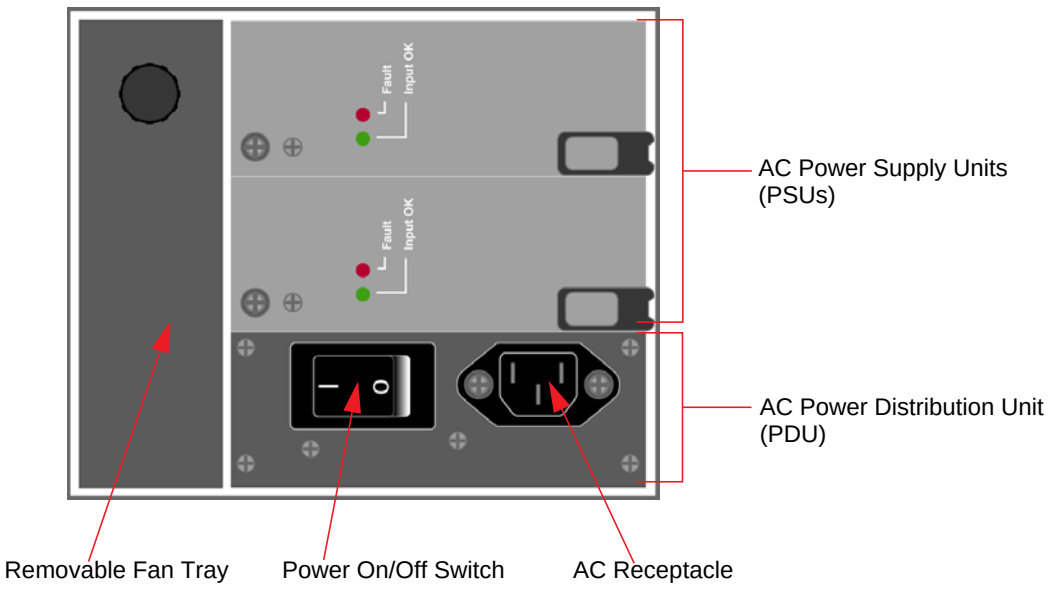
The hai1060 chassis may be ordered with either AC or DC Power Supply Units (PSUs) and Power Distribution Units (PDUs) installed.

Although one power supply unit is sufficient to operate the hai1060, two power supplies may be installed as an option, each supporting half of the full load. In case of failure of one power supply unit, the remaining unit takes over the full load instantaneously.

AC Power Supply

Figure 3-3 below shows the AC PSUs and PDU. The hai1060 AC power supplies operate from 100-240 VAC at 50-60 Hz with a maximum amperage of 4 amps. The chassis is grounded through the three prong AC receptacle.

Figure 3-3 AC PSUs and PDU (hai1060)



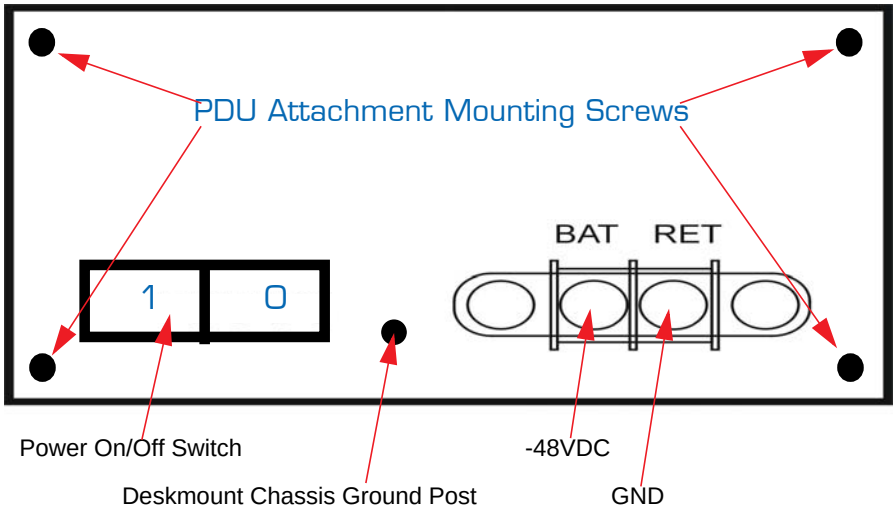
DC Power Supply

The DC PSU is similar in appearance to the AC PSU. Figure 3-4 below shows the DC PDU. The hai1060 DC power supplies operate from -36 to -75 VDC with a maximum amperage of 10 amps.

The BAT and RET terminal posts on the DC PDU must be attached to the -48V and GND supplies respectively. These terminal posts are covered by a plastic cover to prevent accidental shorts and shocks. The BAT terminal must always be connected to the more negative DC power source. The RET terminal must always be connected to the more positive DC power source.

There is a chassis ground post in the center of the PDU which can be attached to the ground for desktop configurations. Alternatively, if the hai1060 is installed in a rack, then the chassis may be grounded by using the rack ground and the mounting brackets for the hai1060, or the chassis side ground screws. If the hai1060 chassis and DC battery are not to be isolated, then the chassis ground port may be connected to the battery ground terminal using a wire.

Figure 3-4 DC Power Distribution Unit (PDU, hai1060)



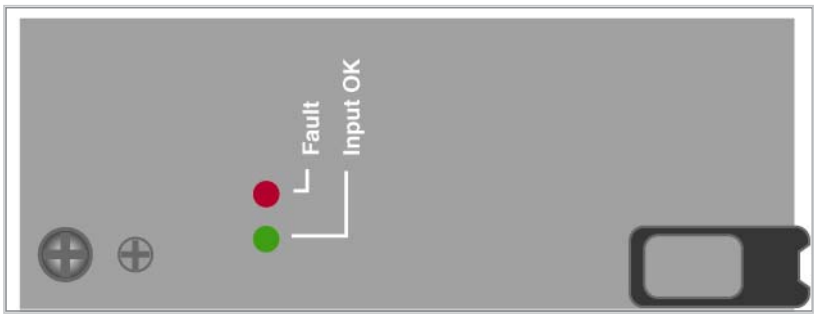
WARNING The chassis ground is connected for both the DC and AC PDU by the attachment mounting screws which attach the PDU to the hai1060 chassis.

Do NOT power on the hai1060 unless the PDU mounting screws are tightened securely to the chassis. Disconnect the power before servicing the hai1060.

Power Supply LEDs

Each PSU has two LEDs: (See figure below)

- The Input OK (green) LED indicates if power is supplied to the PSU.
- The Fault (red) LED indicates if a failure has been detected within the PSU.



Removing and Inserting Power Supplies

The Power Supply Units (PSUs) are hot-swappable components (as long as more than one PSU is installed in the hai1060 chassis).

To remove the PSU from the chassis:

1. Unscrew the locking screws.
2. Press the red lock tab within the ejector handle, and pull the ejector handle.

   A PSU blank filler panel may be installed in PSU Slot 2 if only one PSU is installed in the hai1060 chassis.

To insert a PSU:

1. Push the PSU into a PSU slot until the injector handle engages the side of the chassis.
2. Push the injector handle until the red tab locks into place.
3. Tighten the locking screws until the unit is secure.

NOTE It is physically impossible to insert an AC PSU into a DC chassis and vice-versa. This prevents damage to the units.

Resetting the PDU Breaker

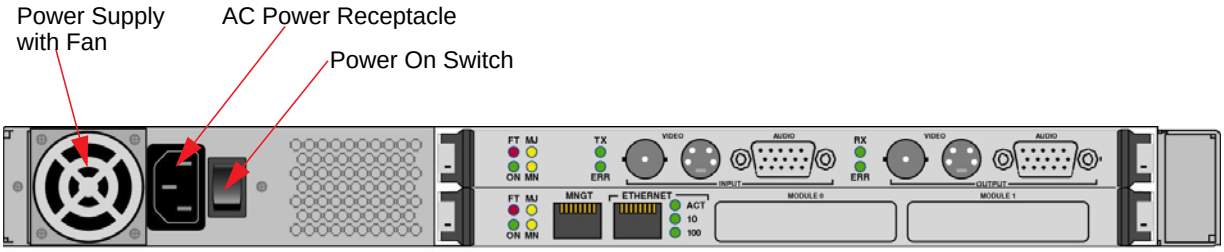
The Power Distribution Unit (PDU) has over-current protection breakers built into the main power rocker switch. Under overload conditions, the rocker power switch returns to the OFF position. Pushing the power switch to ON will reset the breaker.

The PDU is not a hot-swappable component and should never be removed.

Installing the hai1020

The Power On LED is located on the right end of the front panel. Green indicates that the AC power is on. Figure 3-5 below illustrates the rear view of the hai1020.

Figure 3-5 Sample Rear View (hai1020)



Service Slot 0: HM2ED Encoder/Decoder Module
System Slot A: HOST4 System Module

The hai1020 power supply operates from 100-240 VAC at 50-60 Hz with a maximum fused amperage of 4 amps.

The hai1020 can be installed as a desktop unit, or as a 19 inch rack-mounting unit. The hai1020 chassis comes with rubber feet for desktop use and rackmount brackets for use in a rack.

Installation Procedure (hai1020)

To install the hai1020 as a rack-mount or desktop unit:

1. Select the mounting location in the rack or on the desktop.
2. For a rack-mounting unit, install the mounting brackets to the rack frame (if they are not already there).

   -or-

   For a desktop unit, install the four rubber feet.
3. Place and secure the equipment in the selected location.

4. If necessary, install any modules which have not been pre-installed. (See "Installing Modules" on page 77.)

NOTE This step is typically not required since hai1000 series units are shipped with the HOST and audio/video module installed.

---

5. Attach the various cables between the HOST and Encoder/Decoder module connectors and the equipment to which they connect. (See "Connecting the HOST Module" on page 78 and "Connecting the A/V Modules" on page 80.)

   Make sure the power is *off* when you are attaching connectors.

6. Connect the power supply cord(s) to an AC outlet or a DC source.

   For details on the AC and DC power supplies, see "Power Supplies and Distribution Units for the hai1060" on page 71.

7. Turn on the power to the unit. (See "Powering Up the Unit" on page 88.)

Installing Modules

Installing a Module in a Chassis

The hai1000 series is supplied with the required HOST and audio/video service modules pre-installed. However, in the event that an additional module is to be installed or replaced, follow these steps:

To install a module in a chassis:

1. Turn off the power to the unit.
2. Remove the blank filler panel from the appropriate slot.
3. Hold the module by the handles and slide it into the slot.
4. Once the module is firmly engaged, close the handles by bringing them inward, and tighten the two retaining screws.

TIP It may be necessary to set the system time manually (using the CLI `system set Time` command). (See "Configuring System Settings" on page 202.)

Removing a Module from a Chassis

To remove a module from the hai1000 series:

1. Turn off the power to the unit.
2. On the module to be removed, loosen the two retaining screws.
3. Push the handles outwards to unlock the module and pull it out.
4. Install a blank filler panel in the empty slot.

CAUTION The hai1000 series modules are *not* hot-swappable. Do not insert or remove a module while the equipment is operating; doing so may cause unexpected operation.

Always use an antistatic wrist strap to insert or remove a module and be sure to put the module into an antistatic bag after removing it from a chassis.

You must install blank filler panels in all slots that do not contain modules to ensure proper air flow.

Connecting the HOST Module

Connecting to the Network and to a Computer

To connect the HOST4 module:

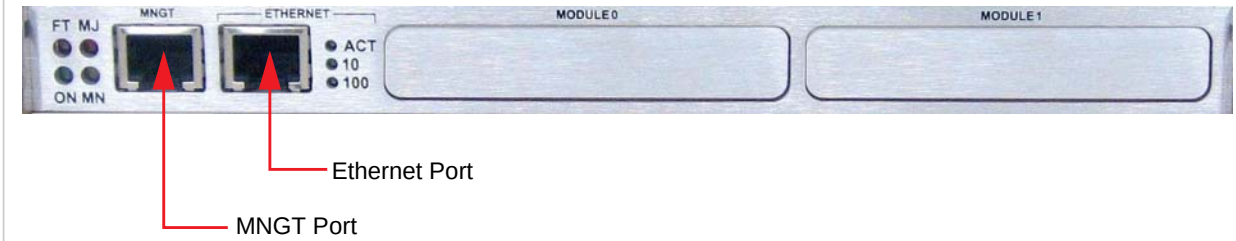
1. Connect the Ethernet port to the IP network using an Ethernet cable (Type Cat 5 or higher).

   This will allow you to telnet to the unit or connect via the Web Interface.

2. Connect the Management (MNGT) port to the serial port of a computer using the grey RS-232 DB9 to RJ45 Serial Management adapter (included in the package) and a standard straight Ethernet cable.

   This will allow you to communicate directly from your computer to the hai1000 series using a serial communication application such as HyperTerminal or Minicom. This is only required if you do not know the IP address or wish to use the Serial Management port instead of the Web interface.

Figure 3-6 HOST4 Module Connectors



CAUTION Take care not to plug the Ethernet cable, especially a Power over Ethernet (PoE) cable, into the Management port, as it may damage the HOST4 module.

Related Topics:

- For details on the connectors, see "HOST4 Module Connections" on page 39.
- To set the terminal parameters to interface with the serial (MNGT) port, see "Serial Interface Setup" on page 79.

Serial Interface Setup

Prior to logging in to the hai1000 series unit for the first time, you need to change the unit's default network settings to match the network in which it will be used. Typically you will connect directly to the unit's serial Management (MNGT) port from your computer using HyperTerminal (or other serial communication application). To get started, you must set the terminal parameters to communicate with the unit.

Keep in mind that the unit must be on the same subnet as the computer.

To set up the serial interface:

1. Connect the hai1000 series' Management (MNGT) port to your computer as described in "Connecting to the Network and to a Computer" on page 78.
2. Power up the computer and start the serial communication application.
3. Set up the terminal parameters as follows:

Parameter	Setting
terminal type	VT-100
baud rate	19 200 bps
data bits	8
parity	none
stop bit	1
flow control	RTS/CTS -or- Hardware (HyperTerminal only)

4. Power up the hai1000 series unit. (See "Powering Up the Unit" on page 88.)
5. From the serial communication application, press **Enter** to get a prompt from the hai1000 series unit.

   It takes approximately two minutes for the hai1000 series to boot. The system will request a login, or display the shell prompt if an active session is still running.

TIP We recommend, for security reasons, that you log out from the hai1000 series and exit from the serial communication application *before* disconnecting the management port.

Related Topics:

- "Connecting to the Network and to a Computer" on page 78
- "Connecting the A/V Modules" on page 80

Connecting the A/V Modules

Connecting Mako Encoders to A/V Sources

NOTE When configuring the Encoder, you *must* select the Video Input and Audio Input connector types. See "Configuring Encoder A/V Settings" on page 117 (for the Web Interface) or "Configuring Encoder A/V Parameters" on page 190 (for the CLI).

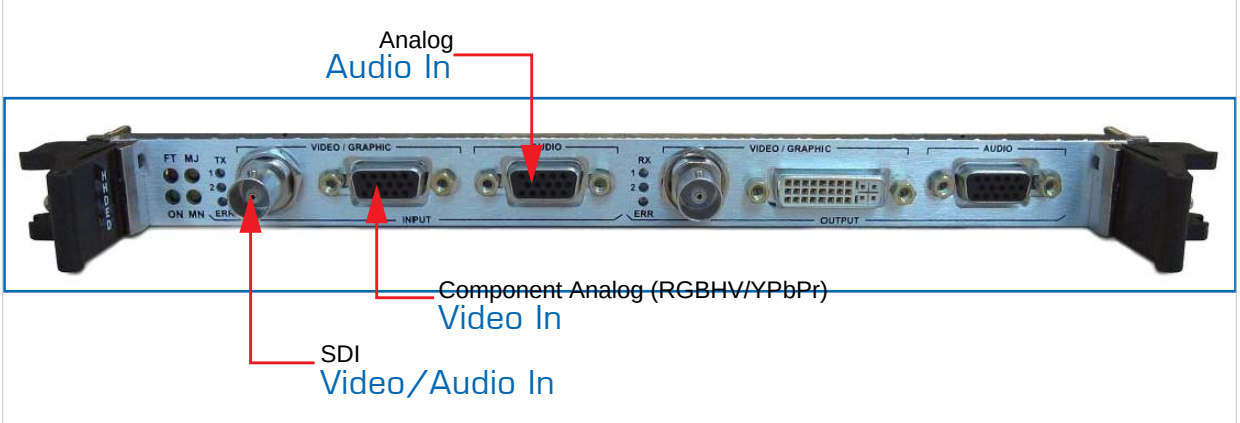
SDI Video Input and Embedded Digital Audio Input use the same BNC connector.

To connect a Mako Encoder:

1. Video In: Connect *one* of the module's Video Inputs to the video source, using the appropriate connector:
   - SDI Video/Audio: Use the BNC connector.
   - Analog Component/YPbPr + RGBHV: Use the HD-15 video cable connector. (For the pinout, see Figure 2-12 on page 52.)

   The default Video Input Type is SDI.
2. Analog Audio In: Connect the module's Audio Input to the audio source, using the HD-15 audio cable connector. (For the pinout, see Figure 2-9 on page 50.)

Figure 3-7 Mako Encoder Input Connectors



For more information, see "Encoder Connections – Mako" on page 42.

Connecting Mako Decoders to A/V Displays

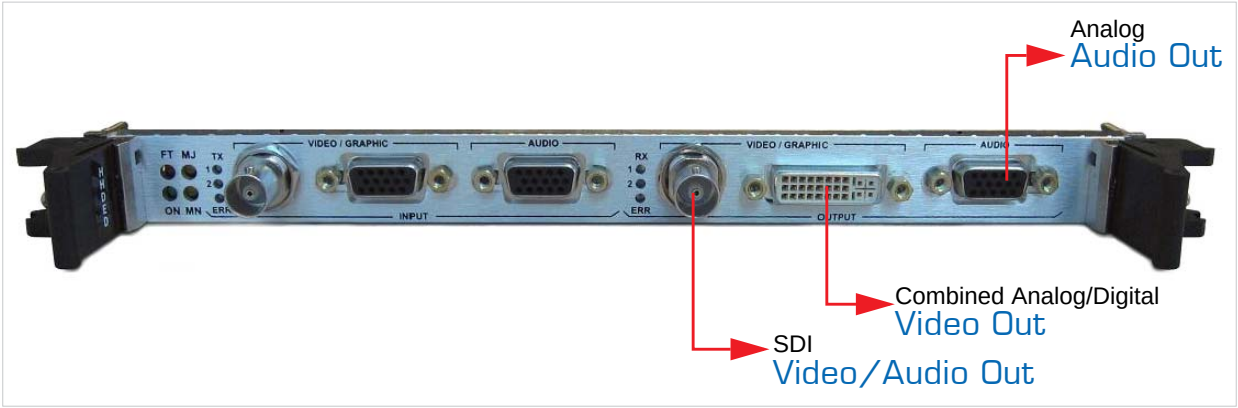
NOTE SDI Video Output and Embedded Digital Audio Output use the same BNC connector.

To connect Mako Decoder Outputs to A/V Displays:

1. Video Out: Connect *one or both* of the module's Video Outputs to a plasma or other video display(s), using the appropriate connector(s):
   - SDI Video/Audio: Use the BNC connector.

   If the module has two BNC connectors, use the connector labeled CVBS.
   - Combined A/D Video: Use the DVI-I connector. (See Figure 2-14 on page 54 for the DVI.)
2. Analog Audio Out: Connect the module's Audio Output to the audio sound system/speakers, using the HD-15 audio cable connector.

Figure 3-8 Mako Decoder Output Connectors



For more information, see "Decoder Connections – Mako" on page 43.

Connecting Standard Definition Encoders to A/V Sources

NOTE When configuring the Encoder, you *must* select the Video Input connector type and (for SDI cards only) the Audio Input connector type. See "Video Input" on page 119 (for the Web Interface) or "Configuring Encoder A/V Parameters" on page 190 (for the CLI).

SDI Video Input and Embedded Digital Audio Input use the same BNC connector.

To connect Standard Definition Encoder Inputs to A/V Sources:

1. Video In: Connect *one* of the module's Video Inputs to the video source, using the appropriate connector:

   - Composite Video: Use the BNC connector.

   If the module has two BNC connectors, use the connector labeled CVBS.

   - SDI Video/Audio: Use the BNC connector.

   If the module has two BNC connectors, use the connector labeled SDI.

   - S-Video: Use the 4-pin mini-DIN connector.

   The default Video Input Type is Composite.

2. Analog Audio In: Connect the module's Audio Input to the audio source, using the HD-15 audio cable connector. (See Figure 2-9 on page 50 for the Audio HD-15.)

Figure 3-9 Encoder Input Connectors (Composite/SDI + Analog Audio)

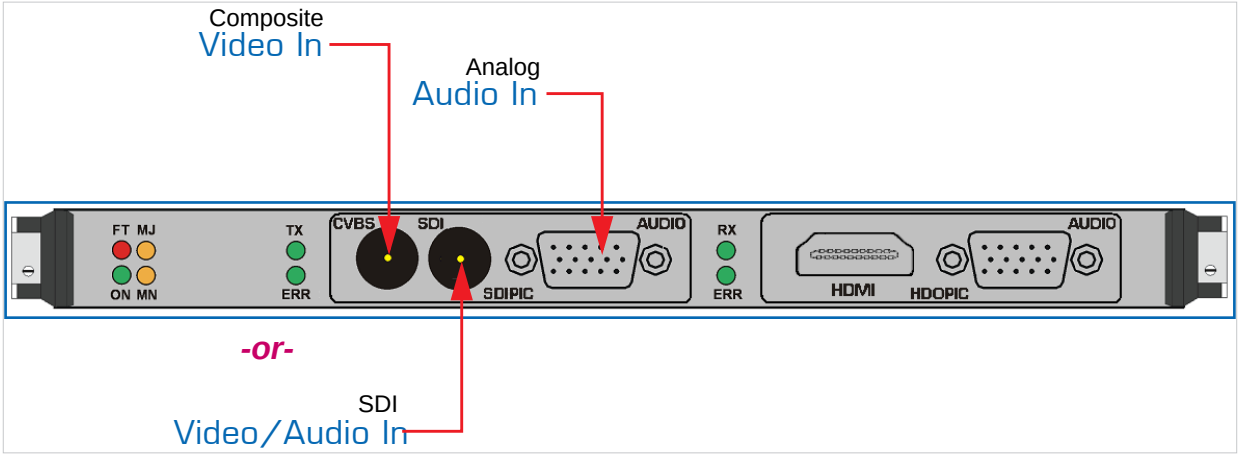
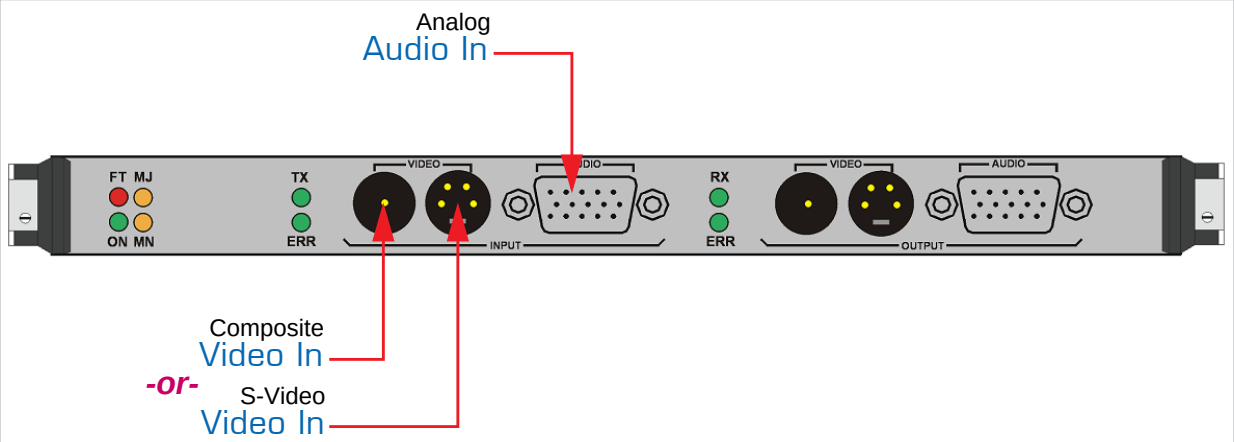


Figure 3-10 Encoder Input Connectors (Composite/S-Video + Analog Audio)



For more information, see "Encoder Connections – SD" on page 44.

Connecting Standard Definition Decoders to A/V Displays

NOTE *Both* of the module's Video Output connectors are active, and for SDI cards, *both* Analog Audio and Embedded Digital Audio are active.

SDI Video and Embedded Digital Audio Output use the same BNC connector.

To connect Standard Definition Decoder Outputs to A/V Displays:

1. Video Out: Connect *one or both* of the module's Video Outputs to a plasma or other video display(s), using the appropriate connector(s):
   - Composite Video: Use the BNC connector.

   If the module has two BNC connectors, use the connector labeled CVBS.
   - SDI Video/Audio: Use the BNC connector.

   If the module has two BNC connectors, use the connector labeled SDI.
   - S-Video: Use the 4-pin mini-DIN connector.
   - HDMI Video: Use the HDMI connector. (See Figure 2-13 on page 53 for the HD-MI.)
2. Analog Audio Out: Connect the module's Audio Output to the audio sound system/speakers, using the HD-15 audio cable connector.

Figure 3-11 Decoder Output Connectors (Composite/S-Video + Analog Audio)

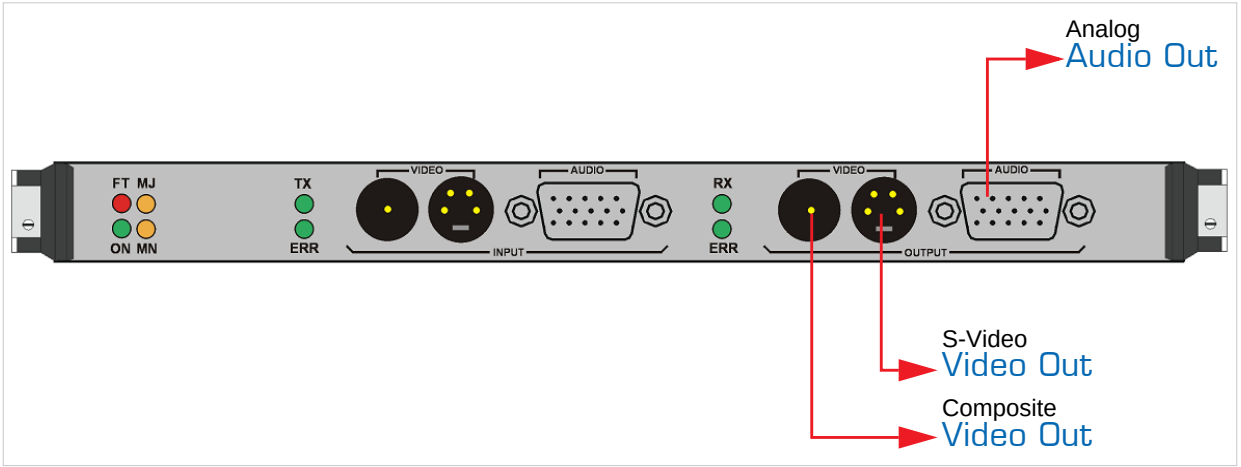
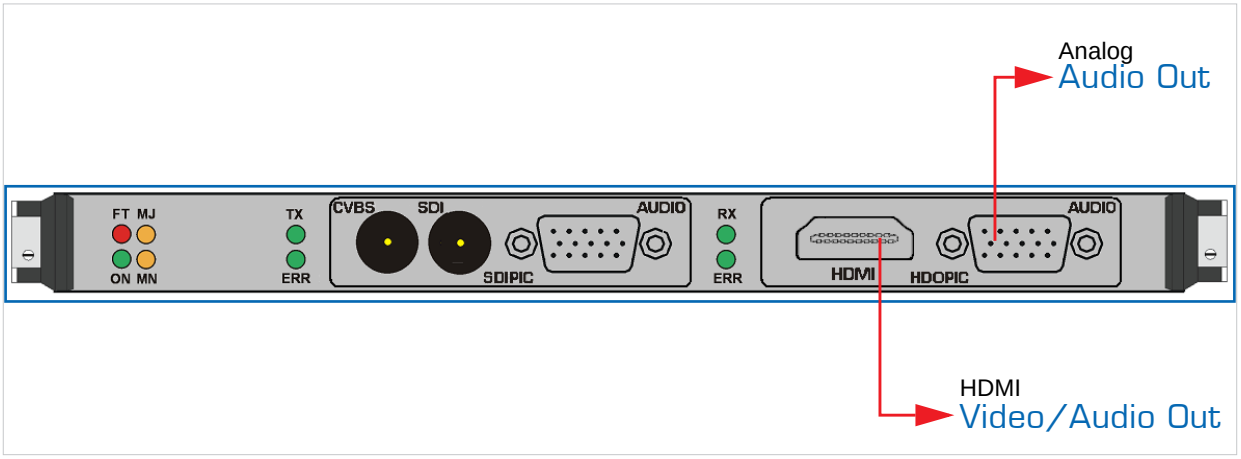


Figure 3-12 Decoder Output Connectors (HDMI + Analog Audio)



For more information, see "Decoder Connections - SD" on page 45.

Connecting the Serial Data Mezzanine Ports

IMPORTANT The Serial Data Mezzanine is an optional feature and must be specified when ordering a hai1000 system.

To connect the Serial Data Mezzanine Ports:

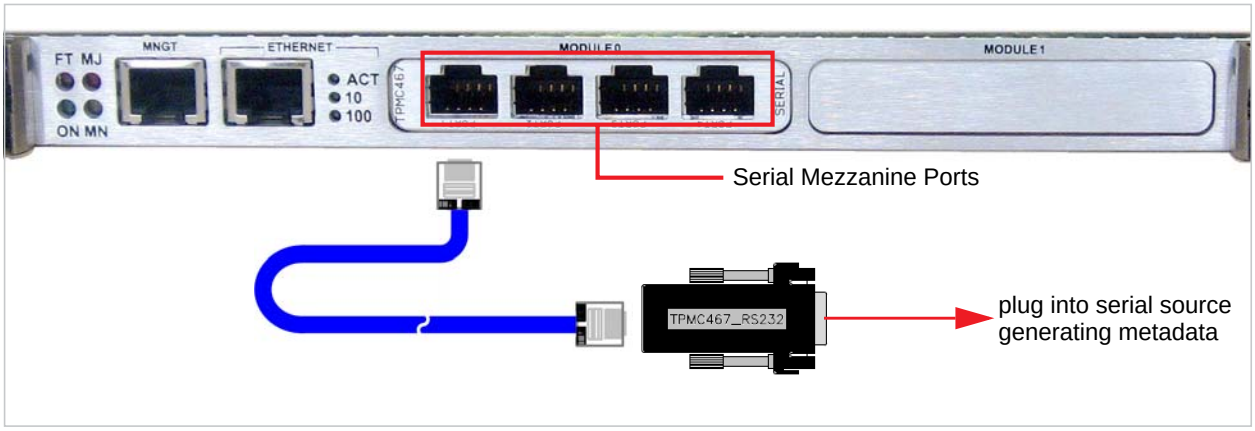
1. Connect the mezzanine port to the serial port of the source (e.g., the computer) that will generate metadata, using the black RS-232 DB9 to RJ45 adapter (shown below) and a standard RJ45 straight patch cord (i.e., no cross-over).

   An RS-232 DB9 to RJ45 adapter is included in the package. An RS-422 DB9 to RJ45 adapter is also available upon request.

   This will allow the hai1000 series to capture metadata coming into the serial port.

2. It is possible to connect up to four mezzanine ports to serial sources to capture serial metadata (keeping in mind that only one serial input port can be used by each Encoder). To obtain additional DB9 to RJ45 adapters, contact your Haivision sales representative.

Figure 3-13 Serial Data Mezzanine Connectors



Related Topics:

- For more information, see "Serial Data Mezzanine" on page 61.
- To set the serial source terminal parameters to interface with the serial mezzanine port, see "Serial Data Terminal Setup" on page 87.

Serial Data Terminal Setup

The Serial Data Mezzanine supports KLV data over both RS-232 and RS-422, and baud rates up to 115,200. These parameters are user-selectable from the Web Interface or CLI on a per port basis. See "Configuring Serial Metadata Capture" on page 135.

The maximum size of a KLV packet is 2000 bytes.

The terminal parameters for the mezzanine ports are configured as follows:

Parameter	Setting
data bits	8
parity	none
stop bit	1
flow control	none

The terminal parameters for the mezzanine ports are not user-configurable.

Related Topics:

- See "Connecting the Serial Data Mezzanine Ports" on page 86.

Powering Up the Unit

NOTE In order to communicate with the hai1000 series directly through its RS-232 management (MNGT) port, you must set the terminal parameters before logging in for the first time. For details, see "Serial Interface Setup" on page 79.

Once all the cables are in place between the connectors of the module panels and the equipment with which they interface, the hai1000 series is ready to be powered up. When you switch on the power, the system will perform a 5-second countdown.

Setting the Network Parameters

The first time you power up a new unit, you will need to set its IP address, subnet mask and other global parameters that specify the networking context for the unit. You also need to specify the boot mode and the parameters for application downloads. These parameters may be modified any time you restart the system.

TIP If you are using multiple hai1000 series units on the same network, be sure to change the default IP address for each unit *before* you begin product provisioning.

Follow the procedure below to interrupt the normal boot sequence to modify the network and system boot parameters.

To set the networking parameters during the bootup sequence:

1. When you see the prompt "Hit any key to stop autoboot" (i.e., while the system is still counting down), press any key to interrupt the countdown.
2. From the command line, type the following command:

   haicfg
3. For each prompt that follows, you can enter a new value, or press **Enter** to accept the value shown in brackets. You can set the following parameters:

Parameter	Description
Default IP Address	An IP address that identifies the unit's Ethernet interface on the LAN.
Default IP Netmask	An IP address that identifies the Subnet Mask for the LAN segment.
Gateway IP Address	The gateway address of the network (typically the address of the network router).

Parameter	Description
Server IP Address	The IP address of the TFTP server where the binary image file is located.
TFTP Image File	default file: hvImage.bin This is the name of the file on the TFTP server to download.
Boot mode	Auto (A), TFTP (T), File (F), or Monitor (M): • Select Auto to load the image file from the flashdisk, and if this fails, from the TFTP server. • Select TFTP to load the image file from the TFTP server to the flashdisk. • If Auto or TFTP mode fails (for instance, because the flashdisk is full), the system goes into Monitor mode. • Select File to load the image file from the flashdisk.
Enable DHCP at startup (y/n)?	• The default is No, which configures the system to use the previously configured network settings. • Yes will enable Dynamic Host Configuration Protocol at startup. (This option is reserved for future use)
Hostname	Enter a unique host name for the unit. This name will be displayed at the login prompt.
Run BIST before booting (y/n)?	The BIST (Built-In Self-Test) is used to verify (off-line) the system integrity of the HOST hardware components and interfaces. • Select Yes to run the BIST before booting the unit. • Select No to boot the unit without running the BIST. NOTE: For normal use, we recommend setting it to No, because running the BIST lengthens the boot time.

4. When haicfg is completed, type the following command to continue the boot process:

   haiboot

   Note that this command runs automatically by default if the countdown isn't interrupted.

The system is now ready to operate. You can either open the Web Interface, or log in to the CLI to begin configuring videoconferences.

- To use the Web Interface, see "Logging In to the Web Interface" on page 103.
- To enter CLI commands, see "Logging In to the CLI" on page 179.

The hai1000 series can also be managed through the Simple Network Management Protocol (SNMP). For more information, see Chapter 8: "Configuring A/V Services Using SNMP".

CHAPTER 4: Installing Firmware Upgrades

This chapter provides instructions for installing hai1000 series firmware upgrades.

NOTE The typical and recommended upgrade procedure is from the Web Interface. However, this chapter also includes instructions for upgrading the firmware from the CLI should you need to do so.

Topics In This Chapter

Installing a Firmware Upgrade from the Web Interface

When you first receive the hai1000 series, all the necessary firmware is pre-installed on it. Upgrades of the hai1000 series firmware are issued through the Haivision Download Center on our website at: https://support.haivision.com.

Please note that you may download the latest Firmware and Documentation by registering via the Haivision Support Portal.

When a firmware upgrade becomes available for the hai1000 series, you can easily install it from the Web Interface. You will first need to copy the upgrade file to your local computer or network.

The upgrade comes in the form of a file with the extension .hai which when loaded will replace the application on your hai1000 series unit.

This section provides instructions to install a firmware upgrade from the Web Interface.

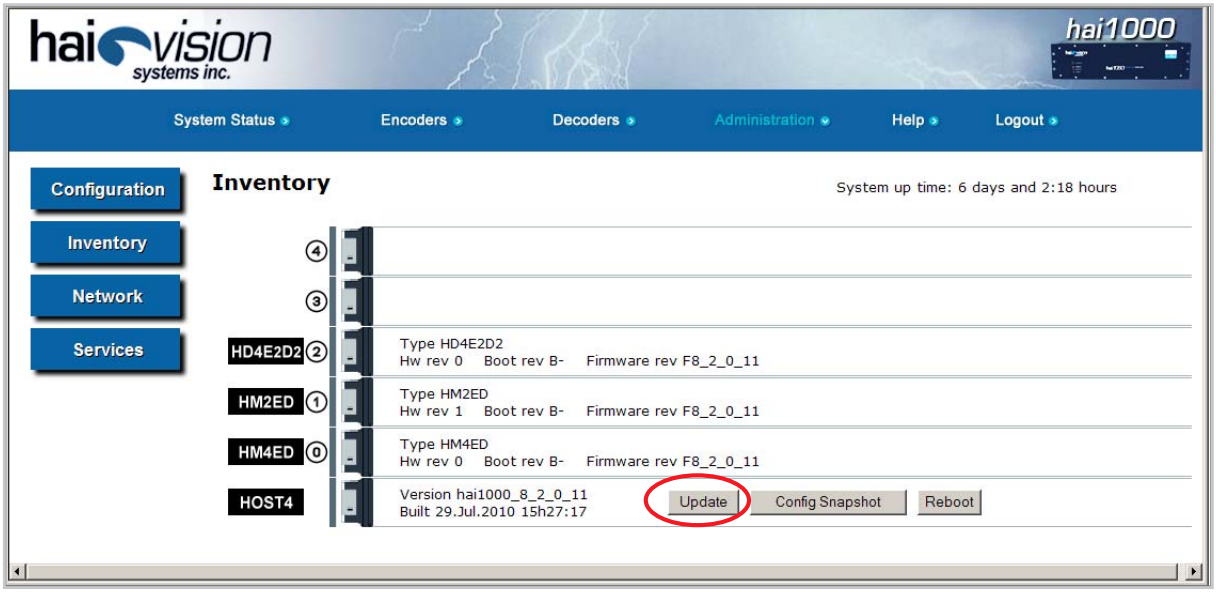
NOTE We recommend that you stop any active RTP sessions while installing a firmware upgrade. Otherwise, you may experience pixelation or video artefacts in the decoded stream during the upgrade.

To install a firmware upgrade:

1. Log in to the Web Interface from your Web browser. (See "Logging In to the Web Interface" on page 103.)
2. Select Administration from the menu bar.

   The Administration > Configuration page opens.

3. Click Inventory to open the Inventory page.

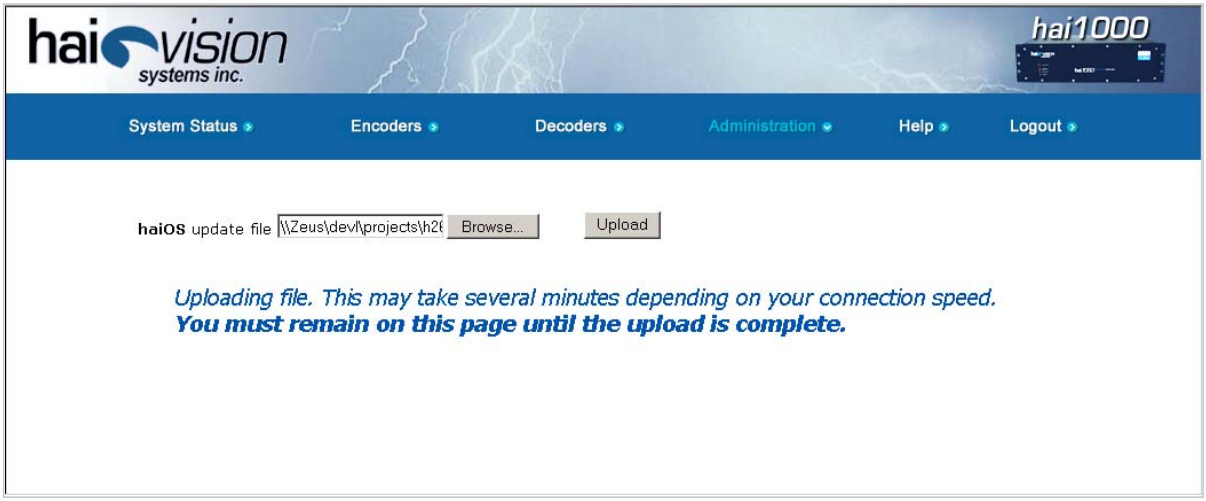


4. On the Host slot, click Update.

   The Update Firmware page opens:

5. Type the name of the .hai file to upload, or click Browse to select the file.
6. Click Upload.

The Uploading File page opens.

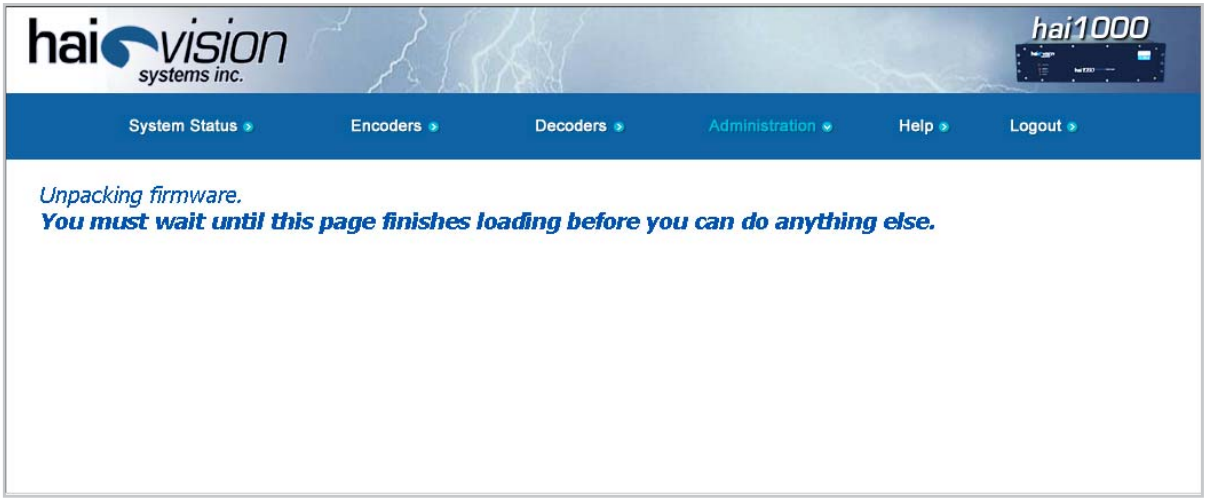


IMPORTANT Wait for the file to be uploaded. Remain on this page and do *not* click anything else in the hai1000 series Web Interface during the upload.

When the file is uploaded, you will see a confirmation page listing the package contents and release date and files.

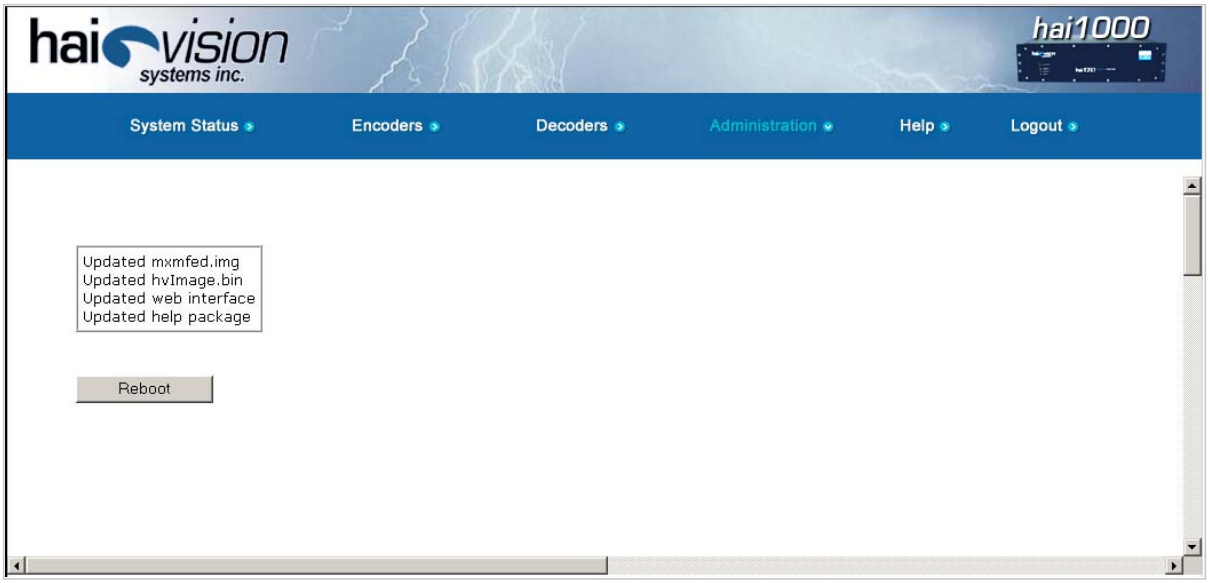
7. Click Continue Upgrade.

   Next the Unpacking Firmware page opens.



CAUTION You must remain on this page until the system completes the process of unpacking the firmware. Failure to do so could result in damage to your system.

When the firmware is unpacked, the caution will be replaced by a confirmation message and a Reboot button.



8. Click Reboot.

While the unit is rebooting, the card LEDs will flash, indicating that the system is installing the update.

CAUTION Do not proceed or shut down the system while the card LEDs are still flashing. Failure to wait could result in damage to your system.

Once the unit has rebooted, the browser will display the Login page for the Web Interface (depending on your Web browser and settings). If not, reload the Login page.

9. Type the Username and Password and click Login (or press Enter).

NOTE After a firmware upgrade has been installed (i.e., onto the HOST module), the Web Interface will be immediately accessible. However, the HOST module may still be in the process of updating the MPEG cards, so there may be a brief delay before the Administration - Inventory page is updated.

Installing a Firmware Upgrade from the CLI

When you first receive the hai1000 series, all the necessary firmware is pre-installed on it. Upgrades of the hai1000 series firmware are issued through the Haivision Download Center on our website at: https://support.haivision.com.

Please note that you may download the latest Firmware and Documentation by registering via the Haivision Support Portal.

This section provides instructions to install a firmware upgrade from the CLI, using a TFTP server to transfer the firmware package to the unit.

IMPORTANT The typical and recommended upgrade procedure is from the Web Interface. For details, see "Installing a Firmware Upgrade from the Web Interface" on page 91.

You must be logged in as root to install firmware upgrades from the CLI.

To install a firmware upgrade from the CLI.

1. Begin by transferring the firmware package to the hai1000 series. If you have a TFTP server installed, you can use the system package download CLI command, as shown in the following example:

```
# system package download hai1000.hai
Downloading package hai1000-8.2.0.hai from 10.64.1.173...
Package downloaded successfully.
```

2. Next, use the system package list command to view the downloaded packages. (They are stored under /usr/share/haivision/packages).

```
# system package list
Downloaded package files:
-rw-r--r--    1 root     root     21009137 May  20 16:53 hai1000-8.2.0.hai
```

3. You can use the system package info command to display the package information for the currently installed package, or you can specify a filename to display information for a specific downloaded package, as shown in the following example:

```
# system package info hai1000-8.2.0.hai
Retrieving package information for hai1000-8.2.0.hai...
Package information for hai1000-8.2.0.hai:
```

```
REVISION: hai1000_8_2_0
DATE: 2010-05-20

COMPONENTS:
packing_list.txt
hvImage.bin
mxmfed.img
hai1000cgi.img

COMMENTS:
For hai1000 release 8.2.0
Video quality issues
```

4. To install the firmware package, use the system package install command, specifying the filename to install, as shown in the example below:

```
# system package install hai1000.hai
Installing package...
Unpacking components...
Updating card firmware...
Updating host software...
Updating web interface...
Updating online help...
Package installed successfully.
You must REBOOT to complete the update process!
#
```

5. Wait for the package to be installed, and do *not* reset or reboot the unit until the upload has completed.
6. When you see the message that tells you to reboot, type reboot.

   While the unit is rebooting, you will lose your connection to the CLI. This will take approximately two minutes. Once the unit has rebooted, you will be able to reconnect to the CLI.

•

CHAPTER 5: Hardware Maintenance

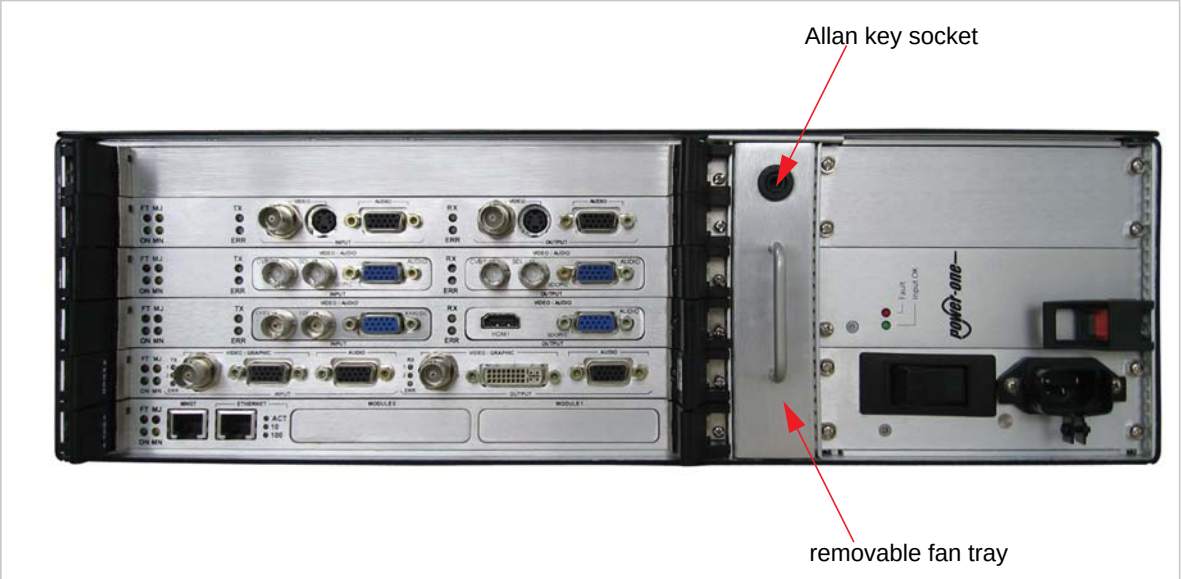
This chapter provides the information you need to maintain the hai1060 hardware.

Topics In This Chapter

Removable Fan Tray (hai1060)

The hai1060 chassis comes equipped with a removable fan tray (shown in Figure 5-1 below).

Figure 5-1 Rear View showing Removable Fan Tray (hai1060)



This fan tray system is controlled with temperature sensors that adjust the fan speed proportionally to the chassis air-flow temperature. The fan tray is a hot-swappable component which may be replaced with the aid of a 5/16” allan key.

To remove the fan tray:

1. Rotate the allan key socket in a counter-clockwise direction.
2. Pull the fan tray from the chassis.

Note that the chassis alarm will sound when the fan tray is removed. Replacing the fan tray with a working unit will shut off the alarm.

To install the new fan tray:

1. Simply push the replacement fan tray unit into the chassis until it locks into place.

Air Filter (hai1060)

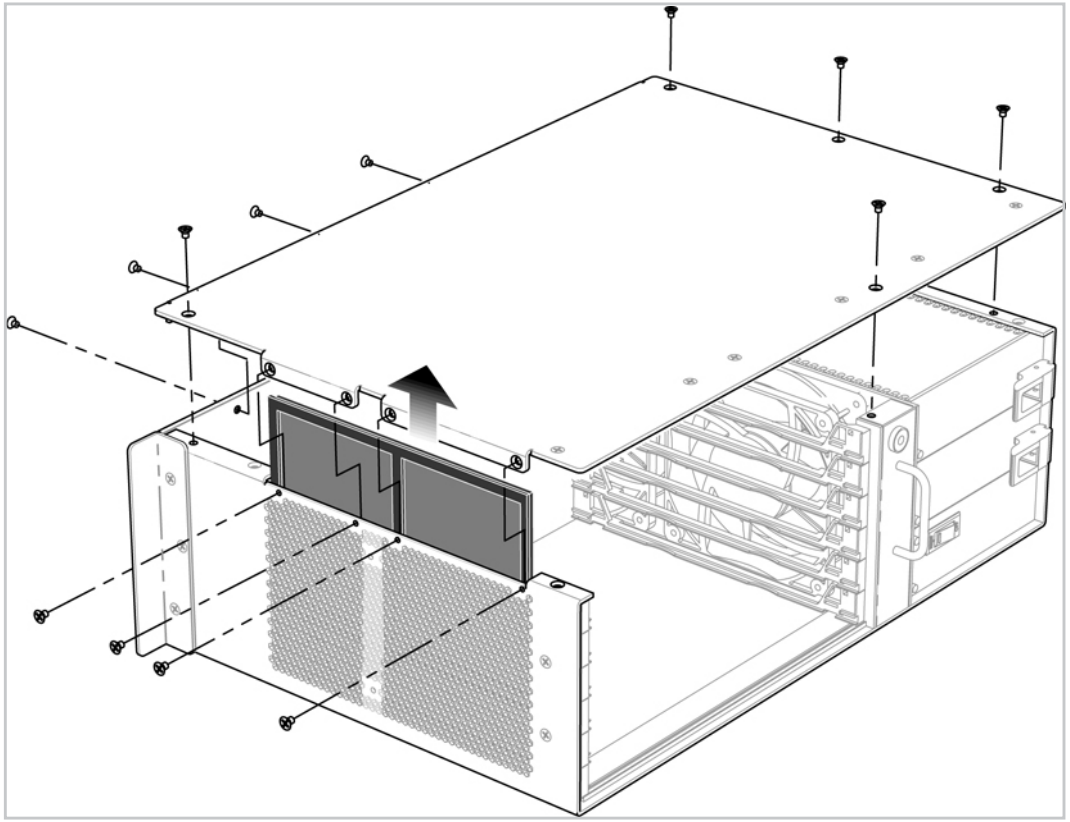
The hai1060 chassis contains an air filter which must be periodically cleaned (approximately every six months, or more frequently in dusty environments).

To clean the air filter:

1. Disconnect the power to the chassis.
2. Unscrew the top cover of the chassis to remove the air filter.

   The top cover is held in place by 13 screws as shown in Figure 5-2 below.

Figure 5-2 Air Filter Removal (hai1060)



3. Remove the filter by lifting it from its mounting location.

   The filter is on the opposite side of the unit from the PSU/PDU.
4. Clean the filter with water and allow it to dry completely before reinserting it into the hai1060 chassis.
5. Re-install and re-screw the cover before re-connecting power to the chassis.

PART II: Session Configuration and Management

CHAPTER 6: Configuring A/V Services From the Web Interface

This chapter presents the information you need to use the Web Interface to configure and monitor audio/video services on the hai1000 series. The Web Interface is an easy-to-use tool to configure settings and set up video conferencing sessions with a minimum of steps.

To access the online help for the hai1000 series, open the Web Interface and click Help from the menu bar.

NOTE This chapter assumes that the hai1000 series hardware has been fully installed and the system properly set up in a network environment. For more information, see Chapter 3: "Hardware Installation and Setup", or contact your system administrator.

Topics In This Chapter

Logging In to the Web Interface

To log in to the hai1000 series configuration Web page:

1. From your Web browser, type the IP Address for the hai1000 series into the address field and press Enter.

   The browser will display the Login page for the configuration Web Interface.

2. Type the Username and Password and click Login (or press Enter).

   The hai1000 series provides the following default username and password for the Web Interface:

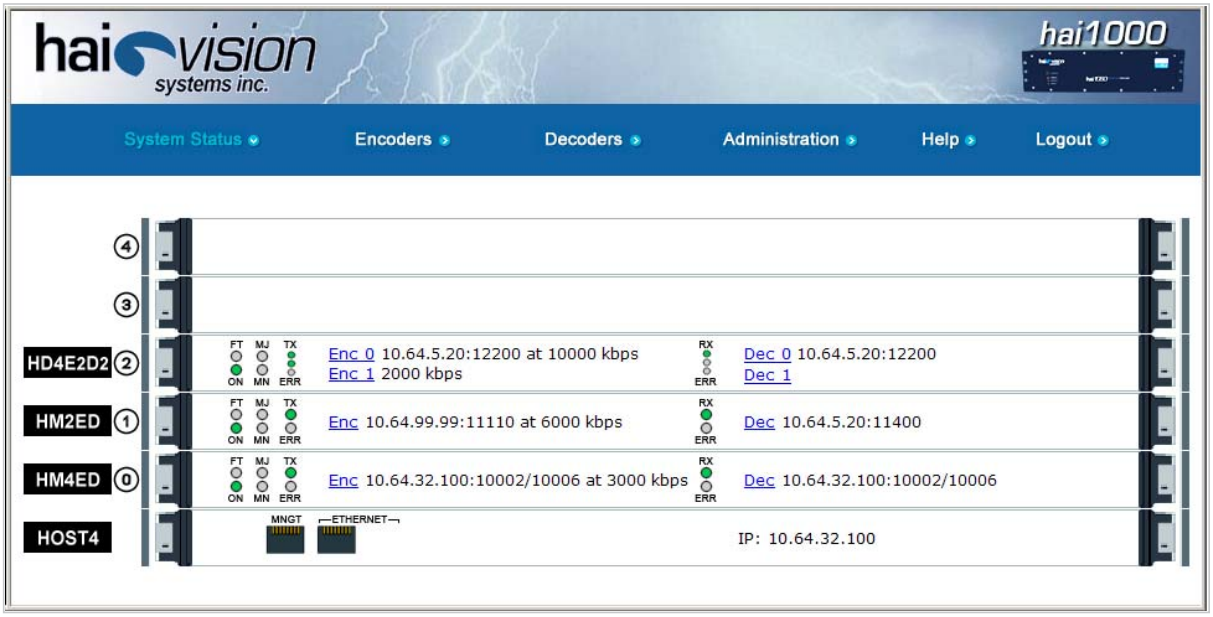
   Username: admin

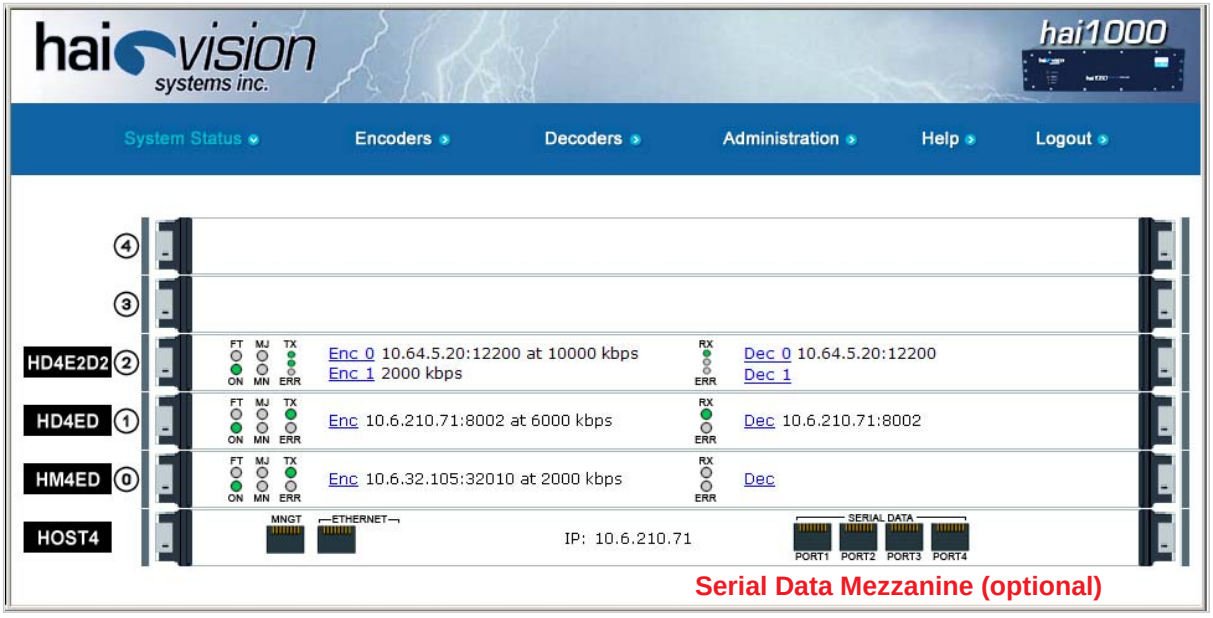
   Password: manager

NOTE The admin account gives you basic user privileges, which include configuring Audio/Video settings and IP links, setting network parameters, viewing hardware inventory, managing configurations, and loading firmware.

To change the password and perform other system administration tasks, you must use the Command Line Interface (CLI, see "Changing the Web Interface Password" on page 180), or see your system administrator.

The hai1000 series System Status page opens, as shown in the following examples.





NOTE The contents of the Web Interface pages will vary depending on your system configuration. Therefore, your Web pages may not exactly match the sample screenshots in this user's guide.

Related Topics:

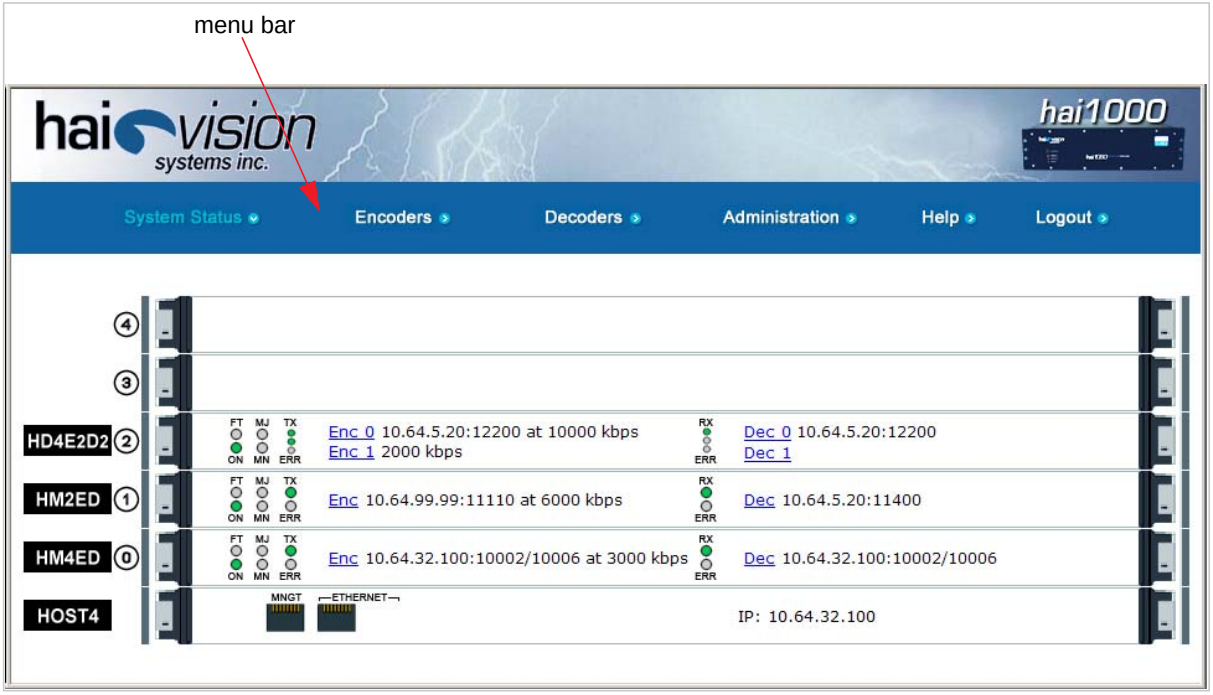
- For an introduction to the Web Interface menus, see “Exploring the Web Interface” on page 106.
- For a description of the System Status page, see “Viewing the System Status” on page 109.
- For configuration procedures, see “Configuring the Encoders” on page 112 and “Configuring the Decoders” on page 144.

Exploring the Web Interface

The System Status page provides access to the main Audio/Video and Stream settings for the Encoders and Decoders, as well as system administration settings for the hai1000 series unit.

Navigational Menus

You can navigate between the Encoder and Decoder configuration and system administration pages by selecting either System Status, Encoders, Decoders, or Administration from the menu bar. A sample System Status page is shown below.



For example, select Encoders from the menu bar to open the Encoder Settings page.

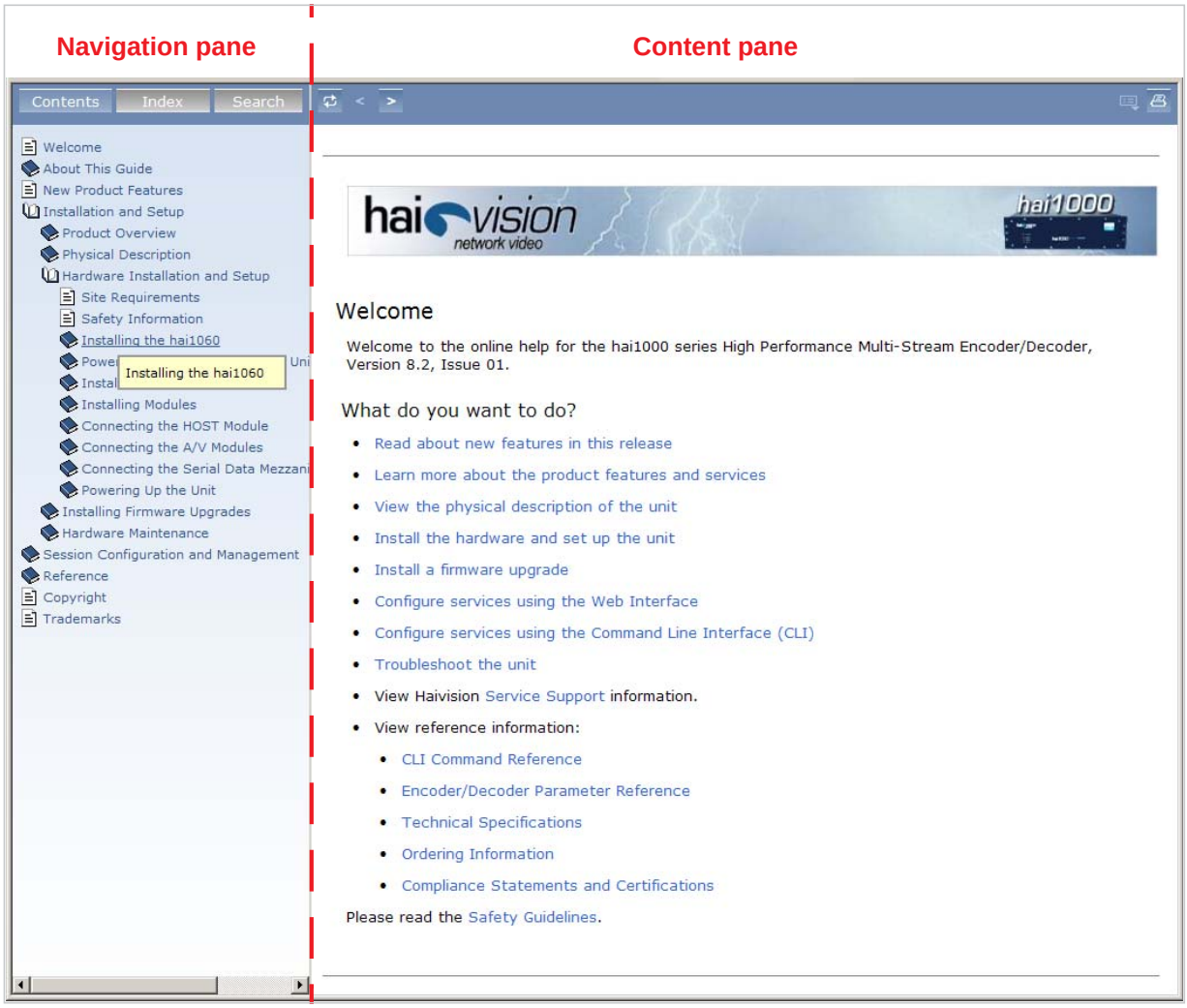
APPLY vs. SAVE

On the Encoder and Decoder Settings pages, you must click APPLY in order for your changes to take effect. After you click APPLY, the hai1000 series will start working with the new settings; however, the settings will *not* be saved and will be lost after a reboot.

To save your configuration settings to the hai1000 series' flash memory, you need to open the Administration > Configuration page (select Administration from the menu bar and click Configuration). This page provides options to manage configurations, including the option to save the current settings as the startup configuration. (See "Saving and Loading Configurations" on page 163)

Online Help

Selecting Help from the menu bar will launch the online help for the hai1000 series. The figure below shows a sample Welcome page.



The online help provides navigational controls found in typical Help systems to enable you to find the information you need.

In the Navigation pane:

Click this button:	To do this…
Contents	display the Table of Contents.
 or 	expand or collapse the topics.
Index	select from an alphabetical index of topics.
Search	enter a word or phrase to carry out a full text search.
Favorites	add a page to (or remove a page from) your list of favorites.

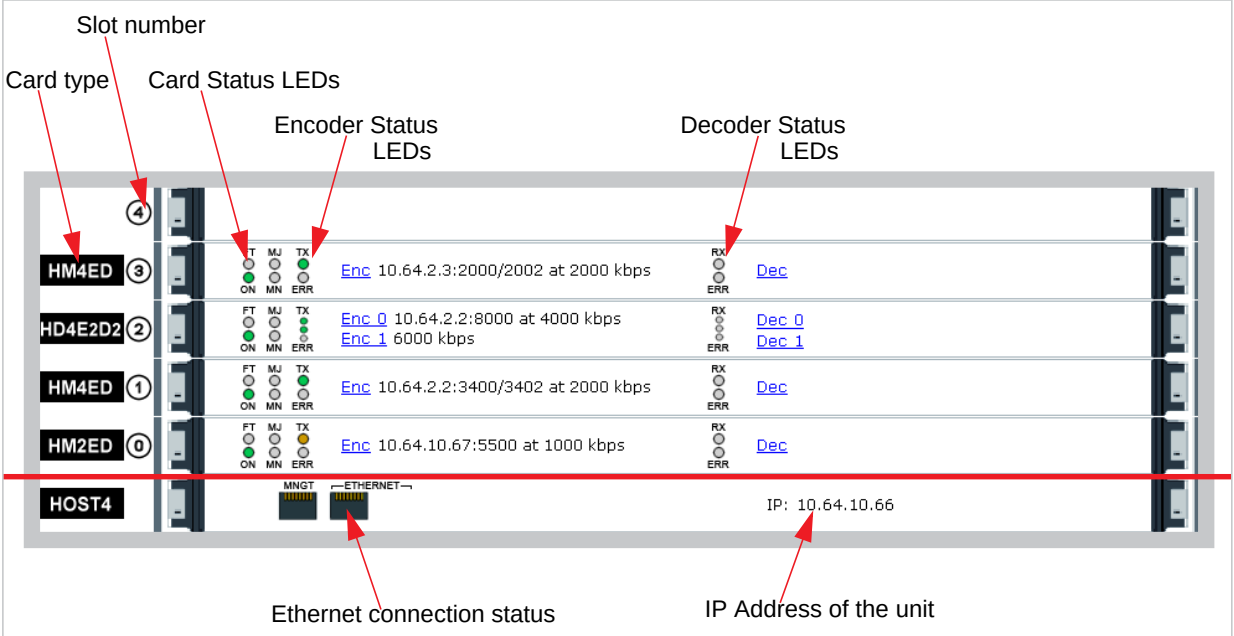
In the Content pane:

Click this button:	To do this…
	show the relative position of the current topic in the Contents.
 and 	page forward and backwards through the topics.

The breadcrumb trail along the top of the Content pane (see figure below) shows you where the current topic falls in the document hierarchy. Breadcrumbs also provide links back to each previous heading.

Viewing the System Status

The System Status page displays a dynamic snapshot of the hai1060 rear slot view to show you – at a glance – the cards (blades) installed in the unit with key setting and status information for each card. For example, in the image below, a HOST4 card is installed in the System Slot (bottom), and Encoder/Decoder cards are installed in the A/V Service Slots (0-4).



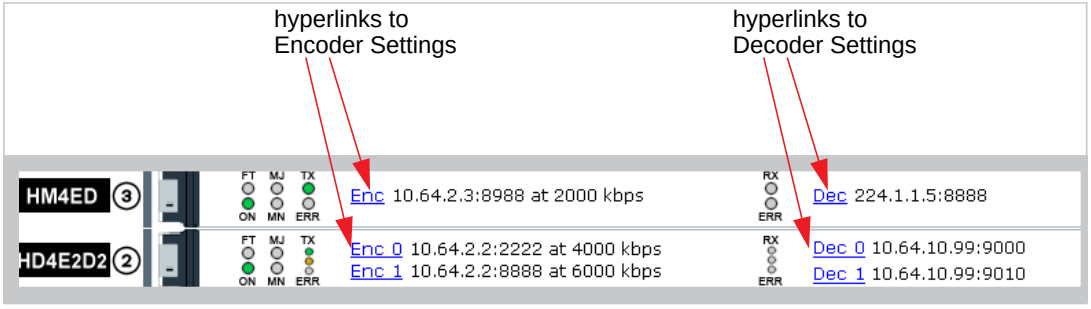
The System Status page provides the following information for each card:

Section	Item	Description
A/V Service Slots (0-4)	Card type	The type of card: for example, HD4ED, HD4E2D2, HM4ED or HM2ED
	Slot number	The A/V service slot in which the card is installed: 0..4
	Card Status LEDs	On, Fault, Maj, Min
	Encoder / Decoder Status LEDs	TX (TX1,TX2), Err / Rx (RX1,RX2), Err
	Encoder Destination / Decoder Source IP Address & Video Port	IP address in dotted-decimal format, followed by the UDP video port number (for active streams)
	Video Bitrate	The current video bitrate for the Encoder.

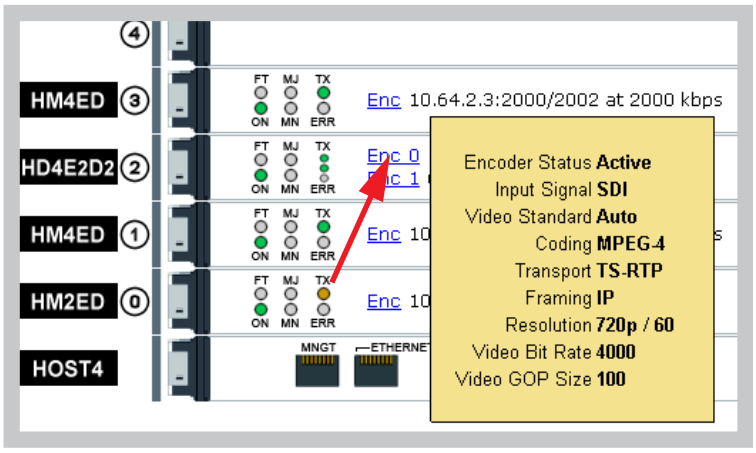
Section (Cont.)	Item (Cont.)	Description (Cont.)
System Slot (bottom)	Card type	HOST4
	Management and Ethernet ports	Ethernet connection status (mouse-over)
	IP Address of the unit	IP address in dotted-decimal format.
	Serial Data Mezzanine ports (optional)	Status and baud rate for each port (mouse-over)

The System Status page also provides access to the detailed configuration and status pages for the unit.

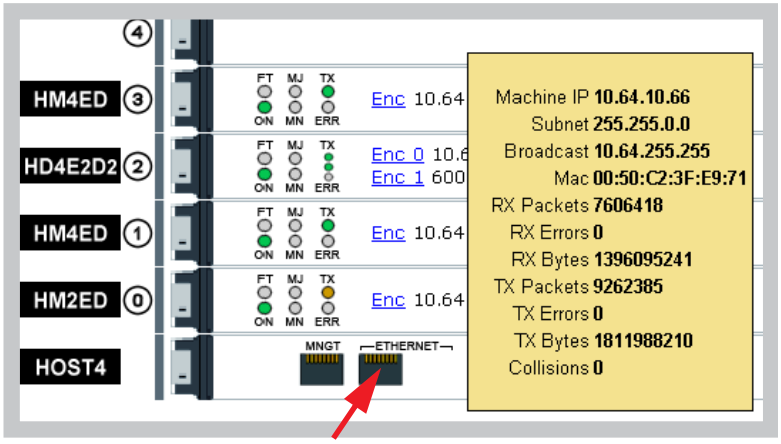
- You can click on the hyperlinks to open the configuration page for an Encoder or Decoder card. In the example below, click Enc or Enc # to open the Encoder Settings page.

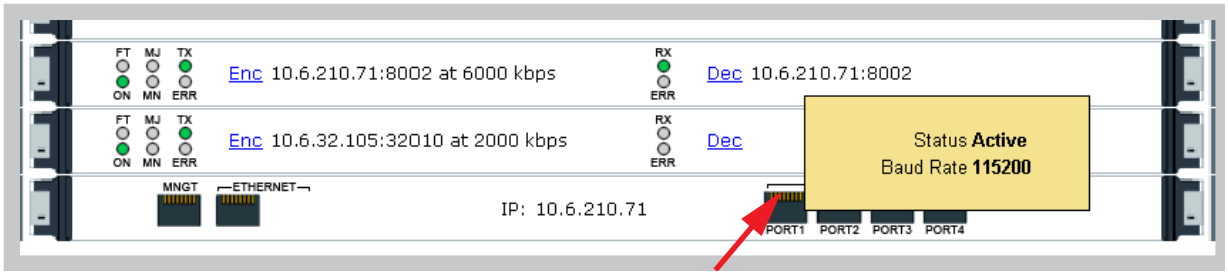


- Also, when you “mouse-over” these hyperlinks, the system displays a popup window with additional settings and status information for the Encoder or Decoder, as shown in the following example:



- You can also “mouse-over” the Ethernet port and (where applicable) the Serial Data Mezzanine ports to display settings and status information for the Ethernet and Serial Data connections:





Configuring the Encoders

The Encoder modules are pre-configured to provide Audio/Video services with a minimum of configuration steps. From the Web Interface, you can view and modify Card and Audio/Video settings for an Encoder, set up IP Streams, and start/stop encoding.

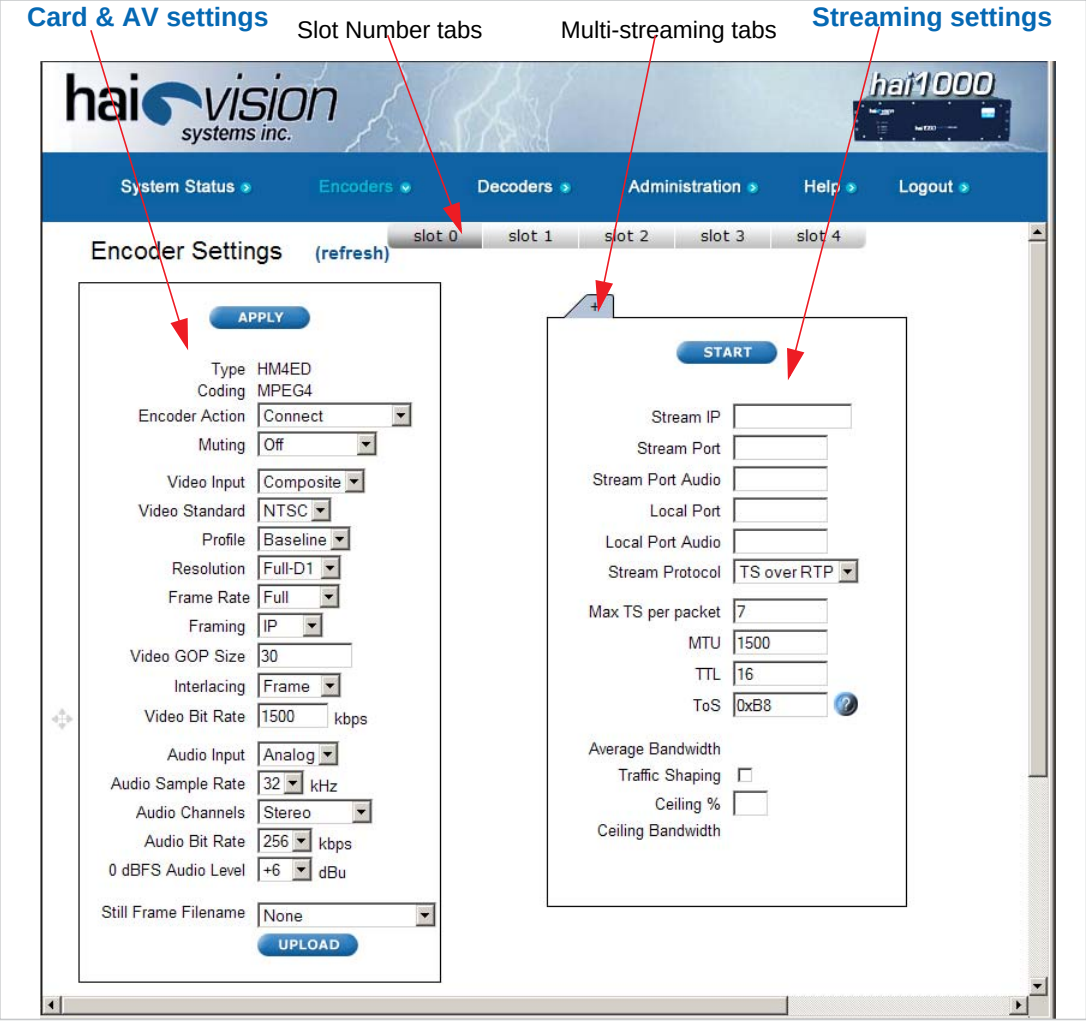
Viewing Encoder Settings

From the System Status page, you can select an Encoder and open a detailed view of its current settings.

To view Encoder settings:

1. On the System Status page, select the Encoder to view and click Enc (or Enc #).

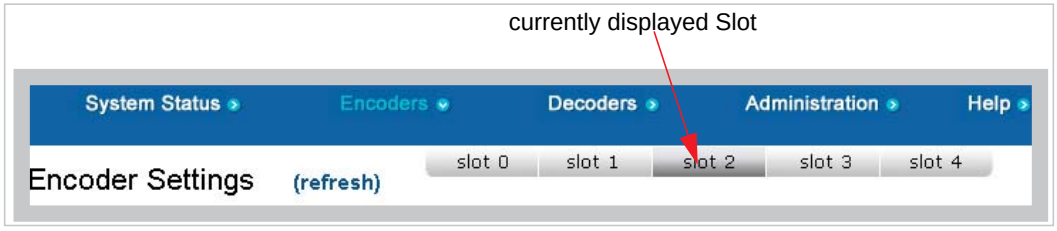
   The Encoder Settings page opens, displaying the settings for the selected Encoder. Following is an example of the Encoder Settings page for an MPEG-4 AVC Encoder installed in A/V Service Slot #0:



TIP To open the Encoder Settings page, you can also select Encoders from the menu bar and then click the Slot # tab.

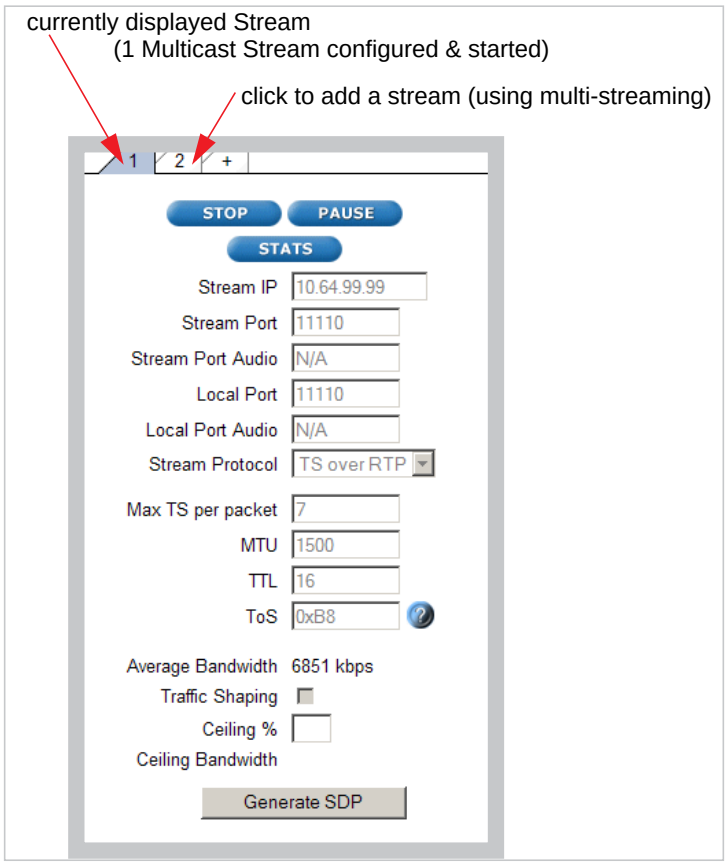
A/V Service Slots

The Encoder Settings page consists of a tabbed pane for each A/V Service Slot. To display the settings for a different slot, click the Slot # tab.



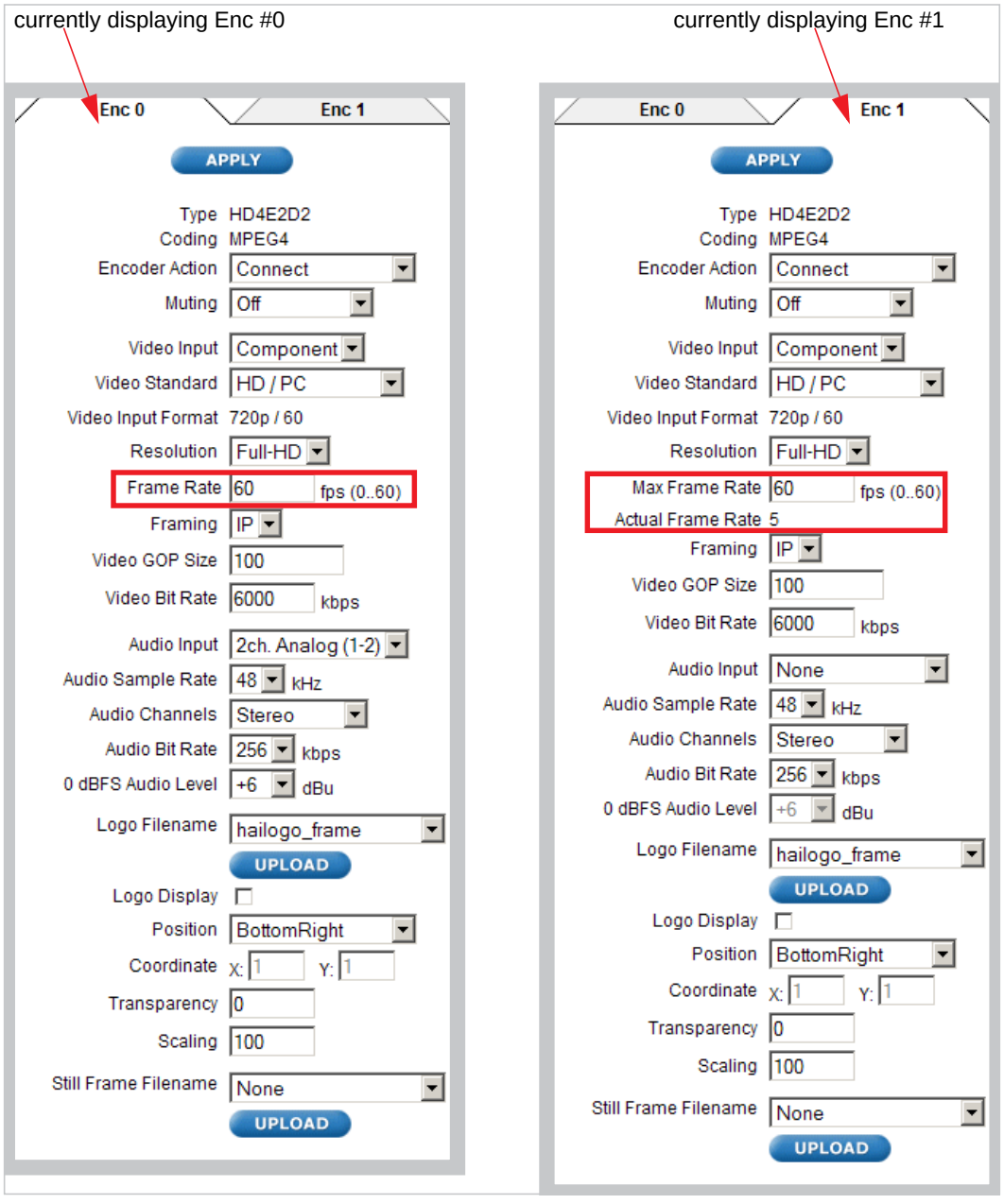
Multi-Streaming

With multi-streaming, each stream is displayed as an embedded tabbed pane (example shown below). To add a stream, click the + tab. For more information, see "Configuring Encoder Streams" on page 129.



Dual-Encoders (HiLo Streaming)

With Dual-Encoders, each Encoder is displayed as an embedded tabbed pane (examples shown below). To display the other Encoder, click the Enc # tab. For configuration details, see "Configuring HiLo Streaming" on page 139.



NOTE The Frame Rate is shared between the two Encoders, and Enc #0 has priority over Enc #1. For Enc #1, you can only specify the Maximum Frame Rate, and the Actual Frame Rate will depend on the Frame Rate specified for Enc #0.

Related Topics:

- For information on configuring the Encoder Card and Audio/Video settings, see "Configuring Encoder A/V Settings" on page 117.
- For information on configuring the Streaming settings, see "Configuring Encoder Streams" on page 129.

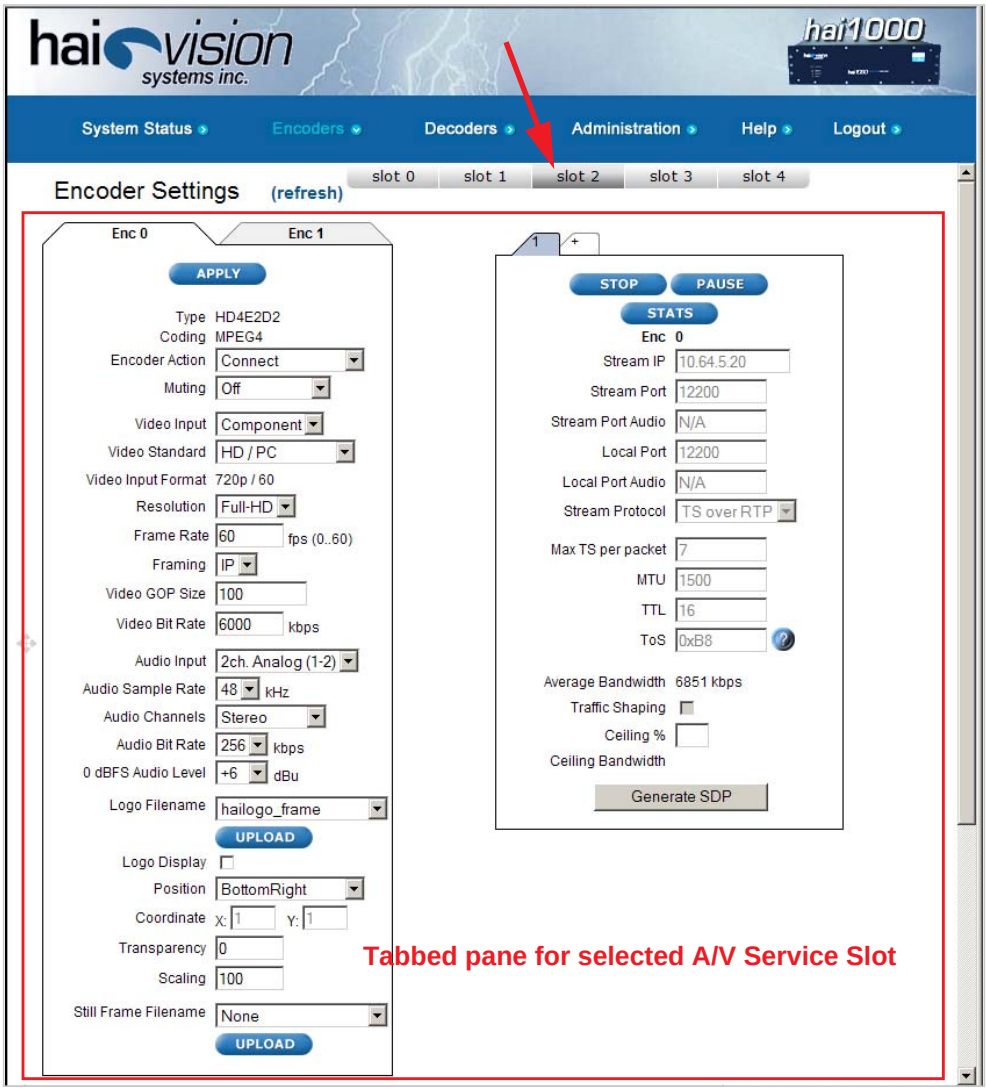
Configuring Encoder A/V Settings

From the Encoder Settings page, you can view and modify Audio/Video settings for the selected Encoder. The Encoder Settings vary according to the type of A/V service card. Most Audio/Video settings are configured at the Encoder end.

To configure Audio/Video Settings on the Encoder:

1. On the Encoder Settings page, select the Slot # of the Encoder to configure. This will display the tabbed pane for that A/V Service Slot.

   Following is an example of the Encoder Settings page for a Mako Dual-Encoder installed in A/V Service Slot #2:



2. Select or enter the new value(s) in the appropriate field(s). See "Encoder A/V Parameters" on page 118.

3. Click APPLY.

NOTE Changing audio or video configuration parameters while a stream is active may result in brief audio or video artifacts.

Your changes will take effect. Note that the settings will *not* be saved.

TIP To save your settings as a configuration file, open the Administration > Configuration page. See "Saving and Loading Configurations" on page 163.

Encoder A/V Parameters

The following table lists the general Encoder Audio/Video parameters:

NOTE For special configurations refer to the appropriate section: "Configuring Serial Metadata Capture" on page 135, "Configuring HiLo Streaming" on page 139, and "Configuring QuickTime SDP" on page 141.

Parameter	Codec Type	Default	Description
Slot #	any	0	The shaded Slot # tab indicates the A/V Service Slot in which the card is installed. You can click any tab to display a different card. TIP: To update the values, click refresh.
Type			The type of A/V service card:
	Mako	n/a	• HD4ED Encoder/Decoder • HD4E2D2 Dual-Encoder/Dual-Decoder
	HM4ED, HM2ED	n/a	• HM2ED Encoder/Decoder • HM4ED Encoder/Decoder • HM2E Encoder Only • HM4E Encoder Only This is auto-detected by the system and cannot be changed.

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
Coding	any	n/a	The video coding standard for the Encoder: • MPEG-2 • MPEG-4 AVC This is auto-detected by the system and cannot be changed from the Web Interface. NOTE: For multi-format codecs, you can switch the MPEG coding value from the CLI. (See "Switching the MPEG Coding Value for a Multi-Format Codec" on page 183.)
Encoder Action	any	n/a	The operating mode of the Encoder: • Connect • Disconnect • Reset • Signal Loopback • Codec Loopback For Reset, see CAUTION on page 124. For loopback details, see "Configuring Encoder Loopbacks" on page 139.
Muting	any	Off	Use to mute or unmute audio and/or video encoding: • Off • Audio • Video • Audio/Video NOTE: For audio-only transport, the Decoder SyncMode must be Fixed. You can specify the SyncMode from the CLI (see "Decoder Video Parameters" on page 315).
Video Input			Select the type of Video Input connector for the Encoder: IMPORTANT: You must select the Video Input signal type. However, no selection is required for RGBHV graphics input.
	Mako	SDI	• SDI • Component
	HM4ED, HM2ED	Composite	• Composite • S-Video • SDI

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
Video Input Format	Mako only	n/a	This is the input signal detected from the video source. It includes the number of pixels per line, whether the video is interlaced or progressively scanned (indicated by i or p), and the number of frames per second: either 25 or 30 for interlaced, or 50 or 60 for progressively scanned. This is auto-detected by the system and cannot be changed. If the signal cannot be detected (or is outside the supported range), the Input Format will be Unknown.
Video Standard			Select the operating Video Standard for the Encoder:
	Mako	HD/PC	• SD (NTSC/PAL): Standard Definition • HD/PC: High Definition NOTE: PC resolutions are also supported. See "Computer Graphics (VGA) Formats (Mako Input)" on page 329.
	HM4ED, HM2ED	NTSC	• NTSC: National Television Systems Committee (North America and Asia) • PAL: Phased Alternate Line (Europe) • Auto: Auto-detect
Profile	HM4ED, HM2ED	Main	The H.264 video profile for the Encoder: • Baseline: Designed to minimize complexity and provide high robustness and flexibility for use over a broad range of network environments and conditions • Main: Designed with an emphasis on compression coding efficiency capability.
Resolution			Select the Video Picture Size, i.e., the number of lines per frame and pixels per line to be encoded.
	Mako - High Definition	Full-HD	• Full-HD: The Encoder encodes whatever it receives and does not modify the resolution. 1280x720 or 1920x1080 • 3/4 HD: This is 3/4 of the horizontal resolution: 960x720 (720p) or 1440x1080 (1080i/p) • 1/2 HD: 640x720 (720p) or 960x1080 (1080i/p) • CIF: 352x288i/p

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
	Mako - Standard Definition	Full-SD	• Full-SD: The Encoder encodes whatever it receives. 720x480i/576i • 3/4 HD: 540x480i/576i • 1/2 HD: 360x480i/576i • CIF: 352x288i
	HM4ED	Full-D1	• Full-D1 (CCIR601, or SD/Standard Definition): 720 pixels/lines x 480 lines (NTSC); 720 pixels/lines x 576 lines (PAL) • Half-D1 (HHR or Half Horizontal Resolution): Half the horizontal resolution is sampled: 352 pixels/lines x 480 lines (NTSC); 352 pixels/lines x 576 lines (PAL)
	HM2ED	Full-D1	• Full-D1 only (see above)
Frame Rate		60	Select/Enter the video frame rate per second:
	Mako		0..60 frames per second NOTE: For Dual-Encoders, Enc #0 has priority over Enc #1. Therefore, the Enc #1 Actual Frame Rate is affected by the Frame Rate specified for Enc. #0.
	HM4ED		• Full • Half • Quarter • Eighth
	HM2ED		• Full only (see above)
Max Frame Rate	Mako Dual-Encoders only	60	Enter the maximum video frame for Enc #1.
Actual Frame Rate	Mako Dual-Encoders only	n/a	(read-only) The actual video frame for Enc #1. NOTE: Because Enc #0 has priority over Enc #1, the Actual Frame Rate is affected by the Frame Rate and Resolution specified for Enc. #0. If the Actual Frame Rate is not sufficient, it may be necessary to reduce either the Resolution or Frame Rate on Enc #1. See “Configuring HiLo Streaming” on page 139.

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
Framing			Select the Video Compression Mode:
	any	IP	• I: I frames only; lowest delay; highest bandwidth • IP: I and P frames only
	HM4ED, HM2ED only	IP	• IBP: I, P and B frames • IBBP: I, P and B frames; highest delay; lowest bandwidth NOTE: (MPEG-4 AVC only) Setting the Encoder Bitrate to 5Mbps with IBP may cause the corresponding Decoder RX LED to flash amber intermittently. For this reason, we recommend that you avoid using B frames with higher bitrates
Video GOP Size			Enter the maximum length of a GOP (Group of Pictures). i.e., the number of frames that a GOP consists of – counting from I-Frame to the last frame in the GOP:
	Mako	100	• 0..1000 (MPEG-4 AVC) NOTE: Infinite GOP (or the value 0) is a mode where I-frames will not be sent and thus removes I-frame pulsing degradations which are very noticeable with low bitrates. Infinite GOP gives a better overall viewing experience at the cost of worse network error recovery (because periodic I-frames correct any previous error). With Infinite GOP, errors will be carried longer in the decoded pictures.
	HM4ED, HM2ED	30	• 1..300 (MPEG-4 AVC) • 1..127 (MPEG-2)
Interlacing	HM4ED, HM2ED only	MBAFF	Select the type of coding for interlaced video: • Frame: The two fields will be combined together • MBAFF (MPEG-4 AVC only): The two fields will be combined together into one single frame and the system will adaptively choose for each pair of vertically adjacent macroblocks the frame or field coding mode.
Video Bit Rate			Enter the maximum video bitrate allowed for the Encoder:
	Mako	6000	• 256..10000 kbps

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
	HM4ED	2000	• 150..6000 kbps
	HM2ED	6000	• 400..10000 kbps
Audio Input			Select the type of Audio Input connector for the Encoder: IMPORTANT: For Mako and SDI boards, you must select the Audio Input signal type.
	Mako	4ch.SDI	• 4ch. SDI • 4ch. Analog • 2ch. SDI (1-2) • 2ch. SDI (3-4) • 2ch. Analog (1-2) • 2ch. Analog (3-4) • none
	HM4ED, HM2ED	Analog	• Analog • SDI
Audio Sample Rate	any		Select the frequency at which the analog audio signal will be digitized:
		48	• 32, 48 kHz
Audio Channels	any	Stereo	Select the number and type of audio channels to encode: • Mono: Only Left input is encoded and transmitted. • Stereo: Standard encoding of Left and Right audio channels. • DualMono: Encoding of two single channels. • JointStereo: Optimization to use when stereo channel is defined as Left+Right and Left-Right signals. NOTE: On the Mako, if 4 Ch. SDI or 4 Ch. Analog is selected, even if Stereo is selected, four channels worth of audio will be encoded as two individual Stereo streams.
Audio BitRate	any	256	Select the maximum audio bitrate allowed for the Encoder: 32..384 kbps

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
0 dBFS Audio Level	any	+6 dBU	Adjusts the maximum analog Audio Input level (0 dBfs) from +6dBU up to +20dBU. This is useful in applications such as broadcast and streaming to allow higher audio headroom. NOTE: This only applies to Analog Audio Input.
Logo Filename	Mako	None	(Optional) Select an image file to display as a logo overlay in the encoded video. NOTE: To configure the logo, see "Configuring Logo Insertion" on page 124.
Still Frame Filename	Mako, HM4ED	None	(Optional) Select a pre-configured static image file to display when the stream is paused. NOTE: See "Configuring Still Images" on page 127.

CAUTION Resetting the Encoder (e.g., Encoder Action>Reset) will result in an interruption of service for approximately 20 seconds.

Configuring Logo Insertion

On systems equipped with one or more Mako modules, you can configure the selected Encoder to insert a graphic file as a logo overlay in the encoded video.

You can select the graphic file from the Encoder Settings page. The image file can be uploaded in either .gif, .jpeg, .bmp or .png format, or .oly (Haivision's image overlay) format. The logo position can either be relative (top left, top right, centered, etc.) or absolute (positioned at the exact X and Y coordinates specified).

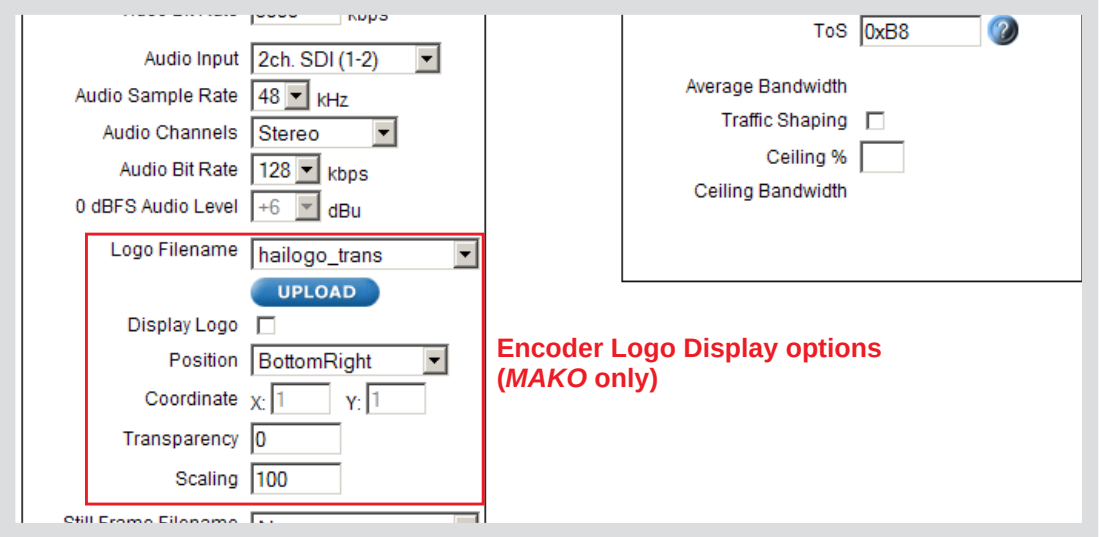
NOTE There is one logo per A/V Service Slot. This means the logo will be shared by dual Encoders, and when you select an image file, it applies to both Encoders.

The maximum file size for logo image files is 66,584 bytes.

To configure logo insertion on the Encoder:

1. On the Encoder Settings page, select the Slot # of the Mako Encoder to configure.

   The following example shows the logo display parameters:

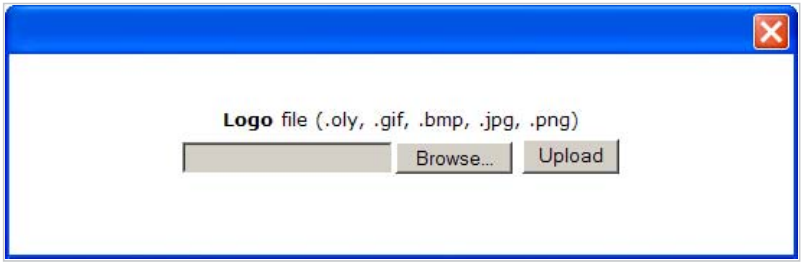


2. Select the filename from the Logo Filename drop-down list.

   -or-

   To upload a new image file in either .oly, .gif, .jpeg, .bmp or .png format, click Upload.

3. In the Logo file dialog, click Browse to select the image file and then click Upload.



   If required, the image file will be converted to Haivision's image overlay (.oly) format and will be included on the Logo Filename drop-down list.

4. On the Encoder Settings page, check the Display Logo checkbox.

5. To configure the logo overlay, select or enter value(s) in the appropriate field(s). See "Encoder Logo Insertion Parameters" on page 126.

6. Click APPLY.

Encoder Logo Insertion Parameters

You may specify the following logo insertion parameters for the Mako Encoder:

Parameter	Default	Description
Logo Filename	hailogo_trans	Select the name of the logo image file to display.
UPLOAD	n/a	Click to select a new image file to upload. The image file can be in either .oly, .gif, .jpeg, .bmp or .png format. NOTE: If required, the file will be converted to Haivision's image overlay (.oly) format and will be located in the folder /usr/share/haivision/logos on the hai1000 Host file system.
Logo Display	disabled	Check this checkbox to display the selected file as a logo overlay.
Position	BottomRight	Select the position for the logo overlay: • Absolute • TopLeft • TopRight • BottomLeft • BottomRight • Centered NOTE: In Absolute mode, the logo is positioned at the exact X and Y coordinates specified (see below).
Coordinates: X and Y	0, 0	Specifies the position of the logo on the X and Y axes. (The origin is the top left corner of the display area.) NOTE: Only takes effect if Position is set to Absolute.
Transparency	0	Specifies the percentage of transparency for the logo: • 0 = no transparency (i.e., a completely solid/opaque logo) • 100 = fully transparent (i.e., a completely transparent/invisible logo)

Parameter	Default (Cont.)	Description (Cont.)
Scaling	100	Specifies the scale factor (percentage) for the logo: • 0% = relative (i.e., stays the same size even when resolution changes) • 25% = 1/4 size • 100% = no scaling • 400% = 4x

Configuring Still Images

On systems equipped with one or more MPEG-4 AVC (Advanced Video Coding/H.264) modules, you can specify a static image that will replace the encoded video stream when the stream is paused. This feature may be used for applications such as blocking out sensitive content or delivering announcements and other messages.

NOTE There can be one still image per Encoder (i.e., one per port). This means that with dual Encoders, you can specify one image file for each Encoder.

The supported file formats for a static image are .264 and .mp4. The file will be located in the folder /usr/share/haivision/stills on the hai1000 Host file system.

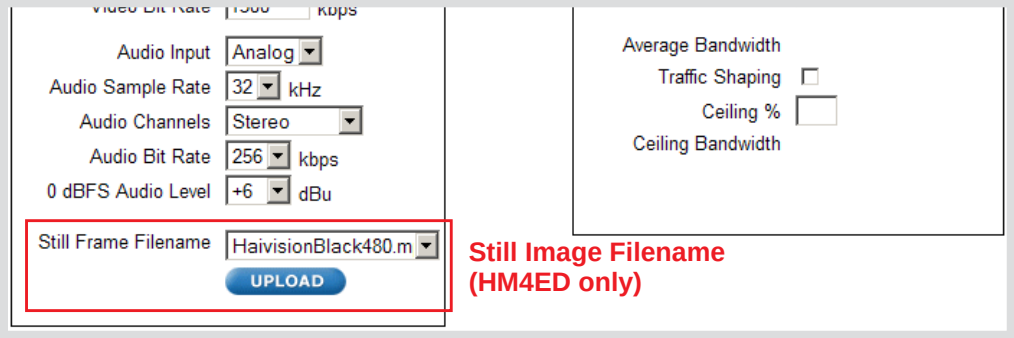
You can either select one of the default image files, or generate a new .264 image file by converting a graphic file in .gif, .jpeg, .bmp or .png format. To do so, use the conversion utility provided through the Haivision Download Center on our website at: https://support.haivision.com.

TIP For best results, the input file resolution must be the same or greater than the output resolution.

To configure a static image:

1. On the Encoder Settings page, select the Slot # of the MPEG-4 AVC Encoder to configure.

   The following example shows the Still Image Filename field:

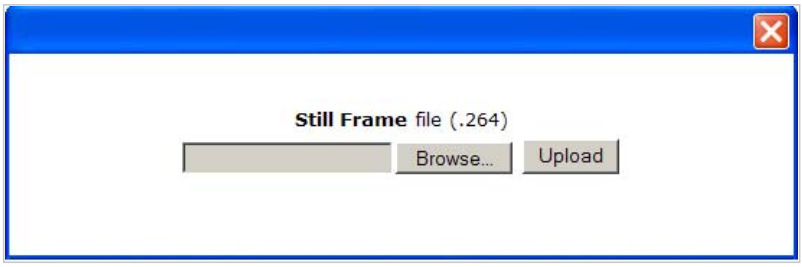


2. Select the filename from the Still Frame Filename drop-down list.

   -or-

   To upload a new .264 or .mp4 file, click Upload.

3. In the Still Frame file dialog, click Browse to select the image file and then click Upload.



4. On the Encoder Settings page, click APPLY.

Pausing and Resuming a Stream

Pausing a stream will switch the encoded content from the video encoder to the still image file (if configured, MPEG-4 AVC modules only). If no still image file has been configured or if there is no video input present, then pausing a stream is the same as muting it.

Resuming a stream that has been paused will switch the encoded content from the still image file to the video encoder.

For audio, pausing is the same as muting.

Configuring Encoder Streams

The hai1000 series supports three types of stream configurations: Unicast, Multicast and Multi-Streaming. Unicast configurations require that you specify a unicast destination IP address for the Encoder Remote IP Address. Multicast configurations require a multicast destination IP address.

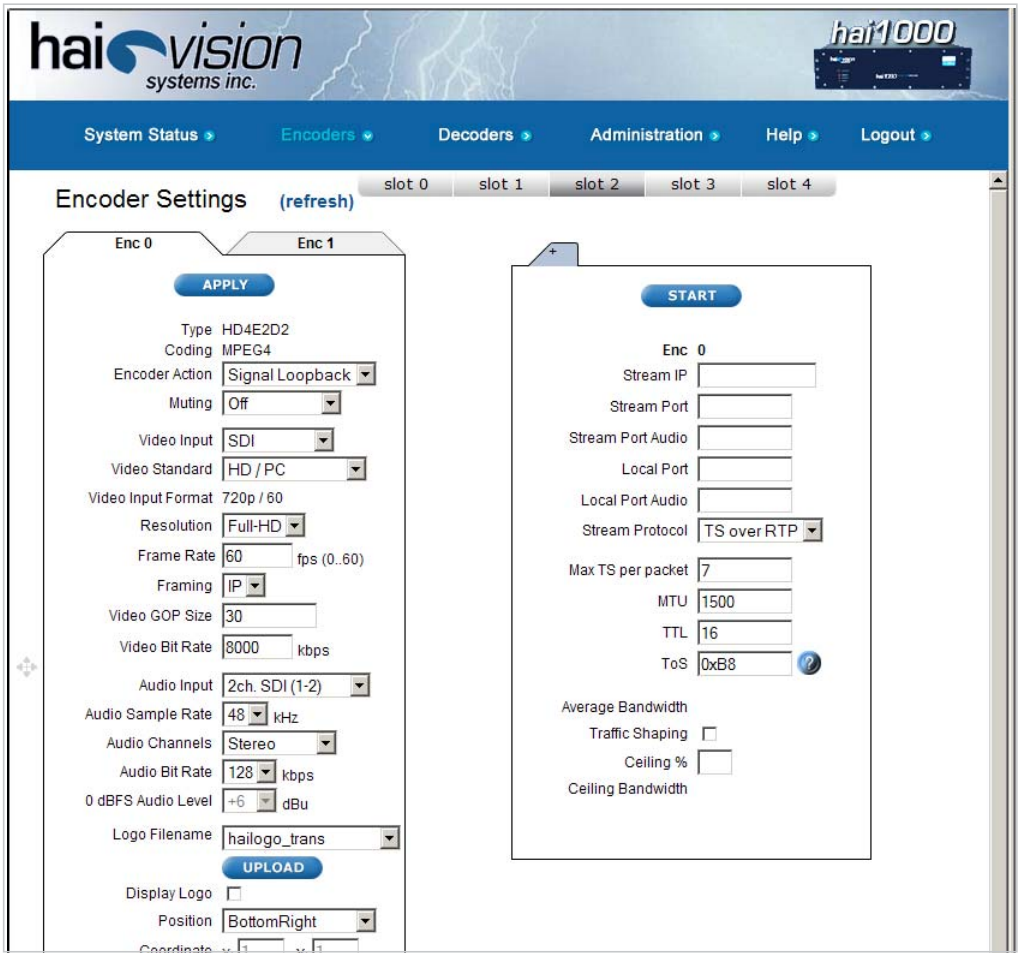
To configure Multi-Streaming from the Web Interface, you can specify up to four IP destination addresses, each copy in its own tabbed pane (labeled 1 - 4). Multi-Streaming sends multiple copies of the same content at the same bitrate and other Audio/Video settings. The destination IP addresses can be either Unicast or Multicast.

For more information on multicasting, including maximum load, see Appendix F.

You can also view statistics for any active stream. For details, see "Viewing Encoder Statistics" on page 133.

To configure an Encoder Streaming Session:

1. On the Encoder Settings page, select the Slot # of the Encoder. (Optionally) To add a stream (using Multi-Streaming), click the + tab.



2. Select or enter the new value(s) in the appropriate field(s). See "Encoder Streaming Parameters" on page 130.

3. Click START to start encoding.

NOTE The STOP and PAUSE buttons become available to control a stream once encoding has started. The RESUME button becomes available when the stream is paused. For more information, see "Pausing and Resuming a Stream" on page 128.

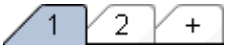
4. (Optional) Click PAUSE to pause encoding. If a Still Image has been configured, this will pause the normal stream play and start the Still Image insertion.

5. Click RESUME to stop the Still Image insertion and resume the normal stream play.

6. Click STOP to stop encoding.

Encoder Streaming Parameters

You may specify the following Streaming settings for the selected Encoder:

Encoder Stream Setting	Description
 example showing two streams configured	(Multi-Streaming only) Click the  tab to create a new session (i.e., a copy of the same content which will be transmitted at the same bitrate and other A/V settings). Click any numbered tab to display the tabbed pane for that stream.
Enc#	(Mako Dual-Encoder only) Selects Encoder #0 or #1.
Stream IP	The IP address of the Destination Decoder in dotted-decimal format (for unicast streams), or a multicast address in dotted-decimal format. For Multicast addresses, see NOTE on page 156.
Stream Port	The destination UDP port# of the stream to be encoded. Enter a number in the range 1026..65,534 *even* numbers only (with the exception of TS over UDP which also allows odd ports).
Stream Port Audio	The second destination UDP port# of the stream to be encoded (required to transport audio only for Direct RTP and QuickTime streams).
Local Port	The source UDP port# of the Encoder. For the range, see Stream Port above.

Encoder Stream Setting	Description (Cont.)
Local Port Audio	The second source UDP port# for the Encoder (required to transport audio only for Direct RTP and QuickTime streams).
Stream Protocol	The Encapsulation Type for the encoded stream: • TS over RTP: Transport Stream over RTP (with RTCP) • TS over UDP: Transport Stream over UDP • Direct RTP: specifies RFC-3984 (RTP) for video and AAC-LC ADTS for audio on separate ports. • QuickTime: Specifies RFC-3984 for video and RFC-3640 for audio payload.
Max TS per Packet	Specifies the maximum number of the MPEG Transport Stream cells per IP packet when using TS encapsulation. (Sender only) 2..7, default = 7 NOTE: Lowering this value will decrease the packet size and is only necessary in certain network conditions.
MTU	(Maximum Transmission Unit) Specifies the maximum allowed size of IP packets for the outgoing RTP data stream. 228..1500, default = 1500
TTL	(Time-to Live for stream packets) Specifies the number of router hops the Stream packet is allowed to travel/pass before it must be discarded. 1..255, default = 16
ToS	(Type of Service) Specifies the desired quality of service (QoS): • 0xB8 = Low delay / high bandwidth (default) • 0xB0 = Low delay • 0xA8 = High bandwidth • 0xA0 = Normal NOTE: For more information, see "toS" on page 265.
Average Bandwith	(read-only) The average network bandwidth.

Encoder Stream Setting	Description (Cont.)
Traffic Shaping	Check or clear this checkbox to enable or disable Traffic Shaping for the stream. For some limited networks such as satellites or some dedicated network pipes, it may be necessary to enable Traffic Shaping to smooth the traffic and respect the absolute upper limit configured. NOTE: Using Traffic Shaping on streams above 7Mbps may create audio/video artifacts (default configuration with medium to heavy movement video content).
Ceiling%	(Traffic Shaping must be enabled) Specifies the percentage of network bandwidth beyond the average rate that the encoder is allowed to use if needed. This is used to set the Ceiling Bandwidth range. 0..100%
Ceiling Bandwith	(Read-only) The absolute bandwidth limit that the encoder will not exceed. The bitrate produced will not exceed this value.
Generate SDP	Generates an SDP (Session Description Protocol) file which you can then download to your computer or server. The SDP file will be used by QuickTime to set the decoder to “tune” to the stream. NOTE: See “Configuring QuickTime SDP” on page 141.

NOTE In a full IP Multicast session, the Encoder Stream IP Address is an IP Multicast address, which is also used for the Decoder Stream IP Address.

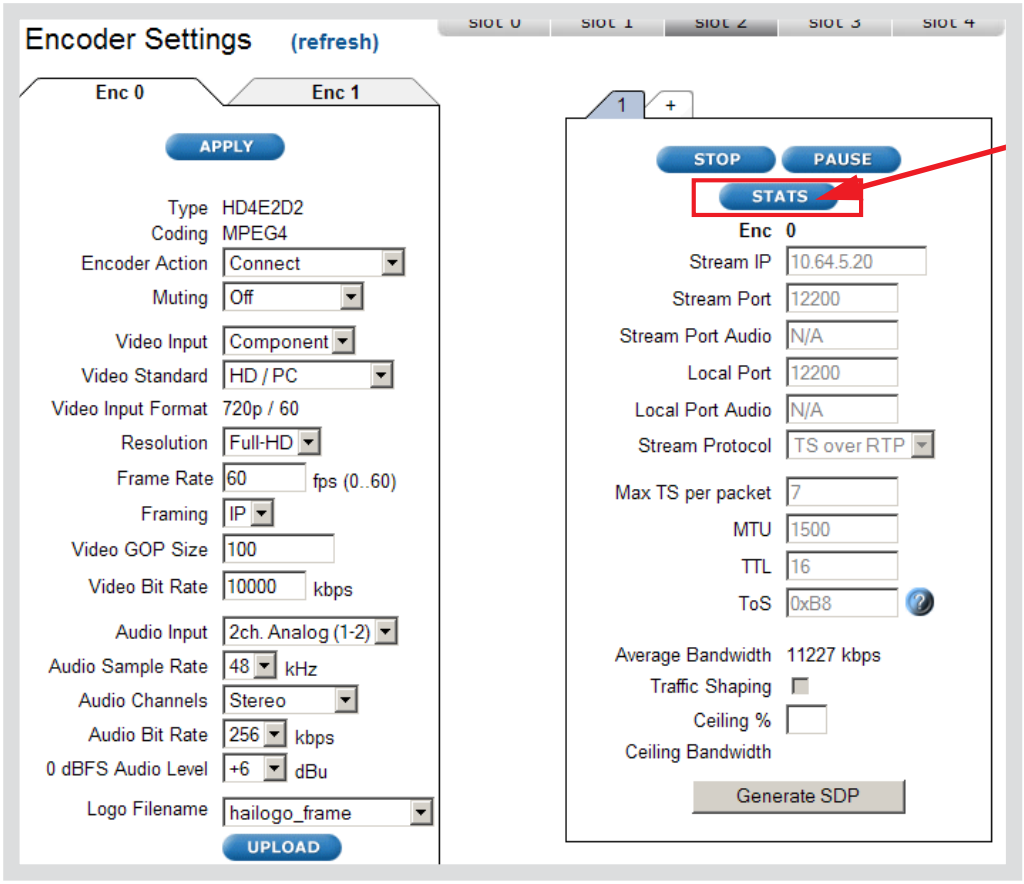
The range of Multicast addresses is from 224.0.0.0 to 239.255.255.255. Multicast addresses from 224.0.0.0 to 224.0.0.255 are reserved for multicast maintenance protocols and cannot be used by RTP sessions. We recommend that you use a multicast address from the Organization-Local scope (239.192.0.0/14).

Viewing Encoder Statistics

Once streaming has started, you can view Encoder statistics such as the number of packets sent and dropped, as well as the video and audio frame and error counts.

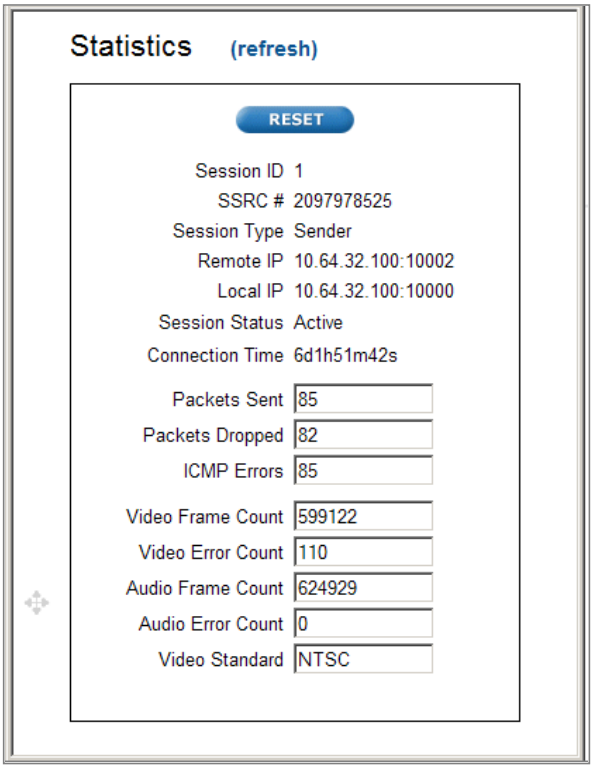
To view statistics for an Encoder stream:

1. On the Encoder Settings page, click STATS (located below STOP and PAUSE in the Stream Configuration section):



TIP When the stream session starts, the START button is replaced by STOP, PAUSE and STATS.

The Encoder Statistics window opens (shown in following example).



2. When you have finished viewing the statistics, click X in the title bar to close the window.

Encoder Statistics

The Encoder Statistics are as follows:

Encoder Statistic	Description
Packets Sent	Number of RTP or UDP packets sent for that stream.
Packets Dropped	Number of packets received by the host that could not be sent to the codec card for processing.
ICMP Errors	Number of Internet Control Message Protocol Errors (indicating that the stream was unable to reach its destination).
Video Frame Count	Number of successfully encoded video frames.
Video Error Count	Number of errors while encoding video.
Audio Frame Count	Number of successfully encoded audio frames.

Encoder Statistic	Description
Audio Error Count	Number of errors while encoding audio.
Video Standard	The operating Video Standard for the Encoder: • (Standard Definition) Either NTSC or PAL. • (Mako) The number of lines and pixels per line to encode.

Configuring Serial Metadata Capture

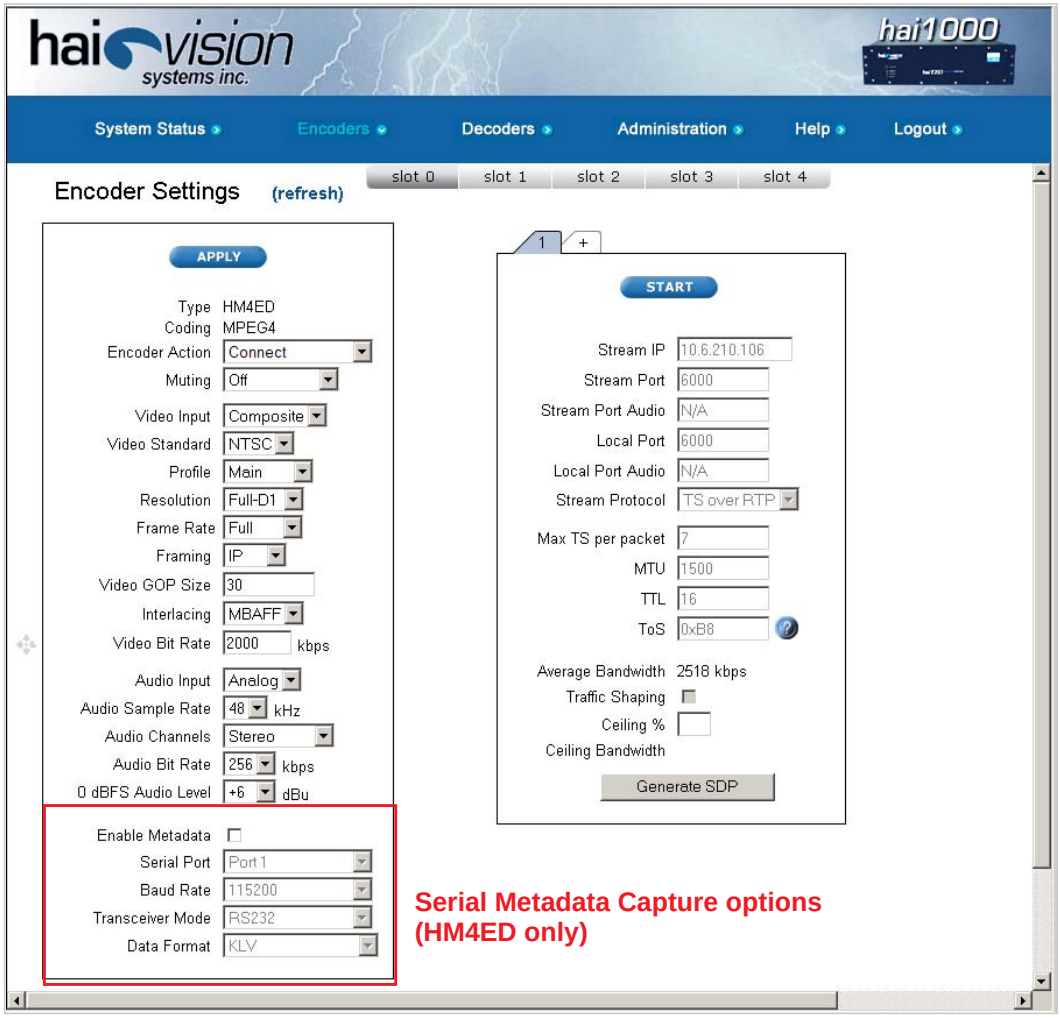
On systems equipped with the Serial Data Mezzanine option and an HM4ED Encoder, from the Encoder Settings page, you can configure the selected Encoder to capture KLV (Key Length Value) metadata from the serial port interface and then incorporate the data information within the MPEG Transport Stream.

NOTE The mezzanine supports four independent serial ports for KLV metadata capture. Note that only one serial input port can be used by each Encoder and that the same serial input port cannot be used by more than one Encoder

To configure Serial Metadata Capture on the Encoder:

1. On the Encoder Settings page, select the Slot # of the HM4ED Encoder to configure.

   The HM4ED Encoder Settings page contains the Serial Metadata Capture parameters (as shown in the following example):



2. Check the Enable Metadata checkbox.
3. Select the appropriate values in the Metadata field(s). See "Serial Metadata Parameters" on page 137.
4. Click APPLY.

Serial Metadata Parameters

You may specify the following Serial Metadata Capture parameters for the Encoder:

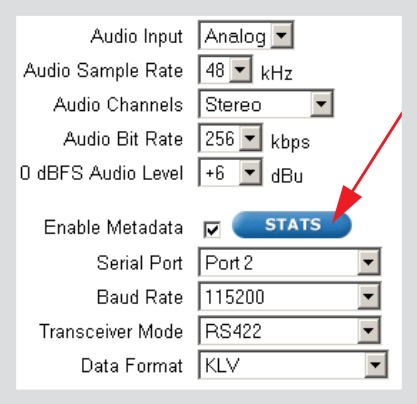
Parameter	Default	Description
Enable Metadata	disabled	Check this checkbox to enable metadata capture from the selected serial mezzanine port.
Serial Port	Port 1	Selects the serial mezzanine port: Ports 1, 2, 3 or 4
Baud Rate	115,200	Sets the baud rate for the port: 1200..115,200
Tranceiver Mode	RS-232	Selects the transceiver mode: either RS-232 or RS-422
Data Format	KLV	Selects the data format for the metadata: KLV only.

Viewing Metadata Statistics

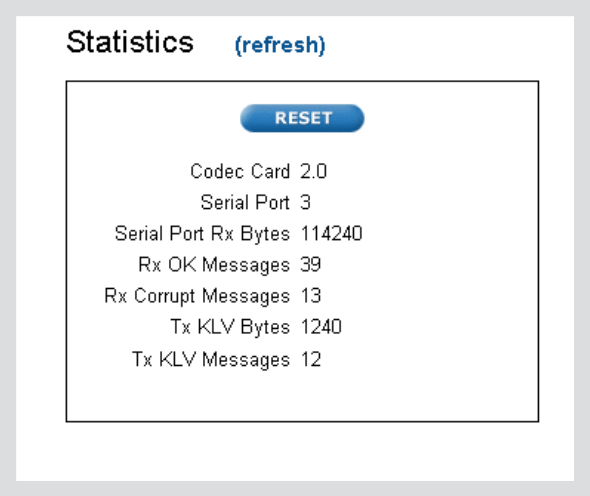
Once streaming has started, you can view statistics for the Metadata Capture, for example, the number of received bytes for the serial port or the number of KLV bytes transmitted.

To view metadata statistics:

1. On the Encoder Settings page, click STATS (located next to the Enable Metadata checkbox):



The Metadata Statistics window opens (shown in following example).



2. When you have finished viewing the statistics, click X in the title bar to close the window.

Serial Metadata Statistics

The Metadata Statistics are as follows:

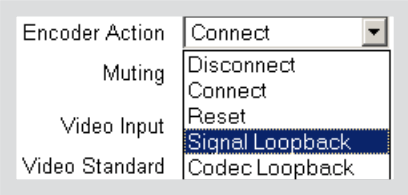
Metadata Statistic	Description
Serial Port Rx Bytes	Number of characters received on the serial port
Rx OK Messages	Number of KLV messages successfully received and validated on the serial port.
Rx Corrupt Messages	Number of KLV messages that were discarded (not inserted on the stream) due to there not being successfully validated (characters lost on the serial link, data corruption, invalid or unsupported KLV formatting).
Tx KLV Messages	Number of KLV messages inserted in the stream.
Tx KLV Bytes	Counter of the total bytes of KLV data inserted in the stream.

Configuring Encoder Loopbacks

From the Encoder Settings page, you can enable or disable loopbacks on the selected Encoder.

To enable or disable Encoder loopbacks:

1. On the Encoder Settings page, select one of the Encoder Action loopback options:

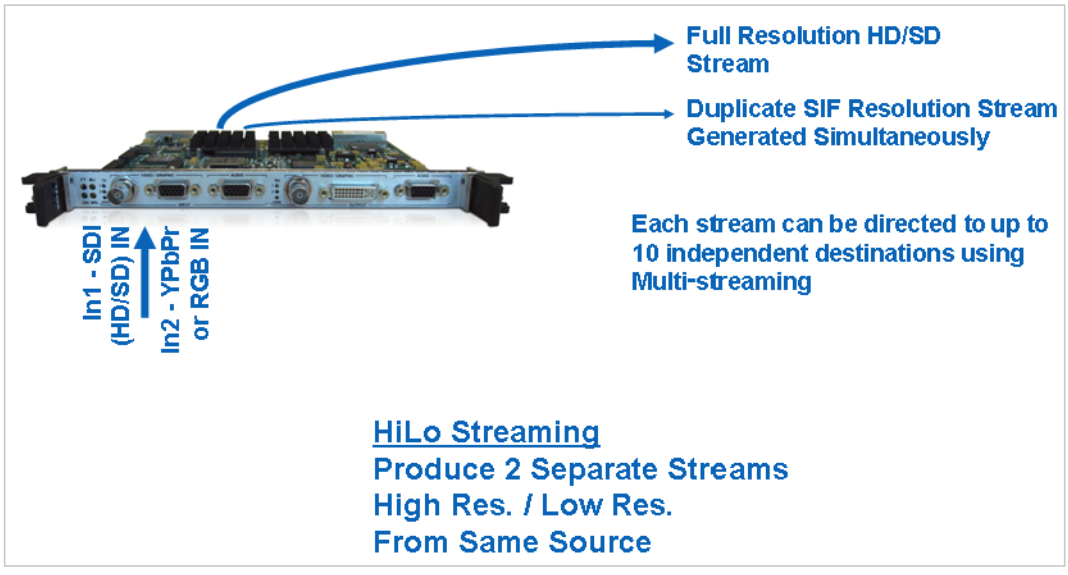


   - Signal: Loops uncompressed video from Video A/D to Video D/A. Signal loopbacks are typically used as a diagnostic tool for troubleshooting. (For an illustration of the Loopback options, see Figure B-1 on page 309).
   - Codec: Encodes the video+audio output and then loops it back to the Local decoder.

2. Click APPLY.

Configuring HiLo Streaming

HiLo streaming refers to simultaneously sending a full quality SD/HD (“Hi”) stream and a thumbnail (“Lo”) sample of the same content from a single input (see diagram below). A Dual-Channel HD4E2D2 Mako Encoder is required for HiLo streaming.

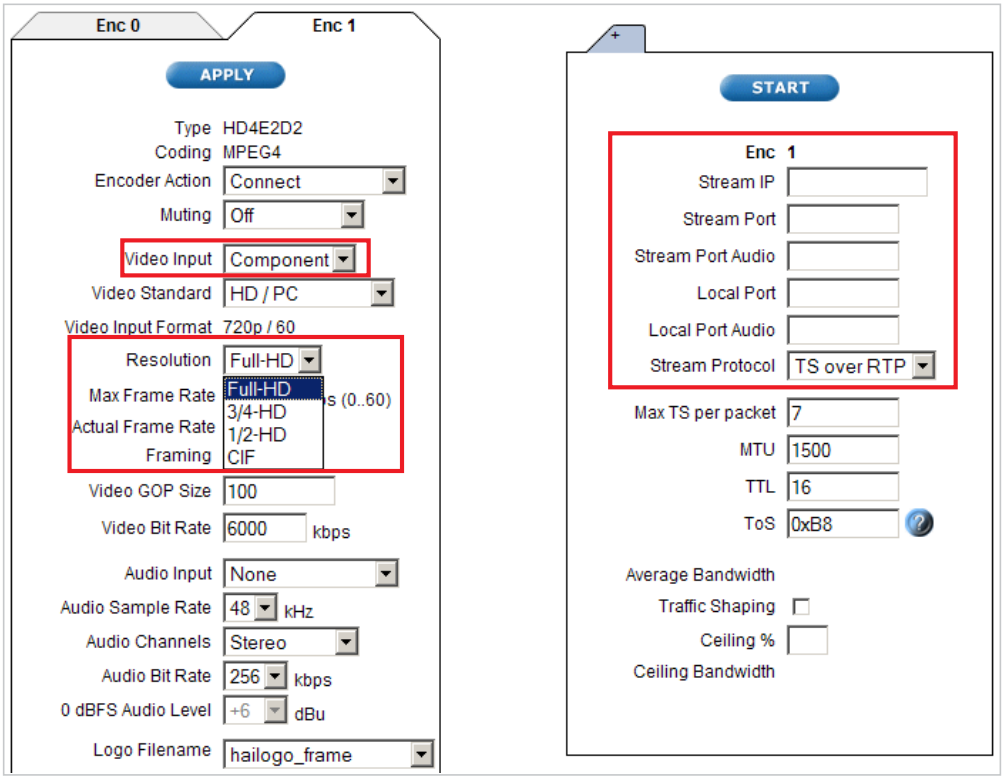


The following requirements apply to HiLo streaming on the hai1000:

- All video formats [HD 720/1080 and SD 480/576] are supported.
- The first Encoder (Enc #0) is used for the “Hi” stream and second Encoder (Enc #1) is used for the “Lo” stream.
- The Lo resolution (CIF/SIF 320x240/288 thumbnail) can be decoded by Wowza and software decoders but not the hai1000 Mako or HMF2 Decoder.
- To configure HiLo streaming with 1080i30 and 1080p30 resolutions, you may need to reduce the streamed resolution and/or frame rate in order to free some encoding resources.

To set up HiLo Streaming from the Web Interface:

1. Set up both Encoders for the same Video Input (SDI or Component).
2. Set the Resolution on the second Encoder (Enc #1) for the CIF/SIF thumbnail (i.e., the “Lo” stream):



3. Set up both Encoders to stream from IP Address <1.2.3.4> to <5.6.7.8>.
4. To configure HiLo streaming with 1080i30 and 1080p30 resolutions, you may need to reduce the streamed resolution and/or frame rate in order to free some encoding resources. To do so, follow these steps:
   a. Set up Enc #0 as the “Hi” stream with the desired encoded resolution.
   b. Set up Enc #1 as the “Lo” stream with the desired encoded resolution.

c. Enter the Frame Rate for Enc #0 and the Max Frame Rate for Enc #1.

d. From the Enc #1 tab, monitor the Actual Frame Rate. If necessary, adjust the encoded Resolution or Frame Rate on Enc #0.

Configuring QuickTime SDP

The hai1000 series supports QuickTime and Flash interoperability (through a Flash gateway) using an SDP (Session Description Protocol) file.

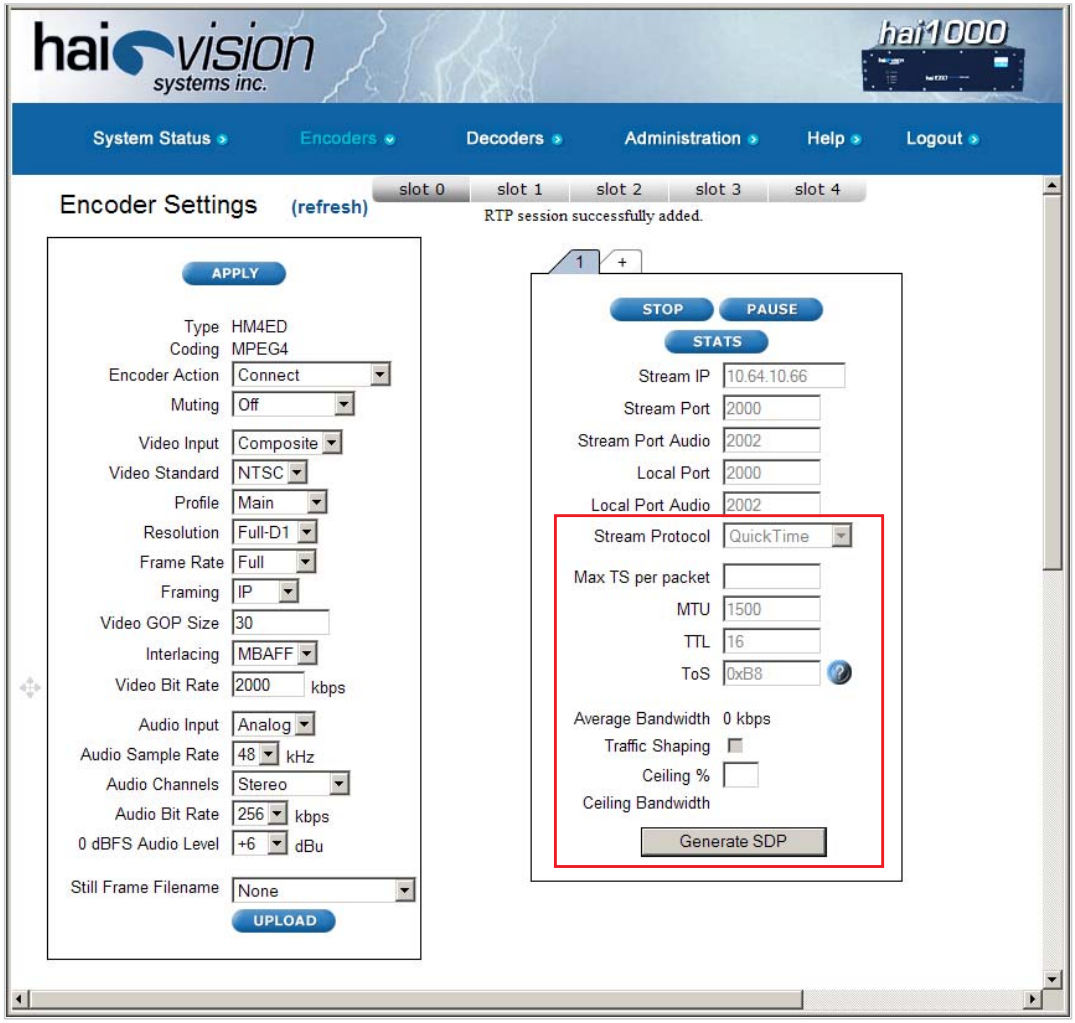
From the Encoder Settings page, you can select QuickTime as the Stream Protocol, and when the session starts, you can generate an SDP file, which you can download to your computer or streaming server. See "SDP File Example" on page 142.

The SDP file must be saved to a location that the QuickTime player can access. Users can then start QuickTime and open the SDP file to start playing the stream.

To configure the Encoder to interoperate with QTSS:

1. On the Encoder Settings page, select the Slot # of the Encoder to configure.
2. Set up the Encoder stream with QuickTime as the Stream Protocol.
3. Click START to start encoding.

4. Once the stream has started, click Generate SDP, as shown in the following example.



5. Save the SDP file to the QTSS movies folder:

   QTSS /Library/QuickTimeStreamingServer/Movies

6. From the decoder, access the live stream URL:

   rtsp://<QTSS hostname or IP>/<HaiVision>.sdp

SDP File Example

The SDP file is compliant to RFC 2327 with both video and audio attributes:

```
v=0
  o=- 1 1 IN IP4 127.0.0.1
  s=proc
  c=IN IP4 224.1.1.5/64
  b=RR:0
  t=0 0
  m=video 7000 RTP/AVP 96
  a=rtpmap:96 H264/90000
```

```
a=fmtp:96 packetisation-mode=0; profile-level-id=42801e; sprop-
parameter
sets=
Z0KAHuigWh7f+AAAAwAFSAgIDSgAAAMACAAK/IMAAAMD0JAAAtxs3vfB8UJ
mgM==,aN41IM==
m=audio 7002 RTP/AVP 97
a=rtpmap:97 mpeg4-generic/90000/2
a=fmtp:97 streamType=5;profile-level-id=22;mode=AAChbr;sizelength=
13;indexlength=3;indexdeltalength=3;config=1290
```

QuickTime SDP Notes

The HM4ED Encoder interoperates with QuickTime Version 7.x with the following settings:

Resolution	Standard	Profile	Interlace Coding	Framing	Video Bit Rate	GOP	# of Audio Ch	Audio Sampling	Audio Bit Rate
Full-D1 / Half-D1*	NTSC / PAL	Baseline / Main	Frame (no MBAFF)	I / IP *no B frames	All	All	2	All	All

Note that Half-D1 resolution from the HM4Ed Encoder looks “squeezed” with QuickTime.

The Mako Encoder interoperates with QuickTime Version 7.x with the following settings:

Format	Resolution	Input Rate	Video Bit Rate	GOP	# of Audio Ch	Audio Sampling	Audio Bit Rate
HD	720p	50 / 60	All	All	2	All	All
	1080p	25 / 30	All	All	2	All	All
PC	1280x768	60 Hz	All	All	2	All	All
	1024x768	60 Hz	All	All	2	All	All
	800x600	60 Hz	All	All	2	All	All

- Mako-interlaced video (1080i, 480i, and 576i) will not interoperate with the QuickTime player.
- The HM2ED will not interoperate with QuickTime since it is MPEG-2 based.
- QuickTime and Flash interoperability is a hai1000 Encoder feature only. The hai1000 Decoder cannot read an SDP file and tune on the stream.
- SNMP support is not required.

Configuring the Decoders

From the Web Interface, you can view the Card and Audio/Video settings for a Decoder, select the Video Standard, set up IP Streams, and start/stop decoding.

NOTE Most Audio/Video settings are defined at the Encoder end, and the Decoder adjusts to the settings embedded in the received stream.

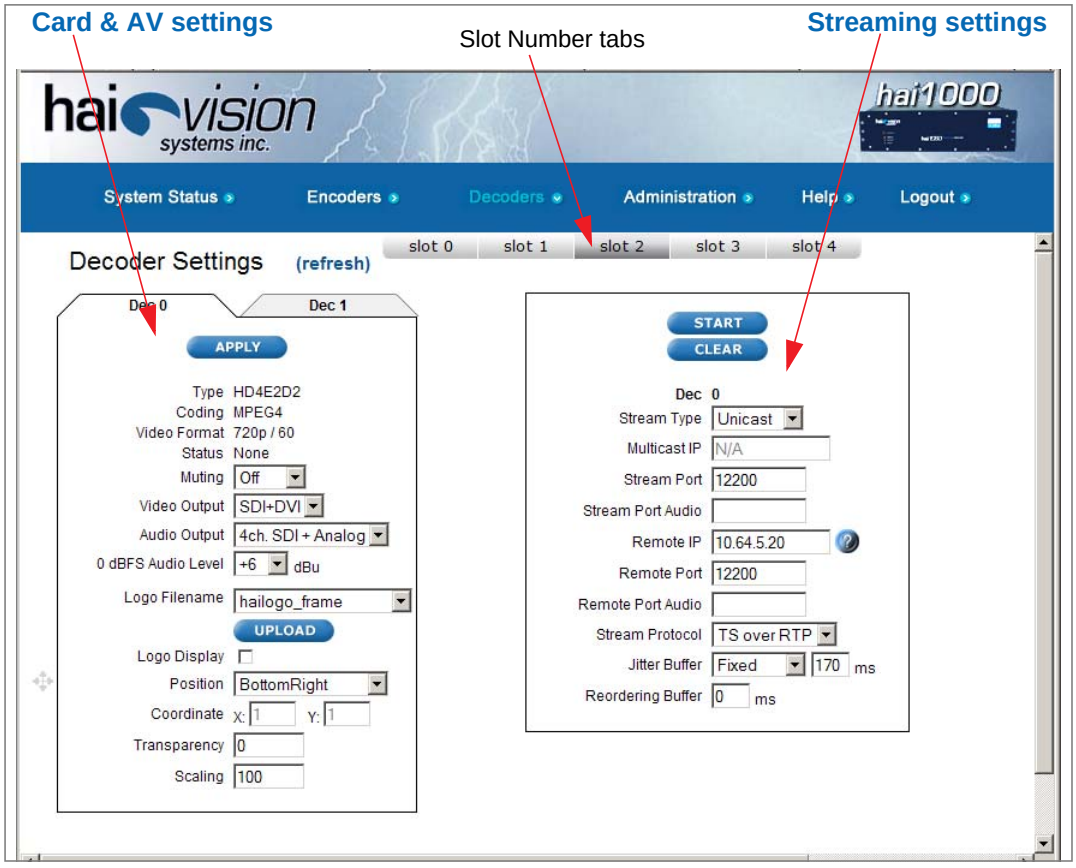
Viewing Decoder Settings

From the System Status page, you can select a Decoder, and open a detailed view of its current settings.

To view Decoder settings:

1. On the System Status page, select the Decoder to view and click Dec (or Dec #).

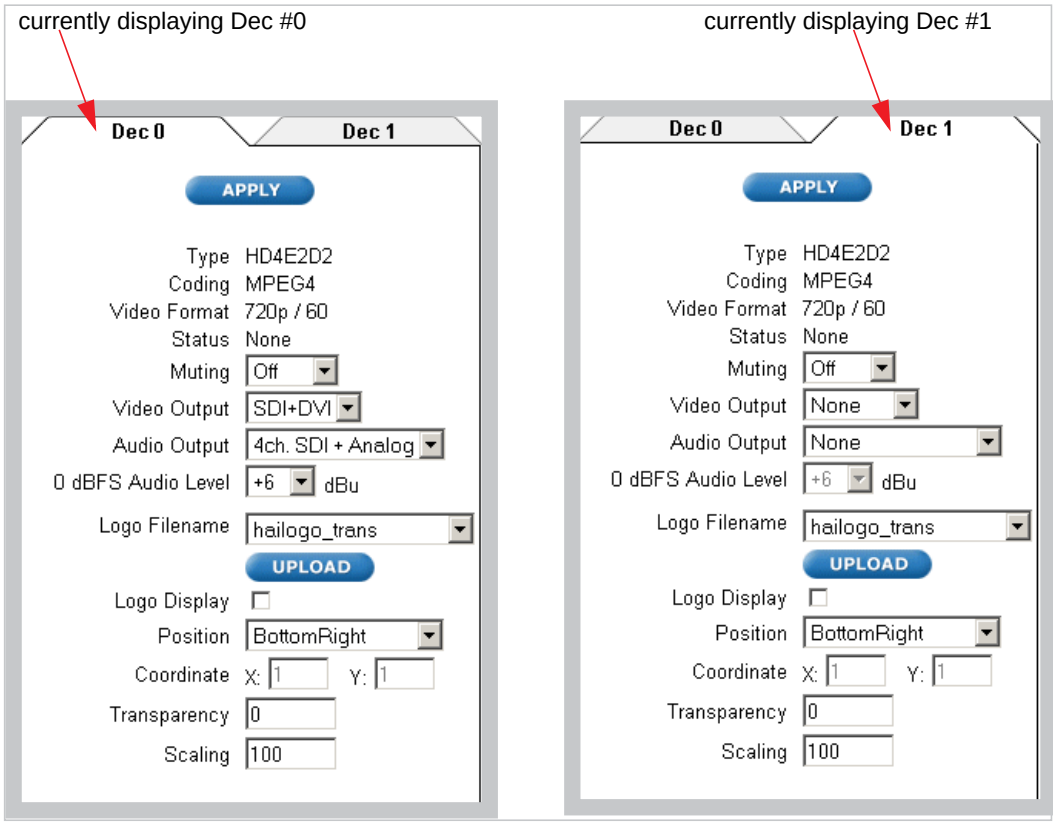
   The Decoder Settings page opens, displaying the key settings for the selected Decoder. Following is a sample Decoder Settings page for a Mako Dual-Decoder installed in A/V Service Slot #2:



TIP To open the Decoder Settings page, you can also select Decoders from the menu bar and then click the Slot #.

Dual-Decoders

Each stream is displayed as an embedded tabbed pane. To display the other stream, click the Dec # tab.



Related Topics:

- For information on configuring the Decoder Card and Audio/Video settings, see "Configuring Decoder A/V Settings" on page 146.
- For information on configuring the Streaming settings, see "Configuring Decoder Streams" on page 154.

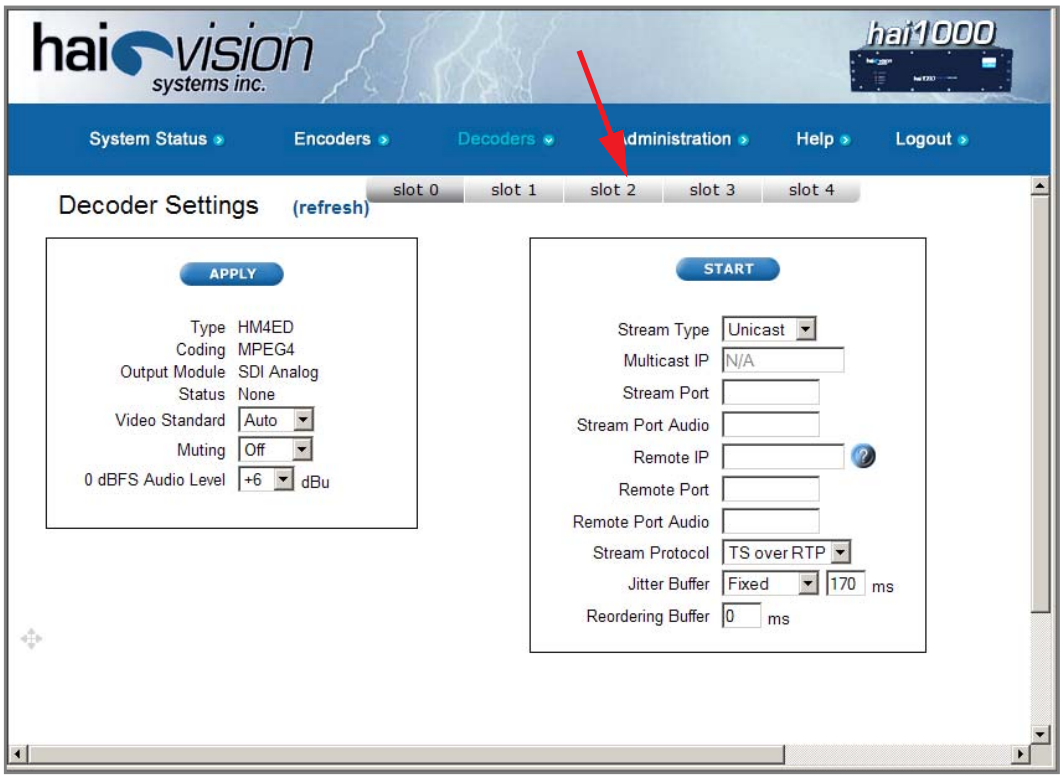
Configuring Decoder A/V Settings

Most Audio/Video settings are configured at the Encoder end. However, depending on the type of Decoder, you can specify parameters such as Video and Audio Output formats, the Video Standard, and the Aspect Ratio. You can also enable or disable Muting for the Decoder. The Decoder A/V Settings vary according to the type of A/V service card.

To configure Audio/Video Settings on the Decoder:

1. On the Decoder Settings page, select the Slot # of the Decoder to configure. This will display the tabbed pane for that A/V Service Slot.

   Following is a sample Decoder Settings page for an MPEG-4 Decoder installed in A/V Service Slot #2:



2. Select or enter the new value(s) in the appropriate field(s). See "Decoder A/V Parameters" on page 147.

3. Click APPLY.

Your changes will take effect. Note that the settings will *not* be saved.

NOTE Changing audio or video configuration parameters while a stream is active may result in brief audio or video artifacts.

TIP To save the settings as a configuration file, open the Administration > Configuration page. See "Saving and Loading Configurations" on page 163.

Decoder A/V Parameters

The following table lists the general Decoder Audio/Video parameters:

NOTE For the parameters to display a graphic overlay, see "Decoder Logo Display Parameters" on page 152.

Parameter	Codec Type	Default	Description
Slot #	any	0	The shaded Slot # tab indicates the A/V Service Slot in which the card is installed. You can click any tab to display a different card. TIP: To update the values, click refresh.
Type			The type of A/V service card:
	Mako	n/a	• HD4ED Encoder/Decoder • HD4E2D2 Dual-Encoder/Dual-Decoder
	HM4ED, HM2ED	n/a	• HM2ED Encoder/Decoder • HM4ED Encoder/Decoder • HM2D Decoder Only • HM4D Decoder Only This is auto-detected by the system and cannot be changed.
Coding	any	n/a	The video coding standard for the Decoder: • MPEG-2 • MPEG-4 AVC This is auto-detected by the system and cannot be changed from the Web Interface. NOTE: For multi-format codecs, you can switch the MPEG coding value from the CLI. (See "Switching the MPEG Coding Value for a Multi-Format Codec" on page 183.)

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
Video Format	Mako	n/a	The number of lines per frame to send to the display, with an indicator (i or p) whether the video is interlaced or progressively scanned. Also, the number of frames per second: either 25 or 30 for interlaced, or 50 or 60 for progressively scanned. • 720p/50 [1280x720@50fps] • 720p/60 [1280x720@60fps] • 1080i/25 [1440x1080@25fps] • 1080i/30 [1440x1080@30fps] • 1080p/25 [1920x1080@25fps] • 1080p/30 [1920x1080@30fps] This is auto-detected by the system and cannot be changed.
Output Module	HM4ED, HM2ED	n/a	The video output type for the Decoder: • Analog • SDI • HDMI This is auto-detected by the system and cannot be changed from the Web Interface.
Status	any	n/a	The connection status for the Decoder: • None - No action taken • Not Initialized - Action is requested, but no action has been taken yet • RTP Activating - Trying to start • Active - Started successfully This is auto-detected by the system and cannot be changed from the Web Interface. NOTE: The status “RTP Activating - Trying to start” typically indicates that no packets are received.
Muting	any	Off	Use to mute or unmute audio and/or video decoding: • Off • Audio • Video • A+V

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
Video Output	Mako	SDI+DVI (Dec0) / none (Dec1)	The type of Video Output connector for the Decoder: • SDI • DVI (Component) • SDI+DVI • none: Required if the other port is set to SDI+DVI NOTE: You must select DVI for RGBHV graphics output because RGBHV graphics can only be sent through the DVI output port. Therefore, two graphics streams sent to the same Dual Decoder cannot be displayed at the same time.
Video Standard	HM4ED, HM2ED	Auto	The operating Video Standard for the Decoder: • NTSC: National Television Systems Committee (North America and Asia) • PAL: Phased Alternate Line (Europe) • Auto: Auto-detect
Audio Output	Mako	4ch.SDI+ Analog (Dec0) / none (Dec1)	The type of Audio Output connector for the Decoder: • 4ch. SDI + Analog • 4ch. SDI • 4ch. Analog • 2ch. SDI (1-2) • 2ch. SDI (3-4) • 2ch. Analog (1-2) • 2ch. Analog (3-4) • None
0 dBFS Audio Level	any	+6 dBU	Adjusts the maximum analog Audio Input level (0 dBfs) from +6dBU up to +20dBU. This is useful in applications such as broadcast and streaming to allow higher audio headroom. NOTE: This only applies to Analog Audio Output.
Logo Filename	Mako	None	(Optional) Select an image file to display as a logo overlay in the decoded video. NOTE: To configure the logo, see "Configuring Logo Display" on page 151.

Parameter (Cont.)	Codec Type	Default	Description (Cont.)
Aspect Ratio	HDMI	Pillarbox	The width-to-height ratio of the video image: • Pillarbox (4:3, i.e., standard TV) • Anamorphic (16:9)
Output Resolution	HDMI	auto (EDID)	The number of lines and pixels per line to send to the display: • auto (EDID) • 1920x1080i30 • 1920x1080i25 • 1280x720p60 • 1280x720p50 • 720x576p50 • 720x576i25 • 720x480p60 • 720x480i30 • 640x480p60 The video is either interlaced or progressively scanned, indicated by i or p. The end number 50 or 60 indicates the number of frames per second to send to the display.
Actual Resolution	HDMI	n/a	The number of lines and pixels per line actually sent to the display. The Actual Resolution is auto-detected by the system and cannot be changed.

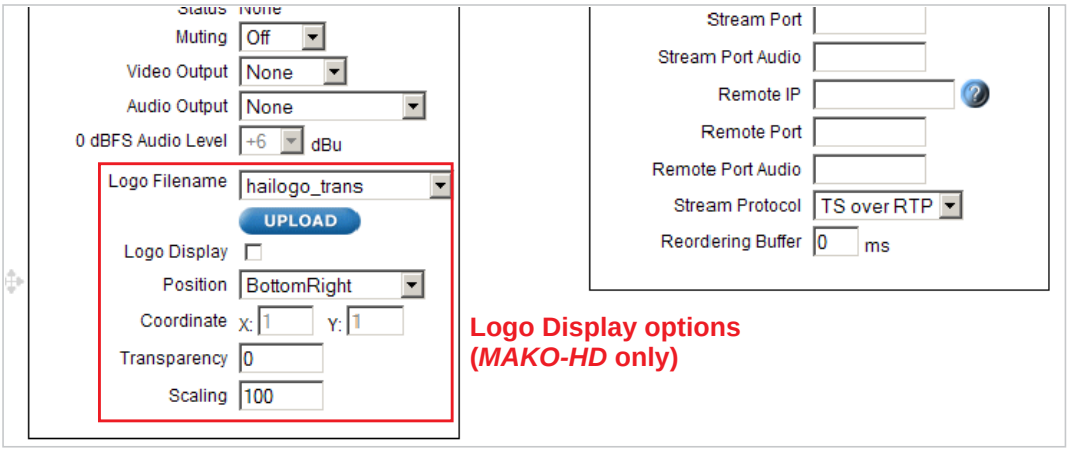
Configuring Logo Display

On systems equipped with one or more Mako modules, from the Decoder Settings page, you can configure the selected Decoder to display a graphic file as a logo overlay in the decoded video.

To configure logo insertion on the Decoder:

1. On the Decoder Settings page, select the Slot # of the Mako Decoder to configure.

   The following example shows the logo display parameters:

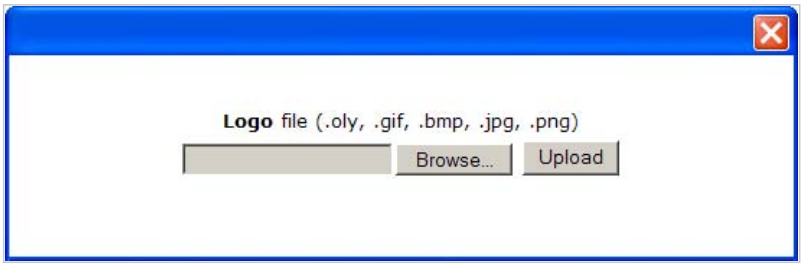


2. Select the filename from the Logo Filename drop-down list.

   -or-

   To upload a new image file in either .oly, gif, jpeg, bmp or png format, click Upload.

3. In the Logo file dialog, click Browse to select the image file and then click Upload.



   (If required) The image file will be converted to Haivision's image overlay (.oly) format and will be included on the Logo Filename drop-down list.

4. On the Decoder Settings page, check the Logo Display checkbox.

5. To configure the logo overlay, select or enter value(s) in the appropriate field(s). See "Decoder Logo Display Parameters" on page 152.

6. Click APPLY.

Decoder Logo Display Parameters

You may specify the following logo display parameters for the Mako Decoder:

Parameter	Default	Description
Logo Filename	hailogo_trans	Select the name of the logo image file to display.
UPLOAD	n/a	Click to select a new image file to upload. The image file can be in either .oly, .gif, .jpeg, .bmp or .png format. NOTE: If required, the file will be converted to Haivision's image overlay (.oly) format and will be located in the folder /usr/share/haivision/logos on the hai1000 Host file system.
Logo Display	disabled	Check this checkbox to display the selected file as a logo overlay.
Position	BottomRight	Select the position of the logo. • Absolute • TopLeft • TopRight • BottomLeft • BottomRight • Centered NOTE: In Absolute mode, the logo is positioned at the exact X and Y coordinates specified.
Coordinates: X and Y	0, 0	Specifies the position of the logo on the X and Y axes. (The origin is the top left corner of the display area.) NOTE: Only takes effect if Position is set to Absolute.

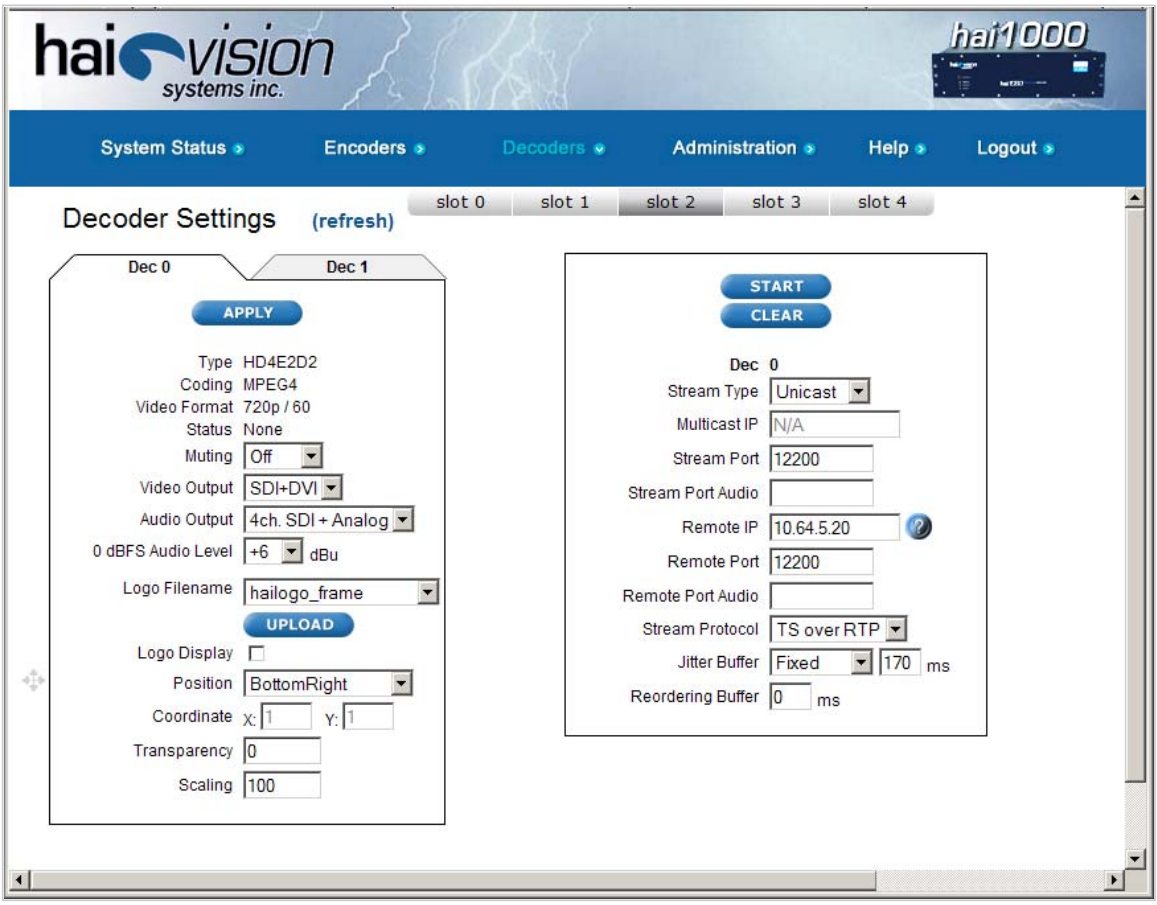
Parameter	Default (Cont.)	Description (Cont.)
Transparency	0	Specifies the percentage of transparency for the logo: • 0 = no transparency (i.e., a completely solid/opaque logo) • 100 = fully transparent (i.e., completely transparent/invisible logo)
Scaling	100	Specifies the scale factor (percentage) for the logo: • 0% = relative (i.e., stays the same size even when resolution changes) • 25% = 1/4 size • 100% = no scaling • 400% = 4x

Configuring Decoder Streams

From the Decoder Settings page, you can set up Decoder streams and start/stop decoding. You can also view statistics for any active stream. For details, see "Viewing Decoder Statistics" on page 157.

To configure a Decoder Streaming Session:

1. On the Decoder Settings page, select the Slot # of the Decoder.



2. Select or enter the new value(s) in the appropriate field(s). See "Decoder Streaming Parameters" on page 155.
3. Click START to start decoding the stream.
4. Click STOP to stop decoding.

Decoder Streaming Parameters

You may specify the following Streaming settings for the selected Decoder:

Decoder Stream Setting	Description
Dec#	(Mako Dual-Decoder only) Selects Decoder #0 or #1.
Stream Type	The Stream Type for the decoded stream: • Unicast • Multicast
Multicast IP	A multicast address in dotted-decimal format. See NOTE following table.
Stream Port	The destination UDP port# of the stream to be decoded. Enter a number in the range 1026..65,534 *even* numbers only (with the exception of TS over UDP which also allows odd ports).
Stream Port Audio	The second destination UDP port# of the stream to be decoded (required to transport audio only for Direct RTP and QuickTime streams).
Remote IP	The IP address of the Source Encoder in dotted-decimal format. For unicast addresses, this field can be left blank, or you can write “any” or “0.0.0.0” to allow packets to be received from any source. Otherwise, if you specify an IP address, the Decoder will only accept packets that originate from this address. For multicast addresses, see NOTE following table.
Remote Port	The UDP port# of the Source Encoder.For the range, see Stream Port above.
Remote Port Audio	The second UDP port# of the Source Encoder (required to transport audio only for Direct RTP and QuickTime streams). The same port requirements apply as for the Stream Port.
Stream Protocol	The Encapsulation Type for the decoded stream: • TS over UDP: Transport Stream over UDP • TS over RTP: Transport Stream over RTP • Direct RTP: specifies RFC-3984 (RTP) for video and AAC-LC ADTS (Advanced Audio Coding-Low Complexity, Audio Data Transport Stream) for audio on separate ports.

Decoder Stream Setting	Description (Cont.)
Jitter Buffer	The default Adaptive buffer provides the best latency/jitter immunity trade-offs in many situations. However, in cases of fluctuating jitter over a period of time, visual impairment could result due to frequent skip/repeat video frames. Select Fixed to add an extra buffer for network jitter compensation for the receiving session. NOTE: On a Mako Dual-Decoder, the Fixed Jitter Buffer is supported on Port 0 only
	Enter the Fixed Jitter Buffer to add to the minimum buffer size required for smooth video playback (with no skipped/repeat video frames). This value is only configurable when Fixed Jitter Buffer is selected. The default value of 100 milliseconds means that the Decoder buffer is set to minimum buffer size + 100ms. The Fixed Jitter Buffer also directly affects the end-to-end latency; for example, 15ms of Jitter Buffer will increase the end-to-end latency by an extra 15ms.
Reordering Buffer	The maximum buffer time allowed for reordering packets. 0-200 milliseconds, default = 0

NOTE In a full IP Multicast session, the Decoder Stream IP Address must be the same IP Multicast address as the Remote IP Address for the Encoder.

The Decoder Remote IP Address can either be the same IP Multicast address, or it can be the IP Address for the Encoder.

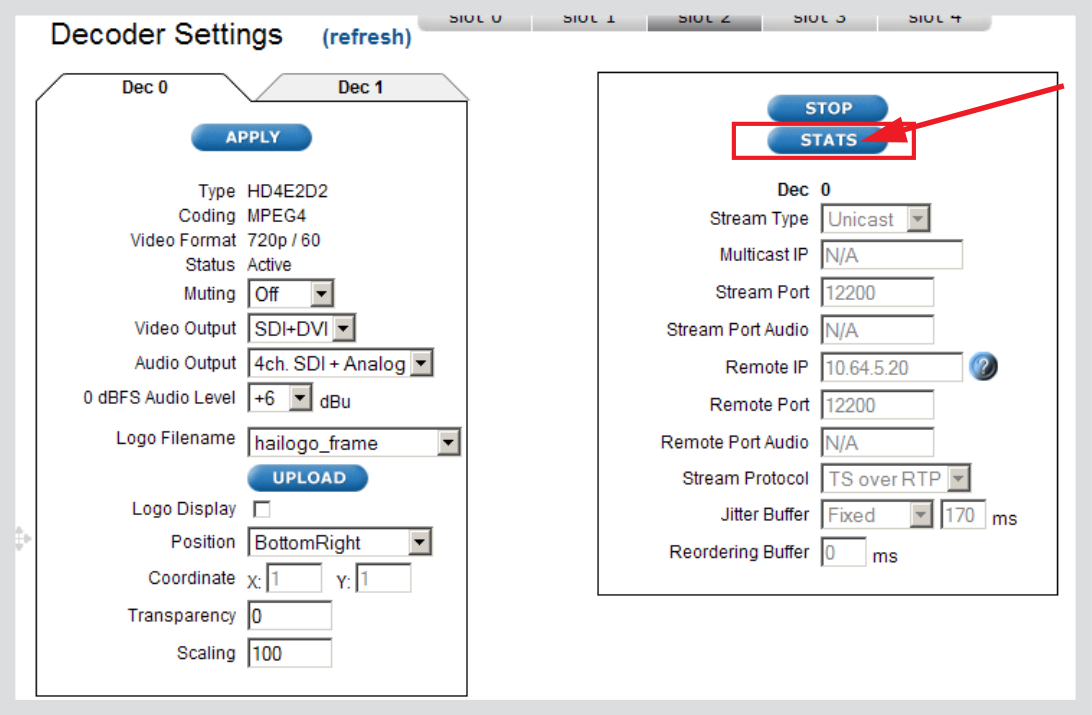
The range of Multicast addresses is from 224.0.0.0 to 239.255.255.255. Multicast addresses from 224.0.0.0 to 224.0.0.255 are reserved for multicast maintenance protocols and cannot be used by RTP sessions. We recommend that you use a multicast address from the Organization-Local scope (239.192.0.0/14).

Viewing Decoder Statistics

Once streaming has started, you can view Decoder statistics such as the number of packets received and dropped, as well as the video and audio frame and error counts.

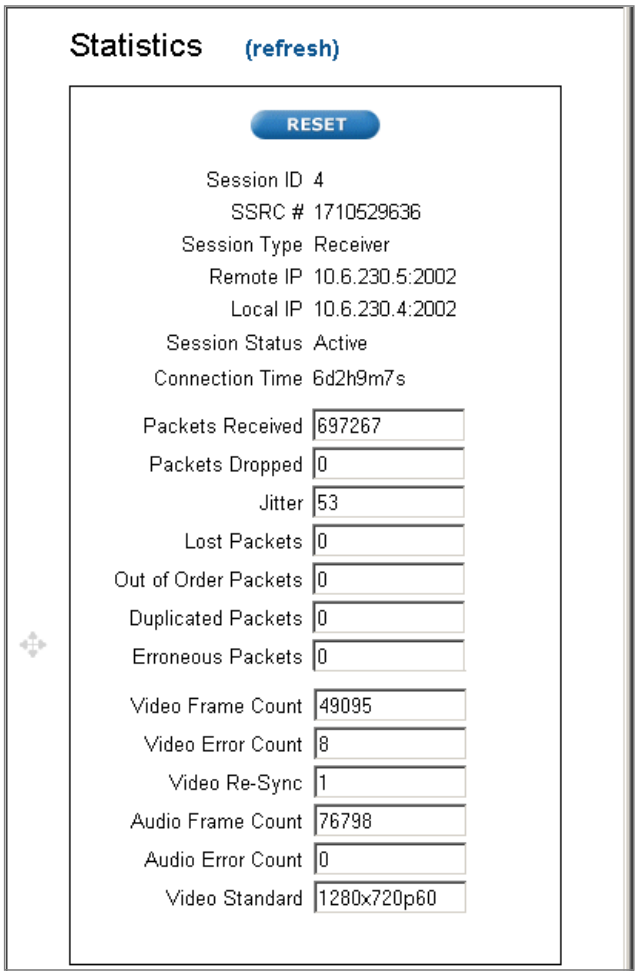
To view statistics for a Decoder stream:

1. On the Decoder Settings page, click STATS (located below STOP in the Stream Configuration section):



TIP When streaming starts, the START button is replaced by STOP and STATS.

The Decoder Statistics window opens (shown in following example).



2. When you have finished viewing the statistics, click X to close the window.

Decoder Statistics

The Decoder Stats are as follows:

Decoder Statistic	Description
Packets Received	Number of RTP or UDP packets received for that stream.
Packets Dropped	Number of packets received by the host that could not be sent to the codec card for processing.
Jitter	An estimate of the statistical variance of the RTP data packet interarrival time, measured in timestamp units.
Lost packets	Based on gaps in sequence numbers, this is a counter of packets that were evaluated to be lost.

Decoder Statistic	Description
Out of Order Packets	Number of packets that were out of order.
Duplicated Packets	The number of packets that were duplicate and received more than once.
Erroneous Packets	The number of packets that were extremely out of sequence.
Video Frame Count	Number of successfully decoded video frames.
Video Error Count	Number of errors while decoding video.
Video Re-Sync	The number of times the decoder has re-synchronized with the received stream. When the input stream is started or switched from one source to another, this is a normal condition. When this happens during steady state operation, this may indicate that the data stream contains errors.
Audio Frame Count	Number of successfully decoded audio frames.
Audio Error Count	Number of errors while decoding audio.
Video Standard	The operating Video Standard for the Decoder: • Either NTSC or PAL (HM2ED and HM4ED) • The number of lines and pixels per line to send to the display (Mako)

Viewing and Configuring System Settings

The Administration > Inventory page provides basic system information such as the operating system up time, along with information about the hardware and software components of the hai1000 series unit. The format is similar to the System Status page, displaying a snapshot of the hai1060 rear slot view that shows the installed cards (blades) with key information for each component.

In addition, you can install a firmware update, generate a file containing the current system configuration, and reboot the system from this page.

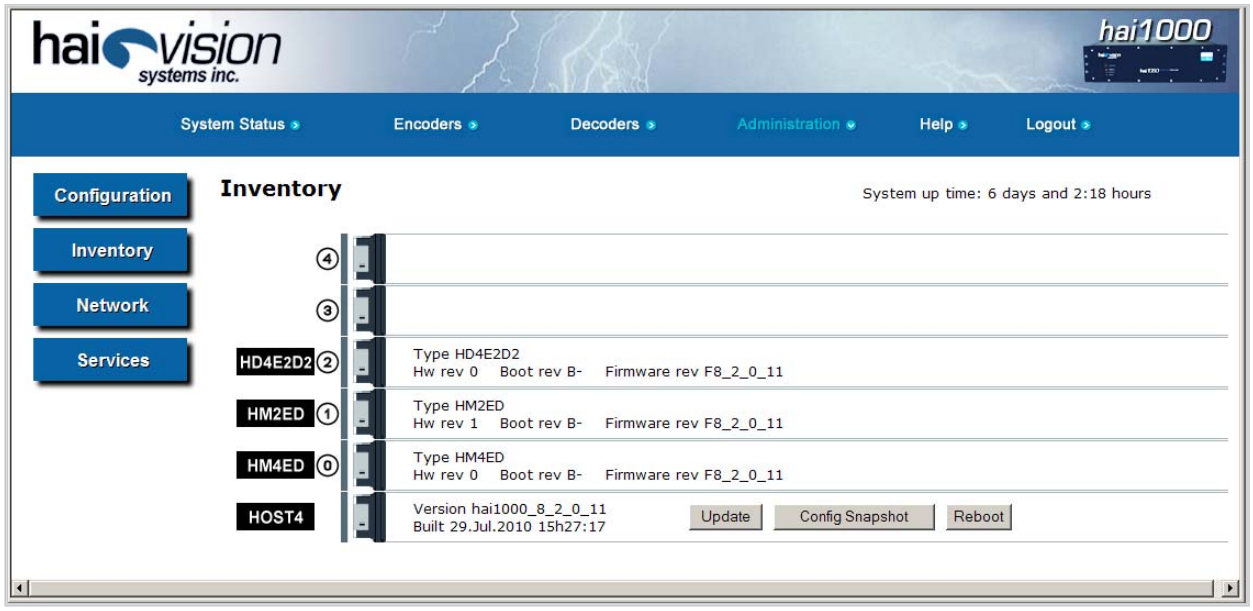
NOTE For the procedure to install a firmware upgrade, see "Installing a Firmware Upgrade from the Web Interface" on page 91.

To view the inventory of hardware components:

1. Select Administration from the menu bar.

   The Administration > Configuration page opens.

2. Click Inventory to open the Administration > Inventory page (shown in the following example).



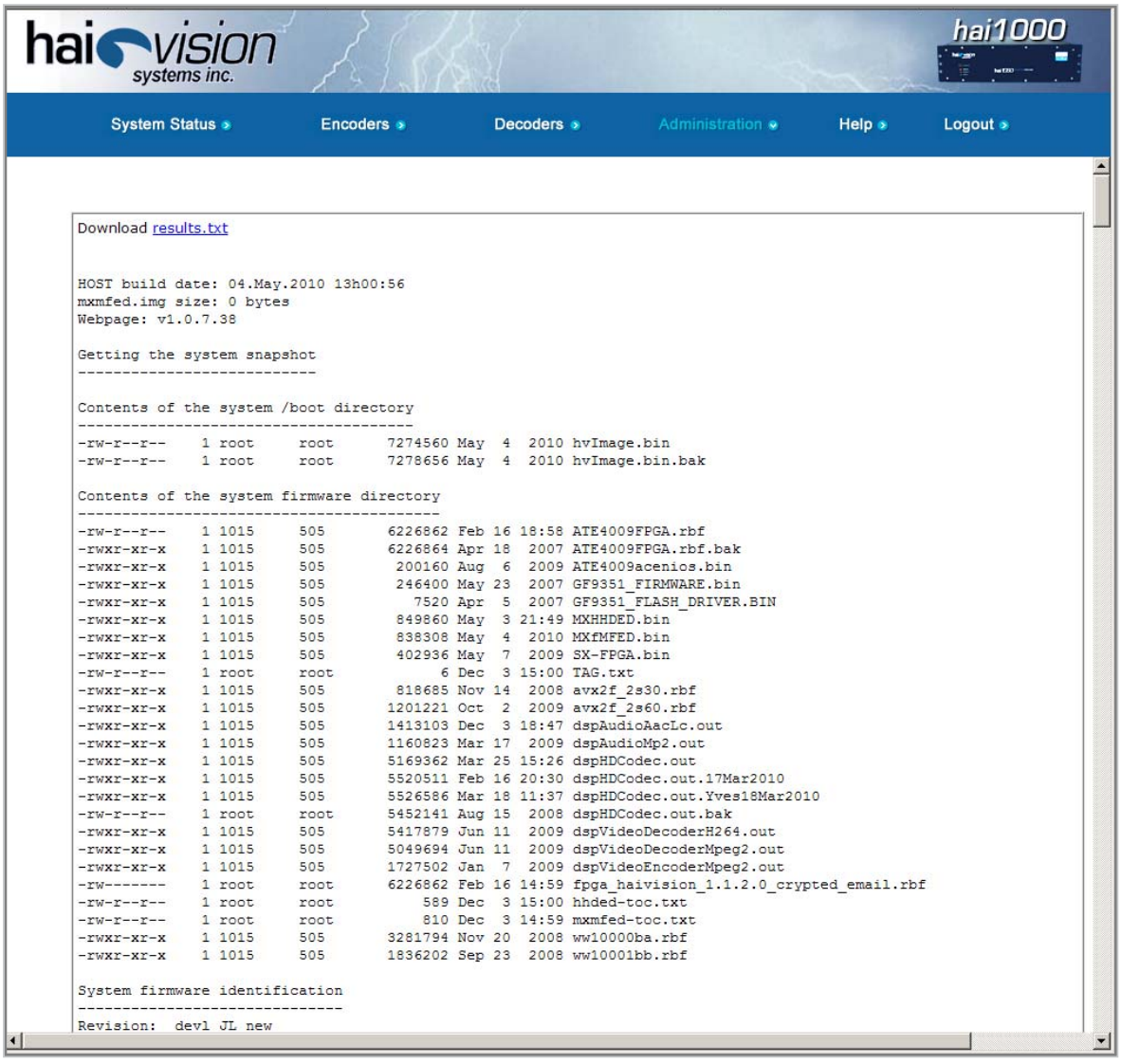
- For each A/V service card, the Administration > Inventory page lists the Card Type, Hardware Revision, Boot Revision, and Application Revision.
- For the system (HOST) module, the Administration > Inventory page lists the Application Revision and build date.

Generating a Configuration Snapshot

To generate a configuration snapshot:

1. Click Inventory to open the Administration > Inventory page.
2. On the Host slot, click Config Snapshot to generate a file containing the current system configuration, which you can download to your computer.

   The System Snapshot page opens, as shown in the following example.

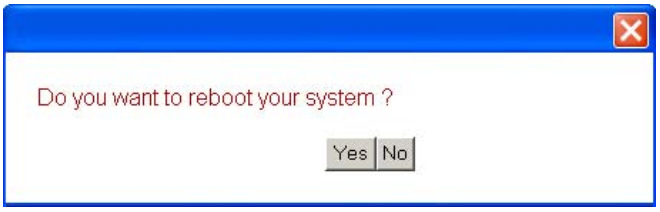


3. To download the file to your computer, click results.txt and save the file on your computer.

Rebooting the System

To reboot the hai1000 series:

1. Click Inventory to open the Administration > Inventory page.
2. On the Host slot, click Reboot.
3. When prompted, click Yes.



The hai1000 series will be rebooted.

While the unit is rebooting, you will lose your connection to the Web Interface. This will take approximately one minute. Once the unit has rebooted, the browser will display the Login page for the Web Interface.

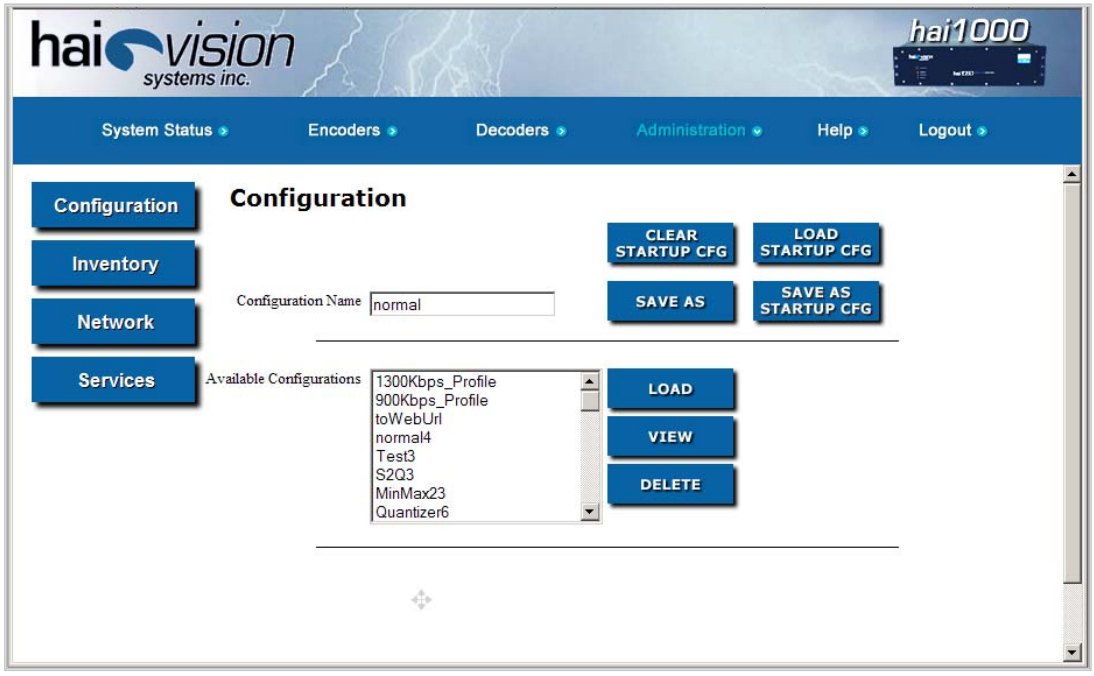
Saving and Loading Configurations

The Administration > Configuration page displays the currently loaded configuration along with previously saved configuration files that are available to load into the system. From here you can save, load, and delete configurations, and view the contents of a configuration file. You can also specify the configuration file that the system will load at startup.

TIP Configuration files contain the values of applicable system settings, including Encoder/Decoder settings and the stream destination. For more information, see "Configuration Management" on page 36.

To manage the current configuration for the unit:

1. Select Administration from the menu bar and click Configuration to open the Administration > Configuration page.



2. To save the current settings as a configuration file, type the filename in the Current Configuration text box and click SAVE AS.
3. To load a different configuration into the current session, select the filename from the list of Available Configurations and click LOAD.

   To remove the currently loaded configuration, select "Empty Configuration" and click LOAD.
4. To view the contents of a configuration file, select the filename from the list of Available Configurations and click VIEW.

5. To delete a configuration file, select the filename from the list of Available Configurations and click DELETE.

To manage startup configurations for the unit:

1. To save the current settings as the startup configuration, type a filename in the Current Configuration text box and click SAVE AS STARTUP CFG.

   Settings saved as the startup configuration will continue to be used after a reboot, or when the unit is turned off and on.

   This option does *not* affect the current session.

2. To load the selected startup configuration file into the current session, click LOAD STARTUP CFG.

   You must have already selected the startup configuration file. This option then applies the settings in the selected configuration file in the current session.

3. To remove a startup configuration file, select the filename and click CLEAR STARTUP CFG.

   This option removes a previously selected startup configuration file. It also removes any RTP sessions specified in the file. On the next reboot, the system will revert to the default startup configuration.

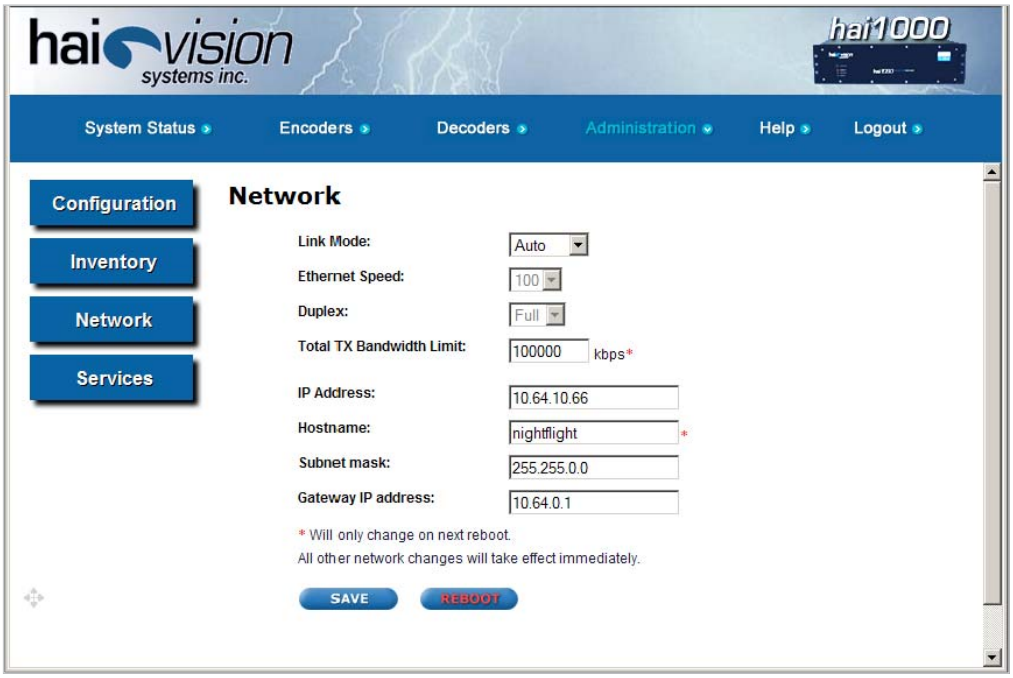
Configuring Network Settings

From the Administration > Network page, you can view and modify the network settings for the hai1000 series unit.

IMPORTANT You must save your changes to the network settings and reboot the unit in order for your changes to take effect.

To view and modify the network settings:

1. Select Administration from the menu bar and click Network to open the Administration > Network page.



2. Enter the new value(s) in the appropriate field(s). You may specify the following Network settings:

Network Setting	Description
Link Mode	Determines whether the Ethernet parameters are set automatically or manually: • Auto - The system will match the Ethernet Speed and Duplex Mode to the Ethernet hub to which it is connecting: • Manual - These values must be set manually.
Ethernet Speed	(read-only) The actual value for the Ethernet Speed. -or- If Link Mode is set to Manual, select the Ethernet Speed: • 10 • 100
Duplex	(read-only) The actual value for the Duplex Mode. -or- If Link Mode is set to Manual, select the Duplex Mode: • Full • Half
Total TX Bandwidth Limit	The maximum transmit bandwidth for the unit in kbps. Specifies the bandwidth “ceiling” for the Ethernet port.
IP Address	An IP Address in dotted-decimal format that identifies the unit in the TCP/IP network.
Hostname	A unique name for the hai1000 series unit.
Subnet Mask	A 32-bitmask used to divide an IP address into subnets and specify the network’s available hosts.
Gateway IP Address	The gateway address of the network (typically the address of the network router).

3. Click SAVE to save your changes to the unit’s flash memory.

4. Click REBOOT.

While the unit is rebooting, you will lose your connection to the Web Interface. This will take approximately one minute. Once the unit has rebooted, the browser will display the Login page for the Web Interface.

Note that if you changed the IP address for the unit, you will need to enter the new IP address to access the unit.

Enabling and Disabling Network Services

For security purposes, you may need to stop one or more network services from accessing the hai1000 series unit. From the Services page, you can enable and disable the following network services: FTP, HTTP, SIP, SNMP, SSH, and Telnet.

To enable or disable network services:

1. Select Administration from the menu bar and click Services to open the Administration > Services page.

   The Services page displays the current status of network services, as shown in the following example.

2. To enable or disable a service, check or uncheck the associated checkbox.

   The Services are as follows:

Service	Description
FTP	File Transfer Protocol, a standard network protocol used to copy files over a TCP/IP-based network, such as the Internet.
HTTP	Hypertext Transfer Protocol, used for Web browsers acting as a client.

Service (Cont.)	Description (Cont.)
SIP	Session Initiation Protocol, a protocol for creating, modifying, and terminating voice- or video-call sessions with one or multiple participants. NOTE: SIP is only modifiable if the optional SIP package has been installed. See "Using Invitation for SIP Interoperability" on page 221.
SNMP	Simple Network Management Protocol, a UDP-based network protocol used mostly in network management systems to monitor network-attached devices.
SSH	Secure Shell, a network protocol that allows data to be exchanged using a secure channel between two networked devices.
Telnet	Telnet, a network protocol used on the internet or local area networks to provide a bidirectional communications via a virtual terminal connection.

3. Click SAVE.

The service(s) will be stopped or started immediately.

Logging Out from the Web Interface

After you finish using the hai1000 series Web Interface, be sure to log out. To do so, click Logout from the menu bar.

NOTE Logging out prevents misuse and unauthorized access to the system.

CHAPTER 7: Configuring A/V Services From the CLI

This chapter presents the information you need to use the Command Line Interface (CLI) to configure and monitor audio/video services on the hai1000 series. This includes configuring Audio/Video parameters and setting up video conferencing sessions. You can also use the CLI to configure system settings and manage configurations.

NOTE This chapter assumes that the hai1000 series hardware has been installed and the system properly set up in a network environment as explained in Chapter 3: "Hardware Installation and Setup".

For a list and description of the CLI commands, refer to Appendix A: "CLI Command Reference".

Topics In This Chapter

Audience

This chapter is intended for users who are familiar with the Linux operating system and environment. Furthermore, the instructions provided in this chapter assume that the system has the following two types of (Linux) users:

Username	Provides these privileges...
admin	Read/write access to basic user commands and parameters required to configure and operate the hai1000 series. This includes configuring A/V and stream parameters, controlling streaming sessions, rebooting the unit, and changing the password. NOTE: CLI users will typically have admin accounts.
root	Read/write access to all commands and parameters to set up as well as configure and operate the hai1000 series. This includes retrieving firmware packages and loading firmware from the CLI, and other system administration tasks.

NOTE Do not change the hai1000 series unit's IP address from the CLI. Instead, use the haicfg command by interrupting the system bootup. For more information, see "Setting the Network Parameters" on page 88.

Or you can change the unit's IP address from the Web Interface (Network page). For more information, see "Configuring Network Settings" on page 165.

Command Summary and Usage Information

The hai1000 series CLI commands fall into two groups:

- A/V and Stream Commands: These commands are used to configure and monitor audio/video services. This group includes commands to configure A/V and Stream parameters, as well as set up Streaming video sessions.
- System Management Commands: This group includes commands to manage the system and configuration for the hai1000 series unit.

A/V and Stream Commands

Table 7-1 A/V and Stream Commands

Command	Description
card	The card command is used to get status information about the Encoder/Decoder card for troubleshooting and diagnostics. It is also used to reset the card, clear the card statistics, or disconnect any active sessions on the card. With multi-format codec cards, the card command is also used to switch the MPEG coding value.
enc	The enc (encoder) command is used to set audio/video parameters on the Encoder, as well as get the status of Encoder parameters. It is also used to create and delete Streaming sessions.
dec	The dec (decoder) command is used to set audio/video parameters on the Decoder, as well as get the status of Decoder parameters. It is also used to create and delete Streaming sessions.

For the A/V and Stream commands, the command syntax is as follows:

```
<command> <slot#.port#> <action> [<parameter> <value>]
```

where:

command specifies the command, for example, card, enc or dec.

slot#[.port#] identifies the slot in which the card is installed, and the port (optional), in the format Slot # (0..4, all) followed by "." followed by the Port # (0..1, all).

The port number is the logical ID of the Encoder or Decoder for the session. The port number is usually 0, except for the second Encoder or Decoder port (1) on a Dual-Encoder or Dual-Decoder. If omitted on the Mako Dual-Encoder / Dual-Decoder, the command applies to both ports.

action indicates the action to be performed, either:

- setting the parameter or stream (set)
- requesting status (get) of the parameter
- disconnecting (disc) a stream
- requesting statistics (stats) and status / counters
- requesting usage information (help) for the command

parameter	is the parameter to set, get, or delete. Parameters can be A/V settings such as VideoBitrate on the Encoder, or the Stream destination.
value	is the value of the parameter.

The following table shows examples of some basic A/V and Stream CLI commands:

Example	Command	Slot#. Port#	Action	Parameter(s)	Value	Comments
enc 0 set VideoBitrate 6000 Sets the Video Bitrate of the encoder in Slot #0 to 6 Mbps.	enc	0.0	set	Video Bitrate	6000	
dec 1.0 get AudioBitrate Displays the Audio Bitrate for the decoder in Slot #1.	dec	1.0	get	Audio Bitrate		Displays a value onscreen
dec 1.0 get VideoStd Displays the Video Standard of the decoder in Slot #1.	dec	1.0	get	VideoStd		Displays onscreen either NTSC or PAL
enc 1 set stream 239.5.2.1/5000//// Sets the Stream Destination of the encoder in Slot #1 to a multicast address.	enc	1.0	set	stream	239.5.2.1/5000////	Remote port=5000 Local port= same as remote
card disc Disconnects all streams on the card.	card		disc			

TIP The command name (i.e., card, enc, dec, reboot, or system) is lower case and case-sensitive. All other command elements are case-insensitive and may be abbreviated.

You can enter several parameters and values on a single line. For instance, to set the video bitrate, the resolution, the compression mode and the GOP size of an Encoder, you can enter a command such as the following:

enc 2 set videobitrate 6000 samplerate 48 compmode ip gopsize 30

System Management Commands

Table 7-2 System Management Commands

Command	Description
convert	The convert command is used to convert a .gif, .jpeg, .bmp or .png image file to Haivision's overlay image (.oly) format.
defcfg	The defcfg command is used to specify the configuration file to load at startup.
ethercfg	The ethercfg command is used to view, manually control, and save the Ethernet configuration parameters.
listcfg	The listcfg command displays a list of the currently available configuration files which are stored in the folder /usr/share/haivision/config.
nmcfg	The nmcfg (Network Management Configuration) command is used by system administrators or GUI/WCI applications in the configuration of SNMP for the hai1000. The nmcfg script reads and edits the standard SNMP configuration files, and then restarts the SNMP agent (snmpd) to apply the new settings. You must be logged in as root to enter nmcfg commands.
passwd	The passwd command is used to change a user password.
readcfg	The readcfg command is used to load a previously saved configuration identified by <filename>.
reboot	The reboot command is used to halt and restart the hai1000 series.
service	The service command is used to start, stop, restart, and get the status of FTP, HTTP, SIP, SNMP, SSH, or Telnet services for an existing hai1000 series unit. You must be logged in as root to enter service commands.
sipcmd	The sipcmd command is used to configure Invitation to manage SIP-based call sessions between the hai1000 series and traditional video-teleconferencing (VTC) endpoints.
system	The system command is used to view and manage firmware upgrade packages. It is also used to set and get the status of system parameters such as the date and time. You must be logged in as root to enter system commands.
writecfg	The writecfg command is used to save the current configuration.

Related Topics:

- For a reference to the CLI commands, see Appendix A: "CLI Command Reference".
- For a reference to the Encoder/Decoder parameters, see Appendix B:

"Encoder/Decoder Parameter Reference".

Logging In to the CLI

NOTE When a hai1000 series unit is powered on for the first time, its IP Address must be set to fit the network on which it will be installed. For information on setting the unit's IP Address and other networking parameters, see "Powering Up the Unit" on page 88.

After the boot process, you will be prompted to log in.

To log in to the hai1000 series from the CLI:

1. At the login prompt, type the Username and Password and press Enter.

   The hai1000 series provides the following default login CLI account:

   Username: admin

   Password: manager

The admin account gives you basic user privileges on the hai1000 series, which include configuring Audio/Video parameter settings and IP links, setting network parameters, and changing the password.

To perform system administration tasks, you must be logged in as root. The default password for the root account is hairoot. For more information, see "Configuring System Settings" on page 202.

Changing the CLI Password

After you log into the hai1000 series CLI for the first time, we recommend that you change the default password.

To change the CLI password:

1. Type the following command:

   passwd

2. When prompted, type the new password twice.

The change will take effect immediately.

TIP For more information on this command, type passwd -h.

Changing the Web Interface Password

You can change the password for the Web interface from the CLI.

To change the Web interface password:

1. From the CLI, type the following command:
   `setpw admin <password>`

The change will take effect immediately.

Exiting the CLI

When you have finished your work, be sure to exit the hai1000 series.

To exit from the hai1000 series:

1. From the command line, type `exit`.

NOTE Exiting properly prevents misuse and unauthorized access to the system.

Viewing and Controlling the Card

You may use CLI commands to view status information for the Encoder/Decoder card, reset the card, disconnect active sessions, clear the card statistics, or switch the MPEG coding value for multi-format codec cards.

The card command syntax is as follows:

card <slot#> <action> [<param> <value>]	
either	card <slot#> get
-or-	card <slot#> set <parameter> <value>
-or-	card <slot#> disc

Viewing the Card Status

To view the card status:

1. Enter the card ... get command, specifying the card slot, for example:

   card 0 get

   The system will display status information such as the card type, version number, and LED Off/On status for the card installed in Slot #0, as shown in the example below.

Figure 7-1 card … get command - sample output (HM4E2D2)

```
$ card 2 get

        CardSlot : 2
        CardType : HM4ED
        HwRev : 1
        BootRev : B-
        ApplRev : F8_2_0_14
        CardAction : None
        State : Working
        InfoClass : None
        ClassData : 09:09:06:06
        FaultLED : Off
        MajorLED : Off
        MinorLED : Off
        CtrlReg1 : 00:00:00:00
        CtrlReg2 : 00:00:00:00

$
```

Related Topics:

- For a reference to the `card ... get` command, see "card" on page 249 (Appendix A).
- For a reference to the Card status parameters, see "Card Group" on page 293 (Appendix B).

Resetting the Card

The `card ... set` command is used to reset an Encoder/Decoder card, in order to force re-initialization of the card, as when power is applied to it.

To reset the Card:

1. Enter the `card ... set` command, specifying the card slot, the `action` parameter, and the `reset` value, for example:

   ```
   card 2 set action reset
   ```

   This resets the card in Slot #2.

   The system will provide an error message if any part of the command is invalid.The system will confirm that the command has been successful.

Related Topics:

- For a reference to the `card ... set` command, see "card" on page 249 (Appendix A).
- For a reference to the MPEG Card parameters, see "action" on page 293 (Appendix B).

Clearing the Card Statistics

The `card ... set` command is also used to clear the statistics for an Encoder/Decoder card.

To clear the Card statistics:

1. Enter the `card ... set` command, specifying the card slot, the `action` parameter, and the `clearstats` value, for example:

   ```
   card 2 set action clearstats
   ```

   This clears the statistics for the card in Slot #2.

Related Topics:

- For a reference to the `card ... set` command, see "card" on page 249 (Appendix A).
- For a reference to the MPEG Card parameters, see "action" on page 293 (Appendix B).

Disconnecting Card Sessions

The card ... disc command is used to disconnect all sessions on the Encoder/Decoder card.

To disconnect all sessions on the Card:

1. Enter the card ... disc command, specifying the card to disconnect, for example:

   card 2 disc

   This disconnects all active sessions on the card in Slot #2.

   The system will provide an error message if any part of the command is invalid.The system will confirm that the command has been successful.

Related Topics:

- For a reference to the card ... disc command, see "card" on page 249 (Appendix A).

Switching the MPEG Coding Value for a Multi-Format Codec

The card ... set command is used to switch the MPEG coding value for multi-format codec cards. For example, the HMFED module can be switched from MPEG-2 to MPEG-4 AVC coding standard, and vice-versa.

The command syntax is as follows:

```
card <slot#> set ctrlreg1 00:00:00:0X action SetAlgorithm
```

where X determines the MPEG coding value for the card: either 2 to specify MPEG-2, or 4 to specify MPEG-4 AVC.

Note that you set the MPEG coding value on a card-by-card basis for a hai1000 series unit, so cards within the same chassis can be set to different coding standards.

To switch the MPEG coding value for a multi-format card:

1. Enter the card ... set command, specifying the card to switch, followed by the CtrlReg1 parameter and MPEG coding value, and the action parameter and the value SetAlgorithm, for example:

   card 2 set ctrlreg1 00:00:00:04 action setalgorithm

   This sets the card in Slot #2 to MPEG-4 AVC.

   -or-

   card 0 set ctrlreg1 00:00:00:02 action setalgorithm

   This sets the card in Slot #0 to MPEG-2.

   The system will provide an error message if any part of the command is invalid.The system will confirm that the command has been successful.

2. Repeat Step #1 as necessary to change all applicable cards in the chassis at once.
3. Reboot the system.

   Changes will only take effect at the next system reboot.

IMPORTANT This only applies to multi-format MPEG-2/MPEG-4 AVC cards.

Related Topics:

- For a reference to the `card ... set` command, see "card" on page 249 (Appendix A)
- For a reference to the MPEG Card parameters, see "action" on page 293 (Appendix B).

Viewing Parameter Settings

You may use CLI commands to view the current Audio/Video and streaming parameter settings for an Encoder or Decoder.

The command syntax for viewing Encoder or Decoder parameters is as follows:

```
enc <slot#.port#> get
-or-
enc <slot#.port#> get <parameter>
```

```
dec <slot#.port#> get
-or-
dec <slot#.port#> get <parameter>
```

where you can either display all the parameters or specify a particular parameter for the Encoder or Decoder.

TIP Stream parameters are only available for viewing when a stream is active.

Viewing Encoder Parameter Settings

To view the parameter settings for an Encoder:

1. Enter the `enc ... get` command, specifying the card slot, for example:

   ```
   enc 0 get
   ```

   The system will display the A/V parameters followed by streaming parameters for the Encoder installed in Slot #0, as shown in the following example.

Figure 7-2 enc … get command - sample output (HM4ED)

```
$ enc 2 get
        CardSlot : 2
        CardPort : 0
        EncoderAction : Connect
        IdleCells : Off
        VideoInput : Component
        VideoStd : Auto
        VideoMute : Off
        VideoPicSize : CCIR601
        VideoLoopback : Off
        VideoBitrate : 5000
        VideoPictureRate : 60
        CompMode : IP
        VideoGOPSize : 100
        VideoPTSOffset : 0
        VideoPID : 33
        AudioInput : Analog12
        AudioLevel : 6
        AudioMute : Off
        AudioLoopback : Off
        AudioBitrate : 256
        AudioAlgorithm : Mpeg2AacLcAdts
        AudioCRC : Off
        AudioMode : Stereo
        SampleRate : 48
        AudioPID : 36
        DataPID : 40
        PCRPID : 34
        PMTPID : 32
        OutputRateCtrl : CBR
        Quantizer : 26
        DeblockingFilter : On
        DeblockingStrength : 0
        TempDecimation : TD_1
        StillImgFileName : None

        Stream #1: TX; Payload AUDIO/AU
        Remote: 10.64.5.20/60002;  Local: 10.64.32.100/60002
        TTL: 16
        Announcements: Off
        Shaping: Off
        Average Bandwidth: 260 Kbps


        Stream #2: TX; Payload VIDEO/AU
        Remote: 10.64.5.20/60016;  Local: 10.64.32.100/60016
        TTL: 16
        Announcements: Off
        Shaping: Off
        Average Bandwidth: 5,186 Kbps
```

To view a specific parameter setting for an Encoder:

1. Enter the `enc ... get` command, specifying the card slot and the parameter, for example:

   ```
   enc 0 get gopsize
   ```

   The system will display the status of the `gopsize` parameter for the Encoder installed in Slot #0.

Related Topics:

- For examples of the `enc ... get` command, see "enc Examples" on page 266 (Appendix A).
- For a reference to the Encoder status parameters, see "Encoder Status Group" on page 311 (Appendix B).

Viewing Decoder Parameter Settings

To view the parameter settings for a Decoder:

1. Enter the `dec ... get` command, specifying the card slot, for example:

   ```
   dec 0 get
   ```

   The system will display the A/V parameters followed by streaming parameters for the Decoder installed in Slot #0, as shown in the following example:

Figure 7-3 dec … get command - sample output (HD4E2D2)

```
$ dec 0 get
        CardSlot : 0
        CardPort : 0
        VideoStd : Auto
        VideoOutput : All
        StillImageType : Blue
        UseSoftFilter : Off
        SoftFilterStrength : 1
        SyncMode : STC
        LowLatency : Off
        Buffering : Adaptive
        VideoMute : Off
        AudioLevel : 20
        AudioMute : Off
        AudioAlgorithm : Auto
        AudioSampleRate : Auto
        AudioVolume : 255
        AudioOutput : All
        DecoderAction : Connect
        PSITables : On
        VideoPID : 33
        AudioPID : 36
        DataPID : 40
        PCRPID : 34
        LogoDisplay : Off
        LogoFileName : "/usr/share/haivision/logos/hailogo_frame.oly"
        LogoPositioning : BottomRight
        LogoXCoordinate : 1526
        LogoYCoordinate : 952
        LogoTransparency : 0
        LogoScaling : 100

        Stream #3: RX; Payload MUXED/TS
        Remote: 10.6.220.12/2002;  Local: 10.6.220.13/2002


        CardSlot : 0
        CardPort : 1
        VideoStd : Auto
        VideoOutput : None
        StillImageType : Blue
        UseSoftFilter : Off
        SoftFilterStrength : 1
        SyncMode : Fixed
        LowLatency : Off
        Buffering : Adaptive
        VideoMute : Off
```

To view a specific parameter setting for a Decoder:

1. Enter the `dec ... get` command, specifying the card slot and the parameter, for example:

   ```
   dec 2 get videomute
   ```

   The system will display the `VideoMute` status for the Decoder installed in Slot #2.

Related Topics:

- For examples of the `dec ... get` command, see "dec Examples" on page 256 (Appendix A).
- For a reference to the Decoder status parameters, see "Decoder Status Group" on page 321 (Appendix B).

Configuring A/V Parameters

The Encoder/Decoder modules are pre-configured to provide Audio/Video services with a minimum of configuration steps. You may use the CLI commands to set Audio/Video parameters on the Encoder and Decoder.

The command syntax for configuring A/V parameters is as follows:

enc <slot#>[.<port#>] set <parameter> <value>
dec <slot#>[.<port#>] set <parameter> <value>

Configuring Encoder A/V Parameters

To set Encoder A/V parameters:

1. Enter the enc ... set command, specifying the card slot, the parameter(s) to modify and the corresponding value(s), for example:

   enc 0 set videoinput svideo

   This sets the Video Input Type to S-Video on the Encoder in Slot #0.

   -or-

   enc 1 set videoloopback local

   This sets the Encoder in Slot #1 to Local Loopback.

   The system will provide an error message if any part of the command is invalid.

Related Topics:

- For examples of the enc ... set command, see "enc Examples" on page 266 (Appendix A).
- For a reference to the configurable Encoder parameters, see "Encoder Control Group" on page 297 (Appendix B).
- For information on inserting an Encoder logo overlay, see "Configuring an Encoder or Decoder Logo Overlay" on page 203.

Configuring Decoder A/V Parameters

Most audio/video parameters are defined at the Encoder end, and the Decoders adjust to the parameters embedded in the received stream.

To set Decoder A/V parameters:

1. Enter the `dec ... set` command, specifying the card slot, the parameter(s) to modify and the corresponding value(s), for example:

   ```
   dec 2 set VideoStd NTSC
   ```

   This sets the Video Standard to NTSC on the Decoder in Slot #2.

   -or-

   ```
   dec 2 set audiomute on
   ```

   This mutes the audio on the Decoder in Slot #2.

NOTE The Port number is required in order to specify the second Decoder port (`#1`). If omitted on the HM4ED or HM2ED, the port number is #0. If omitted on the Mako Dual-Encoder / Dual-Decoder, the command applies to both ports.

The system will provide an error message if any part of the command is invalid.

Related Topics:

- For examples of the `dec ... set` command, see "dec Examples" on page 256 (Appendix A).
- For a reference to the configurable Decoder parameters, see "Decoder Control Group" on page 314 (Appendix B).
- For information on inserting a Decoder logo overlay, see "Configuring an Encoder or Decoder Logo Overlay" on page 203.

Configuring Video Streaming

You may use the CLI commands to create and delete streaming sessions between the local and remote hai1000 series units.

The command syntax for configuring streaming sessions is as follows:

enc <slot#.port#> set stream <RemoteIpAddr/UDP/StreamName /[LocalIpAddr]/UDP/StreamName>
dec <slot#.port#> set stream <RemoteIpAddr/UDP/StreamName /[LocalIpAddr]/UDP/StreamName>

where:

- the RemoteIpAddr and RemoteUDPport are mandatory.
- the remote and local names apply to RTCP sessions.
- the LocalIpAddr, if omitted, will be the IP address of the hai1000 series.
- the LocalUDPport, if omitted, will be the same as the RemoteUDPport.

TIP Square brackets in the command syntax indicate optional items or parameters.

Creating Encoder Streaming Sessions

To create a Streaming Session from the Encoder:

1. Enter the enc ... set ... stream command, specifying the remote and local hai1000 series units, for example:

   enc 0 set stream 239.5.0.0/5000/stream1/192.168.5.1/5010/stream2

   This creates a stream from the Encoder in Slot #0:

   - to the Decoder at (remote) IP Address: 239.5.0.0, remote UDP 5000, session name stream1
   - from local IP Address: 192.168.5.1, local UDP Port 5010, session name stream2

Abbreviated Syntax Examples

Or you can enter an abbreviated syntax, for example:

enc 0 set stream 239.5.0.0/5000///5010/

This abbreviated syntax creates a stream from the Encoder in Slot #0 using the default hai1000 series local address for the Local_IpAddr while specifying the local UDP Port.

-or-

```
enc 0 set stream 239.5.0.0/5000////
```

This minimal syntax creates a stream from the Encoder in Slot #0 using the default hai1000 series local address for the Local_IpAddr, and UDP Port 5000 for both the local and remote UDP ports.

DirectRTP (Elementary Stream) Examples

To transport Elementary Streams (i.e., audio and video in separate streams), use the AU (DirectRTP) Encapsulation Type:

1. Enter the enc ... set ... stream command, specifying the encap and payload parameters, for example:

```
enc 0 set stream 239.5.0.0/5000/stream1/192.168.5.1/5010/stream2
  encap au payload video
enc 0 set stream 239.5.0.0/4000/stream1/192.168.5.1/4010/stream2
  encap au payload audio
```

The first command creates a video stream from the Encoder in Slot #0:

- to the Decoder at (remote) IP Address: 239.5.0.0, remote UDP Video Port 5000, session name stream1
- from local IP Address: 192.168.5.1, local UDP Video Port 5010, session name stream2

The second command creates an audio stream from the Encoder in Slot #0:

- to the Decoder at (remote) IP Address: 239.5.0.0, remote UDP Audio Port 4000, session name stream1
- from local IP Address: 192.168.5.1, local UDP Audio Port 4010, session name stream2

Related Topics:

- For examples of the enc ... set ... stream command, see "enc Examples" on page 266 (Appendix A).

Creating Decoder Streaming Sessions

To create a Streaming Session on the Decoder:

1. Enter the dec ... set stream command, specifying the remote and local hai1000 series units, for example:

```
dec 2 set stream 192.168.5.1/5010/stream2/239.5.0.0/5000/stream1
```

This creates a stream from the Decoder in Slot #2:

- to the Encoder at (remote) IP Address: 192.168.5.1, remote UDP 5010, session name stream2
- from local IP Address: 239.5.0.0, local UDP Port 5000, session name stream1

Related Topics:

- For an example of the dec ... set stream command, see "dec Examples" on page 256 (Appendix A).

Creating Multicast Sessions

The hai1000 series supports both multi-streaming and network multicasting.

- Multi-streaming sends several distinct streams (copies) over the IP network, each to its own destination IP address.
- IP multicasting sends a single stream to a network multicast address (shared by both source and destination). The network then delivers the stream to all the devices that join this IP Multicast session.

You can combine multi-streaming and network multicasting sessions. Simply send one or more of the Multi-streaming copies to an IP Multicast address.

To Configure a Multi-streaming Session:

1. For each copy of the stream, create an RTP Sender session from the Encoder to a remote IP destination address (either unicast or multicast).

   Use the same local address (i.e., the Encoder's own IP Address) for all copies. However, each copy will have a unique local UDP port number.

   The following example, from local IP Address 10.6.220.80, creates three copies of a stream, each to a different destination:

   ```
   enc 0.0 set stream
     10.6.0.201/2008/stream2/10.6.220.80/2008/stream1
   enc 0.0 set stream
     172.6.0.60/2010/stream3/10.6.220.80/2010/stream1
   enc 0.0 set stream
     10.64.10.142/2012/stream4/10.6.220.80/2012/stream1
   . . .
   ```

   Using the CLI or SNMP, a stream may be multicast to up to ten or more destinations. The number of destinations depends on the video content, bitrate, and other A/V parameter settings.

To Configure an IP Multicast Session:

1. Create an RTP Sender session from the Encoder with an IP Multicast address for the remote IP destination address. The local address will be the Encoder's own system IP Address.

   The following example, from local IP Address 10.6.220.80, sends a single MPEG stream to multicast address 235.6.0.142:

   ```
   enc 0.0 set stream 235.6.0.142/2014/sys1/10.6.220.80/2014/stream1
   ```

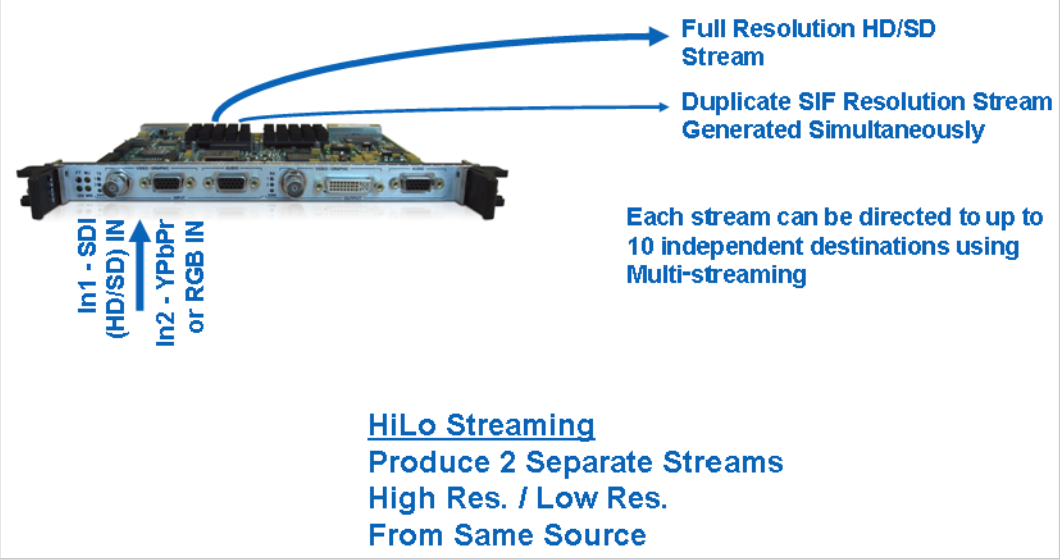
2. Be sure to specify the same IP Multicast address for the Decoder local address.

Related Topics:

- For a reference to the enc ... set ... stream command, see "enc Stream Parameters" on page 264 (Appendix A).
- For a reference to the dec ... set ... stream command, see "dec stream Parameters" on page 255 (Appendix A).
- For more information on multicasting, see Appendix F: "Unicast, Multicast and Multi-Streaming".

Setting Up HiLo Streaming

HiLo streaming refers to simultaneously sending a full quality SD/HD ("Hi") stream and a thumbnail ("Lo") sample of the same content from a single input (see diagram below). A Dual-Channel HD4E2D2 Mako Encoder is required for HiLo streaming.



The following requirements apply to HiLo streaming on the hai1000:

- All video formats [HD 720/1080 and SD 480/576] are supported.
- The first Encoder (Enc #0) is used for the "Hi" stream and second Encoder (Enc #1) is used for the "Lo" stream.

- The Lo resolution (CIF/SIF 320x240/288 thumbnail) can be decoded by Wowza and software decoders but not the hai1000 Mako or HMF2 Decoder.
- To configure HiLo streaming with 1080i30 and 1080p30 resolutions, you may need to reduce the streamed resolution and/or frame rate in order to free some encoding resources.

To set up HiLo Streaming from the CLI:

1. Set up both Encoders for the same video input (SDI or Component). For example, to set up HiLo Streaming on the Encoder in Slot #0, type:

   ```
   enc 0 set videoinput sdi
   ```

2. Set up the second Encoder for the CIF/SIF thumbnail (i.e., the “Lo” stream) on Slot #0, Port #1. For example, type:

   ```
   enc 0.1 set picsize SIF
   ```

3. Set up both Encoders to stream from sample IP Address 1.2.3.4 to 5.6.7.8. For example, type:

   ```
   enc 0.0 set stream 5.6.7.8/2000/"DecoderHi"/1.2.3.4/2000/"EncoderHi"
     actmode rtp encformat udp encap TS
   enc 0.1 set stream 5.6.7.8/6000/"DecoderLo"/1.2.3.4/6000/"EncoderLo"
     actmode rtp encformat udp encap TS
   ```

Pausing and Resuming Streaming Sessions

The command syntax for pausing and resuming Encoder streams is as follows:

enc <slot#.port#> pause [SID]
enc <slot#.port#> resume [SID]

where [SID] is the Stream ID. To determine the Stream ID, simply enter the command enc <slot#.port#> get.

To pause Streaming Sessions on the Encoder:

1. Enter the enc … pause [SID] command, for example:

   ```
   enc 0 pause 2
   ```

   This pauses Stream #2 from the Encoder in Slot #0.

To resume Streaming Sessions on the Encoder:

1. Enter the enc … resume [SID] command, for example:

   ```
   enc 0 resume 2
   ```

This resumes Stream #2 from the Encoder in Slot #0.

Disconnecting Streaming Sessions

The command syntax for disconnecting streams is as follows:

enc <slot#.port#> disc
dec <slot#.port#> disc

To disconnect all Streaming Sessions on the Encoder or Decoder:

1. Enter the enc ... disc or dec ... disc command, for example:

   enc 0 disc

   This disconnects all streaming sessions from the Encoder in Slot #0.

To disconnect a specific Streaming Session:

1. Enter the enc ... disc or dec ... disc command, specifying the ID of the stream to disconnect, for example:

   dec 2 disc 1

   This disconnects Stream ID 1 from the Decoder in Slot #2.

Related Topics:

- For a reference to the dec ... disc command, see “dec Examples” on page 256 (Appendix A).
- For a reference to the enc ... disc command, see “enc Examples” on page 266 (Appendix A).

Viewing and Resetting Statistics

You may use CLI commands to view statistics such as the Encoder/Decoder status, error count, frame count, and end-to-end delay or re-synch count for an Encoder or Decoder.

The command syntax for viewing or resetting statistics is as follows:

enc [<slot#.>] stats [reset]
dec <slot#.port#> stats [reset]

Viewing Encoder Statistics

To view statistics for an Encoder:

1. Enter the enc ... stats command, specifying the card slot, for example:

   enc 0 stats

   The system will display statistics for the Encoder installed in Slot #0, as shown in the following example.

Figure 7-4 enc … stats command - sample output (HD4E2D2)

```
$ enc 0 stats
        CardSlot : 0
        CardPort : 0
        EncoderStatus : Working
        FaultReason : 00:00:00:00
        TransmitLED : Green
        ErrorLED : Off
        InputPresent : Yes
        VideoStandard : 1280x720p60
        VideoPictureRate : 60
        VideoFrameCount : 608904
        VideoErrorCount : 0
        AudioFrameCount : 475750
        AudioErrorCount : 0
        Re-syncCount : 0

        CardSlot : 0
        CardPort : 1
        EncoderStatus : AwaitFraming
        FaultReason : 00:00:00:00
        TransmitLED : Yellow
        ErrorLED : Off
        InputPresent : No
        VideoStandard : Unknown
        VideoPictureRate : 0
        VideoFrameCount : 0
        VideoErrorCount : 0
        AudioFrameCount : 0
        AudioErrorCount : 0
        Re-syncCount : 0

$
```

Related Topics:

- For examples of the enc … stats command, see "enc Examples" on page 266 (Appendix A).

Resetting Encoder Statistics

To reset statistics for an Encoder:

1. Enter the enc … stats reset command, specifying the card slot, for example:

   enc 0 stats reset

   The system will reset the statistics for the Encoder installed in Slot #0.

Related Topics:

- For an example of the enc ... stats reset command, see "enc Examples" on page 266 (Appendix A).

Viewing Decoder Statistics

To view statistics for a Decoder:

1. Enter the enc ... stats command, specifying the card slot, for example:

   dec 0 stats

   The system will display statistics for the Decoder installed in Slot #0, as shown in the following example.

Figure 7-5 dec ... stats command - sample output (HD4E2D2)

```
$ dec 0 stats
        CardSlot : 0
        CardPort : 0
        DecoderStatus : Working
        FaultReason : 00:00:00:00
        ReceiveLED : Green
        ErrorLED : Off
        VideoStandard : 1920x1080i30
        VideoPictureSize : CCIR601
        VideoPictureRate : 30
        VideoFrameCount : 246018
        VideoErrorCount : 0
        AudioAlgorithm : Mpeg2AacLcAdts
        AudioSampleRate : 48khz
        AudioFrameCount : 768909
        AudioErrorCount : 0
        Re-syncCount : 4

        CardSlot : 0
        CardPort : 1
        DecoderStatus : AwaitFraming
        FaultReason : 00:00:00:00
        ReceiveLED : Off
        ErrorLED : Off
        VideoStandard : 1280x720p60
        VideoPictureSize : CCIR601
        VideoPictureRate : 0
        VideoFrameCount : 0
        VideoErrorCount : 0
        AudioAlgorithm : Mpeg2AacLcAdts
        AudioSampleRate : 48khz
        AudioFrameCount : 0
        AudioErrorCount : 0
        Re-syncCount : 0

$
```

Related Topics:

- For an example of the `dec ... stats` command, see "dec Examples" on page 256 (Appendix A).

Resetting Decoder Statistics

To reset statistics for a Decoder:

1. Enter the `dec ... stats reset` command, specifying the card slot, for example:

   ```
   dec 0 stats reset
   ```

   The system will reset the statistics for the Decoder installed in Slot #0.

Related Topics:

- For an example of the `dec ... stats reset` command, see "dec Examples" on page 256 (Appendix A).

Configuring System Settings

You may use CLI commands to set and get the status of hai1000 series system parameters such as the date, time, TFTP IP Address, and TFTP Filename. Also, you use system package commands to install firmware upgrades from the CLI.

The command syntax for system commands is as follows:

```
system <action> <parameter> <value>
```

NOTE You must be logged in as root to enter system commands.

Viewing System Settings

To view the system settings:

1. Enter the system get command, specifying the setting to view, for example:
   system get Date

   The system will display the status of the Date parameter.

Setting System Parameters

To set system parameters:

1. Enter the system set command, specifying the parameter to set, for example:
   system set Time 00:00:00

   The system will set the system Time to 00:00:00.

TIP For more information on using this command, type system.

Related Topics:

- For a reference to the system command, see "system" on page 288 (Appendix A).
- To use system package commands to install a firmware upgrade from the CLI, see "Installing a Firmware Upgrade from the CLI" on page 95.

Configuring an Encoder or Decoder Logo Overlay

With Mako Encoder/Decoder modules, you can use the CLI commands to insert a small graphic file such as your company logo, short message or warning to be displayed in overlay mode. In addition to selecting the graphic image, you can configure the position of the image and the level of transparency.

The image file must already be located on the hai1000 Host file system and be converted to .oly file format. For details, see "Preparing the Image File" below.

NOTE You can also configure a graphic overlay from the Web Interface and can upload files (directly) in either .gif, .jpeg, .bmp or .png format. For details, see "Configuring Logo Insertion" on page 124 and "Configuring Logo Display" on page 151.

Preparing the Image File

In order to display an image as an overlay logo, you need to copy a graphic file to the hai1000 Host and then convert the file to Haivision's overlay image format (.oly). The image file can be in either .gif, .jpeg, .bmp or .png format.

The hai1000 supports image files up to a maximum of 256 x 256 pixels.

- If you supply a larger image file, the hai1000 will scale it down, while keeping the aspect ratio.
- If you supply a smaller image file, it will be used as is.

The maximum file size for overlay (.oly) image files is 66,584 bytes.

The following section explains the conversion process.

Understanding the Conversion Process

The convert application performs two main processes to convert an image: downscaling and quantization.

Downscaling

Downscaling is applied if the input image is larger than the maximum size for the converted image. Images smaller than the limit are not scaled.

The application first determines the best canvas according to the original image aspect ratio. There are five possible canvases, each with a different aspect ratio. The total maximum of pixels is 2^16 = 65536

The possible canvases are (width*height): 64*1024, 128*512, 256*256, 512*128 or 1024*64. The most common image canvases used are 256*256 and 512*128.

When the best canvas is determined, the image is downscaled to fit in that canvas while keeping the original aspect ratio.

Quantization

Quantization is the process of reducing the number of colors in the image. An input image in 24-bit true color format may have more than 16 million colors; however, .oly images use an indexed colormap of 256 colors including 1 index used for transparency. Any image that does not use an indexed colormap or that has a colormap bigger than 256 colors will be quantized to fit in that limit.

Converting the File to .oly Format

To convert an image file to .oly format:

1. Identify the graphic file to convert. Select a still image file in either .gif, .jpeg, .bmp or .png format, with a maximum of 256 x 256 pixels.
2. Transfer the image file to the hai1000 series Host via ftp or tftp.
3. Enter the convert command, specifying the file to convert, for example:

   ```
   convert haivision_frame.png
   ```

   As shown below, the output of the command provides the following information about the converted image: the original image size and aspect ratio, the canvas size used to scale the image, the output image size and aspect ratio, the number of colors used in the quantized colormap, and the output filename.

   ```
   Image width=907 height=294
     Aspect ratio = 3.085034
     Image framed in width=512 height=128
     Image scaled to width=394 height=128
     Scaled image aspect ratio = 3.078125
     Image quantized with 256 color
     Image haivision_frame.oly written
   ```

   The file haivision_frame.oly can now be configured as a logo overlay. For details, see the following section "Configuring the Graphic Overlay from the CLI" on page 204.

Configuring the Graphic Overlay from the CLI

To configure a graphic file in overlay mode, the image file must already be located on the hai1000 Host file system and be in .oly file format. For details, see the previous section "Preparing the Image File" on page 203.

NOTE The steps are the same for configuring a Decoder or Encoder logo.

To configure the graphic overlay from the CLI:

1. Use the following command to specify the file name for the logo file (mylogo.oly) on the Decoder:

   ```
   dec X set logofilename mylogo.oly
   ```

   The CLI will attempt to locate the logo file in the current working directory (typically your home directory after a login) or the standard /usr/share/haivision/logos location.

   You can, optionally, specify the path if the file is in a different location, up to a maximum of 79 characters.

2. Next enable the display of the logo:

   ```
   dec X set logodisplay on
   ```

3. You have several choices to position the logo. For example, to position the logo on the bottom right of the display screen, type:

   ```
   dec X set logoposition bottomright
   ```

   Or if you wish to modify the position of the logo slightly (for example, if your display doesn't show *all* the resolution's pixels), you can tweak the position by setting the positioning mode to Absolute.

   ```
   dec X set logoposition absolute
   ```

   At this point, you can use the dec X get command to view the actual coordinates of the logo and then adjust them to your personal liking.

Adjusting the Logo Position to Accommodate Resolution Changes

Changes to the decoded or encoded resolution may have an impact on the logo position and display. Assume, for example, that you are receiving a 1080i stream and have configured and tweaked your logo to a position you feel is perfect.

At a later time, you receive a 720p stream on the same Decoder and suddenly your logo has either disappeared or is just positioned oddly and also looks a bit too big on the display.

This is where Relative positioning and Relative scaling can help you.

Relative Positioning

Relative positioning means that the logo position is determined using positional shortcuts relative to a 1920 by 1080 display. When the decoded output format changes, the logo position is adjusted proportionately to provide a similar appearance on the new display area.

Relative Scaling

Relative scaling deals with the second half of the resolution change issue. Even if the position of the logo (top left origin) is adjusted automatically, it is possible that since the output resolution is now lower, the logo will not look as well aligned as before due to its size having changed relative to the display.

If you set the logo scaling to Relative (0), the logo's dimensions will be adjusted to take the same amount of screen "real estate" as it did on a reference 1920 by 1080 display. Relative scaling will only downscale the logo, so there is no risk of quality degradation.

The following rules of thumb apply:

- If you plan to use the same resolution all the time, use positional shortcuts or Absolute positioning to set up the logo position.
- If you plan on decoding streams of different resolutions regularly, use Relative positioning and scaling.

Related Topics:

- For a reference to the Encoder graphic overlay parameters, see "Encoder Logo Overlay (Mako only)" on page 307 (Appendix B).
- For a reference to the Decoder graphic overlay parameters, see "Decoder Logo Overlay (Mako only)" on page 319 (Appendix B).

Saving and Loading Configurations

hai1000 series configuration files contain the values of applicable system parameters, including Encoder/Decoder settings and the stream destination. You may use CLI commands to save and load configurations, specify a configuration file to load at startup, and list the currently available configuration files.

The command syntax for configuration commands is as follows:

writecfg <filename>
readcfg <filename>
defcfg <filename>
listcfg

TIP You can view the contents of a configuration file using Linux commands such as more, cat and vi.

Related Topics:

- For more information, see "Configuration Management" on page 36.

Saving the Current Configuration

To save the current configuration:

1. Enter the writecfg command, specifying the filename, for example:

   writecfg myconfig

   This saves every parameter of every card in the system, including Encoder/Decoder settings and stream destination and status (excluding the system IP address), in a file named myconfig in the active directory.

Related Topics:

- For a reference to the writecfg command, see "writecfg" on page 290 (Appendix A).

Loading a Previously Saved Configuration

To load a previously saved configuration:

1. Enter the readcfg command, specifying the filename, for example:

   ```
   readcfg myconfig
   ```

   This loads the previously saved configuration identified by myconfig (located in the active directory), and in doing so, resets every parameter of every card in the system.

   If no filename is specified, the system looks for the default configuration (defaultcfg.sh) under /usr/share/haivision/config.

NOTE If readcfg is executed during active session(s), the sessions are stopped and new sessions are loaded and become active (if applicable).

Related Topics:

- For a reference to the readcfg command, see "readcfg" on page 279 (Appendix A).

Specifying a Configuration File to Load at Startup

To specify a configuration file to load at startup:

1. Enter the defcfg command, for example:

   ```
   defcfg set myconfig
   ```

   This command specifies that the configuration identified by myconfig be loaded at startup.

TIP You can also enter writecfg -d myconfig. This both writes the configuration to myconfig.cfg, and also saves it as the default configuration to be used at the next reboot.

To reset the configuration file to load at startup:

1. Enter the defcfg reset command:

   ```
   defcfg reset
   ```

   This removes the current startup configuration file.

Related Topics:

- For a reference to the defcfg command, see "defcfg" on page 258 (Appendix A).

CHAPTER 8: Configuring A/V Services Using SNMP

This chapter provides information required to manage the hai1000 series through the Simple Network Management Protocol (SNMP). SNMP-based management uses Network Management Stations (NMSs) to collect data or configure devices (SNMP agents) across a TCP/IP network.

Audience

This chapter is intended for users who are familiar with SNMP-based management and who will be developing applications such as provisioning services, or creating and modifying existing network management systems to manage the hai1000 series.

TIP To develop new SNMP applications, see the list of "Supported MIBs" on page 211.

Topics In This Chapter

Overview

To support management of hai1000 series by third party Network Management Stations (NMSs), the system includes an SNMP agent that may be used to configure and control the system's Audio/Video services and RTP sessions. This SNMP agent answers requests and issues traps (event notifications) to NMSs that are allowed to access the system.

NOTE The hai1000 series uses Net-SNMP Version 5.5 and supports SNMP v1, v2c, and v3.

The hai1000 series supports a number of SNMP commands used to set or get Management Information Base (MIB) objects on the local host or on other SNMP agents reachable over the IP networks. For details, see "SNMP Utilities" on page 217.

Supported MIBs

The hai1000 series SNMP agent supports the MIB-II (RFC 1213) standard and its updates, SNMPv3 MIBs, as well as the Haivision Network Video proprietary Enterprise MIB. The following table lists the supported MIBs:

Supported MIBs	Standard	Description
• RFC1213-MIB.txt • SNMPv2-MIB.txt • IP-MIB.txt • IF-MIB.txt • TCP-MIB.txt • UDP-MIB.txt	MIB-II (RFC 1213)	Defines the general objects for use with a network management protocol in TCP/IP internets and provides general information about the unit.
• SNMP-USER-BASED-SM-MIB.txt • SNMP-USM-AES-MIB.txt • SNMP-VIEW-BASED-ACM-MIB.txt	SNMPv3	Supports SNMPv3 User-based Security Model (USM) and View-based Access Control (VACM).
• MAC500-MIB.txt • MXVERSION-MIB.txt • MXRTP-MIB.txt • MXM2ED-MIB.tx	MAC-500 Enterprise	Supports configuration, status, statistics and tests.

SNMP Agent Components

This section provides key information for system administrators responsible for setting up SNMP-management on the hai1000 series.

snmpd

snmpd is an SNMP agent that binds to a port and listens for requests from SNMP management software. Upon receiving a request, it performs the requested operation, either retrieving information or configuring the system. When finished processing the request, the agent sends a response to the sender with the requested information or the status of the configuration operation.

snmpd is located in the directory /usr/sbin.

When you start an SNMP agent on a hai1000 series unit using the snmpd command, it loads the management database with the MIB files in the directory /usr/share/snmp/mibs and configures the agent with the file /usr/share/snmp/snmpd.conf.

For more information, enter the snmpd command with the -h (or --help) argument.

snmpd.conf

snmpd.conf is the configuration file that defines how the SNMP agent works. You may need to edit this file to specify the location of the Network Management System (NMS) and to set up the SNMP access permissions for the unit. On the hai1000 series, the snmpd.conf file includes:

- access control setup (i.e., community and user privileges),
- system information setup (e.g., system location, services and contact),
- trap destinations (i.e., the trap sink community to use).

snmpd.conf is located in the directory /usr/share/snmp.

For a detailed description, see the snmpd.conf file.

SNMP Community Names

Following are the default SNMP community names and their privileges for accessing the hai1000 series MIBs.

SNMP Community Name	Access Rights
admin	Read and write permission
operator	Read-only permission
public	Read-only permission
tech	Read and write permission

SNMP Traps

Traps are SNMP messages that the SNMP agent sends to management stations when events, alarms or faults occur in the system or on the network. The hai1000 series generates trap messages and sends them to active management stations that are identified as the trapcommunity in the Trap Destinations section in the snmpd.conf file.

The following traps are generated by the hai1000 series:

SNMP Trap	Description
coldStart	A coldStart trap indicates that the sending protocol entity (i.e., the hai1000 series) has re-initialized itself and is ready to operate. The coldStart trap is generated when the hai1000 series is powered on. It is developed in accordance with RFC 1215 - MIB.
linkDown or linkUp	A linkDown trap signifies that the sending protocol entity (i.e., the hai1000 series) recognizes a failure in one of the communication links represented in the SNMP agent's configuration. A linkUp trap signifies that the sending protocol entity recognizes that one of the communication links represented in the SNMP agent's configuration has come up. These traps are generated when the Ethernet interface goes down or up. These traps are developed in accordance with RFC 1215 - MIB.

nmcfg

nmcfg is the configuration script that helps the configuration of the SNMP agent. It is particularly useful for the creation and management of SNMPv3 users of the User-based Security Model (USM). The script interacts with the /var/net-snmp/snmpd.conf persistent data file, which maintains the USM user database and other SNMP agent persistent information. The script also performs snmpget commands to display the list of USM users, which is not available in a human readable form in any configuration file.

The script also reads and modifies the snmpd.conf configuration file to manage system parameters (contact, location), community-based (v1/v2c) security, and user access control. Used without parameters, it displays a summary of the SNMP agent configuration: system parameters, access control, and SNMPv3 USM users.

Following is an example of the nmcfg configuration script output:

```
# nmcfg
parameter     value
-------------------------------
engineid      0x80001f88804b7440d84b7c15a8
contact       "john doe <jdoe@example.net>"
location      "QA lab"

model perm   level          user/community      source
-----------------------------------------------------------------
usm   rw     priv           ohndoe              -
usm   rw     auth           nmcfg               -
v2c   rw     noauth         admin               any
v2c   ro     noauth         public              any

auth   privacy        user
--------------------------------
MD5    nopriv         haitrap
SHA    AES            johndoe
MD5    nopriv         nmcfg
MD5    nopriv         trap
#
# nmcfg help
usage: nmcfg
        nmcfg help
        nmcfg access help
        nmcfg access usm permit <uname> {ro|rw} [{noauth|auth|priv}]
        nmcfg access usm delete <uname> [{ro|rw}]
        nmcfg community help
        nmcfg community permit <community> {ro|rw} [<host>]
        nmcfg community delete <community>
        nmcfg system help
        nmcfg system define <param> "<value>"
        nmcfg system delete <param>
        nmcfg user help
        nmcfg user define <uname> [{MD5|SHA} "<pwd>" [{DES|AES}
                ["<pwd>"]]]
        nmcfg user delete <uname>
```

Related Topics

- "nmcfg" on page 273

SNMPv3

For SNMPv3, the definition of a user and its access permission are separate steps, whereas for v1/v2c community-based security, a single configuration line (e.g., `rwcommunity admin`) defines both.

The following command creates the user "johndoe" and defines its authentication protocol and password, and its privacy (encryption) protocol and password. (Note that you can type `nmcfg user help` to view the supported protocols and pass phrase restrictions.)

```
# nmcfg user define johndoe SHA "password" AES "pass phrase"
```

The new user has no permissions until a `rouser` or `rwuser` line is added in the `snmpd.conf` configuration file. The command below shows that read and write permission is granted if the user issues authenticated requests. Note that encryption (privacy) implies authentication.

```
# nmcfg access usm permit johndoe rw auth
```

The following line is added by the above command in the `snmpd.conf` configuration file:

```
rwuser johndoe auth
```

Examples

The following examples show how the v3 parameters are used with the SNMP commands:

The following `get` command has the required security level (authentication) and succeeds.

```
# snmpget –v3 –u johndoe –a SHA –A "password" –l authNoPriv localhost
  sysName.0
SNMPv2-MIB::sysName.0 = STRING: razor
#
```

The following `get` command provides no security (no authentication, no privacy) and fails.

```
# snmpget -v3 -u johndoe -l noAuthNoPriv localhost sysName.0
Error in packet
Reason: authorizationError (access denied to that object)
#
```

The following `set` command provides the highest security level (authentication and privacy), even if access policy only required authentication, and succeeds.

```
# snmpset –v3 –u johndoe –a SHA –A "password" –x AES –X "pass phrase" –l
  authPriv localhost mxRtpCfgType.1.2.0.0 i 2
MXRTP-MIB::mxRtpCfgType.1.2.0.0 = INTEGER: receiver(2)
#
```

SNMP Utilities

The following table summarizes the SNMP commands which can be used to set values or request information from the MIB objects on the local host or on other SNMP agents reachable over the IP networks.

To do this…	Use this command…
To retrieve the value of an object from a network entity.	snmpget
To set information on a network entity.	snmpset
To retrieve management information from a network entity.	snmpstatus
To explore the structure of a MIB tree. NOTE: This command can translate between numerical and textual representation of object, and can display the tree hierarchy in textual form.	snmptranslate
To send an SNMP notification to a manager.	snmptrap
To retrieve the values of *all* objects under a particular location in the MIB object hierarchy tree. Use to obtain the values of all the objects under the system and interfaces nodes. NOTE: The retrieval of a complete subtree is referred to as "walking the MIB."	snmpwalk

The SNMP utilities are located in the directory /usr/bin.

For more information on an SNMP command, enter the command with the -h (or --help) argument.

SNMP Syntax for Setting Up Streams

This section provides an example of the SNMP syntax used to set up a stream on an encoder and a decoder. Note that the following applies to: hai1000 firmware 8.2 and greater.

SNMP Parameters

Parameter	Values
IPADDR	The IP address of the hai1000
SESSID	The ID of new session (1..20)
TYPE	The type of session (1=Encoder, 2=Decoder)
SLOT	The Encoder/Decoder slot to use
CHANNEL	The Encoder/Decoder Channel to use. By default, SDI is 0, and Component/DVI is 1.
REMADDR	Remote IP address of the stream
REMPORT	Remote UDP port of the stream
REMNAME	Remote name of the stream
LOCADDR	Local IP address of the stream
LOCPORT	Local UDP port of the stream
LOCNAME	Local name of the stream
i	Integer value
s	String value
-v2c	snmp version (2c)
-c	Community

To create a stream on the Encoder:

NOTE: The object identifiers (OIDs) must be set in the following order:

1. Set the Type (encoder or decoder):
   .1.3.6.1.4.1.498.13.2.7.1.1.9.SESSID.SLOT.CHANNEL.0 i TYPE
2. Set the Remote IP address:
   .1.3.6.1.4.1.498.13.2.7.1.1.10.SESSID.SLOT.CHANNEL.0 s REMADDR
3. Set the Remote UDP port:
   .1.3.6.1.4.1.498.13.2.7.1.1.11.SESSID.SLOT.CHANNEL.0 i REMPORT

4. Set the Remote name:

   .1.3.6.1.4.1.498.13.2.7.1.1.12.SESSID.SLOT.CHANNEL.0 s REMNAME

5. Set the Local IP address:

   .1.3.6.1.4.1.498.13.2.7.1.1.13.SESSID.SLOT.CHANNEL.0 s LOCADDR

6. Set the Local UDP port:

   .1.3.6.1.4.1.498.13.2.7.1.1.14.SESSID.SLOT.CHANNEL.0 i LOCPORT

7. Set the Local name:

   .1.3.6.1.4.1.498.13.2.7.1.1.15.SESSID.SLOT.CHANNEL.0 s LOCNAME

8. Set the Encoding Format (1: RTP):

   .1.3.6.1.4.1.498.13.2.7.1.1.16.SESSID.SLOT.CHANNEL.0 i 1

9. Activate the session:

   .1.3.6.1.4.1.498.13.2.7.1.1.5.SESSID.SLOT.CHANNEL.0 i 1

SNMP Example: Adding a Stream

Following is an example of how to add a stream to an encoder using the snmpset command.

NOTE: The SET command requires admin rights.

Where,
IPADDR = 192.0.2.42
SESSID = 0
TYPE = 1
SLOT = 0
CHANNEL = 0
REMADDR = 198.51.100.21
REMPORT = 3000
REMNAME = decoder
LOCADDR = 192.0.2.42
LOCPORT = 3000
LOCNAME = encoder

SNMP commands:

```
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.9.1.0.0.0 i 1
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.10.1.0.0.0 s
198.51.100.21
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.11.1.0.0.0 i
3000
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.12.1.0.0.0 s
decoder
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.13.1.0.0.0 s
192.0.2.42
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.14.1.0.0.0 i
3000
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.15.1.0.0.0 s
encoder
```

```
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.16.1.0.0.0 i 1
snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.5.1.0.0.0 i 1
```

To delete a stream on the Encoder [OIDs must be set in the following order]:

1. To deactivate the session:

   .1.3.6.1.4.1.498.13.2.7.1.1.5.SESSID.SLOT.CHANNEL.0 i 3

2. To disconnect the session:

   .1.3.6.1.4.1.498.13.2.7.1.1.5.SESSID.SLOT.CHANNEL.0 i 5

SNMP Example: Deleting a Stream

Following is an example of how to delete a stream from an encoder using the snmpset command:

NOTE: The SET command requires admin rights.

```
Where,
  IPADDR = 192.0.2.42
  SESSID = 1
  SLOT = 0
  CHANNEL = 0
SNMP commands:
  snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.5.1.0.0.0 i 3
  snmpset -v2c -c admin 192.0.2.42 .1.3.6.1.4.1.498.13.2.7.1.1.5.1.0.0.0 i 5
```

CHAPTER 9: Using Invitation for SIP Interoperability

This chapter presents the information you need to use Haivision's Invitation firmware module to configure the hai1000 series to interact with videoconferencing endpoints using Session Initiation Protocol (SIP).

IMPORTANT Invitation is an optional module and must be ordered separately.

Topics In This Chapter

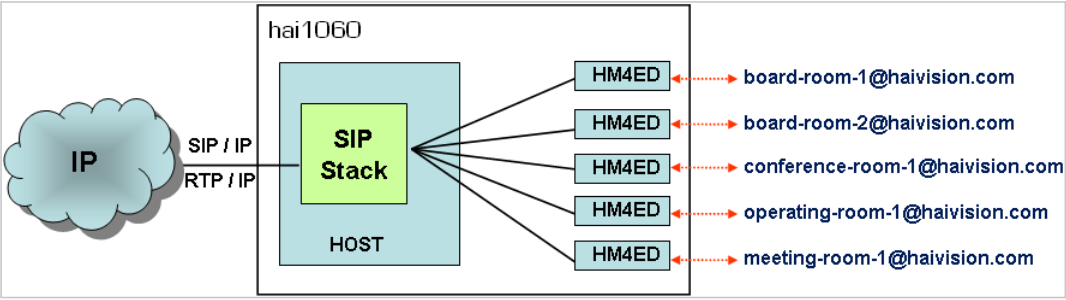
Introduction

Session Initiation Protocol (SIP) is a common protocol for creating, modifying, and terminating voice- or video-call sessions with one or multiple participants. SIP makes it possible for VTC systems from different manufacturers to talk to one another.

Haivision's Invitation™ firmware module provides SIP-based interoperability between the hai1000 series and traditional videoconferencing (VTC) endpoints, through TANDBERG Codian MCU 4500 Series multimedia conferencing bridges (Multipoint Control Units).

Features and Capabilities

Using Invitation, each hai1000 Encoder/Decoder blade can be treated as a separate conferencing device (as shown in the sample breakdown below). Each blade has its own SIP address (i.e., blade-based identification).



Calls can be initiated via the hai1000 interface, the MCU, or the videoconference endpoint. Invitation may be controlled from both the Web Interface and the CLI.

The Codian MCU trans-signals to H.323 as required, and performs necessary call format conversions. The Call is adjusted to maximum capability of either endpoint with regard to resolution and bitrate.

Possible configurations include hai1000 to hai1000 directly, as well as interoperability with other VTC endpoints through a Codian MCU 4500.

The following resolutions are supported:

- HD 1920x1080i/p (no interoperability with Codian in the current release)
  1280x720p
- SD 720x480/576
  352x480/576

Invitation provides the ability to answer calls automatically (auto-answer), as well as to place calls.

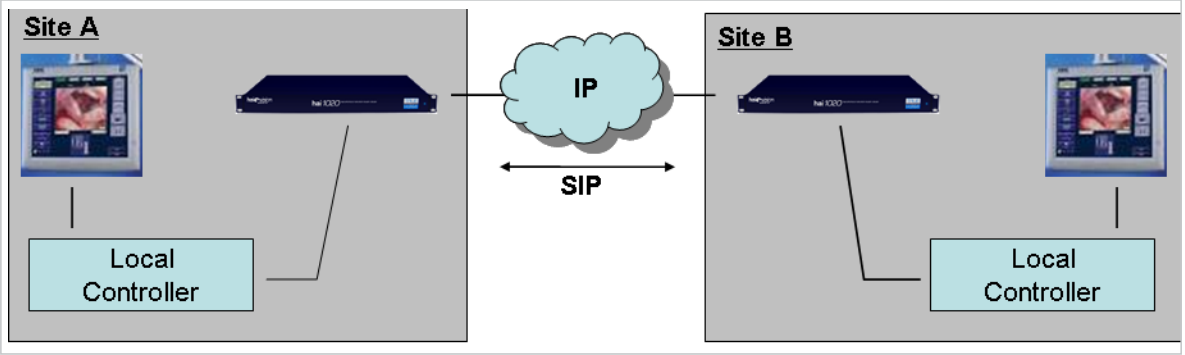
Additional Invitation features and capabilities include:

- SIP User Agent (Client places calls and Server answers calls)
- SIP registration support to an external SIP registrar
- Local address book on the hai1000 with up to 50 contacts
- SIP/SDP Support:
  - SIP RFC 3261 Compliant
  - SDP RFC 2327 Compliant

Call Setup Scenarios

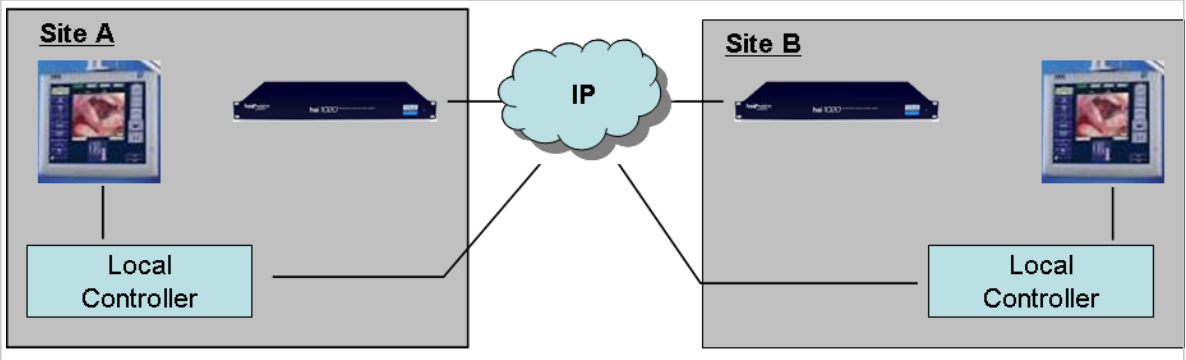
Following are typical call setup examples: SIP, Individual, and Codec Tunneling.

Scenario #1 - SIP



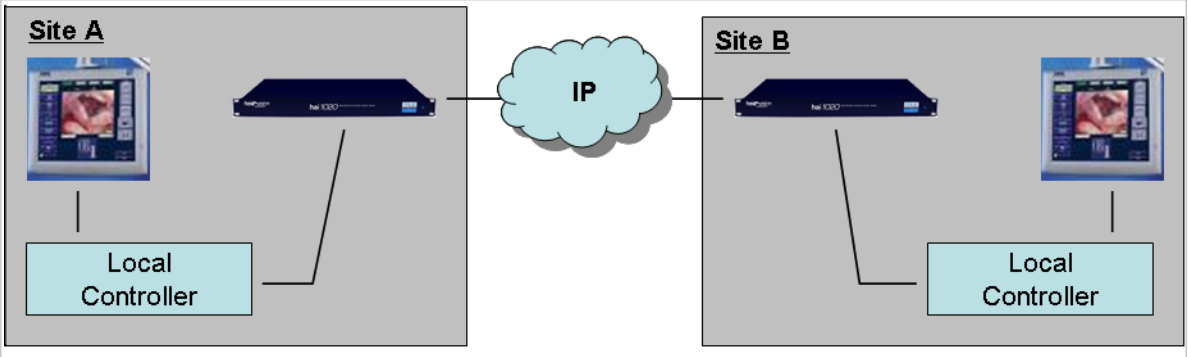
- Controllers can be connected to the codec through serial RS-232 (or Telnet).
- Either Controller (Call Initiator) first configures the local codec through serial RS-232 to call the remote codec using SIP.
- If configured accordingly, the remote codec will auto-answer the call from the local codec (handled by SIP).

Scenario #2 - Individual Setup



- Both Controllers must be on the same IP network as the codec.
- The configuration is done through Telnet.
- Either Controller (Call Initiator) first configures the local codec to stream/receive to/from the remote codec.
- Then that Controller configures the remote codec to stream/receive to/from the local codec.

Scenario #3 - SIP



- Controllers can be connected to the codec through serial RS-232 (or Telnet).
- Either Controller (Call Initiator) first configures the local codec through serial RS-232 to stream/receive to/from the remote codec.
- Then over the same serial RS-232 port, that Controller uses the local codec's built-in Telnet "Tunneling" feature to Telnet into the remote codec and configure it to stream/receive to/from the local codec.

NOTE Other possible scenarios include a Centralized server (or Controller) used to initiate all calls, or an MCU. If an MCU is used, the calls can be all initiated from the MCU and all the codecs can auto-answer (therefore, no codec management is required).

Working with Invitation

First, you configure the SIP Settings, Addresses, and Codec Profiles for your system. Next you set up the "call" between the hai1000 series codec and the endpoint.

Here are the basic steps required to configure Invitation and initiate a call via the Web Interface:

1. Assign a SIP name to each card in the hai1000. (See "Configuring Invitation": "Configuring SIP Addresses".)
2. Create your list of buddies. (See "Initiating Calls".)

   SIP-names use the format user-name@<IpAddr>.
3. Click the buddy name you wish to call.

   The check box is to select auto-answering.
4. Click CALL.

Logging In to Invitation

To log in to the Invitation Web page:

1. From your Web browser, type the hai1000 series unit's IP Address followed by /sip) into the address field and press Enter.

   http://<IP_ADDRESS>/sip

   If you are not yet logged in to the hai1000 series Web Interface, the browser will display the Login page for the SIP Web Interface.

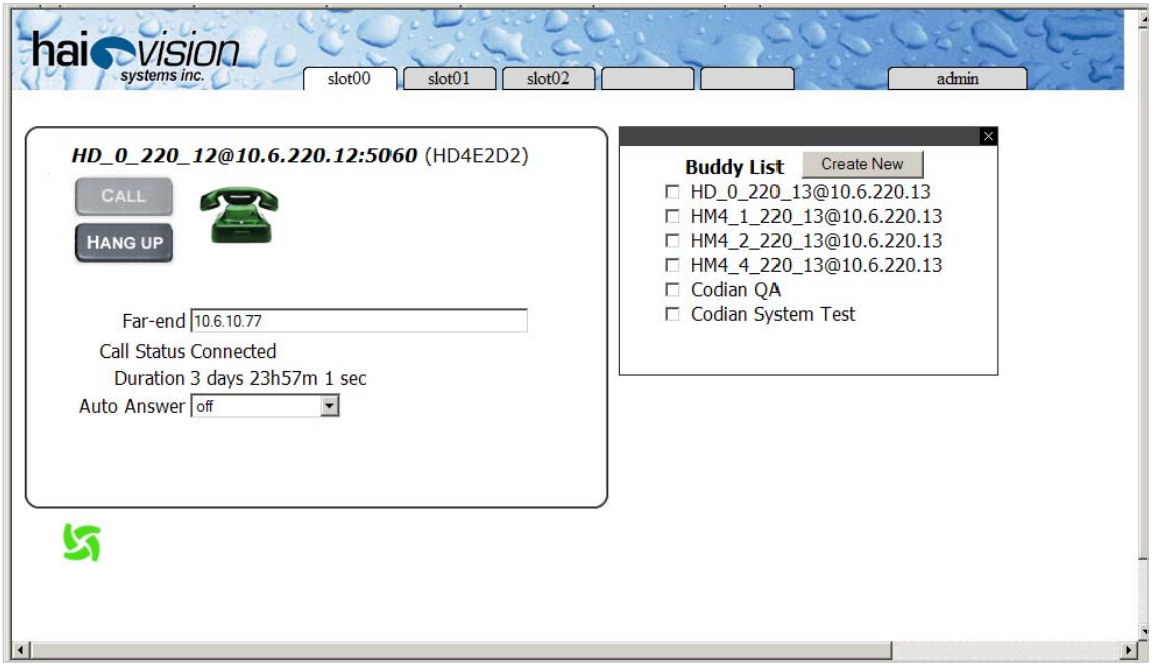
2. To log into the Invitation Web Interface, type the same Username and Password used for the hai1000 series Web Interface and click Login (or press Enter).

   The hai1000 series provides the following default username and password for the Web Interface:

   Username: admin

   Password: manager

NOTE If you are currently logged in to the hai1000 series Web Interface, you will go directly to the Call (Frontend) page for the first card (shown in the following example).



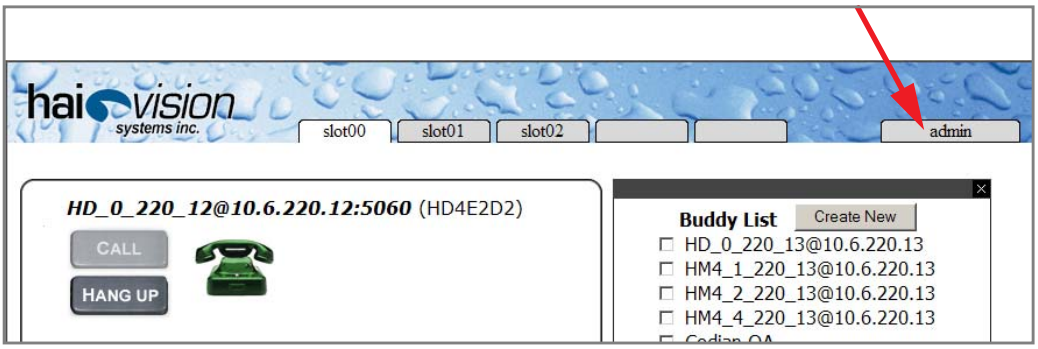
Configuring Invitation

First, you need to configure the SIP Settings, Addresses, and Codec Profiles for the unit.

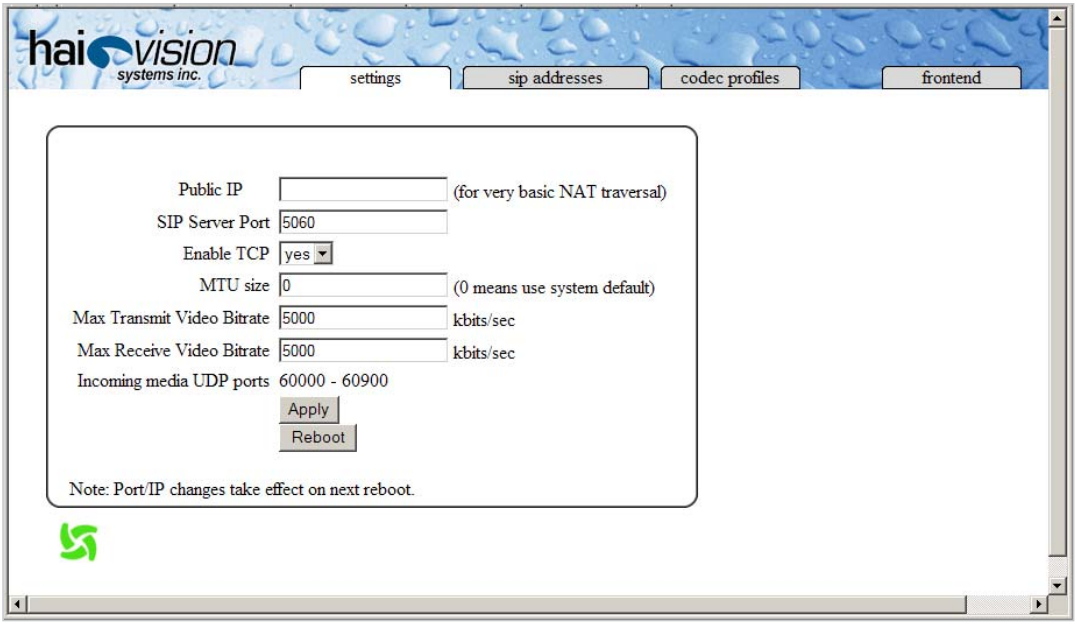
NOTE If you have already configured these settings, or you wish to use the defaults, you can skip the configuration steps and begin to set up calls (See To set up a “call”: on page 232).

To configure Invitation:

1. From the Call (Frontend) page, click the Admin tab to display the Configuration pages.



The (Configuration page) SIP Settings tabbed pane opens.



Configuring SIP Settings

1. To configure the SIP Settings, select or enter the new value(s) in the appropriate field(s). You may specify the following settings:

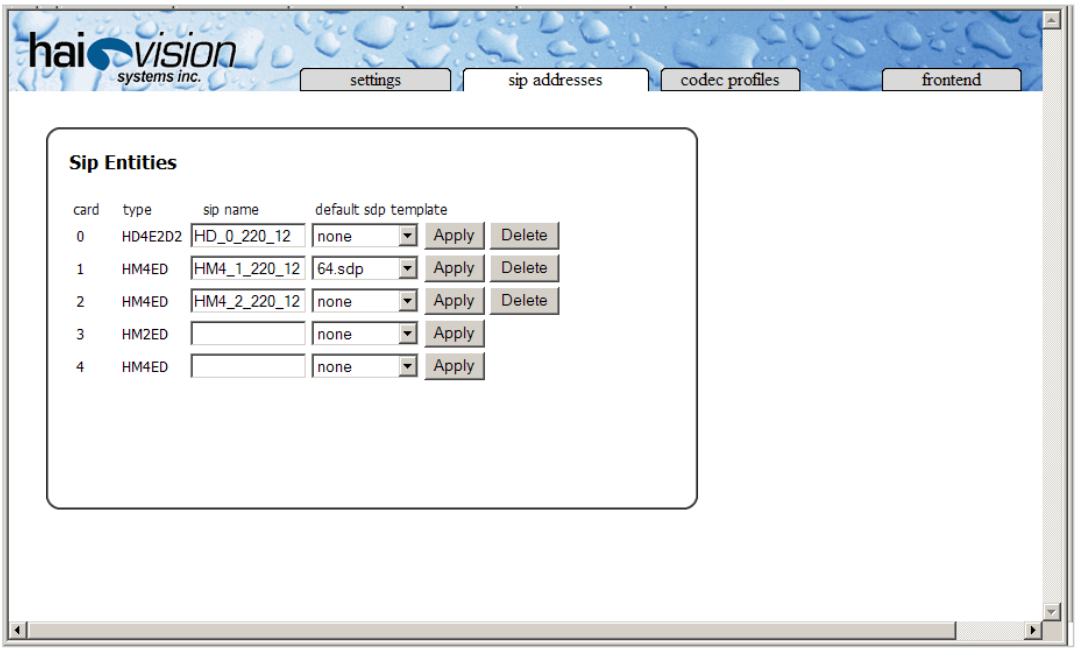
Setting	Default	Description
Public IP	n/a	The public IP address of the router (on the WAN side, if you are behind a router).
SIP Server Port	5060	The port# of the SIP server.
Enable TCP	yes	Select Yes or No to enable or disable TCP.
Max Transmit Video Bitrate	5000	The maximum bit rate (in bits per second) that the Encoder should send. This and the following are “policy” settings, i.e., maximum incoming and outgoing bitrates. The system will negotiate to that rate.
Max Receive Video Bitrate	5000	The maximum bit rate (in bits per second) that the Decoder should receive.
Incoming UDP Ports	n/a	The hai1000 series SIP user agent will request that media (audio/video) be sent on UDP ports in the range of 60000 to 60900.

2. Click Apply to apply your changes to the settings.
3. To reboot the hai1000 series unit, click Reboot and follow the prompts.

   While the unit is rebooting, you will lose your connection to the Web interface. This will take approximately one minute. Once the unit has rebooted, the browser will display the Login page for the Web Interface.

Configuring SIP Addresses

1. Click the SIP Addresses tab to open the Addresses tabbed pane.



   From here you can assign a SIP identity to each Encoder/Decoder card (blade) in the hai1000 series unit.

2. For each codec card in the unit, enter a unique name to identify the blade.
3. Select a default SDP (Session Description Protocol) from the list.

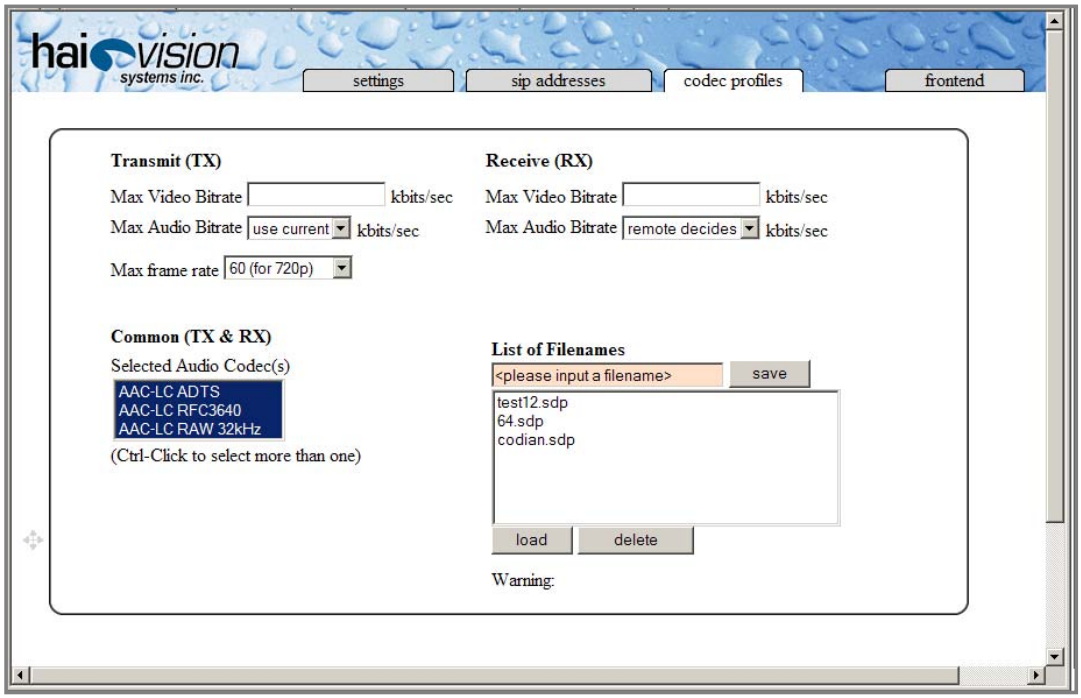
NOTE Whenever the SIP entity connects to another endpoint, it will follow the SDP template. Note that SDP assigned to buddies has more priority than the SDP template assigned to the SIP entity. In other words, it will first try to use the buddy SDP template, then the SIP entity template, or if none, it will use the system default values.

---

4. Click Apply.
5. Repeat for each codec card in the unit.

Configuring Codec Profiles

1. Click the Codec Profiles tab to open the Profiles tabbed pane.



From here you can configure profiles that specify the transmit, receive, and other settings for the hai1000 series unit.

2. You may specify the following settings for a profile:

Codec Profile Setting	Description
Transmit (TX)	
Max Video Bitrate	Enter the maximum Transmit video bitrate in kbits/sec.
Max Audio Bitrate	Select the maximum Transmit audio bitrate in kbits/sec.: 32..384 kbps or Use Current (for ADTS codecs only)
Max Frame Rate	Select the maximum frame rate: • 60 (720p only) • 29.97 (NTSC) • 14.985 (NTSC) • 25 (PAL) • 12.5 (PAL)
Common (TX & RX)	

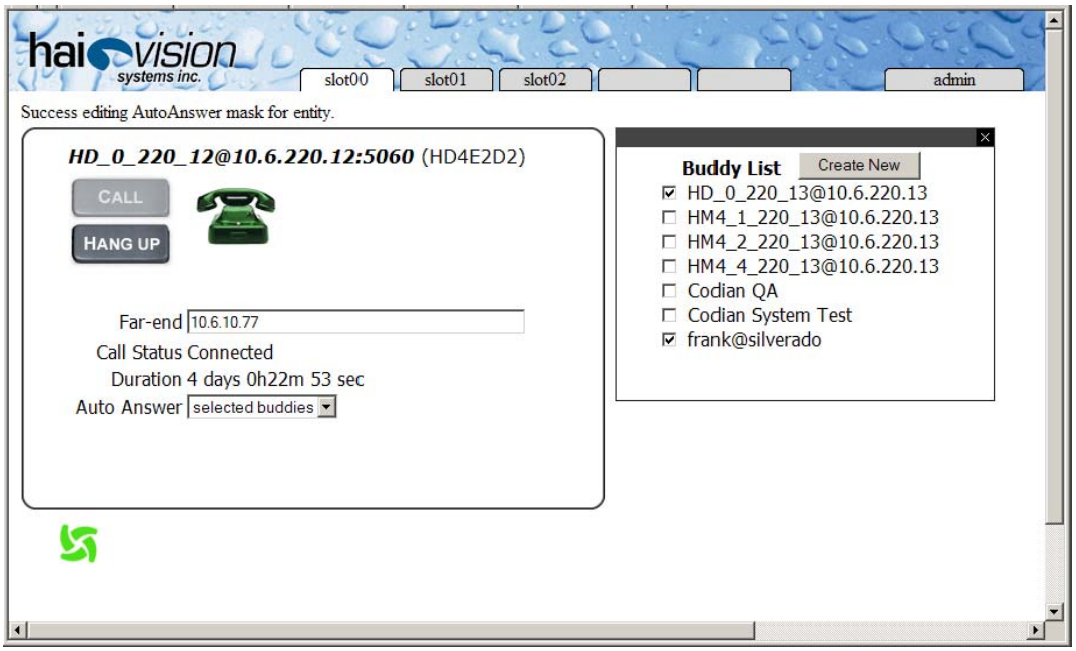
Codec Profile Setting	Description (Cont.)
Audio Codec	Select all audio codec specifications that apply to your system: • AAC-LC ADTS: Advanced Audio Coding - Lossy Compression - Audio Data Transport Stream • AAC-LC RFC3640: Advanced Audio Coding - Lossy Compression - RFC 3640 (RTP Payload Format for Transport of MPEG-4 Elementary Streams) • AAC-LC RAW 32kHz NOTE: It is a good idea to select all the audio codecs unless you know that a specific codec is not supported by a remote endpoint and is wrongfully negotiated.
Receive (RX)	
Max Video Bitrate	Enter the maximum Receive video bitrate in kbits/sec.
Max Audio Bitrate	Select the maximum Receive audio bitrate in kbits/sec.: 32..384 kbps or Remote Decides (for ADTS codecs only)
List of Filenames	Type in a new filename to save the current profile.
Save	Click to save the current profile. You must first type in the filename.
Load	Click to load the selected profile.
Delete	Click to delete the selected profile.

Initiating Calls

Once you have the SIP Settings, Addresses, and Codec Profiles for the unit, you can begin to initiate calls.

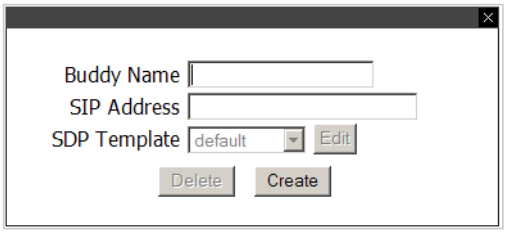
To set up a "call":

1. Click the Frontend tab to return to the Call page.



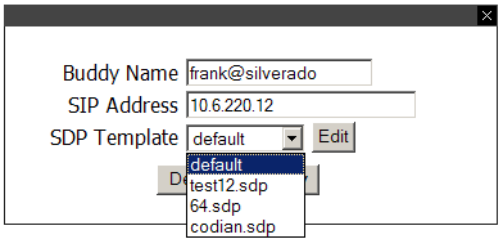
The Call page consists of a "Buddy" List of end points for the codec blade to call or receive calls from, and a call setup pane. From here, you can create or update your list and then initiate calls.

2. To add a new name to your Buddy List, click Create New.



3. Enter the name and the SIP address, and click Create.

4. Once you've created the new buddy, you can select an SDP (Session Description Protocol) Template.



5. You can also edit the SDP Template from here. Simply click Edit and the Edit SDP Template page will open for you to make your changes. (See "Configuring Codec Profiles" on page 230)

   Note that you will lose any changes if you did not save them before clicking Edit.

6. When you have completed your changes to this buddy, click Apply.

7. To select one or more buddies for Auto-Answer, check the checkbox next to their names in the Buddy List.

Managing Calls

1. To initiate a call, click a name on the Buddy List, or type the Far-end address in the address field.

2. For Auto Answer, select either Selected Buddies or Anyone.

   Note that the default is Off, but it's a good idea to change this.

3. Click Call.

   The call status and duration are displayed below the address field.

4. To end the call, click Hang Up.

CHAPTER 10: Troubleshooting

This chapter describes some of the problems you may encounter when using the hai1000 series and provides procedures to resolve them.

Topics In This Chapter

Connectivity Check

This section provides guidelines to follow to isolate connectivity problems on the hai1000 series unit.

Quick Network Check

1. Begin by checking the state of the IP stack. To do so, enter the route command from the CLI, as follows:

   ```
   # route -n
   ```

   The output should be similar to the following:

   ```
   Kernel IP routing table
     Destination Gateway         Genmask         Flags   Metric Ref    Use
     Iface
     10.64.0.0   *               255.255.0.0     U       0      0        0 eth0
     127.0.0.0   *               255.0.0.0       U       0      0        0 lo
     0.0.0.0     10.64.0.1       0.0.0.0         UG      0      0        0 eth0
     #
   ```

2. Check the output to make sure there *is* a default route (the one with 0.0.0.0 as the destination and UG as the flag) and that it matches what you initially configured.

   If not, then you will have to reconfigure your IP gateway parameters (Web Interface or haicfg at startup).

3. Try pinging the default gateway, for example:

   ```
   # ping 10.64.0.1
   ```

   The output should be similar to the following:

   ```
   PING 10.64.0.1 (10.64.0.1): 56 data bytes
     64 bytes from 10.64.0.1: icmp_seq=0 ttl=64 time=0.3 ms
     64 bytes from 10.64.0.1: icmp_seq=1 ttl=64 time=0.3 ms
   ```

   To stop the ping, type Ctrl-C.

4. If the problem seems to be a network issue, try pinging from one hai1000 series unit to the other, and vice-versa.

   This will determine whether each unit can “see” the other, and will answer the question whether or not both systems are accessible on the network.

   If ping fails, the next step is to start checking your LEDs and cables.

5. It’s also a good idea to double-check network settings such as the IP Address, Subnet Mask, and Gateway IP Address on both units.

TIP The Gateway IP Address *must* be set up, regardless of your configuration.

LED Check

1. Check the System LEDs on the relevant Encoder or Decoder.

LED Problem Indications	Problem
TX LED is off.	…no valid video input
RX LED is off.	…no decoder session has been set up
TX or RX LEDs are amber. Amber indicates that a session has been set up but is not yet receiving video.	…no valid video input
MAJ or MIN LED is amber.	…system fault

   For the System LED states, see "HOST4 Module LEDs" on page 40.

   At least one of the 10BaseT or 100BaseT Ethernet LEDs should be lit continuously, while the ACT led should blink from time to time. If these LEDs are not lighting up, check your cables (see "Cable Check" on page 237).

2. Check the Encoder/Decoder LEDs on the relevant module.

   For the Encoder/Decoder LED states, see "Encoder/Decoder LEDs" on page 56.

TIP You can check the actual LEDs on the installed module, or the LEDs displayed on the System Status page (on the Web Interface).

LED Fault Alarms on the HOST Module

When you boot the hai1000 series, all the LEDs on the HOST module light up and then turn off. Following are some of the fault alarms that you may observe.

- If the ON LED is blinking and the Min LED is solid, it indicates that the loading of the HOST firmware failed.
- If the FT LED is solid, try removing and re-inserting the card. If it is still on, this indicates that there is a hardware problem that needs to be examined by a field support technician.

For more information see "HOST4 Module LEDs" on page 40.

Cable Check

If there is no LED activity, check that all cables, including power, network and A/V sources/displays, are securely connected to the hai1000 series unit.

1. Work from the hai1000 series unit to the network connection at your wall jack.
2. Then work from your network connection through to your organization's switch.

For connection information, see Chapter 2: "Physical Description" on page 38.

TIP Make sure that the Ethernet cable is connected in the Ethernet port (i.e., *not* the MNGT port).

Configuration Check

1. From the CLI or the Web Interface, validate Encoder Video settings such as the Bitrate.
2. Reboot the hai1000 series unit either by powering the unit off and on, entering the `reboot` command from the CLI, or clicking Reboot from the Administration > Inventory page.
3. Then check to see if the problem still occurs.

If these steps do not resolve the issue, try troubleshooting the particular problem, for example, see "Video Check" on page 238.

Video Check

When your system has no video, follow these guidelines to determine the problem:

1. Check the Video Input Signal setting.
   - Is Composite (the default) selected when you're actually using S-Video, or SDI?
2. Check the Video Input Format setting.
   - PAL/NTSC Auto-detect will only detect the standard for the *selected* video input interface (i.e., Composite, S-Video, *or* SDI only).
   - Also, Auto-detect will only work if both the Encoder and Decoder are set to Auto. For example, if the Encoder is set to Auto-detect via the Web interface, but it isn't working, make sure the Decoder is also set to Auto-detect.
3. Check the input source. For example, is the camera on?
4. Check the display (output). For example, is the video display on?
5. Run the Loopback tests:

Web Interface: Encoder Settings page	CLI: enc set command	Description
Codec Loopback	EncAction: Local loopback	Encodes the video+audio output and then loops it back to the Local Decoder. You will see changes in the Encoder bitrate and other A/V settings.
Signal Loopback	VideoLoopback: Local	Basic analog loopback. Loops uncompressed video from source to display.

For details, see either "Configuring Encoder Loopbacks" on page 139 (Web Interface) or "Configuring Encoder A/V Parameters" on page 190 (CLI).

- If the problem disappears, it is likely to be a network issue. You will need to work with your system administrator to determine the cause. See "Quick Network Check" on page 235.
- If the problem remains, it is possibly a hardware issue. In this case, contact Haivision Technical Support. See "Service Support" on page 16.

How to Detect RGBHV Input/Output on the Mako

To be able to detect the signal on the RGBHV input, your computer's screen refresh rate must be set to 60 Hertz.

Also, you must set your computer's video output on one of the following supported resolutions for RGBHV Input/Output on the Mako:

WXGA	1280x768 @ 60Hz
XGA	1024x768 @ 60Hz
SVGA	800x600 @ 60Hz
VGA	640x480 @ 60Hz

For more information, see "Computer Graphics (VGA) Formats (Mako Input)" on page 329.

Note that the Mako may take up to 30 seconds to auto-detect the computer signal.

From the Web Interface, to see the detected video input, click refresh on the Encoder Settings page.

Network Video Troubleshooting Checklist

Problem	Possible Solutions
LEDs	
LEDs flashing red or amber	Possible hardware problem. 1. Turn system off 2. Reseat codec card (i.e., remove and re-insert) and reboot
LEDs flashing green	Upgrade not completed. Wait at least 10 minutes before proceeding
Decoder RX LED Off	No session setup. Web: Enc Settings>Start CLI: enc 0 set stream
Encoder TX LED Off	• No video input Web: Enc Settings>Stats CLI: enc 0 stats • Wrong video input selected Web: Enc Settings>Video Input CLI: enc 0 set videoinput
Video	
Video – pixilation	• Interface set to half duplex or 10Mbs Web: Admin>Network CLI: ethercfg • Video bitrate set too high for network Web: Enc Settings>Video Bitrate CLI: enc 0 get videobitrate • Verify the following: • Video loopback (see Videoloopback (signal)) Web: Enc Settings>Enc Action>Signal Loopback CLI: enc 0 set videoloopback local • Does a software decoder show the same? • Does other equipment show the same?
Video – no color	• Verify video standard (PAL / NTSC) Web: Enc Settings>Video Standard CLI: enc 0 get videostd
Video – black output at display	• Verify that display has power • Verify that video input is correctly set • Verify cable between the decoder and the display • Unplug and replug cable at the decoder to ensure that you have selected the correct plasma input

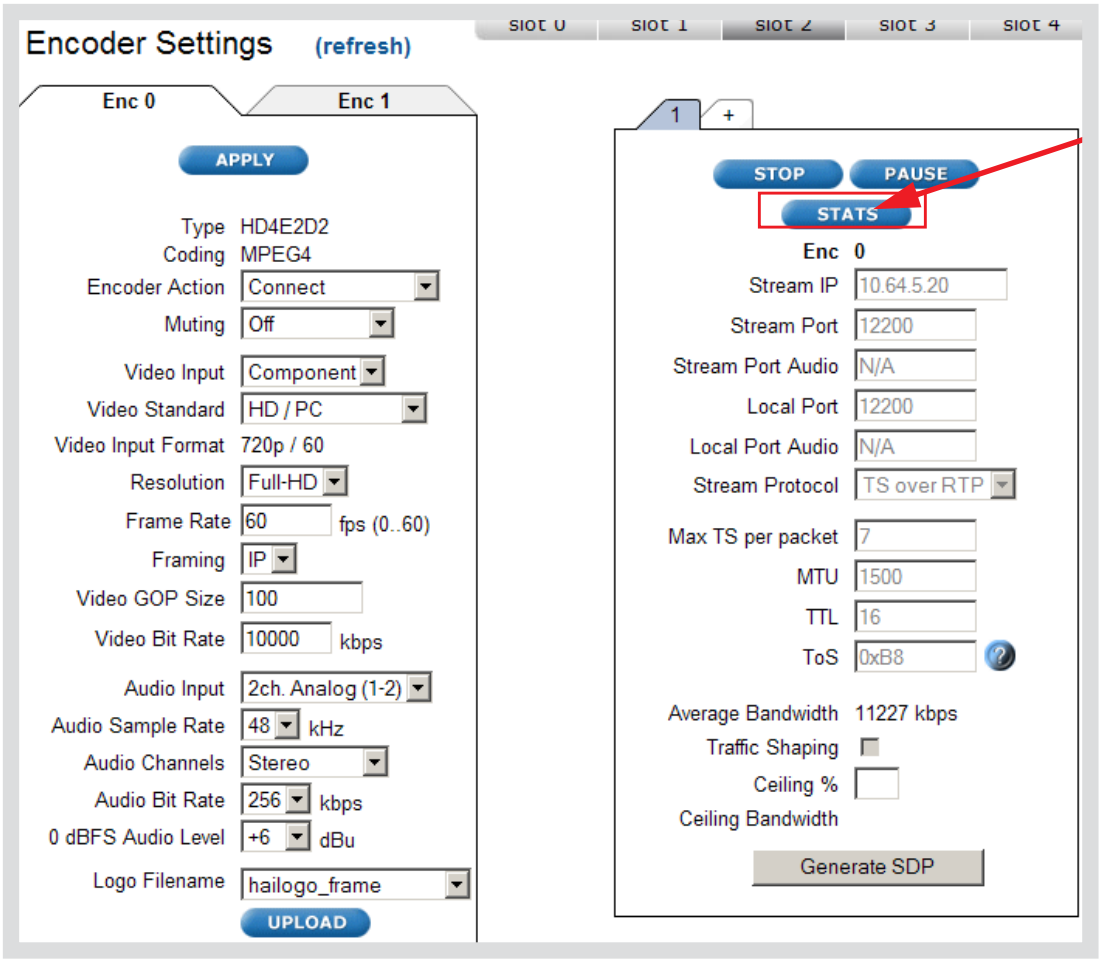
Problem	Possible Solutions
Video – blue output at display	• Verify RX LED Web: System Status CLI: dec 0 stats • Verify network connectivity
Videoloopback (codec)	• Verify internal hardware components Web: Enc Settings>Enc Action>Codec Loopback CLI: enc 0 set action localloopback See "Video, Audio and Local Loopbacks" on page 309.
Videoloopback (signal)	• Verify encoder/decoder cabling (e.g., camera to display) Web: Enc Settings>Enc Action>Signal Loopback CLI: enc 0 set videoloopback local See "Video, Audio and Local Loopbacks" on page 309.
Web Interface	
Web interface doesn't accept changes	Clear your browser's cache

Using Statistics – How to Verify that the Encoder is Streaming

To determine if an Encoder is streaming, you can check the statistics to verify that it is sending Packets:

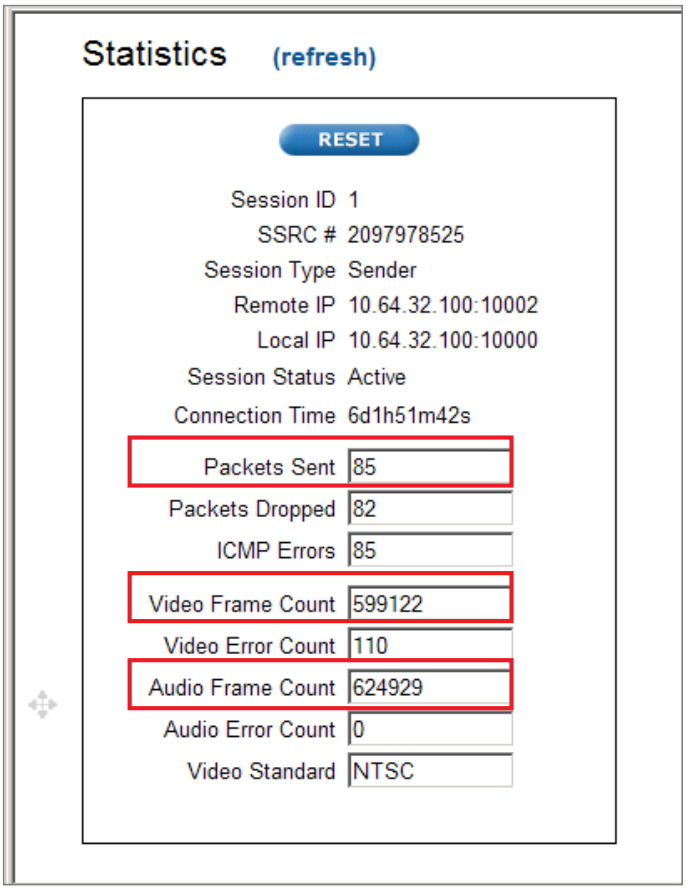
To view statistics for an Encoder stream:

1. Log in to the hai1000 series through the Web Interface and open the Encoder Settings page for the Encoder in question.
2. (For a multi-streamed stream) Click the numbered tab to display the tabbed pane for the stream.
3. Click STATS (located below STOP in the Stream Configuration section).



TIP If the stream session is running, the START button is replaced by STOP and STATS.

The Encoder Statistics window opens (shown in following example).



4. Verify that the Packets Sent, Video Frame Count, and Audio Frame Count values are increasing.

   This tells you that the Encoder is streaming.

For information on the statistics, see "Viewing Encoder Statistics" on page 133.

Hardware Check

When you contact Haivision Technical Support, you may be asked for the serial number of the HOST or Encoder/Decoder board under discussion.

How to Locate the Serial Number on hai1000 Modules

Figure 10-1 Locating the Serial Number on the HOST4 Module

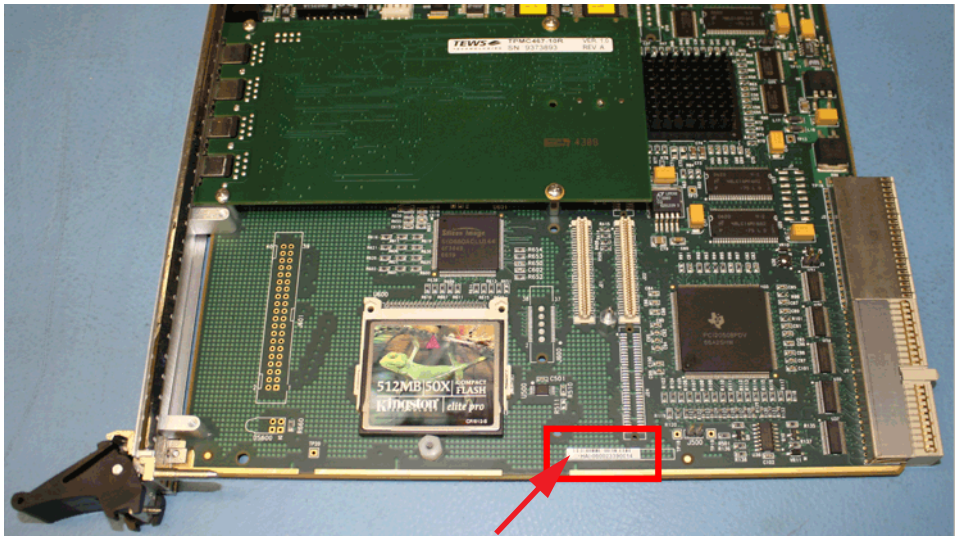


Figure 10-2 Locating the Serial Number on the Mako Encoder/Decoder Module

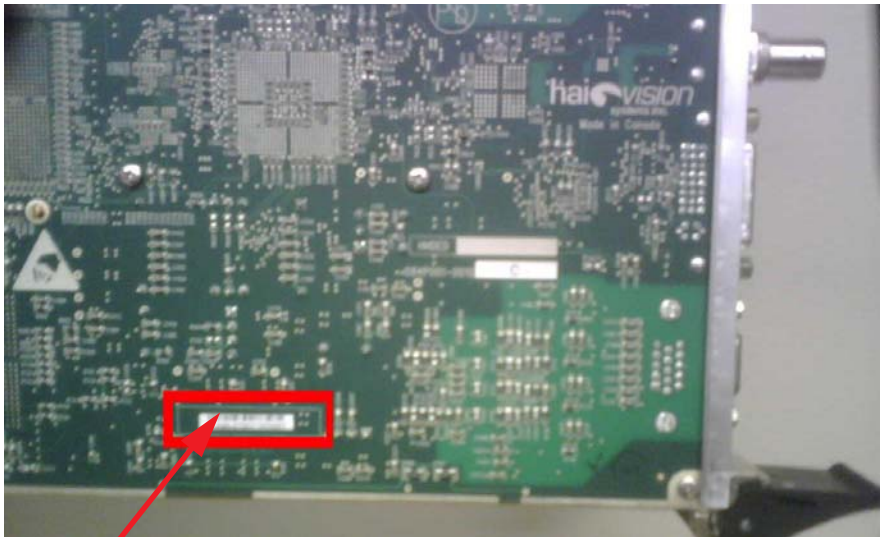
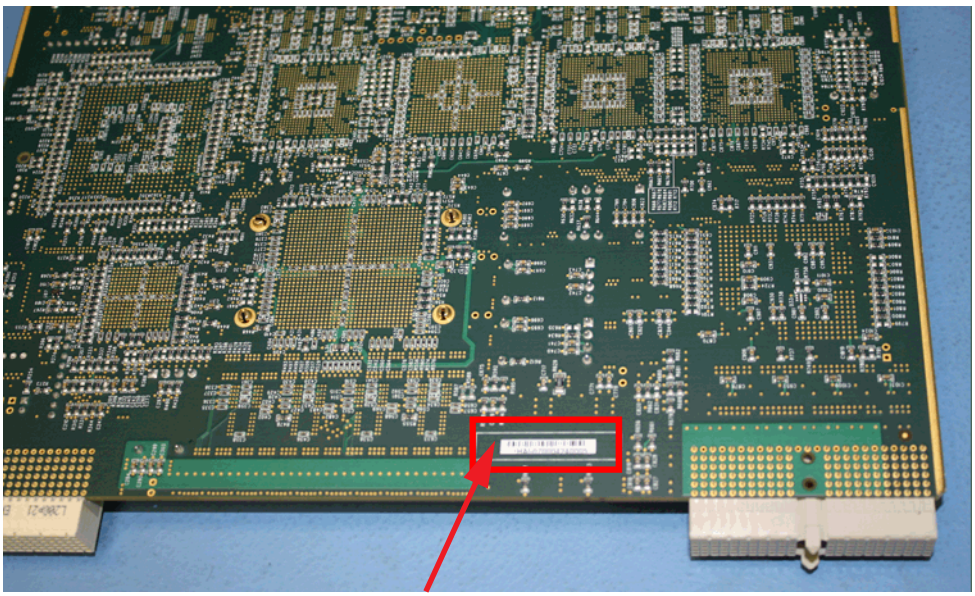


Figure 10-3 Locating the Serial Number on the HM4ED or HM2ED Encoder/Decoder Module



PART III: Reference

APPENDIX A: CLI Command Reference

This alphabetical command reference lists and describes the available hai1000 series Command Line Interface (CLI) commands and their parameters.

Commands In This Appendix

Related Topics

- For procedural information on using CLI commands, refer to Chapter 7: “Configuring A/V Services From the CLI”.
- For a list and description of the Encoder/Decoder configuration parameters, refer to Appendix B: “Encoder/Decoder Parameter Reference”.

Syntax Conventions

The following syntax conventions are used in this appendix:

Convention	Description
MS Sans Serif font	Indicates command names and options, filenames and code samples.
italic font	Indicates variables that you replace with a user-defined value or name.
< >	Same as italics. Variables are enclosed in angle brackets in contexts that do not allow italics.
[ ]	Square brackets indicate optional items or parameters.
x | y	A vertical bar separates items in a list of options from which you must select one. If options are not separated by |, you may use combinations.
{ x | y | z }	Items separated by vertical bars and enclosed in braces indicate a choice of required elements.
[x { y | z }]	Vertical bars and braces within square brackets indicate a required choice within an optional element.

TIP The command name (i.e., card, enc, dec, reboot, or system) is lower case and case-sensitive. All other command elements are case-insensitive and may be abbreviated.

For usage tips and shortcuts, see "Command Summary and Usage Information" on page 174.

card

SYNOPSIS

```
card <slot#>[.<port#>] <action> [<parameter> <value>]
```

DESCRIPTION

The card command is used to get status information about the Encoder/Decoder card for troubleshooting and diagnostics. It is also used to reset the card, clear the card statistics, or disconnect any active sessions on the card.

The card command is also used to switch the MPEG coding standard for multi-format codec cards. For example, the HMFED module can be switched from MPEG-2 to MPEG-4 AVC coding standard, and vice-versa.

ACTIONS

set	Sets card parameter(s).
get	Gets card status information such as the card type, hardware/software version numbers, and LED Off/On status.
disc	Disconnects all active RTP sessions on the card.
help	Displays usage information for the card command.

CARD PARAMETERS

Parameter	Values
action	none, reset, clearstats, setalgorithm 1,2,6,8
ctrlreg1	00:00:00:0X (where X is either 2 to specify MPEG-2, or 4 to specify MPEG-4 AVC/H.264). NOTE: This parameter only applies to multi-format codec cards.

CARD EXAMPLES

card 2 get	Displays status information for an Encoder/Decoder card.
card 2 set action reset	Resets the card. Resetting an Encoder/Decoder card forces re-initialization of the card, as when power is applied to it.

`card 2 set action clearstats`	Clears the statistics for an Encoder/Decoder card.
`card 2 set ctrlreg1 00:00:00:02 action SetAlgorithm`	(Switches the MPEG Coding value for Multi-Format Codec cards only) Sets the MPEG coding value for the card to `02` (MPEG-2)

where:

`2`	is the slot #
`set`	is the action to perform
`ctrlreg1`	is the first parameter to set, i.e., sets the multi-format card to switch its MPEG coding value
`00:00:00:02`	is the value of the `ctrlreg1` parameter, i.e., MPEG-2 coding standard
`action`	is the second parameter to set, i.e., sets the MPEG coding value for the multi-format card to the value specified in the `ctrlreg1` parameter
`SetAlgorithm`	is the value of the `action` parameter, i.e., sets the MPEG coding value

See Also

- "Viewing and Controlling the Card" on page 181
- "Switching the MPEG Coding Value for a Multi-Format Codec" on page 183.
- "Card Group" on page 293 (Appendix B)
- "Viewing the System Status" on page 109 (Web interface)

convert

SYNOPSIS

```
convert <source_image> [<destination_filename>]
```

where:

source_image	is the filename of the image to convert (.gif, .jpeg, .bmp or .png formats supported) The source_image filename is mandatory. Include the path if you are not running convert in the same directory as the image to convert.
destination_filename	is the filename of the converted image (.oly extension preferred but not mandatory) The distination_filename is optional. The system will use the source_image filename with the .oly extension if a destination_filename is not provided. The default output file extension is .oly (Haivision's overlay image format) but can be set to anything else.

DESCRIPTION

The convert command is used to convert an image file to Haivision's overlay image (.oly) format. Files such as your company logo, short message or warning can then be displayed in video streams in overlay mode.

When convert is run without any parameters, the system will display usage information for the command.

CONVERT EXAMPLE

convert logo_small.bmp	converts the file to .oly file format

SEE ALSO

- "Configuring an Encoder or Decoder Logo Overlay" on page 203
- "Configuring Logo Insertion" on page 124 and "Configuring Logo Display" on page 151 (Web Interface)

dec

Synopsis - A/V Parameters

```
dec <slot#>[.<port#>] <action> [<parameter> <value>]
```

-or-

Synopsis - Decoder Streams

```
dec <slot#>[.<port#>] set stream <RemoteIpAddr/UDP/StreamName
    /[LocalIpAddr]/UDP/StreamName>
```

NOTE The port # is required to specify the second decoder port (1) on a Dual-Decoder. If omitted, it defaults to 0.

Description

The dec command is used to set and get the status of Audio/Video and Stream parameters on the Decoder. It is also used to create and delete Streaming sessions.

Actions

set	Sets Decoder Audio/Video and/or Stream configuration parameters. -or- Creates a Streaming video session from the Decoder.
get	Displays Decoder configuration parameters.
stats [reset]	Displays/resets Decoder statistics such as the Decoder status, error count, frame count, and re-synch count.
disc	Disconnects the RTP session received by the Decoder.
help	Displays usage information for the dec command and a list of decoder parameters. Displays context-sensitive help for the particular card type if the slot number is specified.

DEC A/V PARAMETERS

Parameter	Values
Action	Connect, Disconnect, Reset, Clearstats 1..4 For reset, see CAUTION below.
VideoStd	Ntsc, Pal, Auto, 1,2,6
StillImgType	Black, Blue, Freeze, Colorbars, 1..4 (Mako) Blue, Freeze 2,3 (HM4ED, HM2ED)
SyncMode	Stc, Fixed 1,2 (Mako) Stc, Fixed, Video, Audio 1..4 (HM4ED, HM2ED) NOTE: For networks with a large amount of jitter, the Decoder SyncMode must be Fixed.
SoftFilter	Off, On, 1,2 (Mako)
SoftFilterStrength	1..4 (Mako)
LowLatency	Off, On, 1,2
Buffering	Adaptive, Fixed 1,2
Delay	0..300
VideoOutput	none, Sdi, Component, all 0..3 (Mako)
VideoMute	Off, On, 1,2
Aspect Ratio	Pillarbox, Anamorphic, 1,2 (HM4ED, HM2ED only)
Resolution	Auto, 640x480p60, 720x480i30, 720x480p60, 720x576i25, 720x576p50, 1280x720p50, 1280x720p60, 1920x1080i30, 1920x1080i25, 1..10 (HM4ED, HM2ED only)
AudioOutput	none, Analog, Sdi1, Sdi1ch12, Sdi1ch34, Analog12, Analog34, all 0..7 (Mako)
AudioMute	Off, On, 1,2
HdmiAudio	Off, On, 1,2 (HM4ED, HM2ED only)
AudioAlgorithm	Auto, mpeg4AacLcRaw, 1..2
AudioSampleRate	Auto, 32khz, 48khz 1..3
AudioLevel	6..20 (HM4ED, HM2ED)
Volume	0..255
PsiTables	Off, On, 1,2
VideoPID	16..8190

Parameter (Cont.)	Values (Cont.)
AudioPID	16..8190
DataPID	16..8190
PCRPID	16..8190
Mako **only**	
LogoDisplay	Off, On, 1,2
LogoFilename	none, <logo image file name> NOTE: The file must be in Haivision's overlay image (.oly) format. See "Configuring an Encoder or Decoder Logo Overlay" on page 203.
LogoTransparency	0..100% NOTE: 0 = no transparency (i.e., completely solid/opaque logo); 100 = fully transparent (i.e., completely transparent/invisible logo)
LogoScaling	25..400% NOTE: 0 = relative, 25% = 1/4, 100% = no scaling, 400% = 4x TIP: See "Adjusting the Logo Position to Accommodate Resolution Changes" on page 205.
LogoPosition	Absolute, Topleft, Topright, Bottomleft, Bottomright, Centered 1..6
LogoXCoordinate	1..1920 NOTE: This parameter only takes effect if LogoPosition is set to Absolute. The origin is the top left corner of the display. TIP: When you enter the enc get command, the LogoX and LogoYCoordinate parameters return the current location of the logo (regardless of the LogoPosition setting).
LogoYCoordinate	1..1080 NOTE: This parameter only takes effect if LogoPosition is set to Absolute (see above).

NOTE Changing audio or video configuration parameters while a stream is active may result in brief audio or video artifacts.

CAUTION Resetting the Decoder (e.g., dec 0 set action reset) will result in an interruption of service for approximately 20 seconds.

Related Topics:

- "Decoder Control Group" on page 314 (Appendix B)

DEC STREAM PARAMETERS

Parameter	Description / Values
stream	Specifies the source and destination (remote and local) hai1000 units, in the format: <RemoteIpAddr/UDP/StreamName /[LocalIpAddr]/UDP/StreamName> • For the IP address, enter an IP address in dotted-decimal format or a host symbolic name. • For the UDP port, enter a number in the range 1026..65,534 *even* numbers only (with the exception of TS over UDP which also allows odd ports). For multicast addresses, see NOTE below.
actmode	Specifies the Activation Mode for the decoded stream: RTP, RTCP (default) • When a session is activated in RTP mode, the system only establishes an RTP session. • When a session is activated in RTCP mode, the system establishes two sessions: one RTP session and one RTCP session for monitoring purposes. NOTE: RTCP is useful to collect network metrics such as network jitter, packet loss, etc.
encformat	Specifies the Encapsulation Format for the decoded stream: UDP, RTP (default) • UDP opens a raw-UDP connection without the RTP protocol. UDP can be used to interoperate with devices that do not support RTP. Note that if the encformat is raw UDP, the RTP statistics are not calculated. • RTP opens an unconditional RTP session. For more information, see "RTP Protocol" on page 33.
payloadtype	(Optional) Specifies the Payload Type for the decoded stream: Audio, Video, MUXED (default) • Audio: Use if encap is set to AU (DirectRTP). • Video: Use if encap is set to AU (DirectRTP). • Muxed (Multiplexed): Use if encap is set to TS.

Parameter	Description / Values (Cont.)
encapsulation	(Optional) Specifies the Encapsulation Type for the decoded stream: TS (default), AU • TS (Transport Stream) • AU (Access Unit/DirectRTP): Transports audio and video access units in separate streams NOTE: If encapsulation is set to TS, payloadtype should be MUXED. If encapsulation is set to AU, payloadtype can be AUDIO or VIDEO but *not* MUXED.
reorder delay	The amount of time to wait for out-of-order packets. 0-200 milliseconds (default = 0)

NOTE The Multicast address range is from 224.0.0.0 to 239.255.255.255. Multicast addresses from 224.0.0.0 to 224.0.0.255 are reserved for multicast maintenance protocols and cannot be used by RTP sessions. We recommend that you use a multicast address from the Organization-Local scope (239.192.0.0/14).

In a full IP Multicast session, the Decoder local IP_address and the Encoder remote IP_address must be the same IP Multicast address.

The Decoder remote IP_address can either be the same IP Multicast address, or it can be the local IP_address for the Encoder (i.e., the Encoder's own IP address).

Also, all IP Multicast session receivers must share the same name.

DEC EXAMPLES

dec 0 set logofilename mylogo.oly	Specifies the logo filename as mylogo.oly (located in either the current working directory or the folder /usr/share/haivision/logos).
dec 2 set VideoStd PAL	Sets the value of the VideoStd parameter to PAL.
dec 2 set stream 192.168.5.1/5010/stream2 / 239.5.1.1/5000/stream1	Creates a Decoder Stream to remote IP Address 192.168.5.1, UDP Port# 5010, Session Name stream2 from local IP Address 239.5.1.1, UDP Port# 5000, Session Name stream1.
dec 2 set stream 192.168.5.1/5010////	Creates a Decoder Stream using an abbreviated command syntax. • the local UDP port# defaults to the remote UDP port# • the local IP address defaults to the hai1000 series unit's IP address

dec 2 get Action	Displays the status of the Action parameter for the Decoder: Action: Connect
dec 2 get	Displays the complete list of Audio/Video and Stream parameters for the Decoder.
dec 1 stats	Displays Decoder statistics for the Decoder in Slot #1.
dec 0 stats reset	Resets the statistics for the Decoder in Slot #0.
dec 2 disc 1	Disconnects Stream ID 1 on the Decoder in Slot #2.
dec 2 disc	Disconnects all streams on the Decoder in Slot #2.

See Also

- "Configuring A/V Parameters" on page 190
- "Decoder Control Group" on page 314 (Appendix B)
- "Configuring the Decoders" on page 144 (Web interface)

defcfg

SYNOPSIS

```
defcfg <action> [<filename>]
```

DESCRIPTION

The defcfg command is used to specify the configuration file to load at startup.

ACTIONS

set	Assigns a previously saved configuration identified by <filename> to load at startup.
reset	Removes the current startup configuration file. No filename is required; if a filename is specified, it will be ignored.
get	Lists the current startup configuration file, if any. Writes the file to <filename>.

NOTE If no filename is specified, the system looks for the default configuration file (defaultcfg.sh) saved under /usr/share/haivision/config.

EXAMPLE

defcfg set hai1000.cfg	Specifies that the configuration file hai1000.cfg be loaded at startup.

SEE ALSO

- "Specifying a Configuration File to Load at Startup" on page 208
- "writecfg" on page 290
- "Saving and Loading Configurations" on page 163 (Web interface)

enc

Synopsis - A/V Parameters

```
enc <slot#>[.<port#>] <action> [<parameter> <value>]
```

-or-

Synopsis - Encoder Streams

```
enc <slot#>[.<port#>] set stream <RemoteIpAddr/UDP/StreamName
      /[LocalIpAddr]/UDP/StreamName>
```

NOTE The port # is required to specify the second encoder port (1) on a Dual-Encoder. If omitted, it defaults to 0.

Description

The enc command is used to set and get the status of Audio/Video and Stream parameters on the Encoder. It is also used to create and delete, as well as pause and resume Streaming sessions.

Actions

set	Sets Encoder Audio/Video and/or Stream configuration parameters. -or- Creates Streaming sessions from the Encoder.
get	Displays Encoder configuration parameters.
stats [reset]	Displays/resets Encoder statistics such as the Encoder status, frame count, error count, and end-to-end delay.
disc [SID]	Disconnects the specified Encoder session (identified by Session ID, SID).
pause [SID]	Pauses Encoder session(s). SID may be all or a specific session ID. Pausing a stream will switch the encoded content from the video encoder to a still image file if configured. See "Pausing and Resuming a Stream" on page 128.
resume [SID]	Resumes Encoder session(s). SID may be all or a specific session ID. See "Pausing and Resuming a Stream" on page 128.

help	Displays usage information for the enc command and a list of encoder parameters. Displays context-sensitive help for the particular card type if the slot number is specified.

ENC A/V PARAMETERS

Parameter	Values
Action	Connect, Disconnect, Reset, Localloopback, Clearstats, 1,2,3,4,6 For reset, see CAUTION below. NOTE: LocalLoopback is equivalent to the Web Interface Codec loopback option.
IdleCells	Off, On, 1,2 NOTE: This will cause the insertion of IDLE TS cells into a TS stream when necessary.
VideoMute	Off, On, 1,2 NOTE: For networks with a large amount of jitter, the Decoder SyncMode must be Fixed.
VideoBitrate	256..10000 kbps (Mako) 150..6000 kbps (HM4ED) 400..10000 kbps (HM2ED)
VideoPicrate	0..60 NOTE: For Dual-Encoders, Enc #0 has priority. Therefore, the actual frame rate for Enc #1 is affected by the Video Picture Rate specified for Enc. #0.
VideoLoopback	Off, Local, 1,2 NOTE: Local VideoLoopback is equivalent to the Web Interface Signal loopback option.
VideoStd	Ntsc, Pal, Auto (HD), 1,2,6
VideoInput	Component, Sdi, 3,4 (Mako) Composite, Svideo, Component, Sdi, 1,2,3,4 (HM4ED, HM2ED) NOTE: You *must* select the Video Input type.
Filter	Comb, Notch, 1,2 (HM4ED, HM2ED) For more information, see Filter on page 300.
CompMode	I, Ip, 1,2 (Mako) I, Ip, Ibp, Ibbp, 1,2,3,4 (HM4ED, HM2ED)

Parameter (Cont.)	Values (Cont.)
GOPSize	0..1000 (Mako) 1..300 (HM4ED) 1..127 (HM2ED)
PicSize	Ccir601, hhr, CIF, 3/4, 1..4 (Mako) Ccir601, hhr, 1, 2 (HM4ED)
VbvDelay	0..75000
VideoptsOffset	0..300
VideoPID	16..8190
AudioInput	none, Analog, Sdi1, Sdi1ch12, Sdi1ch34, Analog12, Analog34, all 0..7 NOTE: For Mako and SDI boards, you *must* select the Audio Input type.
AudioLevel	6..20
AudioMute	Off, On, 1,2
AudioBitrate	32, 64, 128, 256, 384 kbps
AudioLoopback	Off, Local, 1..2
AudioMode	Mono, Stereo, Dualchannel, Jointstereo, 1..4 (Mako) Mono, Stereo, Dualchannel, Jointstereo, Dualstereo, Quadmono 1,.6 (HM4ED, HM2ED)
AudioAlgo	mpeg2AacLcAdts, mpeg4AacLcLoas, mpeg4AaclcRaw, mpeg4AacLcAdts, 3..6 (Mako, HM4ED) mpeg1Layer2 2 (HM2ED)
AudioCrc	Off, On, 1,2 (Mako, HM4ED)
SampleRate	32, 48 kHz 1,2
AudioPID	16..8190
DataPID	16..8190
PCRPID	16..8190
PMTPID	16..8190
Advanced H.264 Parameters	
Profile	Baseline, Main, 1,2
UseOpenGOP	Off, On, 1,2
MinimumGOP	1..300

Parameter (Cont.)	Values (Cont.)
OutputRateControl	Cbr, Vbr, Vbrq, Abr, 1..4 NOTE: Abr is available on the HM4ED only to maintain compatibility with v8.1.2 and previous hai1000 releases. Abr does not tightly enforce the bitrate limit and provides better latency in I and IP compression modes.
Quantizer	6..51
dbfilter	Off, On, 1,2
dbstrength	-6..+6
TemporalDecimation	Td_1, Td_2, Td_4, Td_8 1,2,4,8 NOTE: (Mako) This has been replaced by VideoPicrate.
Interlacing	Frame, Mbaff 1,3 (HM4ED)
StillImageFilename	none, <still image file name> NOTE: On MPEG-4 AVC modules, this image will be inserted when a stream is paused. The file must be in .264 or .mp4 format. The file will be located in the folder /usr/share/haivision/stills on the hai1000 Host file system. See "Configuring Still Images" on page 127.
Mako **only**	
LogoDisplay	Off, On, 1,2
LogoFilename	none, <logo image file name> NOTE: The file must be in Haivision's overlay image (.oly) format. See "Configuring an Encoder or Decoder Logo Overlay" on page 203.
LogoTransparency	0..100% NOTE: 0 = no transparency (i.e., completely solid/opaque logo); 100 = fully transparent (i.e., completely transparent/invisible logo)
LogoScaling	25..400% NOTE: 0 = relative, 25% = 1/4, 100% = no scaling, 400% = 4x TIP: See "Adjusting the Logo Position to Accommodate Resolution Changes" on page 205.
LogoPosition	Absolute, Topleft, Topright, Bottomleft, Bottomright, Centered 1..6

Parameter (Cont.)	Values (Cont.)
LogoXCoordinate	1..1920 NOTE: This parameter only takes effect if LogoPosition is set to Absolute. The origin is the top left corner of the display. TIP: When you enter the enc get command, the LogoX and LogoYCoordinate parameters return the current location of the logo (regardless of the LogoPosition setting).
LogoYCoordinate	1..1080 NOTE: This parameter only takes effect if LogoPosition is set to Absolute (see above).

NOTE Changing audio or video configuration parameters while a stream is active may result in brief audio or video artifacts.

CAUTION Resetting the Encoder (e.g., enc 0 set action reset) will reset the Decoder as well as the Encoder on the same codec and will result in an interruption of service for approximately 20 seconds. We recommend that reset be reserved for diagnostic and debugging purposes.

Related Topics:

- See "Encoder Control Group" on page 297

ENC STREAM PARAMETERS

Parameter	Description / Values
Stream	Specifies the destination and source (remote and local) hai1000 units, in the format: <RemoteIpAddr/UDP/StreamName/[LocalIpAddr]/UDP/StreamName> • For the IP address, enter an IP address in dotted-decimal format or a host symbolic name • For the UDP port, enter a number in the range 1026..65,534 *even* numbers only (with the exception of TS over UDP which also allows odd ports). For multicast addresses, see NOTE on page 266.
actmode	Specifies the Activation Mode for the encoded stream: RTP, RTCP (default) • When a session is activated in RTP mode, the system only establishes an RTP session. • When a session is activated in RTCP mode, the system establishes two sessions: one RTP session and one RTCP session for monitoring purposes. NOTE: RTCP is useful to collect network metrics such as network jitter, packet loss, etc.
encformat	Specifies the Encapsulation Format for the encoded stream: UDP, RTP (default) • UDP opens a raw-UDP connection without the RTP protocol. UDP can be used to interoperate with devices that do not support RTP. Note that if the encformat is raw UDP, the RTP statistics are not calculated. • RTP opens an unconditional RTP session. For more information, see "RTP Protocol" on page 33.
payloadtype	(Optional) Specifies the Payload Type for the encoded stream: Audio, Video, MUXED (default) • Audio: Use if encap is set to AU (DirectRTP). • Video: Use if encap is set to AU (DirectRTP). • Muxed (Multiplexed): Use if encap is set to TS.

Parameter	Description / Values (Cont.)
encapsulation	(Optional) Specifies the Encapsulation Type for the encoded stream: TS (default), AU, QT, RAW • TS (Transport Stream) • AU (Access Unit/DirectRTP): Use to transport audio and video access units in separate streams. • QT (QuickTime): Specifies RFC-3984 for video and RFC-3640 for audio payload (see "QuickTime SDP and Interoperability" on page 37). • Raw (raw image file, used with SIP) NOTE: If encapsulation is set to TS, payloadtype should be MUXED. If encapsulation is set to AU, payloadtype can be AUDIO or VIDEO but *not* MUXED.
ttl	(Time-to Live for stream packets) Specifies the number of router hops the Stream packet is allowed to travel/pass before it must be discarded. 1..255, default = 16
toS	(Optional) (Type of Service) Specifies the desired quality of service (QoS). This value will be assigned to the Type of Service field of the IP Header for the outgoing streams. Range = 0..255 (decimal) or 0..0xFF (hex) Default = 184 or 0xB8 Usage recommendations: • 0xB8 = Low delay / high bandwidth • 0xB0 = Low delay • 0xA8 = High bandwidth • 0xA0 = Normal A DiffServ or DSCP (Differentiated Services Code Point) value must be converted to a ToS precedence value. For example, AF41 or DSCP 34 becomes ToS 136. For more information, see RFC2474.
MaxTS	Specifies the maximum number of MPEG Transport Stream cells per IP packet when using TS encapsulation. (Sender only) 2..7, default = 7 NOTE: Lowering this value will decrease the packet size and is only necessary in certain network conditions.
mtu	(Maximum Transmission Unit) Specifies the maximum allowed size of IP packets for the outgoing RTP data stream. 228..1500, default = 1500
shaping	For some limited networks such as satellites or some dedicated network pipes, it may be necessary to enable Traffic Shaping to smooth the traffic and respect the absolute upper limit configured. Off, On

Parameter	Description / Values (Cont.)
ceiling	(shaping must be On) The percentage of network bandwidth beyond the average rate that the encoder is allowed to use if needed. This is used to set the ceiling bandwidth range. 0..100%, default = 15
sap	(Session Announcement Protocol) Enables or disables SAP announcements for this session (Sender only): Off, On
name	If SAP is enabled, specifies the name of the session for use in announcements.
description	(Optional) Specifies an expanded description of the session for use in announcements.
keywords	(Optional) Specifies one or more keywords associated with the session for use in announcements.
author	(Optional) Specifies author information for the session for use in announcements.
copyright	(Optional) Specifies copyright information for the program for use in announcements.

NOTE The Multicast address range is from 224.0.0.0 to 239.255.255.255. Multicast addresses from 224.0.0.0 to 224.0.0.255 are reserved for multicast maintenance protocols and cannot be used by RTP sessions. We recommend that you use a multicast address from the Organization-Local scope (239.192.0.0/14).

In a full IP Multicast session, the Encoder local IP_address is the unit's own IP address. The Encoder remote IP_address and the Decoder local IP_address use the same IP Multicast address.

Also, all IP Multicast session receivers must share the same name.

ENC EXAMPLES

enc 0 set logodisplay on	Enables the display of the logo.
enc 0 set videoinput svideo	Sets the value of the videoinput parameter to svideo.
enc 2 set stream 239.5.2.1/5000/stream1/ 192.168.5.1/5010/stream2	Creates a new Encoder Streaming Session to remote IP Address 239.5.2.1, UDP Port# 5000, Session Name stream1 from local IP Address 192.168.5.1, UDP Port# 5010, Session Name stream2.

enc 2 set stream 239.5.2.1/5000////	Creates an Encoder Streaming Session using an abbreviated command syntax. NOTE: • the local UDP port defaults to the remote port • the local IP address defaults to the hai1000 series' IP address
enc 0 get gopsize	Displays the status of the gopsize parameter: gopsize: 30
enc 0 get	Displays the complete list of Audio/Video and Stream parameters for the Encoder.
enc 1 stats	Displays Encoder statistics for the Encoder in Slot #1.
enc 0 stats reset	Resets the statistics for the Encoder in Slot #0.
enc 0 disc 1	Disconnects Stream ID 1 on the Encoder in Slot #0.
enc 0 disc	Disconnects all streams on the Encoder in Slot #0.

See Also

- "Configuring A/V Parameters" on page 190
- "Encoder Control Group" on page 297 (Appendix B)
- "Configuring the Encoders" on page 112 (Web interface)

ethercfg

SYNOPSIS

```
ethercfg [-a on|off] [-s 10|100] [-d half|full] [-c bandwidth] [-w yes| no]
```

DESCRIPTION

When the hai1000 series boots up, it automatically initializes and configures the Ethernet interface to match the settings on the Ethernet switch to which it is connecting. However, you may need to disable autonegotiation, and manually force settings such as the Ethernet interface line rate and duplex mode. The ethercfg command is used to view, manually control, and save the Ethernet configuration parameters.

If no options are specified, the system displays the current settings, for example:

```
$ ethercfg
        Speed: 100Mb/s
        Duplex: Full
        Auto-negotiation: on
        Link detected: yes
        Ceiling: 100000Kbit
```

OPTIONS

-a	--autoneg	Enables or disables autonegotiation
-s	--speed	If autonegotiation is disabled, sets the speed
-d	--duplex	If autonegotiation is disabled, sets the duplex mode
-c	--ceiling	Puts a “ceiling” on the bandwidth available to the Ethernet port
-w	--write	Skips the save settings prompt

EXAMPLE

ethercfg -s 100	Sets the line speed to 100 Mbps (and in doing so, disables autonegotiation).

```
$ ethercfg -s 100
Autonegotiation disabled to permit speed/duplex mode configuration.
        Speed: 100Mb/s
        Duplex: Full
        Auto-negotiation: off
        Link detected: yes
        Ceiling: 100000Kbit

Do you wish to save these settings ? (y,n): y
Settings saved successfully.
$
```

See Also:

- "Configuring Network Settings" on page 165 (Web interface)

hvquery

SYNOPSIS

```
hvquery <option><parameter>
```

DESCRIPTION

The hvquery command is a troubleshooting and diagnostic tool.

NOTE IPv4 addresses are returned in dotted-decimal (a.b.c.d) format.

The hvquery command may also be used to change the network configuration (i.e., IP address, netmask and gateway address) of the hai1000 series from the Telnet CLI. This is useful in cases where you do not have access to the unit through its management serial port.

TIP When changing the IP address, be sure to also change the netmask and gateway address.

OPTIONS

-getip4	Reads the IPv4 Address
-getip4netmask	Reads the IPv4 Netmask
-getip4broadcast	Reads the IPv4 Broadcast Address
-getip4gw	Reads the IPv4 Gateway Address
-dhcpon	Reads the DHCP status. Returns either a “YES” or “NO” string.
-getbaudrate	Reads the Serial Port Baud Rate
-gethostname	Reads the hostname
-sethostname	Writes the hostname to the specified name.
-bistlog	Dumps the BIST Log
-bistmanual	Selects Manual BIST
-bistauto	Selects Automatic BIST
-bistclear	Clears the BIST Log
-setip4	Writes the IPv4 Address to the specified value
-setip4netmask	Writes the IPv4 Netmask to the specified value

-setip4gw	Writes the IPv4 Gateway to the specified value
-setip4broadcast	Writes the IPv4 Broadcast to the specified value
-setdhcp	Sets DHCP (on/off)
-setbaudrate	Writes the Baud Rate to the specified value
-gettftpimage	Reads the TFTP File Image Name
-settftpimage	Writes the TFTP File Image Name to the specified value
-gettftpserver	Reads the TFTP Server IP Address
-settftpserver	Writes the TFTP Server IP Address to the specified value
-getbootmode	Gets the Boot Mode
-setbootmode	Sets the Boot Mode

EXAMPLE

hvquery -gethostname	Reads the hostname of the hai1000 series unit
hvquery -setip4 10.6.0.15 hvquery -setip4gw 10.6.0.1 hvquery -setip4netmask 255.255.255.0	Changes the hai1000 series unit's network settings NOTE: Reboot the unit for changes to take effect.

listcfg

SYNOPSIS

listcfg

DESCRIPTION

The listcfg command displays a list of the currently available configuration files which are stored in the folder /usr/share/haivision/config. These files may be loaded using the readcfg command.

NOTE As of Version 8.2, the WCI and CLI config file systems have been integrated. Existing WCI files can still be loaded; however, saved file are always in the CLI format. There is no automatic conversion of old WCI config files to the CLI config file format. This must be done manually by loading the WCI file, and then saving it.

---

nmcfg

NOTE You must be logged in as root to enter nmcfg commands.

SYNOPSIS

```
nmcfg help
nmcfg access help
nmcfg access usm permit <uname> {ro|rw} [{noauth|auth|priv}]
nmcfg access usm delete <uname> [{ro|rw}]

nmcfg community help
nmcfg community permit <community> {ro|rw} [<host>]
nmcfg community delete <community>

nmcfg system help
nmcfg system define <param> "<value>"
nmcfg system delete <param>

nmcfg user help
nmcfg user define <uname> [{MD5|SHA} "<pwd>" [{DES|AES}
      ["<pwd>"]]]
nmcfg user delete <uname>
```

DESCRIPTION

The nmcfg (Network Management Configuration) command is used by system administrators or GUI/WCI applications in the configuration of SNMP for the hai1000. The nmcfg script reads and edits the standard SNMP configuration files, and then restarts the SNMP agent (snmpd) to apply the new settings.

It supports the configuration of v1/v2c community-based security model and v3 USM (User-based Security Model). Only traditional access permissions (read-only, read-write) are supported by the script.

Note that traps are not supported by the nmcfg script.

A detailed help, describing the options is available for each command option (for example, nmcfg access help or nmcfg user help).

For more information, see "nmcfg" on page 214 (in "SNMP Agent Components").

OPTIONS

access	Defines the access permissions granted to the v1/v2c communities and USM (v3) users. Only the USM security model option is shown in the summary help. The v2c security model, a different format for community configuration, is only displayed in the access detailed help. Note that the v2c security model also applies to SNMP v1.
community	Defines community-based (v1v/2c) security configuration for the hai1000.
system	Defines contact and location system parameters.
user	Defines user-based (v3) security configuration for the hai1000.

ACTIONS

define	Acts as both create and update. If an object does not exist, it is added. If it exists, it is replaced or updated with the new settings. It is then not necessary to delete an existing object to change its settings. All required settings of an object are specified when defining/changing an object. It is not possible to set settings individually.
permit	Defines the access permissions for the community or the user.
delete	Deletes the specified object.
help	Displays usage information for the command, or if specified, the option.

NOTE nmcfg settings persist after reboots, unlike other hai1000 settings which are lost when the unit is rebooted unless saved as a configuration.

EXAMPLE #1: INITIALIZE A COMMUNITY-BASED (V1/V2C) SYSTEM

In the example below, a system with default settings is configured for local LAN only read-write access for the admin community. System parameters are defined and unneeded communities are removed.

```
# nmcfg
parameter     value
------------- ----------------------------------
contact       <undefined>
location      <undefined>

model  perm   level          user/community      source
------ ------ -------------- ------------------- -------
v2c    rw     noauth         admin               any
v2c    ro     noauth         operator            any
v2c    ro     noauth         public              any
v2c    rw     noauth         tech                any
# nmcfg system define contact "myname <myname@example.org>"
# nmcfg system define location "Media Lab"
# nmcfg community delete tech
# nmcfg community delete operator
# nmcfg community permit admin rw 192.168.0.0/16
#
```

EXAMPLE #2: CREATE AN SNMPV3 USER

Two commands are required to create a USM (v3) user:

```
# nmcfg user define joenet SHA "arfds23dsjs" AES "2394urscxkvn"
# nmcfg access usm permit joenet rw
```

EXAMPLE #3: INITIALIZE A USM-ONLY (SNMPV3) SYSTEM

In the example below, system security is enforced by completely disabling SNMPv1/v2c accesses, and by requiring v3 USM authentication for read-only access and encryption for read-write access.

```
# nmcfg
parameter     value
------------- ------------------------------------
contact       <undefined>
location      <undefined>

model  perm   level          user/community      source
------ ------ -------------- ------------------- ---------
v2c    rw     noauth         admin               any
v2c    ro     noauth         operator            any
v2c    ro     noauth         public              any
v2c    rw     noauth         tech                any

# nmcfg agent stop
# nmcfg system define contact "joe net <jnet@example.org>"
# nmcfg system define location "Media Lab"
# nmcfg community delete admin
# nmcfg community delete tech
# nmcfg community delete operator
# nmcfg community delete public
# nmcfg user define admin SHA "arfds23dsjs" AES "2394urscxkvn"
# nmcfg user define guest MD5 "nososecret"
# nmcfg access usm permit admin rw priv
# nmcfg access usm permit guest ro
# nmcfg agent start
# nmcfg

parameter       value
--------------- ------------------------------------
engineid        0x80001f88802054a68b4b75388e
contact         "joe net <jnet@example.org>"
location        "Media Lab"

model  perm   level          user/community      source
------ ------ -------------- ------------------- ---------
usm    rw     priv           admin               -
usm    ro     auth           guest               -
usm    rw     auth           nmcfg               -

auth   privacy user
------ -------- --------------
SHA    AES    admin
MD5    nopriv guest
MD5    nopriv nmcfg
#
```

See Also

- "nmcfg" on page 214 (in "SNMP Agent Components")

passwd

SYNOPSIS

```
passwd [<option>] [<name>]
```

DESCRIPTION

The passwd command is used to change a user password. If no name is specified, it changes the password for the current user.

OPTIONS

-a	Defines the algorithm to be used for the password (choices: des, md5)
-d	Deletes the password for the specified user account
-l	Locks (disables) the specified user account
-u	Unlocks (re-enables) the specified user account
-h	Displays usage information for the passwd command

EXAMPLE

passwd	Changes the password for the current user account. The system prompts the user to enter the old password and then the new password.

SEE ALSO

- "Changing the CLI Password" on page 179

readcfg

SYNOPSIS

```
readcfg [<filename>]
```

DESCRIPTION

The readcfg command is used to load a previously saved configuration identified by <filename>. In doing so, readcfg reassigns every parameter of every card in the system, including Encoder/Decoder settings and stream destination and status (excluding the system IP address).

If no pathname is specified, the system looks for the file in the active (local) directory and under /usr/share/haivision/config. If no filename is specified, the system looks for the default configuration (defaultcfg.sh) under /usr/share/haivision/config.

NOTE If readcfg is executed during active session(s), the sessions are stopped and new sessions are loaded and become active (if applicable).

EXAMPLE

readcfg hai1060.cfg	Loads the configuration file hai1060.cfg.

SEE ALSO

- "Loading a Previously Saved Configuration" on page 208
- "writecfg" on page 290
- "Saving and Loading Configurations" on page 163 (Web interface)

reboot

SYNOPSIS

```
reboot
```

DESCRIPTION

The `reboot` command is used to halt and restart the hai1000 series.

EXAMPLE

`reboot`	Reboots the hai1000 series. NOTE: While the unit is rebooting, you will lose your connection to the CLI. This will take approximately two minutes. Once the unit has rebooted, you can reconnect to the unit and log in again.

SEE ALSO

- "Rebooting the System" on page 162 (Web Interface)

service

NOTE You must be logged in as root to enter service commands.

SYNOPSIS

```
service [<service> <action>]
```

DESCRIPTION

The service command is used to start, stop, restart, and get the status of services for an existing hai1000 series unit. The services can be: all, FTP, HTTP, SIP, SNMP, SSH, or Telnet.

ACTIONS

stop	Stops the specified service(s).
start	Starts (or re-starts) the specified service(s).
status	Displays the status of the specified service(s).

EXAMPLE

service all status — Displays the status of all services for the unit.

```
Network service started for ftpd
Network service started for httpd
Network service started for sipdaemon
Network service started for snmpd
Network service started for sshd
Network service started for telnetd
```

SEE ALSO

- "Enabling and Disabling Network Services" on page 168 (Web Interface)

sipcmd

SYNOPSIS

```
sipcmd <action> <parameter> <global options>
```

DESCRIPTION

The sipcmd command is used to configure Haivision's Invitation™ firmware module to create, modify, and terminate call sessions between the hai1000 series and traditional video-teleconferencing (VTC) endpoints.

ACTIONS

GET	Displays information (read-only operation)
CALL	Makes an outgoing call
ANSWER	Accepts an incoming call
DISCONNECT	Disconnects call(s)
CREATE_ENTITY	Creates a sip entity
EDIT_ENTITY	Edits a sip entity
RELOAD_SDP	Reloads an SDP template
RELOAD_BUDDIES	Reloads all buddy files (no parameters needed)
AUTO_ANSWER	Chooses the auto-answer policy for an entity
BUDDY_AUTO_ANSWER	Adds or removes this buddy in the auto-answer list of a specific entity effective when auto-answer policy is set to "selected". Editing the buddy auto-answer list only applies if the global card's auto-answer mode is set to "selected". For example: sipcmd AUTO_ANSWER -e 0 -policy selected
SET	Changes an application settings (in nightflight.ini)
RESTART	Disconnects all calls and restarts the sip application

ABBREVIATIONS:

```
-a <=> -sipAddress
-b <=> -buddy_id
-c <=> -card
-e <=> -entity
-h <=> -hostip
-i <=> -callindex
```

-p <=> -policy
-w <=> -what

GET PARAMETERS

Parameter	Description
-what entity OR entities	NOTE: In the current release, the only value supported for the parameter Entity Encoder Video Input is Not Forced, which means the input will follow the current system configuration instead of forcing it to a specific input connector at the start of call.
-what rtp_sessions	
-what calls	

GET EXAMPLE

```
sipcmd GET -what calls
```

CALL PARAMETERS

Parameter	Description
-sipAddress x	Mandatory
-entity x	(Optional) Local entity index who is placing the call.
-card x	(Optional) The card that is placing the call.
NOTE: You must either provide either card or entity.	

CALL EXAMPLE

```
sipcmd CALL -a 2222@10.64.10.66:5060
  -e 0

sipcmd CALL -a 2222@10.64.10.66:5060
  -c 0
```

ANSWER Parameters

Parameter	Description
-sipAddress x	(Mandatory) Remote sip address to answer to.
-entity x	(Optional) Local entity index who is placing the call.
-card x	(Optional) The card that is placing the call.
NOTE: You must either provide either card or entity.	

ANSWER Example

```
sipcmd ANSWER -sipAddress 2222@10.64.10.66 -e
 0
```

DISCONNECT Parameters

Parameter	Description
-entity x	(Optional) Disconnects/rejects all calls belonging to this entity index.
-callindex x	(Optional) Disconnects/rejects this specific call index.
-card x	(Optional) Local entity index that is being called.
-what all	Disconnects/rejects all sip calls.
NOTE: Only use one of the three parameters (entity, callindex or what all).	

DISCONNECT Examples

```
sipcmd DISCONNECT -e 0

sipcmd DISCONNECT -i 0

sipcmd DISCONNECT -c 0
```

RELOAD_SDP Parameters

Parameter	Description
-sdpFilename x	(Mandatory) Use to signal server that the file was modified.

CREATE_ENTITY Parameters

Parameter	Description
-encoder_card x	The assigned encoder card {0,4}
-encoder_port x	(Optional) The assigned encoder port {0}
-decoder_card x	The assigned decoder card {0,4}
-decoder_port x	(Optional) The assigned decoder port {0,1}
-name x	Use to change the part in the sip address before the @

CREATE_ENTITY Example

```
sipcmd CREATE_ENTITY -encoder_card 0 -decoder_card 0 -name
  JohnDoe
```

EDIT_ENTITY Parameters

Parameter	Description
-entity x	(Mandatory) Entity index, numerical value {0,9}
-name x	Use to change the part in the sip address before the @
-encoder_card x	Use to change the assigned encoder card {0,4}
-decoder_card x	Use to change the assigned decoder card {0,4}
-sdp_filename "720x480.sdp"	Can be empty (with quotes) assign none

EDIT_ENTITY Example

```
sipcmd EDIT_ENTITY -e 0 -name JohnDoe

sipcmd EDIT_ENTITY -e 0 -name jerry -decoder_card 1

sipcmd EDIT_ENTITY -e 0 -sdp_filename ""
```

AUTO_ANSWER (AA) PARAMETERS

Parameter	Description
-entity x	entity index
-policy x	{on, selected, off}.where selected means selected buddies.

AUTO_ANSWER (AA) EXAMPLE

```
sipcmd AA -e 0 -policy off

sipcmd AUTO_ANWSER -e 0 -p selected
```

BUDDY_AUTO_ANSWER (BAA) PARAMETERS

Parameter	Description
-entity x	entity index
buddy_id x	32 character buddy unique id
auto_answer x	Value of 0 means no, value of 1 means yes (about auto-answering)

BUDDY_AUTO_ANSWER (BAA) EXAMPLE

```
sipcmd BAA -e 0 -buddy_id 60e9f7f46e68a391021289d6501641f6 -
  auto_answer 1

sipcmd BUDDY_AUTO_ANWSER -e 0 -b 60e9f7f46e68a391021289d6501641f6
  -auto_answer 0
```

SET PARAMETERS

Parameter	Description
-public_ip x	This will be used.
-enable_tcp x	{0,1}
-server_port x	Will take effect on next reboot.

SET Example

```
sipcmd SET -public_ip ""
sipcmd SET -public_ip 64.71.146.10
sipcmd SET -public_ip 64.71.146.10 -server_port 6060
```

Global Options:

Option	Description
-hostip x	(Optional, default=localhost) With this variable you can use the sipcmd to send requests to sip daemons running on remote hosts.

Example: Detecting and Answering Incoming Calls

This example shows how to detect incoming calls in order to answer them.

From the sipcmd GET command, you can parse all calls, and one or several of them will be in the Offering state (i.e., someone is calling). For example:

```
(...)
~~~~~ Session/Call ~~~~~~~~~~~~~~
Call ID: A50B80DF@10.64.10.77
Call Index: 4
Call Status: Offering
Local Entity Name: jerry@10.64.10.66:5060
Remote Entity Name: 10.64.10.77:5060
Remote Device Type: Codian MCU 4500
(...)
```

Using the remote endpoint from the Remote Entity Name, type the following command:

```
> sipcmd ANSWER -sipAddress 10.64.10.77 -e 0
```

Note that the sip port is optional when it's the default (5060).

See Also

- "Using Invitation for SIP Interoperability" on page 221

system

NOTE You must be logged in as root to enter system commands.

SYNOPSIS

```
system <action> <parameter> <value>
```

DESCRIPTION

The system command is used to set and get the status of hai1000 series system parameters such as the date and time. It is also used to view and manage firmware upgrade packages.

ACTIONS

set	Sets system parameter(s).
get	Gets system parameter information.
package	Displays information about firmware upgrade packages. If a filename is specified, displays information about a specific package, or installs or downloads the package file.

SYSTEM SET/GET PARAMETERS

Parameter	Value
date	mm/dd/yyyy
time	hh:mm:ss
tftpipaddr	(TFTP IP Address) 0.0.0.0
tftpfile	(TFTP Filename) file_name
dns	Domain name initialization
revision	Revision information

System package Parameters

Parameter	Description / Values
package list	Displays a list of downloaded packages (if packages have already been downloaded to the unit).
package info [<filename.hai>]	Displays information about the currently installed package. If a filename is specified, displays information about a specific package.
package install <filename.hai>	Installs the specified package.
package download <filename.hai> [tftpipaddr]	Downloads the specified package using TFTP. If no IP address is specified, the system uses the tftp server address configured in haicfg.
package delete <filename.hai>	Deletes a previously installed package.

Examples

system set time 12:00:00	Sets the value of the Time parameter to 12:00:00.
system get time	Displays the status of the Time parameter: Time (hh:mm:ss) is 12:00:00
system package install hai1000.hai	Installs the firmware upgrade package hai1000.hai onto the unit.

See Also

- "Configuring System Settings" on page 202
- "Installing a Firmware Upgrade from the CLI" on page 95
- "Viewing and Configuring System Settings" on page 160 (Web interface)

writecfg

SYNOPSIS

```
writecfg [-d] [<filename>]
```

DESCRIPTION

The writecfg command is used to save the current configuration. writecfg saves every parameter of every card in the system, including Encoder/Decoder settings and stream destination and status (excluding the system IP address), in a file defined by <filename>.

If no pathname is specified, the file is saved in the active (local) directory and under /usr/share/haivision/config. If no filename is specified, the configuration is saved under defaultcfg.sh. However, you must enter the -d option in order for this configuration to be loaded at the next reboot.

OPTIONS

-d	Saves the configuration as the default configuration to be loaded at the next reboot. Two copies are saved: one in the active (local) directory and another under /usr/share/haivision/config.

EXAMPLES

writecfg	(Without parameters) Saves a copy of the configuration in the active directory only.
writecfg myconfig	(Without an extension) Writes to the file myconfig.cfg.
writecfg otherconfig.cfg	Writes to otherconfig.cfg.
writecfg -d myconfig.cfg	Writes to myconfig.cfg *and* saves it as the default configuration to be used at the next reboot.

SEE ALSO

- "Saving the Current Configuration" on page 207
- "readcfg" on page 279
- "defcfg" on page 258
- "Saving and Loading Configurations" on page 163 (Web interface)

APPENDIX B: Encoder/Decoder Parameter Reference

This appendix lists and describes the configuration parameters for the Encoder/Decoder modules on the hai1000 series.

NOTE This appendix is intended to be used as a reference for managing the hai1000 series using either the Web Interface, CLI, or SNMP.

Topics In This Appendix

Introduction

When establishing audio/video services on the hai1000 series, you can either accept or change the default settings for the Encoder/Decoder modules. This appendix provides full details on all the audio/video parameters available to configure and monitor the status of this module according to your requirements.

For an introduction to the Encoder/Decoder modules and multimedia services provided by the hai1000 series, see Chapter 1: “Product Overview”.

Encoder/Decoder Parameter Groups

The Encoder/Decoder modules are controlled through the following MIB parameter groups:

Card Group

The **Card Group** parameters provide an overview of the state and configuration of a particular Encoder/Decoder module. Also, the action parameter may be used to reset the module or switch the MPEG coding value for multi-format codec cards (i.e., from MPEG-2 to MPEG-4 AVC). There is one **Card Group** per module.

Table B-1 lists the Card Group parameters, attributes, and values along with a description of each parameter. Default values are indicated by [d].

Table B-1 Card Parameters

Parameter	Attr	Values	Description
CardSlot	R	0..4 (hai1060) 0 (hai1020)	Indicates the number of the service slot in which the module is installed. This parameter is required for all commands.
CardType	R	unknown(1) hm2e(4) hm2d(5) hm2ed(6) hm4e(7) hm4d(8) hm4ed(9) hd4ed(14) hd4e2d2(15)	Indicates the type of module:
Hw Rev	R	<string>	Indicates the production revision of the module.
Boot Rev	R	<string>	Indicates the revision of the firmware executed at module power-up.
Appl Rev.	R	<string>	Indicates the revision of the firmware that the module executes while in service. This code is downloaded automatically at initialization time.
action	R/W		Sets the module for reset, clearing statistics, or switching the MPEG coding value for multi-format cards. Results are reported in the module State. An Action request momentarily displays the selected action. When the action is accepted, this parameter returns to None. NOTE: (3), (4), (5) and (7) are reserved for future use. The Action request choices are:

Table B-1 Card Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		none(1)[d]	No action. Default.
		reset(2)	Forces re-initialization of the module, as when power is applied to it.
		clearstats(6)	Resets all statistics counters of all the module's MIB statistics tables to zero.
		setalgorithm(8)	(Multi-format codecs only) Switches the MPEG coding value for the card to the value specified in the CtrlReg1 parameter. Takes effect upon the next system reboot.
CtrlReg1	R/W		(Multi-format codecs only) Specifies the MPEG coding value for the card, either:
		00:00:00:02	MPEG-2
		00:00:00:04	MPEG-4
State	R		Displays the current module operating State resulting from selections made in the action parameter. NOTE: (6) and (7) are reserved for future use. Descriptions that may appear are:
		reset(1)	Transition state. The module is being reset.
		loading(2)	Transition state. The module is loading its local processors and devices.
		init(3)	Transition state. Initial configuration after reset is released.
		working(4)[d]	Steady state. Normal operation.
		fault(5)	Steady state. The module is unable to perform normal operation due to internal condition. See InfoClass, ClassData, and Encoder or Decoder Fault Reason parameters for details.
		boot(8)	Transition state. Early board initial configuration (execution from the module boot PROM).
		config(9)	Transition state. The module is receiving its operating parameters from the hai1000 series host.

Table B-1 Card Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		cached(10)	Steady state. There is no MPEG module installed, but a configuration exists.
InfoClass	R		Under normal operation, indicates that card capability information can be read from the ClassData parameter. If the module is unable to recover from a fault, displays the fault reason. Please take note of these values if you are contacting Haivision Technical Support. The fault reasons that may appear are:
		none(1)[d]	No fault reported.
		hardwarefault(2)	Failure of a hardware component of the module. The module needs to be replaced if the problem persists
		softwarefault(3)	Failure of a software component of the module.
ClassData	R	<integer>	Additional information about the InfoClass.
		0 (zero) [d]	No fault reported.
		non-zero value	Fault code.
		XX:XX:...(i.e., 4 octets)	Indicates available MPEG coding capability for the card: • XX:XX:..02 = MPEG-2 • XX:XX:..04 = MPEG-4 • XX:XX:..06 = capable of being set to either MPEG-2 or MPEG-4. i.e., the card is reconfigurable/multi-format.
Fault LED	R	off(1) [d], on(2)	Reflects the state of the FT (Fault – red) LED on the module front panel. Lit if the module is in reset or fault state.
Major LED	R	off(1) [d], on(2)	Reflects the state of the MJ (major alarm – amber) LED on the module front panel. Lit if the module is in reset state.
Minor LED	R	off(1) [d], on(2)	Reflects the state of the MN (minor alarm – amber) LED on the module front panel. Lit if the module is in reset state.

Table B-1 Card Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
Ctrl Reg1	R/W	XX:XX:...	Control Register 1. The maximum length is 4 octets. (For Haivision use)
Ctrl Reg2	R/W	XX:XX:...	Control Register 2. The maximum length is 4 octets. (For Haivision use)

Encoder Control Group

The **Encoder Control Group** parameters control the behavior of a specific encoder channel or port on an Encoder/Decoder module.

Table B-2 lists the Encoder Control Group parameters, attributes, and values along with a description of each parameter. Default values are indicated by [d].

Table B-2 Encoder Control Parameters

Parameter	Attr	Values	Description
CardSlot	R	0..4 (hai1060) 0 (hai1020)	The number of the service slot in which the module is installed. This parameter is required for all commands.
CardPort	R		The port number is the logical ID of the encoder for the session.
		0..1	Specifying a port number is not required for either the HM4ED or HM2ED module since there is only one encoder port (0). If omitted on the Mako Dual-Encoder / Dual-Decoder, the command applies to both ports.
EncoderAction	R/W		The operating mode of the encoder. When this parameter is changed, the action performed by the encoder is immediate. Results of selections made to this parameter are reported in the Encoder Status Group for the module. When the module is Reset, this parameter returns to the previous mode. NOTE: (5) is reserved for future use. The Action request choices are:
		connect(1)[d]	Default operating mode. Encodes the incoming video/audio signal.
		disconnect(2)	Disables the encoder. All encoding and transmission is stopped.

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		reset(3)	Forces re-initialization of this encoder section, as when power is applied to it. Will return to previous state upon reset completion. CAUTION: Resetting the Encoder will reset the Decoder as well as the Encoder on the same codec and will result in an interruption of service for approximately 10 seconds. We recommend that reset be reserved for diagnostic and debugging purposes.
		localloopback(4)	Encodes the video+audio output and then loops it back to the Local decoder.
		clearstats(6)	Resets the statistics for the encoder.
idlecells	R/W	off(1)[d], on(2)	When enabled, causes the insertion of IDLE TS cells into a TS stream when necessary.
Encoder Video Parameters			
VideoMute	R/W	off(1)[d], on(2)	When enabled, stops video encoding. NOTE: For audio only transport, the Decoder SyncMode must be Fixed, STC or Audio (i.e., *not* Video). (See page 316.)
VideoBitrate -	R/W		The Video Raw Elementary Stream bitrate (kbps).
Mako		256..10000 kbps, 6000 [d]	
HM4ED		150..6000 kbps, 2000 [d]	
HM2ED		400..10000 kbps, 6000 [d]	
VideoPictureRate Mako only	R/W	0..60	The video frame rate per second. NOTE: For Dual-Encoders, Enc x.0 has priority over Enc x.1. This means the resources needed for Enc x.0 will be fully satisfied first. Then the remaining resources will be assigned to Enc x.1.

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
VideoLoopback	R/W		Enables video loopback:
		off(1)	Normal operation.
		local(2)	Loops uncompressed video from video A/D to video D/A. (Diagnostic tool for troubleshooting; see "Video, Audio and Local Loopbacks" on page 309.)
VideoStd	R/W		The operating video standard of this encoder. IMPORTANT: This *must* be set to the same value as the decoder that receives the data. For more information, see VideoStd on page 315. NOTE: (3), (4) and (5) are reserved for future use.
		ntsc(1)	National Television Systems Committee (North America and Asia).
		pal(2)	Phased Alternate Line (Europe).
		auto(6)[d]	Auto-detects the standard of the received video for the *selected* input connector type (either Composite, S-Video, *or* SDI). NOTE: Auto-detect will only detect the standard for the *selected* video input interface (i.e., Composite, S-Video, Component, *or* SDI).
VideoInput	R/W		The type of video input connector to use. IMPORTANT: You must select the video *input* connector type.
HM4ED, HM2ED only		composite(1) ([d]HM4ED/HM2ED)	In a Composite signal, the luminance information is mixed with the chrominance information. The encoder has to separate these components before it can compress them.
HM4ED, HM2ED only		svideo(2)	With S-Video, the luminance and chrominance signals are sent on different wires, thus providing better separation and improving the sharpness of the image and eliminating some artifacts (e.g., "dot-crawling").

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
all codecs		component(3)	With Analog Component Video / YP_BP_R, the brightness and color components of the signal are maintained separately so that they do not interfere with each other in order to maintaining signal clarity. NOTE: (Mako) With Component video input, the Video Standard is auto-detected by the system.
all codecs		sdi(4) ([d]Mako)	With SDI (Serial Digital Interface), the signal is sent serially over one coaxial cable. There is no loss due to conversion, and the audio signal can be embedded with the video signal. NOTE: (Mako) With SDI video input, set the Video Standard to: • ntsc or pal = SD input • auto = Mako For a dual-encoder Mako, the default is sdi for Enc x.0, and component for Enc x.1.
Filter HM4ED, HM2ED only	R/W	comb(1)[d], notch(2)	The video input filter to use. Applies to Analog video only. NOTE: The comb filter has a better frequency response of the luminance and thus provides a sharper image at the expense of requiring more bits to encode the images. Changing the filter is likely to make minor improvements.
CompMode	R/W		The Video Compression Mode:
		i(1)	I frames only; lowest delay; highest bandwidth
		ip(2) [d]	I and P frames only; low delay; high bandwidth NOTE: The Mako encoder only supports I and IP frames.

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
HM4ED, HM2ED only		ibp(3)	I, P and B frames NOTE: (MPEG-4 AVC only) Setting the Encoder Bitrate to 5Mbps with IBP may cause the corresponding Decoder RX LED to flash amber intermittently. For this reason, we recommend that you avoid using B frames with higher bitrates.
HM4ED, HM2ED only		ibbp(4)	I, P and B frames; highest delay; lowest bandwidth.
GopSize	R/W		The Group of Pictures size for the encoded video.
Mako		0..1000, 100[d]	
HM4ED		1..300, 30 [d]	
HM2ED		1..127, 30[d]	
PicSize	R/W		The Video Picture Size (Resolution). The number of lines and pixels per line to be encoded.
Mako/HM4ED only		ccir601(1)[d]	(also known as Full D1, or SD) 720 pixels/lines x 480 lines (NTSC) 720 pixels/lines x 576 lines (PAL)
		hhr(2)	(Half Horizontal Resolution, or Half D1) 352 pixels/lines x 480 lines (NTSC) 352 pixels/lines x 576 lines (PAL)
Mako only		3/4(4)	(3/4 HD: This is 3/4 of the horizontal resolution) 960 pixels/lines x 720 lines (720p) or 1440 pixels/lines x 1080 lines (1080i/p)
VbvDelay HM4ED, HM2ED only	R	0..75000, 0 [d]	VBV (Video Buffer Verifier) Delay adjustment value. NOTE: The units are in 90 kHz ticks.

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
ptsOffset		0..300, 0 [d]	The number of milliseconds to add to the video Presentation Time Stamp (PTS) at the Encoder level. Specifying a non-zero value will delay the presentation of the video by that amount of time before it is sent over the network. Associated audio remains unchanged. NOTE: The Decoder SyncMode must be set to video or audio in order for this parameter to have an impact.See SyncMode.
Encoder Audio Parameters			
AudioInput	R/W		The type of Audio Input connector for the Encoder: NOTE: For Mako or SDI boards, you must select the Audio Input signal type.
		analog(1)[d]	Analog audio uses the HD-15 D-Sub input connector.
		sdi1(2)	Serial Digital Interface Group 1. SDI audio is embedded in the same stream as the video and therefore uses the same BNC connector as the video.
Mako only		none(0), Analog(1), Sdi1(2), Sdi1ch12(3), Sdi1ch34(4), Analog12(5), Analog34(6)	• none • 4ch. Analog • 4ch. SDI • 2ch. SDI (1-2) • 2ch. SDI (3-4) • 2ch. Analog (1-2) • 2ch. Analog (3-4)

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
AudioLevel	R/W	6..20, 6 d	Adjusts the maximum analog Audio Input level (0 dBfs) from +6dBU up to +20dBU. This is useful in applications such as broadcast and streaming to allow higher audio headroom. NOTE: This only applies to Analog Audio Input.
AudioMute	R/W	off(1)d, on(2)	When enabled, stops encoding audio. NOTE: For video only transport, the Decoder SyncMode must be Fixed, STC or Video (i.e., *not* Audio). (See page 316.)
AudioBitrate	R/W	32, 64, 128, 256, 384 kbps, 256 d	The bitrate of the Compressed Audio Elementary Stream (ES) in kbps.
AudioLoopback	R/W		Enables audio loopback:
		off(1)d	Normal operation.
		local(2)	Returns the output of audio A/D to audio D/A.
AudioAlgo	R/W		The audio compression algorithm:
HM2ED only		mpeg1Layer2(2)d	Encodes audio using the MPEG-1 Layer 2 algorithm.
Mako/HM4ED		mpeg2AacLcAdts(3)	Encodes audio using the 13818-7 MPEG-2 AAC-LC algorithm with an ADTS header.
Mako/HM4ED		mpeg4AacLcLoas(4)	Encodes audio using the 14496-3 MPEG-4 AAC-LC algorithm with a LOAS header.
Mako/HM4ED		mpeg4AaclcRaw(5)	Encodes audio using the 14496-3 MPEG-4 AAC-LC algorithm without any encapsulation.
Mako/HM4ED		mpeg4AacLcAdts(6)	Encodes audio using the 14496-3 MPEG-4 AAC-LC algorithm with an ADTS header.
AudioCrc Mako/HM4ED only	R/W	off(1)d, on(2)	(MPEG-4 AVC only) Enables generation of the optional 16 bit CRC (Cyclic Redundancy Check) for each audio frame.

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
AudioMode	R/W		Number and type of audio channels to encode:
		mono(1)	Only Left input is encoded and transmitted. NOTE: The decoder will play the stream on Left and Right outputs.
		stereo(2)[d]	Standard encoding of Left and Right audio channels.
		dualchannel(3)	Optimization to use when Left and Right channels are totally independent signals.
		jointstereo(4)	Optimization to use when stereo channel is defined as Left+Right and Left-Right signals.
HM4ED, HM2ED only		dualstereo(5)	Encoding of two stereo pairs (four channels).
HM4ED, HM2ED only		quadmono(6)	Encoding of four single channels.
SampleRate	R/W	32, 48 kHz, 48 [d]	Frequency at which the analog audio signal is digitized. (kHz)
Program Parameters			
VideoPid	R/W	16..8190, 33 [d]	Video Packet Identifier
AudioPid	R/W	16..8190, 36 [d]	Audio Packet Identifier.
DataPID	R/W	16..8190, *40* [d]	Data Packet Identifier. Used for KLV metadata.
PcrPid	R/W	16..8190, *34* [d]	PCR (Program Clock Reference) Packet Identifier. Time stamp in the TS from which the decoder timing is derived.
PmtPid	R/W	16..8190, *32* [d]	PMT (Program Map Table) Packet Identifier
Advanced H.264 Video Parameters			
Profile	R/W		The h.264 profile for the Encoder:
HM4ED / Standard Definition only		baseline(1)	Designed to minimize complexity and provide high robustness and flexibility for use over a broad range of network environments and conditions

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		main(2)	Designed with an emphasis on compression *coding efficiency* capability.
UseOpenGOP HM4ED / Standard Definition only	R/W	Off(1)[d], On(2)	Open GOPs allow the use of referenced pictures from the previous GOP at the current GOP boundary, i.e., when B Frames at the start of a GOP rely on I or P frames from the immediately previous GOP.
MinimumGOP HM4ED / Standard Definition only	R/W	1..300, *1* [d]	The minimum Group of Pictures size allowed for the stream.
OutputRateControl Mako/HM4ED	R/W	cbr(1)[d], vbr(2), vbrq(3), abr(4)	Selects the output rate control mode: • CBR: The stream is encoded at a set (i.e., constant) bitrate. • VBR: The stream is encoded at a variable bitrate. • VBRQ: A fixed Quantizer encodes the video. • ABR: The stream is encoded at a target average bitrate. CAUTION: Using VBRQ can result in "bursty" traffic. NOTE: Abr is available on the HM4ED only to maintain compatibility with v8.1.2 and previous hai1000 releases. Abr does not tightly enforce the bitrate limit and provides better latency in I and IP compression modes.

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
Quantizer	R/W	6..51, *26* [d]	Specifies the quantization applied to the stream. Quantization is typically used to reduce the amount of data required to represent a signal. Lower quantizer values increase the encoded video quality and produce larger file sizes, while higher quantizer values decrease encoded video quality and produce smaller file sizes. The default 26 offers the best quality. Changing this parameter is not recommended. NOTE: This parameter is only applicable with VBRQ OutputRateControl.
dbfilter	R/W	Off(1), On(2)[d]	Enables the use of the deblocking filter, which removes the block-like artifacts from low-quality, highly compressed videos, and greatly increases the overall video quality.
dbstrength	R/W	-6..6, *0*	Specifies the overall amount of deblocking to be applied to the picture. Higher values deblock more effectively, but also reduce sharpness and cause the entire image to be softened. The default value of 1 is almost always sufficient to get rid of most blocking.
TemporalDecimation	R/W	td_1(1) [d], td_2(2), td_4(4), td_8(8)	Specifies the extent of temporal decimation, used to reduce the average frame rate of an image sequence before compression to achieve high-compression ratios. NOTE: (Mako) This has been replaced by VideoPictureRate.
Interlacing	R/W		The coding mode for interlaced material:
HM4ED / Standard Definition only		Frame(1)	Frame coding mode: combines the two fields together

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		MBAFF(3) [d]	MBAFF (MacroBlock Adaptive Frame-Field) coding mode: combines the two fields to one single frame and adaptively chooses the frame or field coding mode for each pair of vertically adjacent macroblocks.
StillImageFilename		1 to 79 characters, none[d]	The name of the file containing the still image to be inserted when a stream is paused. NOTE: The file must be in .264 or .mp4 format. See "Configuring Still Images" on page 127. The CLI will attempt to locate the logo file in the current working directory (typically your home directory after a login) or the folder /usr/share/haivision/stills on the hai1000 Host file system. Or you can specify the path if the file is in a different location.
Encoder Logo Overlay (Mako only)			
LogoDisplay	R/W	Off(1)[d], On(2)	Enables or disables display of the configured logo.
LogoFilename	R/W	1 to 79 characters, none[d]	Specifies the location from the host perspective of the logo image file: <logo image filename> NOTE: The file must be converted to Haivision's overlay image (.oly) format. See "Configuring an Encoder or Decoder Logo Overlay" on page 203. The CLI will attempt to locate the logo file in the current working directory (typically your home directory after a login) or the folder /usr/share/haivision/logos on the hai1000 Host file system. Or you can specify the path if the file is in a different location.
LogoTransparency	R/W	0..100, *0* [d]	Specifies the percentage of transparency for the logo. • 0 = no transparency (i.e., a completely solid/opaque logo), • 100 = fully transparent (i.e., a completely transparent/invisible logo)

Table B-2 Encoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
LogoScaling	R/W	25..400, *100* [d]	Specifies the scale factor for the logo (in percentage). • 0% (relative) • 25% (1/4 size) • 100% (no scaling) • 400% (4x) TIP: Relative scaling means the logo will stay the same size even when the resolution changes. See "Adjusting the Logo Position to Accommodate Resolution Changes" on page 205.
LogoPosition	R/W		Specifies the position of the logo.
		Absolute(1)	In Absolute mode the logo is positioned at the exact X and Y coordinates specified in the configuration (see below).
		Topleft(2), Topright(3), Bottomleft(4), Bottomright(5)[d], Centered(6)	Shortcuts for quick and easy positioning of the logo.
LogoXCoordinate	R/W	1[d]..1920	Position of the logo on the X axis. (The origin is the top left corner of the display area.) Only takes effect if the Logo Position is set to Absolute. NOTE: The X and Y coordinates are used to position the logo on a reference display of 1920 by 1080. As the input resolution changes, the logo's position is updated proportionately to give a similar location on the display. TIP: When you enter the enc get command, the LogoX and LogoYCoordinate parameters return the current location of the logo (regardless of the Logo Position setting).
LogoYCoordinate	R/W	1[d]..1080	Position of the logo on the Y axis (see above). Only used if the Logo Position is set to Absolute.

Video, Audio and Local Loopbacks

Figure B-1 illustrates the Loopback options for the Encoder/Decoder module.

For a mapping of Web Interface and CLI equivalents for the loopback options, see Table B-3 on the following page.

Figure B-1 Encoder/Decoder Loopback Options

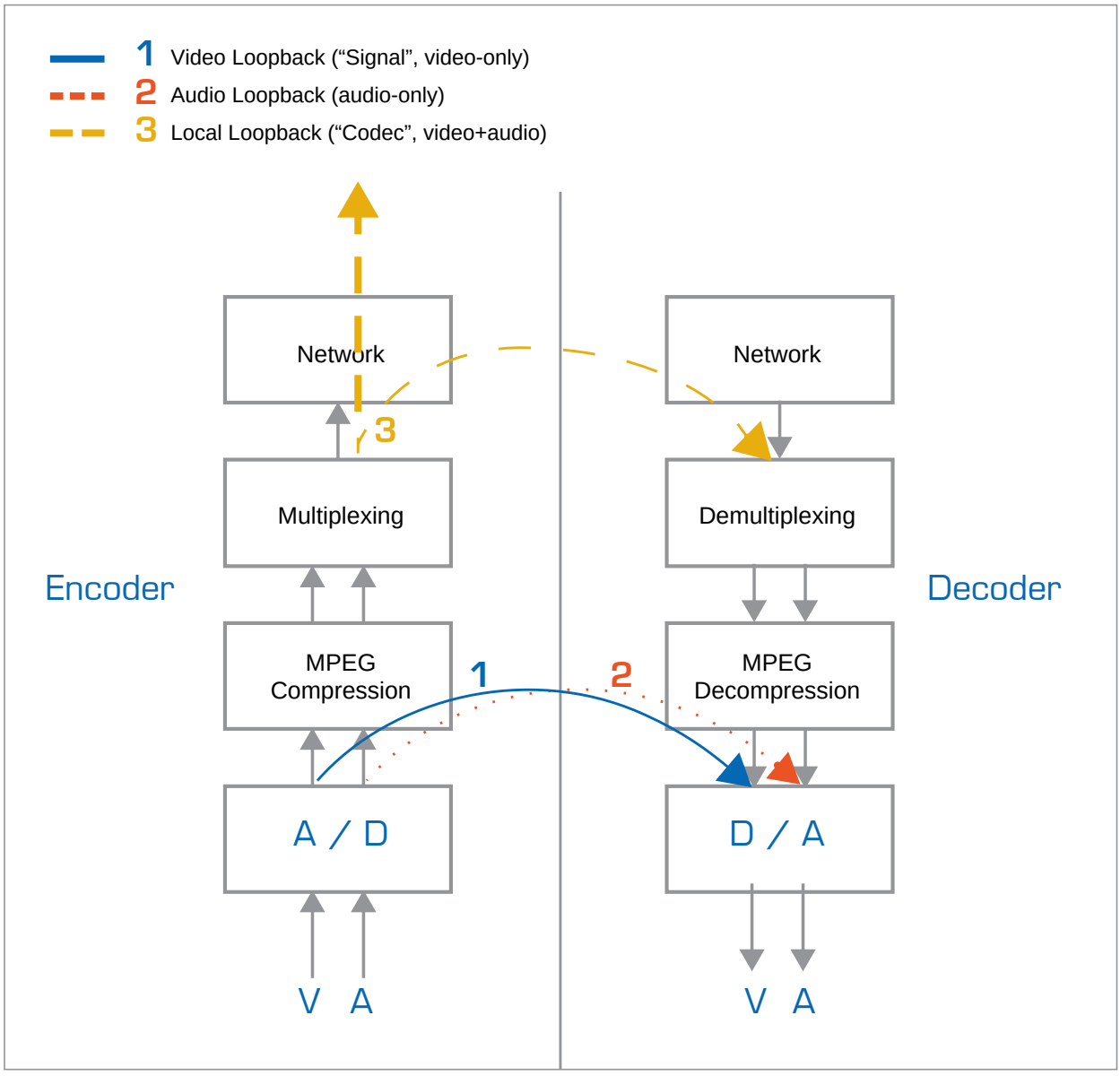


Table B-3 Loopback Command Equivalents

	Loopback Option / Description	Web Interface	CLI
1	**Video loopback ("Signal")** Loops uncompressed video from video A/D to video D/A. Typically used as a diagnostic tool for troubleshooting.	Encoder Settings: EncAction>Signal Loopback	VideoLoopback: Local
2	**Audio loopback** Returns the output of audio A/D to audio D/A.	not available from Web interface	AudioLoopback: Local
3	**Local loopback ("Codec")** Encodes the video+audio output and then loops it back to the Local decoder.	Encoder Settings: EncAction>Codec Loopback	EncoderAction: LocalLoopback

Encoder Status Group

The **Encoder Status Group** parameters display information that is useful when performing diagnostics or troubleshooting problems related to a specific encoder channel or port on an Encoder/Decoder module.

Table B-4 lists the **Encoder Status Group** parameters, attributes, and values along with a description of each parameter. Default values are indicated by [d].

Table B-4 Encoder Status Parameters

Parameter	Attr	Values	Description
CardSlot	R	0..4 (hai1060) 0 (hai1020)	The number of the service slot in which the module is installed. This parameter is required for all commands.
CardPort	R		The port number is the logical ID of the encoder for the session.
		0..1	Specifying a port number is not required for either the HM4ED or HM2ED module since there is only one encoder port (0). If omitted on the Mako Dual-Encoder / Dual-Decoder, the command applies to both ports.
Status	R		Indicates the operating state of the encoder channel resulting from selections made in the Encoder Control Group EncoderAction parameter. NOTE: (9) and (10) are reserved for future use. Descriptions that may appear are:
		Reset(1)	Transition state. The encoder is being reset.
		Init(2) [d]	Transition state. Initial configuration after reset is released.
		Loading(3)	Transition state. The encoder section is loading its local processors.
		Idle(4)	When a Disconnect EncoderAction request has been selected for the encoder.
		Start(5)	Transition state.
		AwaitFraming (6)	Steady state. The encoder is ready for operation, but is not receiving an MPEG stream from the network.

Table B-4 Encoder Status Parameters (Cont.)

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		Working(7)	Steady state. Normal encoder operation.
		Terminate(8)	Transition state
		Fault(11)	Steady state. The encoder is unable to perform normal operation due to internal condition. See InfoClass, ClassData, and Fault Reason parameters for details.
Fault Reason	R		Internal error code to provide additional information about an encoder failure. (For Haivision use)
		0 (zero) [d]	No fault reported.
		non-zero value	Fault code.
Transmit LED	R		Reflects the status of the associated encoder TX LED
		Off(1)[d]	This encoder is not configured.
		Green(2)	A valid MPEG stream is being encoded.
		Yellow(3)	No input signal.
Error LED	R		Reflects the status of the associated encoder ERR LED
		Off(1)[d]	Normal Operation. No errors or alarms.
		Green(2)	The encoder is being initialized.
		Yellow(3)	Alarm: the encoder is not operating properly.
VideoInputPresent	R	No(1)[d], Yes(2)	Indicates whether the encoder detects analog video input.
Video Standard	R		The number of lines and pixels per line to encode.
HM4ED, HM2ED		NTSC, PAL	

Table B-4 Encoder Status Parameters (Cont.)

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
Mako only		1280x720p50, 1280x720p60, 1920x1080i30, 1920x1080p30, 1920x1080i25, 1920x1080p25, 1920x1080p50, 1920x1080p60 720x480i30, 720x480p60, 720x576i25, 720x576p50, 640x480p60(VGA), 800x600p60(SVGA), 1024x768p60(XGA), 1280x768p60(WXGA), 1280x720p25, 1280x720p30	NOTE: The video is either interlaced or progressively scanned, indicated by i or p. Also, the number of frames per second is either 25 or 30 for interlaced, or 50 or 60 for progressively scanned.
VideoPictureRate Mako only	R	0..60	The video frame rate per second. NOTE: For Dual-Encoders, Enc x.0 has priority over Enc x.1. This means the resources needed for Enc x.0 will be fully satisfied first. Then the remaining resources will be assigned to Enc x.1.
VideoFrameCount	R	<integer>	Indicates the number of pictures encoded.
VideoErrorCount	R	<integer>	Indicates the number of video coding errors.
AudioFrameCount	R	<integer>	Indicates the number of audio frames encoded.
AudioErrorCount	R	<integer>	Indicates the number of audio-related errors encountered.
Resync Count	R	<integer>	Indicates the number of times the video Encoder has re-synchronized to the video source. When the input video source is started or switched from one source to another, this is a normal condition. When this happens during steady state operation, this normally indicates a video input source stability problem.

Decoder Control Group

The **Decoder Control Group** parameters control the behavior of a specific decoder channel or port on an Encoder/Decoder module. Keep in mind, however, that most audio/video parameters are defined at the encoder end.

Table B-5 lists the Decoder Control Group parameters, attributes, and values along with a description of each parameter. Default values are indicated by [d].

Table B-5 Decoder Control Parameters

Parameter	Attr	Values	Description
CardSlot	R	0..4 (hai1060) 0 (hai1020)	The number of the service slot in which the module is installed. This parameter is required for all commands.
CardPort	R		The port number is the logical ID of the decoder for the session.
		0..1	The port number is required to specify the second decoder port (1) on a Dual-Decoder module. NOTE: If omitted on the HM4ED or HM2ED module, it defaults to 0. If omitted on the Mako Dual-Encoder / Dual-Decoder, the command applies to both ports.
DecoderAction	R/W		The operating mode of the decoder. When this parameter is changed, the action performed by the decoder is immediate. The Action request choices are:
		connect(1)[d]	Default operating mode. Decodes the received MPEG stream.
		disconnect(2)	Disables the decoder. Any received data is discarded. Audio and video output mute actions are performed.

Table B-5 Decoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		reset(3)	Forces re-initialization of this decoder section, as when power is applied to it. Will return to previous state upon reset completion. CAUTION: Resetting the Decoder will reset the Encoder as well as the Decoder on the same codec and will result in an interruption of service for approximately 10 seconds. We recommend that reset be reserved for diagnostic and debugging purposes.
		clearstats(4)	Resets the statistics for the decoder.
Decoder Video Parameters			
VideoStd	R/W		The operating video standard of this decoder channel. IMPORTANT: This *must* be set to the same value as the encoder that is generating the stream sent to this decoder. For more information, see VideoStd on page 299. NOTE: (3), (4) and (5) are reserved for future use.
		NTSC(1)	National Television Systems Committee (North America and Asia).
		PAL(2)	Phased Alternate Line (Europe).
		Auto(6))[d]	Auto-detects the standard of the received video stream.
StillImgType	R/W		Still Image Type. Defines the behavior of the decoder when it is not receiving a video stream or when the video output is muted.
		Blue(2)[d]	Plays a blue video picture.
		Freeze(3)	Keeps displaying the last received picture.

Table B-5 Decoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
SyncMode	R/W		The mode of synchronization of sound and picture for this Decoder.
		STC(1)[d]	Synchronizes with the Encoder system clock.
		Fixed(2)	Decodes packets without synchronizing video and audio. This may result in A/V sync issues, but may be required in circumstances where network performance hinders synchronization. NOTE: Fixed mode is required for networks with a large amount of jitter.
		Video(3)	Video is the clock master. The audio Decoder waits for the video Decoder to start playing before audio plays.
		Audio(4)	Audio is the clock master. The video Decoder waits for audio Decoder to start playing before video plays.
SoftFilter - Mako	R/W	Off(1)[d], On(2)	Enables the use of filtering applied to render the image more homogeneous.
SoftFilterStrength - Mako	R/W	1..4, *1*	Specifies the overall amount of soft filtering to be applied to the picture. Higher values filter more effectively, but could deteriorate the image. The default value of 1 is almost always sufficient.
LowLatency	R/W	Off(1)[d], On(2)	Reserved for future use.
Buffering	R/W	Adaptive(1)[d], Fixed(2)	The Fixed Decoder Buffer (FDB) provides an extra buffer (or Delay) for network jitter compensation for the receiving session. The FDB is added to the minimum buffer size required for smooth video playback (with no skipped/repeat video frames). (The minimum buffer is not user configurable.) The FDB also directly affects the end-to-end latency; for example, 15ms of FDB will increase the end-to-end latency by an extra 15ms. NOTE: On a Mako Dual-Decoder, the FDB is supported on Port 0 only

Table B-5 Decoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
Delay	R/W	0..300, *100* d	This value is configurable when Fixed Decoder Buffering is selected. The default FDB value of 100 milliseconds means that the Decoder buffer is set to minimum buffer size + 100ms.
VideoOutput - Mako	R/W	none, SDI, Component, all , 0..3	The video port used to output decoded frames. NOTE: You must select all to output video to both ports, i.e., SDI video and DVI/RGBHV output.
VideoMute	R/W	Off(1)d, On(2)	When enabled, stops display of the received video stream, if any, and display still image. Action is immediate.
AspectRatio HDMI only	R/W		The width-to-height ratio of the video image:
		Pillarbox(1)d	4:3, i.e., standard TV
		Anamorphic(2)	16:9
Resolution HDMI only	R/W	auto, 640x480p60, 720x480i30, 720x480p60, 720x576i25, 720x576p50, 1280x720p50, 1280x720p60, 1920x1080i30, 1920x1080i25	The number of lines and pixels per line to send to the display. The video is either interlaced or progressively scanned, indicated by i or p. The end number 50 or 60 indicates the number of frames per second to send to the display.
Decoder Audio Parameters			
AudioOutput- Mako	R/W	none, Analog, Sdi1, Sdi1ch12, Sdi1ch34, Analog12, Analog34, all 0..7	The type of Audio Output connector for the Decoder:
AudioMute	R/W	Off(1)d, On(2)	When enabled, stops playing the received audio stream, if any. Action is immediate.
HDMIAudio	R/W	Off(1), On(2)d	Enables or disables audio on the HDMI output.

Table B-5 Decoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
AudioAlgorithm	R/W		The audio compression algorithm:
		Auto(1)[d]	Auto-detects the audio compression algorithm received by the decoder.
		mpeg4AacLcRaw(2)	Expects the audio compression algorithm used for the received audio to be MPEG-4 Part 3 AAC-LC (Advanced Audio Coding - Low Complexity) without either the ADTS or LOAS headers.
AudioSampleRate	R/W	Auto(1)[d], 32(2), 48(3)	Frequency at which the analog audio signal is digitized. (kHz)
AudioLevel	R/W	6..20	Adjusts the maximum analog Audio Output level (0 dBfs) from +6dBU up to +20dBU. This is useful in applications such as broadcast and streaming to allow higher audio headroom. This only applies to Analog Audio Output.
Volume	R/W	0..255 [d]	Linear volume attenuation control. 0 – off, 128 = 50%, 255 = 100%.
Program Parameters			
PSI Tables	R	On(2)	Use to automatically detect PID values. If set to On, the presence of valid PSI tables in the TS stream is mandatory.
VideoPID	R/W	16..8190, *33*	Video Packet Identifier
AudioPID	R/W	16..8190, *36*	Audio Packet Identifier
DataPID	R/W	16..8190, *40* [d]	Data Packet Identifier. Used for KLV metadata.
PcrPID	R/W	16..8190, *34*	PCR Packet Identifier

Table B-5 Decoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
Decoder Logo Overlay (Mako only)			
LogoDisplay	R/W	Off(1)[d], On(2)	Enables or disables display of the configured logo
LogoFilename	R/W	1 to 79 characters, none[d]	Specifies the location from the host perspective of the logo image file: <logo image filename> NOTE: The file must be converted to Haivision's overlay image (.oly) format. See "Configuring an Encoder or Decoder Logo Overlay" on page 203. The CLI will attempt to locate the logo file in the current working directory (typically your home directory after a login) or the folder /usr/share/haivision/ logos on the hai1000 Host file system. Or you can specify the path if the file is in a different location.
LogoTransparency	R/W	0..100, *0* [d]	Specifies the percentage of transparency for the logo. • 0 = no transparency (i.e., a completely solid/opaque logo) • 100 = fully transparent (i.e., a completely transparent/invisible logo)
LogoScaling	R/W	25..400, *100* [d]	Specifies the scale factor for the logo (in percentage). • 0% (relative) • 25% (1/4 size) • 100% (no scaling) • 400% (4x) TIP: Relative scaling means the logo will stay the same size even when the resolution changes. See "Adjusting the Logo Position to Accommodate Resolution Changes" on page 205.

Table B-5 Decoder Control Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
LogoPosition	R/W		Specifies the position of the logo.
		Absolute(1)	In Absolute mode the logo is positioned at the exact X and Y coordinates specified in the configuration (see below)
		Topleft(2), Topright(3), Bottomleft(4), Bottomright(5)[d], Centered(6)	Shortcuts for quick and easy positioning of the logo.
LogoXCoordinate	R/W	1[d]..1920	Position of the logo on the X axis. (The origin is the top left corner of the display area.) Only takes effect if the Logo Position is set to Absolute. NOTE: The X and Y coordinates are used to position the logo on a reference display of 1920 by 1080. As the output resolution changes, the logo's position is updated proportionately to give a similar location on the display. TIP: When you enter the dec get command, the LogoX and LogoYCoordinate parameters return the current location of the logo (regardless of the Logo Position setting).
LogoYCoordinate	R/W	1[d]..1080	Position of the logo on the Y axis (see above). Only used if the Logo Position is set to Absolute.

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Decoder Status Group

The **Decoder Status Group** parameters display information that is useful when performing diagnostics or troubleshooting problems related to a specific decoder channel on an Encoder/Decoder module.

Table B-6 lists the Decoder Status Group parameters, attributes, and values along with a description of each parameter. Default values are indicated by [d].

Table B-6 Decoder Status Parameters

Parameter	Attr	Values	Description
CardSlot	R	0..4 (hai1060) 0 (hai1020)	The number of the service slot in which the module is installed. This parameter is required for all commands.
CardPort	R	All	The port number is the logical ID of the decoder for the session.
		0..1	The port number is required to specify the second decoder port (1) on a Dual-Decoder module. NOTE: If omitted on the HM4ED or HM2ED module, it defaults to 0. If omitted on the Mako Dual-Encoder / Dual-Decoder, the command applies to both ports.
Status	R		Indicates the operating state of the decoder channel resulting from selections made in the Decoder Control Group DecoderAction parameter. NOTE: (9) and (10) are reserved for future use. Descriptions that may appear are:
		Reset(1)	Transition state. The decoder is being reset.
		Init(2)[d]	Transition state. Initial configuration after reset is released.
		Loading(3)	Transition state. The decoder section is loading its local processors.
		Idle(4)	When a Disconnect DecoderAction request has been selected for the decoder.
		Start(5)	Transition state.

Table B-6 Decoder Status Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
		AwaitFraming(6)	Steady state. The decoder is ready for operation, but is not receiving an MPEG stream from the network.
		Working(7)	Steady state. Normal decoder operation.
		Terminate(8)	Transition state.
		Fault(11)	Steady state. The decoder is unable to perform normal operation due to internal conditions. See Decoder Fault Reason parameter for details.
Fault Reason	R		Internal error code to provide Haivision with additional information about the decoder failure.
		0 (zero) [d]	No fault reported.
		non-zero value	Fault code.
Receive LED	R		Reflects the status of the associated decoder RX LED
		Off [d](1)	This decoder is receiving no data.
		Green(2)	A valid MPEG stream is being decoded.
		Yellow(3)	An erroneous stream is being received by this decoder. May also indicate that no video or audio is being received by this decoder.
Error LED	R		Reflects the status of the associated decoder ERR LED.
		Off [d](1)	Normal Operation. No errors or alarms.
		Green(2)	The decoder is being initialized.
		Yellow(3)	Alarm: the decoder is not operating properly.
VideoStandard	R		The operating Video Standard for the Decoder:
HM4ED, HM2ED		NTSC, PAL	

Table B-6 Decoder Status Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
Mako only		1280x720p50, 1280x720p60, 1920x1080i30, 1920x1080p30, 1920x1080i25, 1920x1080p25, 1920x1080p50, 1920x1080p60 720x480i30, 720x480p60, 720x576i25, 720x576p50, 640x480p60(VGA), 800x600p60(SVGA), 1024x768p60(XGA), 1280x768p60(WXGA), 1280x720p25, 1280x720p30	The number of lines and pixels per line to send to the display. NOTE: The video is either interlaced or progressively scanned, indicated by i or p. Also, the number of frames per second is either 25 or 30 for interlaced, or 50 or 60 for progressively scanned.
VideoPictureSize	R	ccir601, hhr, 3/4	The Video Picture Size (Resolution).
VideoPictureRate	R	0..60	The video frame rate per second.
VideoFrameCount	R	<integer>	Indicates the number of successfully decoded video frames.
VideoErrorCount	R	<integer>	Indicates the number of video-related errors encountered.
AudioAlgorithm	R/W		The audio compression algorithm:
		unknown(0)	There is no audio being received or the audio algorithm is unsupported.
HM2ED only		mpeg1Layer2(2)	(HM2ED only) The received audio is using the MPEG-1 Layer 2 algorithm.
HM4ED, Mako		mpeg2AacLcAdts(3)	The received audio is using the MPEG-2 Part 7 AAC-LC (Advanced Audio Coding - Low Complexity) algorithm with an ADTS header.
HM4ED, Mako		mpeg4AacLcLoas(4)	The received audio is using the MPEG-4 Part 3 AAC-LC (Advanced Audio Coding - Low Complexity) algorithm with a LOAS header.
HM4ED, Mako		mpeg4AaclcRaw(5)	The received audio is using the MPEG-4 Part 3 AAC-LC (Advanced Audio Coding - Low Complexity) algorithm without an ADTS or LOAS header.

Table B-6 Decoder Status Parameters

Parameter (Cont.)	Attr (Cont.)	Values (Cont.)	Description (Cont.)
HM4ED, Mako		mpeg4AacLcAdts(6)	The received audio is using the MPEG-4 Part 3 AAC-LC (Advanced Audio Coding - Low Complexity) algorithm with an ADTS header.
AudioSampleRate	R/W	Auto(1)[d], 32(2), 48(3)	Frequency at which the analog audio signal is digitized. (kHz)
AudioFrameCount	R	<integer>	Indicates the number of successfully decoded audio frames.
AudioErrorCount	R	<integer>	Indicates the number of audio-related errors encountered.
ResyncCount	R	<integer>	Indicates the number of times the decoder has re-synchronized with the received stream. When the input stream is started or switched from one source to another, this is a normal condition. When this happens during steady state operation, this may indicate that the data stream contains errors.

APPENDIX C: Technical Specifications

This appendix lists the technical specifications for the hai1000 series.

Topics In This Appendix

Video Specifications

Video Encoding Specifications – Mako Encoder

Video Specifications – Mako Encoder	
Signal (Input)	SDI (75Ω BNC)
	Analog Component/YPbPr and RGBHV (HD-15 connector)
Video Interfaces	SMPTE 292M (HD-SDI) / SMPTE 259M-C (SD-SDI)
	BT.709-5 / CEA 770.3-C (HDTV Analog Component)
	VESA DMT (VGA)
	DDWG DVI
Input Resolutions	
SDI connector only	HD/1080p (1920 x 1080 up to 30 frames per second)
SDI or YPbPr/Component connector	HD/1080i (1920 x 1080 up to 60 fields per second)
	HD/720p (1280 x 720 up to 60 frames per second)
	SD/576i (720 x 576i up to 50 fields per second)
	SD/480i (720 x 480i up to 60 fields per second)
YPbPr/Component connector only	SD/576p (720 x 576p up to 50 fields per second)
	SD/480p (720 x 480p up to 60 fields per second)
Input Computer Resolutions	
WVGA	1280x768 @ 60Hz
XGA	1024x768 @ 60Hz
SVGA	800x600 @ 60Hz
VGA	640x480 @ 60Hz
Bitrates	256 kbps to 10.0 Mbps

Video Specifications (Cont.)– Mako Encoder	
Compression Standard	ITU-T Rec. H.264 AVC / ISO|IEC 14496-10 (MPEG-4 Part 10: Advanced Video Coding)
	Baseline and Main Profile
	Up to Level 4.1
	I, IP framing
	Variable Group of Pictures (GOP) size
	Support for CAVLC
Latency	As low as 70 ms (end-to-end) when paired with a Mako Decoder

Supported Video Encoding Resolutions (Mako)

		Y,Pb,Pr & Y,Cb,Cr TV Input Resolutions /Frame Rates									
Output Resolutions		1080p		1080i		720p		480i	480p	576i	576p
Name	Resolution	30*	25	30*	25	60/30*	50/25	30*	60*	25	50
HD 1080	1920x1080	All	All	All	All	-	-	-	-	-	-
3/4 HD 1080	1440x1080	All	All	All	All	-	-	-	-	-	-
1/2 HD 1080	960x1080	All	All	All	All	-	-	-	-	-	-
HD 720	1280x720	-	-	-	-	All	All	-	-	-	-
3/4 HD 720	960x720	-	-	-	-	All	All	-	-	-	-
1/2 HD 720	640x720	-	-	-	-	All	All	-	-	-	-
SD 480	720x480	-	-	-	-	-	-	All	All	-	-
SD 576	720x576	-	-	-	-	-	-	-	-	All	All
4SIF	704x480	-	-	-	-	-	-	-	-	-	-
4CIF	704x576	-	-	-	-	-	-	-	-	-	-
3/4 D1 NTSC	540x480	-	-	-	-	-	-	All	All	-	-
3/4 D1 PAL	540x576	-	-	-	-	-	-	-	-	All	All
2SIF	704x240	-	-	-	-	-	-	-	-	-	-
2CIF	704x288	-	-	-	-	-	-	-	-	-	-
Half-D1 NTSC	352x480	-	-	-	-	-	-	All	All	-	-
Half-D1 PAL	352x576	-	-	-	-	-	-	-	-	All	All
SIF	352x240	-	-	-	-	-	-	-	-	-	-
CIF	352x288	OK / 16:9						OK / 14:3			

Legend:

*Also includes 1/1.001 frame rates such as 29.97 and 59.94

480p and 576p are only available over Component Video Interface (not SDI)

1080p is only available over SDI (not Component Video Interface)

Computer Graphics (VGA) Formats (Mako Input)

	Standard	Resolution (H x V)	*True Refresh Rate (Hz)	Active L/F	Total L/F	Pixel Clock Rate (MHz) (24-bit)
WXGA	VESA GTF	1280x768	60.00	768	795	80.136
WXGA	VESA DMT	1280x768	59.87	768	798	79.50
XGA	VESA DMT	1024x768	60.00	768	806	65.00
SVGA	VESA DMT	800x600	60.32	600	628	40.00
VGA	n/a	640x480	60.00	480	525	25.175

NOTE * The corresponding *Computer* Refresh Rate is 60 Hz for all the above formats.

Supported Graphic Encoding Resolutions (Mako)

Output Resolutions		RGB & RGBHV Computer Graphic Input Resolutions /Frame Rates			
		1280x768 60 Hz	1024x768 60 Hz	800x600 60 Hz	640x480 60 Hz
WXGA	1280x768	All	-	-	-
3/4 WXGA	960x768	All	-	-	-
1/x WXGA	640x768	All	-	-	-
XGA	1024x768	-	All	-	-
3/4 XGA	768x768	-	All	-	-
1/2 XGA	512x768	-	All	-	-
SVGA	800x600	-	-	All	-
3/4 SVGA	600x600	-	-	All	-
1/2 SVGA	400x600	-	-	All	-
VGA	640x480	-	-	-	All
3/4 VGA	480x480	-	-	-	No
1/2 VGA	320x480	-	-	-	No
SIF	352x240	-	-	-	-
CIF	352x288	OK / 5:3	OK / 4:3	No	No

Legend:

No: Encoder stops encoding.

Video Decoding Specifications – Mako Decoder

Video Specifications – Mako Decoder	
Signal (Output)	SDI (75Ω BNC)
	DVI-I Single-Link (combined Analog and Digital connector)
Video Interfaces	SMPTE 292M (HD-SDI) / SMPTE 259M-C (SD-SDI)
	BT.709-5 / CEA 770.3-C (HDTV Analog Component)
	VESA DMT (VGA)
	DDWG DVI
Output Resolutions	
SDI connector	HD/1080p (1920 x 1080 up to 30 frames per second)
	HD/1080i (1920 x 1080 up to 60 fields per second)
	HD/720p (1280 x 720 up to 60 frames per second)
	SD/576i (720 x 576i up to 50 fields per second)
	SD/480i (720 x 480i up to 60 fields per second)
DVI-I connector	HD/1080i (1920 x 1080 up to 60 fields per second)
	HD/720p (1280 x 720 up to 60 frames per second)
Output Computer Resolutions	
WVGA	1280x768 @ 60Hz
XGA	1024x768 @ 60Hz
SVGA	800x600 @ 60Hz
VGA	640x480 @ 60Hz
Bitrates	256 kbps to 10.0 Mbps

Video Specifications (Cont.)– Mako Decoder	
Decoding Capabilities	ITU-T Rec. H.264 AVC / ISO|IEC 14496-10 (MPEG-4 Part 10: Advanced Video Coding)
	Baseline and Main Profile
	Up to Level 4.1
	I, IP framing
	Variable Group of Pictures (GOP) size
	Support for CAVLC
Latency	As low as 70 ms (end-to-end) when paired with a Mako Encoder

Video Encoding/Decoding Specifications – Standard Definition

Video Specifications – Standard Definition (HM2F/H4F/H2C/H4C)	
Signal Input/Output	Composite (75Ω BNC)
	S-Video (4-pin Mini-DIN)
	Optional SDI @ 270 Mbps (75Ω BNC)
	Optional HDMI Upscaler (output only) – (Type-A HDMI)
Video Interfaces	NTSC (ITU-R BT.470 System M) or PAL (ITU-R BT.470 System B, D, G, H, I)
	SMPTE 259M SD-SDI
Resolution (NTSC/PAL)	Full D1 720x480i/576i (SD/Standard Definition; also known as CCIR601)
	Half D1 352x480i/576i (HHR/Half Horizontal Resolution)
Bitrates	150 kbps to 6.0 Mbps (MPEG-4 AVC) 400 kbps to 10.0 Mbps (MPEG-2)
Compression Standards	ITU-T Rec. H.264 AVC | ISO/IEC 14496-10 (MPEG-4 Part 10: Advanced Video Coding) Baseline and Main Profile
	ITU H.262 or ISO/IEC 13818-2: MPEG-2 video
	4:2:0 Main Profile @ Main Level
	Up to Level 3.0
	I, IP, IBP, IBBP framing
	Variable Group of Pictures (GOP) size with Intra-frame insertion at scene cut
	Support of CABAC and CAVLC
	Frame mode and Macroblock-adaptive frame-field (MBAFF) coding
Rate Control	Constant (CBR)
	Variable (VBR)
Latency	From 120ms to 300ms (end-to-end)

Audio Specifications

Audio Specifications	
Audio Interfaces	4 analog audio channels, balanced/unbalanced, XLR or RCA (HD-15 connector) through break-out cable
	SMPTE 272M Level A and Level C (Synchronous 48kHz): SDI Embedded Audio GROUP1 (75Ω BNC)
	HDMI digital audio
Bitrates	32, 64, 128, 256, 384 kbps
Sample Rates	32, 48 kHz (Analog Interface) 48 kHz (SDI/Serial Digital Interface)
Mode	Mono Stereo Dual Mono
Compression Standards	
Mako/ HM4ED	ISO/IEC 14496-3: MPEG-4 AAC ISO/IEC 13818-7: MPEG-2 AAC-LC
HM2ED	ISO/IEC 11172-3: MPEG-1 Layer 2 audio
A-V Synchronization	Under 20 milliseconds

KLV Data Specifications

KLV Data Specifications	
KLV Input	The serial KLV data is compliant to SMPTE 336M-2007. A 16-byte Universal Key is used to separate successive KLV packets (messages). The first 5-byte preamble (06 0E 2B 34 02) is used by the hai1000 to sync on the beginning of a new KLV packet.
	The incoming serial KLV data is also formatted as per SMPTE 336M-2007 Local Data Set Coding. Examples of KLV group coding are described in MISB Engineering Guideline EG 0601.1, Section 5 UAS Datalink Local Data Set. (See NOTE below for additional implementation considerations).
Stream Insertion	Compressed video frames (and associated KLV data) are time-stamped as per MISB RP 0604 Section 4.2. It is assumed that users will pre-configure the hai1000 Internal System Clock to the desired UTC time.
	The KLV metadata is inserted in the MPEG stream as per MISB RP 0604, Section 6.2 – Synchronous Carriage of Metadata.
References	SMPTE 336M-2007 Data Encoding Protocol using Key-Length-Value
	MISB EG 0601.1 UAS Datalink Local Metadata Set
	MISB RP 0604 Time Stamping Compressed Motion Imagery

NOTE In case the KLV serial data is transmitted from the source to the hai1000 over a relatively error-prone medium (such as wireless), it is up to the project's System Integrator to insure the integrity of the KLV packets by using data recovery mechanisms such as Forward Error Correction, etc.

Even with the recovery mechanisms provided by the project's System Integrator, there will still be some corrupted KLV data messages (e.g., the 5-byte key preamble is corrupted). The hai1000 will use serial data inactivity periods of 500ms to re-initialize the internal KLV packet framer. This is in order to minimize error propagation.

Again to minimize the chance for the hai1000 to not recover from potentially corrupted KLV data, the length of a KLV packet shall not exceed 500ms. Beyond this time limit, the hai1000 will consider that the incoming serial data was probably corrupted (it was not able to find the KLV packet boundaries) and will therefore look for the next 5-byte preamble.

IP Network Specifications

IP Network Specifications	
Standards	Ethernet 10/100 Base-T, auto-detect, Half/Full-duplex
	IGMPv3 (Internet Group Management Protocol) for IP Multicast
	IPv4 (Internet Protocol version 4)
	DHCP (Dynamic Host Configuration Protocol)
Connector	RJ45
IP Transport	MPEG Transport Stream as per ITU-T Rec. H.222.0 | ISO/IEC 13818-1
	Transport Stream over RTP (with RTCP)
	Transport Stream over UDP
	Direct RTP for video and audio on separate ports using RFC 3984 (RTP) video and MPEG AAC-LC
	QuickTime Stream using RFC 3984 Video Encoder encapsulation for video and AAC-LC audio payload as per RFC 3640
Application Protocols	HTTP (Web browser)
	SAP (Session Announcement Protocol)

Management Specifications

Management Interfaces	
Management	Command line over Telnet/RS-232
	FTP/TFTP Client/Server
SNMP	MIB-II (RFC 1213)
	MIB Traps (RFC 1215)

Regulatory/Compliance

Regulatory/Compliance	
Certification*	UL / CSA / CE
Compliance*	Electromagnetic Compatibility: EN 55022 (Emissions) / 55024 (Immunity)
	Safety (Low Voltage Directives): EN 60950-1 (CSA C/US) / IEC/EN 60950-1 (International /CB Scheme)
	Industry Canada Warnings: Canadian ICES-003, “Electromagnetic Compatibility” / Avis d’Industrie Canada: la norme NMB-003 du Canada, “La Compatibilité électromagnétique”
	FCC Part 15, Subpart B, Class A
Compliance with Environmental Regulations*	RoHS, European Union Directive 2002/95/EG
	RoHS, Marking Control for China, Regulation SJ/T 11364-2006
	*for details, see Appendix E: “Compliance Statements and Certifications”

Physical - hai1060

Physical Description – hai1060, 6 slot (3RU)	
Dimensions (H x W x D)	130 x 438 x 343 mm 5.125 x 17.25 x 13.5 in.
Weight	Approximately 9.1 kg [20 lbs.] fully loaded

Physical Description – hai1060, 6 slot (3RU)	
Power Requirements	100-240V AC, 50-60 Hz, 4 Amp. max. -or- -48V DC; 200 W max.
Temperature	0° to 50° C [32° to 122° F] operating -40° to 70° C [-40° to 158° F] non-operating
Relative Humidity	Up to 95% without condensation
Rackmount	19" included

Physical - hai1020

Physical Description – hai1020, 2 slot (1RU)	
Dimensions (H x W x D)	44 x 438 x 305 mm 1.75 x 17.25 x 12.0 in.
Weight	4.5 kg [approximately 10 lbs.]
Power Requirements	100-240V AC; 125 W max.
Temperature	0° to 50° C [32° to 122° F] operating -40° to 70° C [-40° to 158° F] non-operating
Relative Humidity	Up to 95% without condensation
Rackmount	19" included

APPENDIX D: Ordering Information

This appendix provides a list, including description and part numbers, of the hai1000 series items that can be ordered from your Haivision sales representative.

Topics In This Appendix

Hardware Components and Firmware for the hai1000 series

Table D-1 Hardware and Firmware for the hai1000 series

Module Name	Description	Part Number
hai1000 Chassis		
	hai1060 6 slot chassis with CPU & IP Ethernet Network Interface Blade (AC Power Supply)	F-1060-AC
	hai1060 6 slot chassis with CPU & IP Ethernet Network Interface Blade (DC Power Supply)	F-1060-DC
	hai1020 2 slot chassis with CPU & IP Ethernet Network Interface Blade (AC Power Supply)	F-1020
High Definition Codec Blades		
Mako	MPEG-4 AVC (H.264) HD Encoder/Decoder Blade - HD-SDI w/ AES/EBU and YPbPr/RGBHV w/ 4 Channel Analog Audio - 720p/1080i/1080p	B-1000-HDED
Standard Definition Codec Blades		
HMF2	MPEG-4 AVC (H.264) Encoder/Decoder Blade (HM4ED-F) - Analog S-Video and Composite Video, 4 Channel Audio	B-1000-HM4EDF
HMF2	MPEG-4 AVC (H.264) Decoder Blade (HM4D-F) - Analog S-Video and Composite Video, 4 Channel Audio	B-1000-HM4DF
HMF2	MPEG-4 AVC (H.264) Encoder Blade (HM4E-F) - Analog S-Video and Composite Video, 4 Channel Audio	B-1000-HM4EF
HMF2	MPEG-2 Encoder/Decoder Blade (HM2ED-F) - Analog S-Video and Composite Video, 4 Channel Audio	B-1000-HM2EDF
(Standard Definition) Codec Carrier Blades (Codec PICs required)		
HMF2	H.264 MPEG-4 AVC Encoder/Decoder Carrier Blade (HM4ED-C) - Requires 1 Input PIC and 1 Output PIC	B-1000-HM4EDC
HMF2	MPEG-4 AVC (H.264) Decoder Carrier Blade (HM4D-C) - Requires 1 Output PIC	B-1000-HM4DC
HMF2	MPEG-4 AVC (H.264) Encoder Carrier Blade (HM4E-C) - Requires 1 Input PIC	B-1000-HM4EC
HMF2	MPEG-2 Encoder/Decoder Carrier Blade (HM2ED-C) - Requires 1 Input PIC and 1 Output PIC	B-1000-HM2EDC
I/O Personality Interface Cards (PICs, Carrier Blade required)		
HMF2	Digital Input (SDI) PIC - SDI, Composite Video, 4 Channel Analog Audio, 4 Channel SDI Embedded Digital Audio	B-1000-PICSDI

Table D-1 Hardware and Firmware for the hai1000 series

Module Name	Description	Part Number
HMF2	Digital Output (SDO) PIC - SDI, Composite Video, 4 Channel Analog Audio, 4 Channel SDI Embedded Digital Audio	B-1000-PICSDO
HMF2	HD Digital Output (HDO) PIC - HDMI, Embedded Digital Audio, 4 Channel Analog Audio, 720p/60 or 720p/50	B-1000-PICHDO
Serial Data Mezzanine option		
4SP	4-Port Serial PMC (PCI Mezzanine) Card for KLV transport integration	B-1000-4SP
MPEG-2 Firmware		
HMF2	MPEG-2 Encoder/Decoder Firmware for any HMF2 MPEG-4 AVC Blade, enables MPEG-2 on a MPEG-4 AVC encode/decode Blade (switchable)	SW-1000-MP2
SIP Firmware		
Invitation	Firmware for SIP-based interoperability with Codian 4500 MCU, per hai1060 system	SW-1060-INV
Invitation	Firmware for SIP-based interoperability with Codian 4500 MCU, per hai1020 system	SW-1020-INV

System Cables for the hai1000 series

Table D-2 System Cables for the hai1000 series

Module Name	Cable Description	Length	Part Number
HOST Cables			
HOST	Management Cable for Host MNGT Port, adapter DB9 female to RJ45 jack		C-MGMT
High Definition Codec Cables			
Mako	Output cable adapter kit for Mako, containing the following parts: • DVI to HDMI output dongle • DVI to HD-15 DSUB output dongle • HD-15 DSUB to 5xBNC cable	10 ft	CA-HD-OUTSET
Audio Cables			
Mako / H2C / H4C	HD-15 DSUB to RCA Unbalanced Audio Cable, 4 channels	10 ft	CA-HM-4RCA10
Mako / H2C / H4C	HD-15 DSUB to XLR Female Balanced Audio Cable, 4 channels	10 ft	CA-HM-4XF10
Mako / H2C / H4C	HD-15 DSUB to XLR Male Balanced Audio Cable, 4 channels	10 ft	CA-HM-4XM10
H2C / H4C	HD-15 DSUB to RCA Unbalanced Audio Cable, 2 channels	10 ft	CA-HM-2RCA10
H2C / H4C	HD-15 DSUB to XLR Female Balanced Audio Cable, 2 channels	10 ft	CA-HM-2XF10
H2C / H4C	HD-15 DSUB to XLR Male Balanced Audio Cable, 2 channels	10 ft	CA-HM-2XM10
Power Cords			
Power cord	SJT shielded, 18/3, UL/CSA (included) North American standard		CP-NA
Power cord	Europe standard		CP-EUR
Power cord	UK/Ireland standard		CP-UK
Power cord	Australia/New Zealand/China standard		CP-AUSNZCH
Power cord	Italy standard		CP-IT
Power cord	Taiwan/Philippines standard		CP-TWPH
Power cord	Switzerland standard		CP-SW

NOTE Usage of recommended HDMI cables with molded ferrite (as provided in the hai1000 series package) is required for the HDMI Output card to meet requirements on the EMI/RFI interference.

APPENDIX E: Compliance Statements and Certifications

This appendix lists and describes the standards and certifications to which the hai1000 series complies.

Topics In This Appendix

General Requirements for the Environment (GRE)

Haivision's *General Requirements for the Environment* (GRE) document describes Haivision's global specification for restricting or prohibiting certain chemical compounds or materials in Haivision's products or manufacturing processes, and contains general product content restrictions (battery, material content, packaging materials, product labeling and marking requirements, and others). Refer to Table E-1: "GRE and RoHS Limits" for a summary of GRE limits.

Haivision's *General Requirements for the Environment* document is available on request.

RoHS Compliance

The components and manufacturing processes used to produce the hai1000 series are certified to meet RoHS requirements. RoHS ("Restriction of Hazardous Substances") refers to the European Union Directive 2002/95/EG on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

To comply with this directive, Haivision has ensured that all RoHS compliant components it uses meet the Standard of less than "0.1% by weight per homogeneous material for lead, chromium, mercury, PBB and PBDE, and 0.01% by weight and per homogeneous material for cadmium."

Table E-1 GRE and RoHS Limits

Substance/Use	GRE Limits by weight	RoHS Limits by weight
PBB flame-retardants must not be contained in plastic parts, components, materials and products	0.1% (1000 PPM)	0.1% (1000 PPM)
PBDE flame-retardants must not be contained in plastic parts, components, materials and products	0.1% (1000 PPM)	0.1% (1000 PPM)
Cadmium and its compounds	0.01% (100 PPM)	0.01% (100 PPM)
Hexavalent Chromium and its compounds (Metallic Application)	Not Present	0.1% (1000 PPM)
Hexavalent Chromium and its compounds (Non-metallic Application)	0.1% (1000 PPM)	
Lead and its compounds	0.1% (1000 PPM)	0.1% (1000 PPM)
Lead carbonates and sulfates must not be used in any paint applied to parts, components, materials or products	0.01% (100 PPM)	*Not covered

Table E-1 GRE and RoHS Limits

Substance/Use	GRE Limits by weight	RoHS Limits by weight
Lead in PVC coating for external cable, wire and cords	0.03% (300 PPM)	0.1% (1000 PPM)
Lead in PVC coating for internal cable, wire and cords	0.1% (1000 PPM)	
Mercury must not be used in parts, components, materials or products (including switches, relays or electrical contacts)	0.1% (1000 PPM)	0.1% (1000 PPM)

* For meeting GRE requirements, the more restrictive limits apply.

China RoHS

Marking Control for China

The marking of this product meets the requirements for *Marking for Control of Pollution by Electronic Information Product* (Regulation SJ/T 11364-2006) and *Regulations on Product Marking and Labeling* (1995).

中国国家产品控制标记

此产品之控制标记符合 SJ/T 11364-2006 中国电子信息产品污染控制管理办法标准及 1995 国家产品控制标记规定。

HDMI Output Card

The HDMI Output card has been tested for compliance with appropriate FCC and CE rules and regulations. Usage of recommended HDMI cables with molded ferrite is required to meet requirements on the EMI/RFI interference.

FCC Part 15, Subpart B, Class A Compliance

This device complies with Part 15 of the FCC Rules and Regulations. Operation is subject to the following two conditions:

1. This device may not cause harmful interference and
2. This device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Warnings

NOTICE: The Industry Canada Label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Electromagnetic Compatibility

This Class A digital apparatus complies with Canadian ICES-003.

Avis d'Industrie Canada

L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conformé aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement: L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

La Compatibilité électromagnétique

Cet appareil numérique de la classe A est conforme a la norme NMB-003 du Canada.

Deutschland

Installation Anweisungen: Installieren Sie die Telefonleitungen nicht während eines Gewitters. Installieren Sie die Telefonleitungen nicht in einem feuchten Raum, auβer die Dose entspricht den Vorschriften für Feuchträume. Berühren Sie unisolierte Telefonleitungen oder Einrichtungen nicht, auβer diese sind vom Telefonnetz getrennt. Vorsicht bei der Installierung oder Änderung von Telefonleitungen. *Achtung:* Es gibt keine durch den Benutzer zu wartende Teile im Gerät. Wartung darf nur durch qualifiziertes Personal erfolgen.

EC Declaration of Conformity

The products to which this declaration relates are in conformity with the following relevant harmonized standards, the reference numbers of which have been published in the Official Journal of the European Communities.

Electromagnetic Compatibility

EN 55022: 1998 + Amendment A1: 2000 Class A (Emissions)

Specification for limits and methods of measurement of radio interference characteristics of information technology equipment. Criteria tested include:

- Conducted Disturbance at Main Ports
- Conducted Common Mode (Asymmetric Mode) Disturbance at Telecommunication Ports
- Radiated Disturbance

EN 55024: 1998 + Amendment A1: 2001 Class A (Immunity)

Generic immunity standard Part 1 Residential, Commercial, and Light Industry. Criteria tested include:

- Electrostatic Discharge Immunity
- Conducted Disturbances, Induced by Radio-Frequency Fields Immunity
- Radiated, Radio Frequency, Electromagnetic Field Immunity
- Surge Immunity
- Electrical Fast Transient/Burst Immunity
- Voltage Dips, Short Interruptions and Voltage Variation Immunity

Safety

EN 60950-1: CSA C/US

Low Voltage Directive relating to electrical equipment designed for use within certain voltage limits.

IEC/EN 60950-1: International /CB Scheme

Low Voltage Directive relating to electrical equipment designed for use within certain voltage limits.

Mechanical Tests (hai1060 only)

Altitude Test GR-63-CORE, 4.1.3

Heat Dissipation Test GR-63-CORE, 4.1.4

Operating Cycle Test GR-63-CORE, 5.1.2

Drop Test (handling) GR-63-CORE, 5.3.2

“Office” Vibration Test GR-63-CORE, 5.4.2

Acoustic Survey Test GR-63-CORE, 5.6.2

APPENDIX F: Unicast, Multicast and Multi-Streaming

The hai1000 series supports three major types of RTP/RTCP stream configurations: Unicast, Multicast and Multi-streaming. This section describes these configurations, beginning with an overview of local and remote addresses.

For information on how to configure multicasting on the hai1000 series, refer to the appropriate section (depending on whether you are using the Web Interface or the CLI):

- To configure multicast streams using the Web Interface, see "Configuring Encoder Streams" on page 129 and "Configuring Decoder Streams" on page 154.
- To configure multicast streams using the CLI, see "Creating Multicast Sessions" on page 194.

Topics In This Chapter

Local and Remote Addresses

Each RTP session participant is configured with a Local and Remote descriptor consisting of an IP address, a UDP port and a Name.

For an Encoder (i.e., the sender), the Remote descriptor specifies where it will be sending RTP encapsulated MPEG streams and RTCP sender reports, whereas the Local descriptor specifies where it will be listening for RTCP receiver reports.

For a Decoder (i.e., the receiver), the Remote descriptor specifies where it will be sending RTCP receiver reports, whereas the Local descriptor specifies where it will be receiving RTP encapsulated MPEG streams and listening for RTCP sender reports.

In order to establish an RTP/RTCP based connection, the Remote/Local settings of the hai1000 series Encoder must correspond to the Local/Remote settings of the peer Decoder(s). The table below shows examples of correct Remote/Local settings for an unicast session on a hai1060 Encoder and its destination hai1060 Decoder(s):

hai1060-1 (Sender)		hai1060-2 (Receiver)	
Local IP Address	192.34.72.86	Local IP Address	192.34.72.125
Local UDP port	2300	Local UDP port	4000
Local Name	"teacher"	Local Name	"student"
Remote IP Address	192.34.72.125	Remote IP Address	192.34.72.86
Remote UDP port	4000	Remote UDP port	2300
Remote Name	"student"	Remote Name	"teacher"

Unicast Configurations

With IP Unicasting, an IP packet stream is sent from a single source to a single destination. Both the source and the destination of the MPEG stream are identified by unicast IP addresses. Though packets are sent on LAN segments and across routers, devices other than the source and destination will typically ignore them.

Multi-Streaming Configurations

With Multi-streaming, copies of the same MPEG stream are sent to up to five unicast destinations. A copy of an existing RTP stream is set up by specifying an RTP session with a unique Copy number and a different Remote destination from an existing RTP session entry. From the receiver's point of view, the Multi-streaming configuration is indistinguishable from a normal Unicast Configuration.

In the absence of any multicast address allocation policy or endpoint authentication mechanism, or for networks that don't support multicast traffic, Multi-streaming provides better privacy and functionality than IP multicasting for multi-user sessions at the expense of network bandwidth usage efficiency.

IP Multicast Configurations

With IP Multicasting, an IP packet stream is sent from a single source to a selected set of destinations using the network's packet replication mechanisms. Both the source and the destinations use the same multicast address to send and receive the IP stream.

Whereas RTP-encapsulated MPEG streams and RTCP sender reports are always sent and received over a multicast address, RTCP receiver reports may be sent and received over the same multicast address (full multicast) or through unicast connections (partial multicast).

IP Multicasting may be used for broadcast type applications or for interactive conferencing type applications using different configuration options: one shared multicast-address for all, one multicast-address per sender, or multicast/unicast mix. These configuration options are explained below.

One Multicast-Address for All

All the senders (encoders) and the receivers (decoders) in the conference share the same IP multicast address and different UDP ports for each sender/receiver stream.

The multicast packets are forwarded (and if necessary duplicated) by the IP network to all the members of the multicast group (conference members). Every receiver will thus receive RTP and RTCP packets from the every sender using a different UDP port. Every sender will receive RTCP Receiver Reports from every receiver.

The advantage of this configuration is that every participant can have a complete view of the conference senders and receivers. The disadvantage is that packets from all senders are delivered to all receivers whether they want them or not.

One Multicast-Address Per Sender

Each sender and the associated receivers use a unique IP multicast address.

The multicast packets are forwarded from a single sender to all the receivers. Selected receivers will thus receive RTP and RTCP packets from this sender. The sender will receive RTCP Receiver Reports from the associated receivers. The associated receivers will also see each other’s reports.

The advantage of this configuration is that the RTP stream from the sender might be forwarded to a subgroup of all potential receivers. The network bandwidth usage can thus be better controlled. The disadvantage is that several multicast addresses are required for a fully meshed conference.

Multicast/Unicast Mix

The sender sends to an IP multicast address, but receives at its own unicast address.

The multicast packets are forwarded from a single sender to all the receivers. Selected receivers will thus receive RTP and RTCP packets from this sender. The sender will receive RTCP Receiver Reports from the associated receivers. The receivers do not see each other’s reports.

The advantage of this configuration is that it improves privacy. The disadvantage is that endpoints have a limited view of the conference participants.

IP Multicasting on the hai1000 series

IP Multicasting is the transmission of data over IP to a *host group* identified by a single IP destination address.

- The hai1060 can simultaneously join up to eight multicast groups on its Ethernet interfaces.
- The hai1020 can simultaneously join two multicast groups on its Ethernet interfaces (two receivers corresponding to one dual-decoder).

The hai1000 series Ethernet interface will:

- receive multicast packets for the groups of which it is a member, as well as
- format and send “local multicast packets.”

NOTE The network must support IP Multicast.

Maximum Encoding/Decoding Load (Mako)

Keep in mind that the maximum bandwidth for each Mako blade is 30 Mbps. This means that you may have, for example, 3 x 10 Mbps or 6 x 5 Mbps encoder unicast streams.

IMPORTANT The bandwidth is shared between the encoder and the decoder; therefore, using 30 Mbps. for encoding leaves no throughput for decoder operation.

APPENDIX G: Open Source Software Credits

This appendix lists the Open Source software packages used in the hai1000 series haiOS:

Open Source Software Credits

Haivision is grateful to the following organizations for making available their Open Source software packages:

Package	Version	License	Organization URL	Description
Linux	2.6.9	GPL	www.kernel.org	Operating system
Busybox	1.00	GPL	www.busybox.net	Shell and service programs.
U-Boot	1.1.1	GPL	www.denx.de/en/Software/WebHome	CPU Boot loader
UClibc	0.9.26	LGPL	uclibc.org	Runtime libraries
Ethtool	3	GPL	www.sourceforge.net/projects/gkernel	Ethernet management/ diagnostic tool
hwclock	2.12	GPL	www.freshmeat.org	query/set h/w clock
E2fsprogs	1.35	GPL	e2fsprogs.sourceforge.net	ext2 filesystem utilities
msntp	1.6	Custom general public license	www.hpcf.cam.ac.uk	Simple Network Time Protocol (SNTP)
netsnmp	5.5	Modified BSD	www.net-snmp.org	Free SNMP agent and tools
vsftpd	2.0.4	GPL	vsftpd.beasts.org	FTP server
iproute2	2.6.23	GPL	http://www.linuxfoundation.org/en/Net:Iproute2	IP transport smoothing or “traffic shaping”

Package	Version	License	Organization URL	Description
Iperf	2.0.4	Custom BSD	http://sourceforge.net/projects/iperf	Iperf performance test
Openssh	4.6p1	BSD	http://www.openssh.com	Free version of the SSH connectivity tools
Openssl	0.9.8l	Apache	http://www.openssl.org	Open Source toolkit implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) protocols
Zlib	1.2.3	Custom	http://zlib.net	Compression Library (required by openssl)

Please refer to the URLs listed above for details of each Open Source licensing agreement. Code for GPL-related components is available upon request.

For additional information, refer to www.fsf.org/licensing.

APPENDIX H: Warranty Information

Haivision Network Video One (1) Year Limited Warranty

Haivision warrants its hardware products against defects in materials and workmanship under normal use for a period of ONE (1) YEAR from the date of equipment shipment ("Warranty Period"). If a hardware defect arises and a valid claim is received within the Warranty Period, at its option and to the extent permitted by law, Haivision will either (1) repair the hardware defect at no charge, or (2) exchange the product with a product that is new or equivalent to new in performance and reliability and is at least functionally equivalent to the original product. A replacement product or part assumes the remaining warranty of the original product or ninety (90) days from the date of replacement or repair, whichever is longer. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes Haivision's property.

EXCLUSIONS AND LIMITATIONS

This Limited Warranty applies only to hardware products manufactured by or for Haivision that can be identified by the "Haivision" trademark, trade name, or logo affixed to them. The Limited Warranty does not apply to any non-Haivision hardware products or any software, even if packaged or sold with Haivision hardware. Manufacturers, suppliers, or publishers, other than Haivision, may provide their own warranties to the end user purchaser, but Haivision, in so far as permitted by law, provides their products "as is".

Haivision does not warrant that the operation of the product will be uninterrupted or error-free. Haivision does not guarantee that any error or other non-conformance can or will be corrected or that the product will operate in all environments and with all systems and equipment. Haivision is not responsible for damage arising from failure to follow instructions relating to the product's use.

This warranty does not apply:

(a) to cosmetic damage, including but not limited to scratches, dents and broken plastic on ports;

(b) to damage caused by accident, abuse, misuse, flood, fire, earthquake or other external causes;

(c) to damage caused by operating the product outside the permitted or intended uses described by Haivision;

(d) to a product or part that has been modified to alter functionality or capability without the written permission of Haivision; or

(e) if any Haivision serial number has been removed or defaced.

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OBTAINING WARRANTY SERVICE

Before requesting warranty service, please refer to the documentation accompanying this hardware product and the Haivision Support Portal http://support.haivision.com. If the product is still not functioning properly after making use of these resources, please contact Haivision or Authorized Reseller using the information provided in the documentation. When calling, Haivision or Authorized Reseller will help determine whether your product requires service and, if it does, will inform you how Haivision will provide it. You must assist in diagnosing issues with your product and follow Haivision's warranty processes.

Haivision may provide warranty service by providing a return material authorization ("RMA") to allow you to return the product in accordance with instructions provided by Haivision or Authorized Reseller. You are fully responsible for delivering the product to Haivision as instructed, and Haivision is responsible for returning the product if it is found to be defective. Your product or a replacement product will be returned to you configured as your product was when originally purchased, subject to applicable updates. Returned products which are found by Haivision to be not defective, out-of-warranty or otherwise ineligible for warranty service will be shipped back to you at your expense. All replaced products and parts, whether under warranty or not, become the property of Haivision. Haivision may require a completed pre-authorized form as security for the retail price of the replacement product. If you fail to return the replaced product as instructed, Haivision will invoice for the pre-authorized amount.

APPLICABLE LAW

This Limited Warranty is governed by and construed under the laws of the Province of Quebec, Canada.

This Limited Hardware Warranty may be subject to Haivision's change at any time without prior notice.

Haivision Network Video End User Software License Agreement

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1.2 You. The individual or legal entity specified in the Entitlement, or for evaluation purposes, the entity performing the evaluation.

1.3 License Fee. License Fee shall mean the consideration paid to Haivision for use of the Licensed Software. The License Fee is part of the price paid for the relevant Product.

1.4 Licensed Software. Licensed Software shall mean the executable version of Haivision's computer software, program or code, in object code format (specifically excluding source code), together with any related material including, but not limited to the Reference Manuals or database schemas provided for use in connection with the Licensed Software and including, without limitation, all Upgrades through the date of installation.

1.5 Reference Manuals. Reference Manuals shall mean the most current version of the documentation for use in connection with the Licensed Software provided by Haivision to You.

1.6 Updates. Updates shall mean any periodic software releases, additions, fixes, and enhancements thereto, release notes for the Licensed Software and related Reference Manuals, (other than those defined elsewhere in this section as Upgrades) which have no value apart from their operation as part of the Licensed Software and which add minor new functions to the Licensed Software, but none so significant as to warrant classification as an Upgrade, which may be provided by Haivision to fix critical or non-critical problems in the Licensed Software on a scheduled, general release basis. Updates to the Licensed Software ("Version") are denoted by number changes to the right of the decimal point for a version and revision number (for example going from 2.0.0 to 2.1.3).

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3. TERM AND TERMINATION

3.1 Term. The license and service term are set forth in your Entitlement(s). Additionally, this Agreement may be terminated without cause by You upon thirty (30) days written notice to Haivision.

3.2 Termination for Breach. Your rights under this Agreement will terminate immediately without notice from Haivision if You materially breaches it or takes any action in derogation of Haivisions' rights to Software. Haivision may terminate this Agreement should any Software become, or in Haivision's reasonable opinion likely to become, the subject of a claim of intellectual property infringement or trade secret misappropriation.

3.3 Termination; Effect; Survival. Upon the termination of this Agreement for any reason: (a) all license rights granted hereunder shall terminate; (b) You shall immediately pay to Haivision all amounts due and outstanding as of the date of such termination or expiration; and (c) You shall return to Haivision all Licensed Software and all Haivision Confidential Information not otherwise required under the terms of this Agreement or certify that all such Licensed Software and Confidential Information have been destroyed. Notwithstanding any termination of this Agreement, the following provisions of this Agreement shall survive for the relevant period of time set forth therein, if any: Sections 2.2, 4.1, 4.2, and 5..

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4.1 Haivision Warranty.

(a) Haivision warrants that the Licensed Software will operate substantially in accordance with the Reference Manuals provided for a term of ninety (90) days (the "Warranty Period") after its delivery date. As Your sole and exclusive remedy for any breach of this warranty, Haivision will use its commercially reasonable efforts to correct any failure of the Licensed Software to operate substantially in accordance with the Reference Manuals which is not the result of any improper or unauthorized operation of the License Software and that is timely reported by You to Haivision in writing within the Warranty Period, provided that in lieu of initiating commercially reasonable efforts to correct any such breach, Haivision may, in its absolute discretion, either (i) replace the Licensed Software with other software or technology which substantially conforms to the Reference Manuals or (ii) refund to You a portion of the fee paid for the relevant Product, whereupon this Agreement shall terminate. This warranty shall immediately terminate if You or any third party makes or attempts to make any modification of any kind whatsoever to the Licensed Software.

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5.4 Waiver and Amendment. No modification, amendment or waiver of any provision of this Agreement shall be effective. No failure or delay by either party in exercising any right, power or remedy under this Agreement, except as specifically provided herein, shall operate as a waiver of any such right, power or remedy. Without limiting the foregoing, any terms and conditions of the Entitlement or similar materials submitted by either party to the other shall be of no force or effect.

5.5 Enforcement by Third Party. For any Licensed Software licensed by Haivision from other suppliers, the applicable supplier is a third party beneficiary of this Agreement with the right to enforce directly the obligations set forth in this Agreement against You.

5.6 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of Illinois, without regard to principles relating to conflicts of law.

5.7 Severability. If any provision of this Agreement is held by a court of competent jurisdiction to be contrary to law, such provision shall be changed and interpreted so as to best accomplish the objectives of the original provision to the fullest extent allowed by law and the remaining provisions of this Agreement shall remain in full force and effect.

5.8 Force Majeure. Neither party shall be liable to the other party for any failure or delay in performance to the extent that such delay or failure is caused by fire, flood, explosion, war, terrorism,

embargo, government requirement, labor problems, export controls, failure of utilities, civil or military authority, act of God, act or omission of carriers or other similar causes beyond its control. If any such event of force majeure occurs, the party delayed or unable to perform shall give immediate notice to the other party, and the party affected by the other's delay or inability to perform may elect, at its sole discretion, to terminate this Agreement or resume performance once the condition ceases, with an option in the affected party to extend the period of this Agreement up to the length of time the condition endured. Unless written notice is given within 30 calendar days after the affected party is notified of the condition, the latter option shall be deemed selected. During an event of force majeure, the affected party shall exercise reasonable effort to mitigate the effect of the event of force majeure.

If you have questions, please contact Haivision Network Video, 4445 Garand, Montréal, Québec, H4R 2H9 Canada.

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