Haivision

Makito™

Compact HD H.264 Video Encoder
User's Guide Version 2.3

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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.

Fan Blade

Do not touch or push the fan blade with fingers or other objects. Doing so may damage the fan and/or fan bearings, which can result in a noise problem as well as accelerated failure of the mechanical part.

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Haivision

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About This Guide

Welcome to the User's Guide for the Makito™ Compact HD H.264 Video Encoder, Version 2.3. This User's Guide describes how to install, configure, and manage the Makito to send 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

About Haivision

Haivision is a global leader in delivering advanced video networking, digital signage, and IP video distribution solutions. Haivision offers complete end-to-end technology for video, graphics, and metadata to help customers to build, manage, and distribute their media content to users throughout an organization or across the Internet. Haivision has specific expertise in the enterprise, education, medical/healthcare, and federal/military markets.

Haivision is based in Montreal and Chicago, with technical centers in Beaverton, Oregon; Austin, Texas; and Hamburg, Germany.

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 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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Email: info@haivision.com

Or visit our website at: http://www.haivision.com

Obtaining Documentation

You may download the Makito firmware, Release Notes, and user documentation, including this User's Guide through Haivision's Download Center at:
http://www.haivision.com/download-center/

NOTE   All customers may access the Download Center; however, a login is required. If you do not have a login, select the link to create an account.

Related Documents

In addition to this User's Guide, the following documents are also available through Haivision's Download Center (see previous link):

• Makito Quick Start Guide

• Makito Decoder User's Guide

• Makito v2.1 Hardening Guide

Service Support

Haivision is committed to providing the service support and training needed to install, manage, and maintain your Haivision equipment.

For more information regarding service programs, training courses, or for assistance with your support requirements, contact Haivision Technical Support via our Support Portal on our website at: http://www.haivision.com/support/

Document Conventions

The following document conventions are used throughout this User's Guide.

TIP   The light bulb symbol highlights suggestions or helpful hints.

NOTE   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, <u>could</u> 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 2.3 of the Makito introduces the following new feature:

Introduction of Makito-720p/1080i

The Makito-720p/1080i is an intermediate encoder product with capabilities between the Makito and the Barracuda. The Makito-720p/1080i is designed to act as a lower-cost alternative to the Makito for deployment in bundles with IPTV Furnace or Calypso. It targets video encoder applications that do not require 1080p or computer resolutions above 768p to be supported (i.e., 1080p50/60, 1400x1050p60, and 1280x1024p input signals are not accepted).

The new product SKUs are as follows:

- S/B-290E-SDI-M
- S/B-290E-DVI-M

For more information, see

PART I: Installation and Setup

CHAPTER 1: Introduction

This chapter provides a brief overview of Haivision's Makito Video Encoder, along with a description of the main hardware components and key features.

NOTE References to the "Makito" can be taken to include the following unless specifically stated otherwise:

- Makito Compact HD H.264 Video Encoder with DVI (#S/B-290E-DVI),

- Makito-SDI Compact HD H.264 Video Encoder with SDI (#S/B-290E-HDSDI), and

- Makito-720p/1080i (#S/B-290E-DVI-M or #S/B-290E-SDI-M).

Topics In This Chapter

Product Overview

The Makito Compact HD H.264 Video Encoder is Haivision's latest video networking solution, delivering high performance H.264 in a compact and cost-effective form factor. The Makito is ideal for multichannel enterprise IPTV delivery, for HD signage deployments, and for mass HD distribution/record environments such as schools, medical facilities, and professional training and simulation environments.

The Makito supports HD up to 1080p60 (Component Analog or Digital) or computer resolutions up to 1280x1024 at 75 Hz (RGB or DVI-D) input via its DVI-I connector. The Makito-SDI supports SDI, HD-SDI, 3G-SDI (the new standard for 1080p60), and Composite on its BNC interface. The Makito-SDI supports S-Video (for Standard Definition). Thus the Makito addresses video-over-IP encoding anywhere on a resolution / bandwidth scale from CIF as low as 150 kbps to Full HD at 15 Mbps.

The Makito-720p/1080i is also available as a lower-cost alternative to the Makito for deployment in bundles with IPTV Furnace or Calypso. It targets video encoder applications that do not require 1080p or computer resolutions above 768p to be supported.

Figure 1-1   Front View (Single Chassis)

Figure 1-2   Sample Rear View (Makito #B-290E-DVI, Single Chassis)

Makito Air

The Makito Air Ruggedized HD/SD H.264 Video Encoder incorporates the performance and power of the standard Makito in a ruggedized chassis and couples this with full KLV/CoT metadata capabilities. The Makito Air addresses Intelligence, Surveillance, Reconnaissance (ISR) challenges by delivering H.264 video from Standard Definition up to 1080p60 with metadata over IP. For details, see "Makito Air Interfaces and LEDs" on page 28.

Chassis Styles

The Makito is available in four chassis styles:

- as an ultra compact appliance for single channel encoding (shown in previous section),

- within a 4U high density chassis (MB21) that can contain up to 21 Makito encoders and/or decoders,

- within a 1U chassis (MB6) that can contain up to six Makito encoders and/or decoders, and

- the Makito Air Ruggedized HD/SD H.264 Video Encoder.

The MB21 and MB6 chassis are shown in the following figures.

Figure 1-3   Multichannel Chassis - Front View (Top - MB21, Bottom - MB6)

Figure 1-4　　Multichannel Chassis - Rear View (Top - MB21, Bottom - MB6-AC)

> **NOTE**　The MB6 is available with a single AC, DC, or medical grade AC power supply. For details, see "MB6 (Six-Slot) Chassis" on page 51.
>
> The Makito Dual Height Blade may be used in either the MB21 or MB6 chassis.

The Makito Air is shown in the following figure.

Figure 1-5　　Makito Air - Front and Rear Views

Applications

Typical examples of Makito applications include:

- IPTV Distribution – delivering video channels to viewers in schools, financial institutions, live event venues, control rooms, and within government organizations.

- Medical Systems – driving controlled and secure video throughout healthcare facilities enabling education, consultation, and procedural review.

- Streaming Services – connecting facilities, affiliates, and event locations with real-time high definition video, simultaneously addressing streaming and distribution challenges.

- ISR (Intelligence, Surveillance, Reconnaissance) [Makito Air] – combining the excellent image quality and performance of 1080p60 high definition video with KLV/CoT metadata capabilities in a ruggedized chassis.

Physical Description

Following is a description of the Makito interfaces, connectors, and LED status indicators:

System Interfaces (Rear Panel)

The Makito comes with a 10/100/1000 Base-T Ethernet Network interface for both traffic and management (RJ45).

Figure 1-6   Ethernet Connection (Makito #B-290E-DVI)
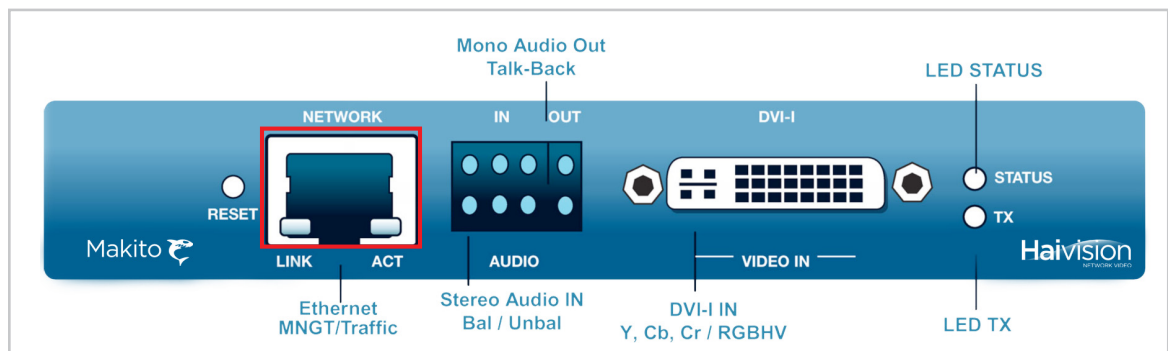
On the Makito Dual Height Blade, a computer can be connected to the COM1 serial port through its DB9 connector.

Figure 1-7   Serial Connection (Makito Dual Height Blade #B-290E-DVI-S)
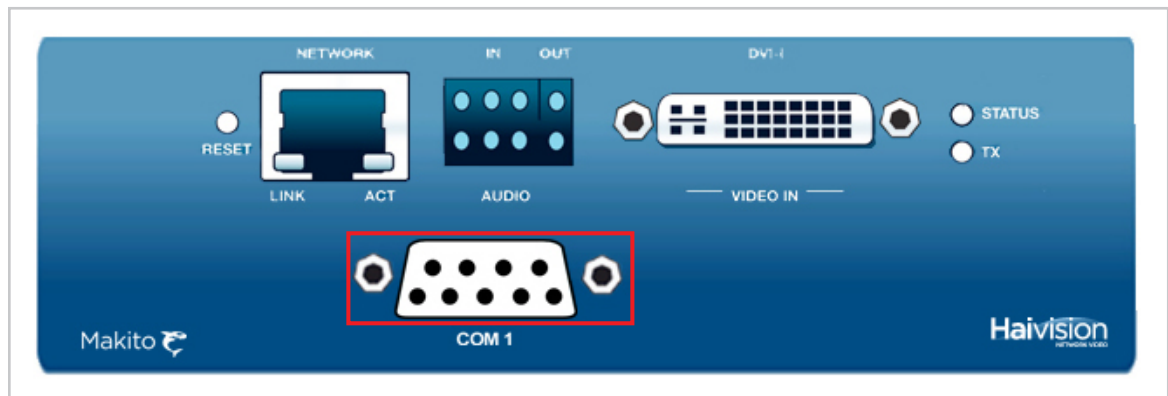
On the Makito-SDI, a computer can be connected to the COM1 RS-232/422 serial port through its RJ45 connector (Serial Management adapter required).

Figure 1-8   Ethernet and Serial Connections (Makito-SDI #B-290E-HDSDI)
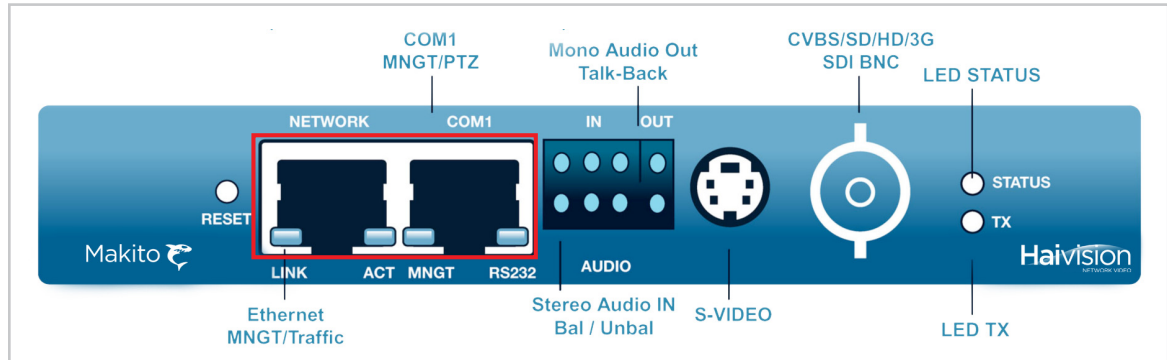
NOTE The COM1 port may also be used for KLV and CoT Metadata Capture and stream insertion. (This option must be installed at the factory.)

Related Topics

- "Connecting the Encoder to the Network and a Computer" on page 34
- "Serial Interface Setup" on page 36

Audio/Video Interfaces (Rear Panel)

> ℹ **NOTE** The Analog Audio interface is the same for both the Makito (B-290E-DVI) and the Makito-SDI (B-290E-HDSDI).

Makito DVI-I Input

The Makito video interface consists of a single DVI-I connector (shown below).

Figure 1-9   DVI-I Interface
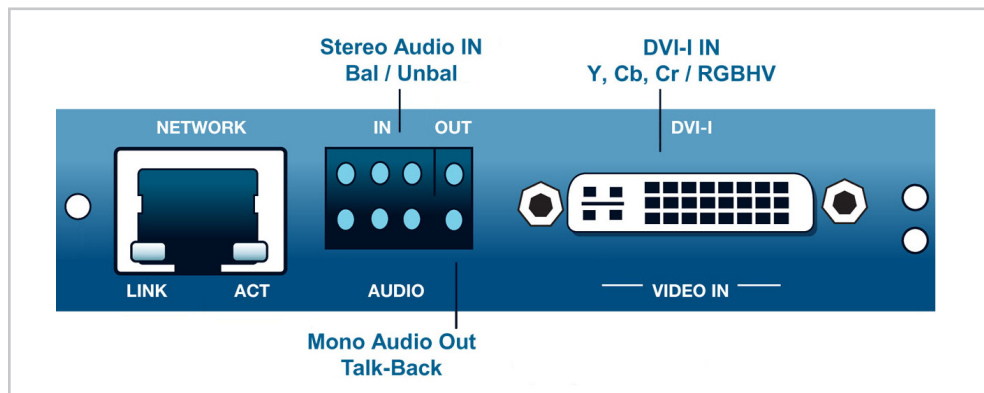
The DVI-I connector supports the following inputs:

- Component Analog video (Y,Pb,Pr / RGBHV)
- Component Digital video (Y,Cb,Cr / DVI)
- SD and HD video
- Computer graphics

Only one input format – either digital or analog – is encoded at a time.

> ℹ **NOTE** If the content is HDCP copy-protected, the stream will not be encoded.
>
> The Makito encoder supports EDID resolution capabilities negotiation.

Related Topics

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-

Makito-SDI BNC/S-Video Input

The Makito-SDI video interface consists of one BNC connector and one S-Video connector (shown below).

Figure 1-10   BNC/S-Video Interface
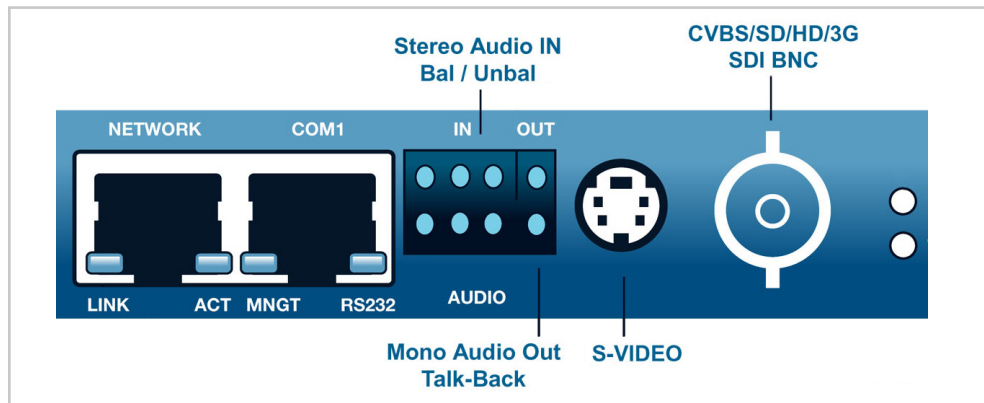
- The 4-pin Mini-DIN connector is used for S-Video input signals.
- The 75Ω BNC connector is used for Composite (CVBS), SD-SDI (Serial Digital Interface) and HD-SDI video input signals. It is also a 3G-SDI capable interface supporting 1080p 50/60 fps video @ 3Gbps.

  In addition, the BNC connector supports auto-detection of the HD resolution and embedded digital audio.

CAUTION   Be sure to use an HD video-capable coax cable. Otherwise, the video signal will be too attenuated and the encoder will not sync on it.

Related Topics

-
-

Audio Interface

The Makito audio interface consists of a single 8-pin terminal block connector for two-channel balanced/unbalanced analog audio input (one stereo pair) and mono audio output.

Figure 1-11   Audio Interface
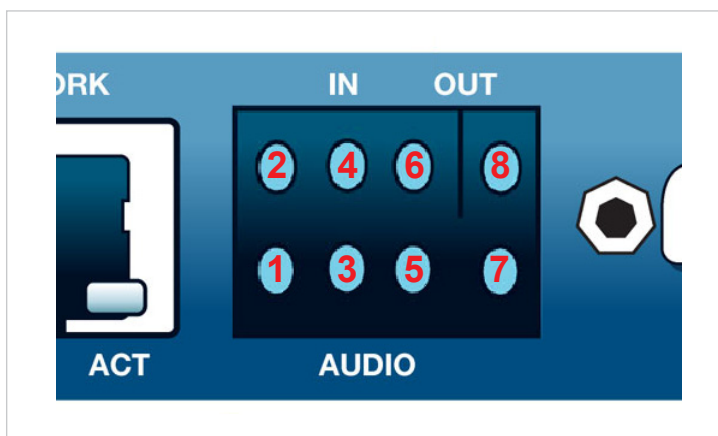
For the pinout, see <u>"Audio Terminal Block Connector Pinout"</u> on page 42.

An adaptor is required to interface with the audio port. An RCA female to Terminal audio dongle for unbalanced audio is included in the package. To use with balanced audio, see <u>"Modifying the RCA-Terminal Dongle for Balanced Audio"</u> on page 41.

Related Topics

• <u>"Connecting the Encoder to A/V Sources"</u> on page 39

LED Status Indicators (Rear Panel)

The LED colors and flashing (blinking) speed indicate the status (operational state) of the Makito Encoder.

Figure 1-12   LED Status Indicators (sample view, Makito-SDI #B-290E-HDSDI)
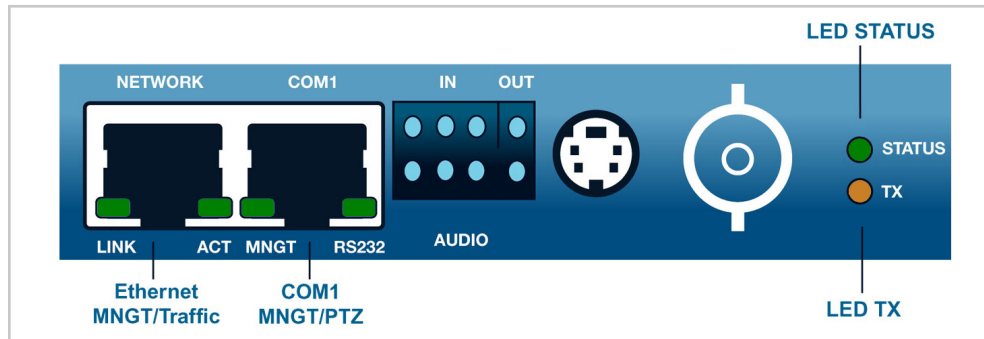
Table 1-1   LED Status Indicators

Function	Color	Description	Indication
STATUS	RED/ GREEN	OFF	No power
		RED Solid	Error / Fault
		GREEN Blinking	Booting / Initialization
		GREEN Solid	No Fault / OK
TX	AMBER/ GREEN	AMBER Solid	At least one of the conditions below is sufficient to turn the LED AMBER: • Encoder booting • Valid video input NOT detected • Valid digital audio input NOT detected (if digital audio input is selected) • Video Mute is applied • Audio Mute is applied (regardless of the audio input selected)
		GREEN Solid	When ALL the conditions below are met: • Valid video input detected • Valid digital audio input detected (if digital audio input is selected) • No Video Mute is applied • No Audio Mute is applied

Table 1-1   LED Status Indicators (Continued)

Function	Color	Description	Indication
Network port			
LINK	GREEN	OFF	Not Connected
		GREEN Blinking once per second	Connected at 10 Mbps
		GREEN Blinking twice per second	Connected at 100 Mbps
		GREEN Blinking three times per second	Connected at 1000 Mbps
ACT	GREEN	OFF	No Activity
		GREEN Intermittent	Little activity (e.g., management). The LED should be lit when there is activity
		GREEN Solid	Intense Activity (e.g., transmitting video traffic)
COM1 port (Makito-SDI)			
MNGT	GREEN	OFF	Port configured in Metadata Capture Mode
		GREEN Solid	Port configured in Management Mode
RS232	GREEN	OFF	Port configured in either RS-422/485
		GREEN Solid	Port configured in RS-232

Related Topics

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Makito Air Interfaces and LEDs

The Makito Air is shipped with an optional MIL connector set or cable set. Customers are responsible for assembling their own cables. Please refer to the connector pinouts included in "Connector Mapping" on page 45.

System Interfaces (Makito Air)

The Makito Air comes with a 10/100/1000 Base-T Ethernet Network interface [port J1] (shown below) for both traffic and management.

A metadata source can be connected to the serial port [J2] for metadata capture.

Figure 1-13   Makito Air Interfaces and LEDs (Front View)

TX and Status LEDs

J3: SDI + Embedded Audio Input / Composite Video

J2: Serial + Analog Audio Input

J1: Gigabit Ethernet port
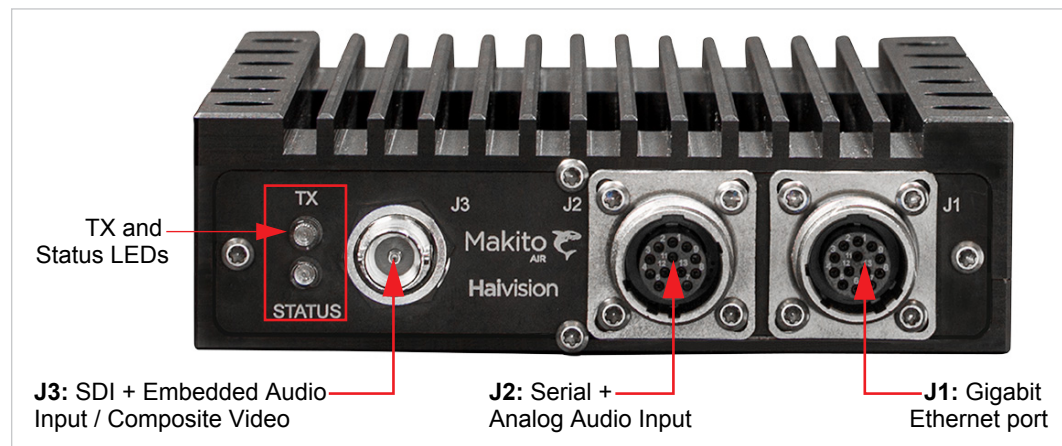
Audio/Video Interfaces (Makito Air)

The Makito Air video interface consists of a single BNC connector [J3] for SDI/Composite input.

The Makito Air audio interface includes:

- one BNC (SDI) connector [J3] for embedded digital audio shared with the video input, and
- one Analog Audio input connector [J2] shared with the serial port.

LED Status Indicators (Makito Air)

The Makito Air STATUS and TX LEDs function the same as the standard Makito LEDs. For the LED colors and flashing (blinking) speed indicators, see "LED Status Indicators (Rear Panel)" on page 26.

Related Topics

- "Installing and Connecting the Makito Air" on page 43

Audio Talkback

The Audio Talkback feature allows two-way audio communication using the Makito encoder's audio output to function like an audio decoder. Audio talkback enables end users monitoring a streaming session to "talk back" to individuals at the video source. The audio stream is received via a speaker or headphones connected to the encoder. For example, students at remote classroom locations are able to ask their teacher questions, or a chief surgeon observing a surgery can collaborate.

The audio talkback feature uses the InStream software player application to send the talkback to the Makito. The talkback is played out of the encoder's 8-pin terminal block connector (see "Audio Interface" on page 25).

The following picture illustrates a sample signal path from the audio source through the Makito's audio output when using the talkback feature.

Figure 1-14   Audio Talkback Signal Path
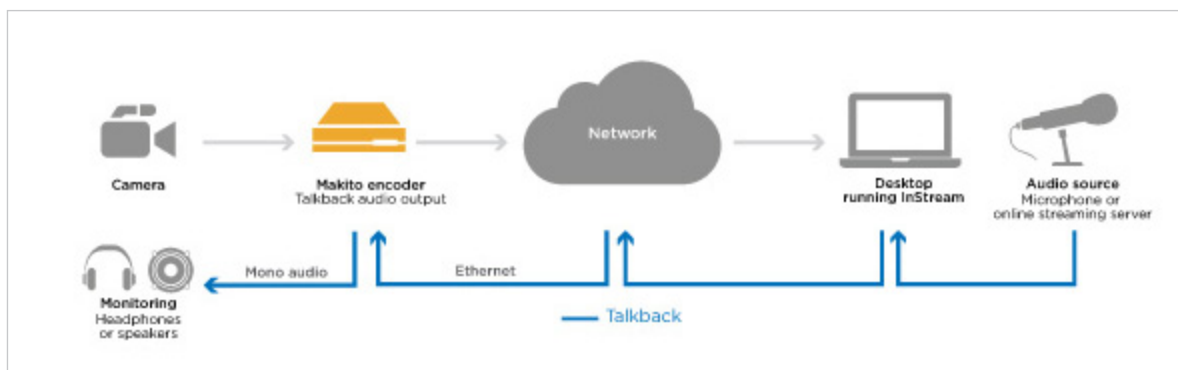
There is no audio mixer on the Makito, so the talkback feature is "First-In/First Served", meaning that only one user can use the return audio channel at a time. The InStream software player application provides "push-to-talk" functionality, which requires that the user push a button to transmit audio. The user must keep pushing the button to use the talkback channel. This prevents the user from accidentally locking and not releasing the channel.

The audio is only sent to the source video encoder; it is not distributed to other viewers of the stream.

The Talkback network service may be stopped or started from the Web interface (Services page, see "Enabling and Disabling Network Services" on page 145) or using the service command.

CLI commands are used to enable and disable reception of talkback audio, set the talkback volume, clear talkback statistics, and display talkback information. For details, see "talkback" on page 262 (CLI). Talkback audio is not configurable through SNMP in the current release.

NOTE Audio talkback is uncompressed audio (using approximately 350 kbps of network bandwidth).

For the audio talkback format specifications, see

Hardening

Hardening is a term used to describe the process of securing a networked device's various interfaces. This includes removing or limiting certain features to prevent their abuse, and securing the data hosted by the device.

Version 2.3 of the Makito includes features that allow the administrative interface to be secured based on the requirements of the Common Criteria (CC) 3.1 Certification at Evaluation Assurance Level 1 (EAL 1), augmented with security requirements for Network Devices Protection Profile (NDPP) assurance requirements.

These features are described in detail in the Makito v2.1 Hardening Guide, available from Haivision's Download Center at http://www.haivision.com/download-center/.

NOTE   While any Makito encoder at Version 2.1 or higher can be hardened by following the procedures described in this guide, the Common Criteria certification only applies to those specifically at Version 2.1.1-3.

The Makito v2.1 Hardening Guide provides the procedures to install and configure Makito encoders to be hardened based on the requirements of the Common Criteria NDPP. This guide is written for administrators and assumes that the reader is familiar with networks and network terminology. No encoder-specific knowledge is required. This guide also assumes that the reader is a trusted individual.

CHAPTER 2: Installing the Encoder

This chapter explains how to set up and connect the Makito. It also includes the instructions for factory reset.

Topics In This Chapter

Setting Up the Encoder

Always read the instructions carefully and keep this User's Guide for future reference.

Please choose a suitable location for operating the encoder(s). By doing so you will preserve long lifesaving and stability of the unit(s).

Set up the encoder on a reliable and flat surface when using the single Makito chassis, or mount in a rack, when using the 1U (MB6) or 4U (MB21) chassis.

CAUTION   The MB21 chassis must either be installed on a securely fastened rack shelf, or fastened directly to the rack using support brackets. For instructions on how to properly secure or support the MB21, refer to the MB21 Important Notice (provided in the package and available through Haivision's Download Center).

Safety First

Please pay particular attention to the following points in order to help protect yourself and the encoder:

• Refer to "Safety Guidelines" on page 3.

• The Makito is an indoor appliance and should be kept in a dry, dust free environment.

• There are no user-serviceable parts inside the unit. Making unauthorized changes will void the warranty.

• Only connect the unit to a compatible power source.

• If an electrical fault occurs, disconnect the unit and contact Haivision Technical Support.

• Never try to force the connections when setting up the system as this may damage the unit.

• The MB21 and MB6-AC chassis have more than one power supply cord. Disconnect both (2) power supply cords before servicing to avoid electric shock.

Connecting the Encoder to the Network and a Computer

To connect the Network Interface:

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

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

Figure 2-1   Network Connector (Makito #B-290E-DVI)
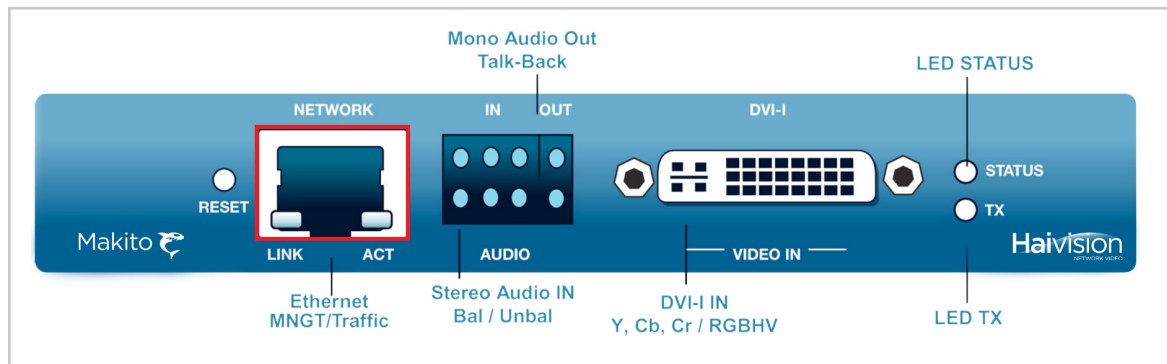
To connect the Serial Interface:

The serial interface is available on the Makito Dual Height Blade and the Makito-SDI.

1. (Optional) Connect the COM1 port to the serial port of a computer:

   • Makito Dual Height Blade: Use the DB9 connector and a null modem serial cable.

   • Makito-SDI: Use the grey RS-232 DB9 to RJ45 Serial Management Adaptor (Makito-SDI #B-290E-HDSDI) (included in the package) and a standard straight Ethernet cable.

   This will allow you to communicate directly from your computer to the Makito using a serial communication application such as HyperTerminal or Minicom. This is only required if you wish to use the Serial Management COM1 port instead of the Web interface. For more information, see "Serial Interface Setup" on page 36.

Figure 2-2   Serial Connector (Makito Dual Height Blade #B-290E-DVI-S)
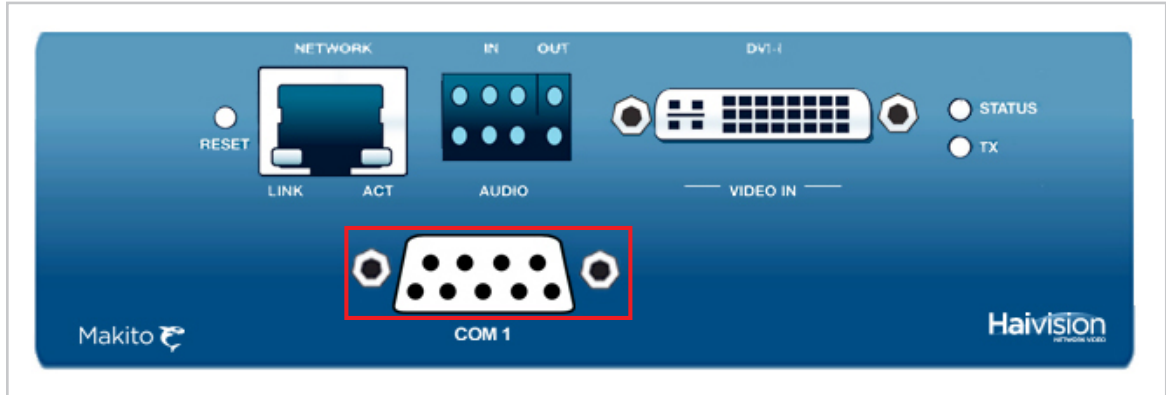
Figure 2-3   Network and Serial Connectors (Makito-SDI #B-290E-HDSDI)
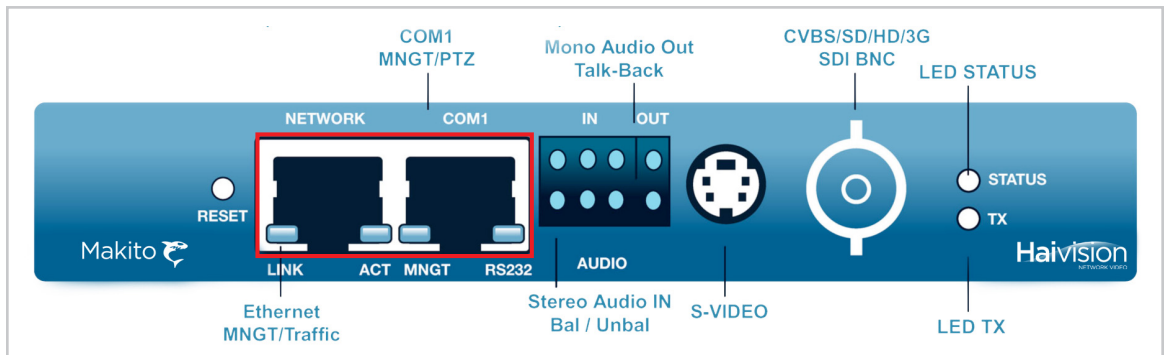
Figure 2-4   Serial Management Adaptor (Makito-SDI #B-290E-HDSDI)

plug into
computer
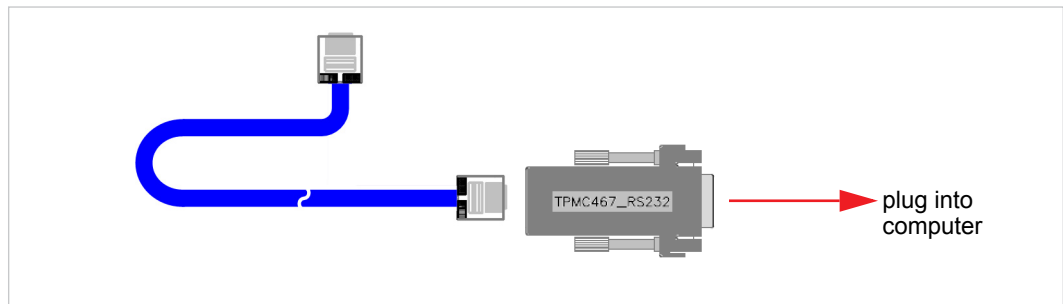
⚠️ **CAUTION** Take care not to plug the Ethernet cable from an Ethernet switch (especially a Power over Ethernet (PoE) switch) directly into the COM1 serial port as it may damage the encoder.

Related Topics:

- For details on the connectors, see "System Interfaces (Rear Panel)" on page 21.
- To set the terminal parameters to interface with the serial COM1 port, see the following section, "Serial Interface Setup".

Serial Interface Setup

The serial interface is available on the Makito Dual Height Blade and the Makito-SDI.

Prior to logging in to the Makito for the first time, you may wish to change the unit's default network settings to match the network in which it will be used. You can do so by connecting directly to the Makito's serial COM1 port from your computer using HyperTerminal (or other serial communication application).

Or you can (optionally) configure your system to capture CoT or KLV metadata from the serial port interface. Note that metadata capture is an optional feature and must be installed at the factory.

In either case, to get started, you must set the terminal parameters to communicate with the Makito.

To set up the serial interface:

1. Connect the Makito's COM1 port to your computer as described in the previous section, "Connecting the Encoder to the Network and a Computer".

2. Power up the computer and start the serial communication application.

3. Set up the terminal parameters as follows:

Parameter	Setting
baud rate	115,200 bps
data bits	8
parity	None
stop bit	1
flow control	None

4. Power up the Makito. (See "Powering Up the Unit" on page 47.)

5. From the serial communication application, press **Enter** to get a prompt from the Makito.

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

TIP You can view the COM port settings from the Web interface. For information, see "Managing the COM Port" on page 124.

We recommend that you log out from the Makito and exit from the serial communication application *before* disconnecting the COM1 port.

COM1 Serial Port DB9 Pinout (Makito Dual Height Blade)

On the Makito Dual Height Blade, the COM1 serial port uses a DB9 connector which has the following pinout:

Table 2-1   COM1 Serial Port DB9 Pinout (Makito Dual Height Blade)

DB9 Pin#	RS-232 Signal Name	RS-485/RS422 Signal Name
1	N/C	N/C
6	N/C	N/C
2	COM0_RXD	COM0_RXDP
7	N/C	COM0_TXDP
3	COM0_TXD	COM0_TXDN
8	N/C	COM0_RXDN
4	N/C	N/C
9	N/C	N/C
5	GND	GND
N/A	N/A	N/A

COM1 Serial Port RJ45 Pinout (Makito-SDI)

On the Makito-SDI, the COM1 serial port uses an RJ45 connector which has the following pinout:

Table 2-2   COM1 Serial Port RJ45 Pinout (Makito-SDI)

Pin #	Signal	Name
1	n/c	Not connected
2	n/c	Not connected
3	n/c	Not connected
4	GND	Signal Ground
5	RXD	Receive Data
6	TXD	Transmit Data
7	n/c	Not connected
8	n/c	Not connected

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

Connecting the Encoder to A/V Sources

Connecting the DVI-I Interface (Makito)

> ℹ️ NOTE   When configuring the encoder, you *must* select the Video Input type, either Analog (Component/RGB) or Digital (HDMI/DVI). See "Video Settings" on page 73 (Web interface), or "videnc Parameters" on page 268 (CLI).

To connect the Makito DVI-I Interface:

1. Component Analog/Digital Video/Computer Graphics: Connect your Video Source cable to the Makito DVI-I Input connector.

2. Analog Audio In: Connect your Audio Source cable to the Makito Audio 8-pin terminal block connector (shown below).

   • For unbalanced audio, use the RCA female to Terminal audio dongle (included in the package, shown below).

   • For balanced audio, see "Modifying the RCA-Terminal Dongle for Balanced Audio" on page 41.

Figure 2-5   DVI-I Input Connections
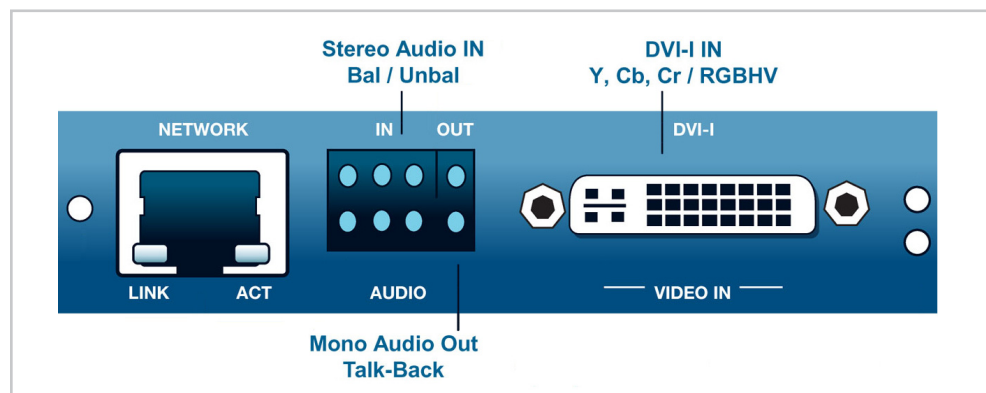
Figure 2-6   Audio RCA to Terminal Dongle (unbalanced audio)
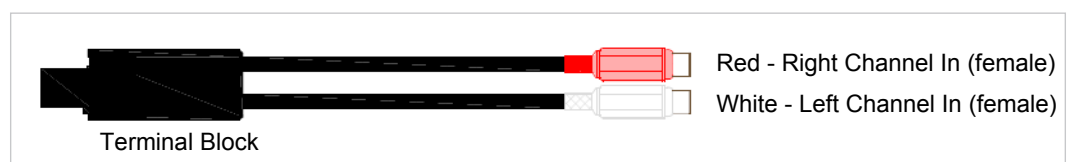
Related Topics

- "Modifying the RCA-Terminal Dongle for Balanced Audio" on page 41
- "Audio Terminal Block Connector Pinout" on page 42

Connecting the BNC/S-Video Interface (Makito-SDI)

ℹ️ **NOTE** The same BNC connector is used for Composite and SDI Video Input and Embedded Digital Audio Input.

When configuring the encoder, you *must* select the Video Input type. See "Video Settings" on page 73 (Web interface), or "videnc Parameters" on page 268 (CLI).

To connect the BNC/S-Video Interface:

1. Video In: Connect your Video Source cable to *one* of the Makito-SDI's Video Inputs, using the appropriate connector:
   - S-Video: Use the 4-pin mini-DIN connector.
   - Composite (CVBS) Video: Use the BNC connector.
   - SDI Video/Audio (either SD or HD): Use the BNC connector.

2. Analog Audio In: Connect your Audio Source cable to the Makito-SDI's 8-pin Audio terminal block connector (shown below).
   - For unbalanced audio, use the RCA female to Terminal audio dongle (included in the package, shown below).
   - For balanced audio, see "Modifying the RCA-Terminal Dongle for Balanced Audio" on page 41.

Figure 2-7   BNC/S-Video Connections

Figure 2-8   Audio RCA to Terminal Dongle (unbalanced audio)

Red - Right Channel In (female)
White - Left Channel In (female)
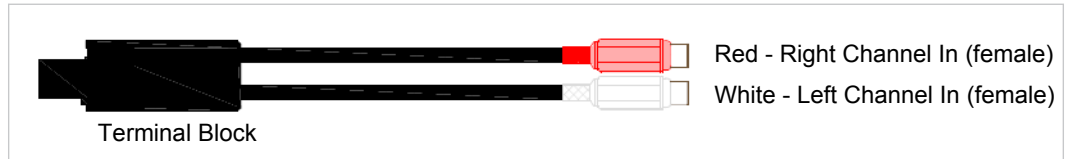
Terminal Block

Modifying the RCA-Terminal Dongle for Balanced Audio

For balanced audio, you can modify the audio RCA to Terminal dongle provided in the package to re-use the terminal block connector.

To modify the RCA-Terminal dongle for Balanced Audio:

1. Remove the cover from the terminal block connector.

Press apart the side clamps and
lift the top part off the terminal block
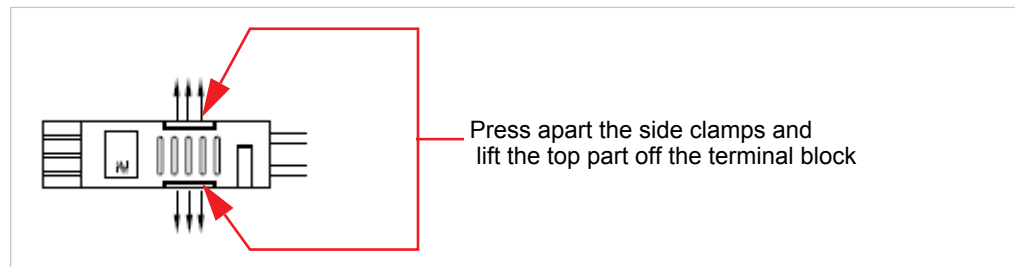
2. To release each wire, use a flat screw driver and push it in the rectangular area. (The terminal block has tension clamp connections.)

Use a flat screw driver to push the square
to release the wire
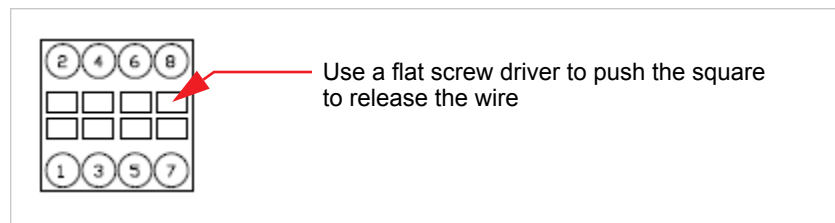
3. Pull each wire to remove it from the terminal block.

4. Prepare your new audio wires by removing about .150 inch of the wire's insulation.

5. Insert the new wires by pressing the tension clamp and then removing the screw driver to release the tension clamp.

   Refer to "Audio Terminal Block Connector Pinout" for the balanced/unbalanced audio pinout.

Audio Terminal Block Connector Pinout

The Makito 8-pin audio terminal block connector has the following pinouts:

Figure 2-9   Balanced and Unbalanced Audio Connector Pinouts
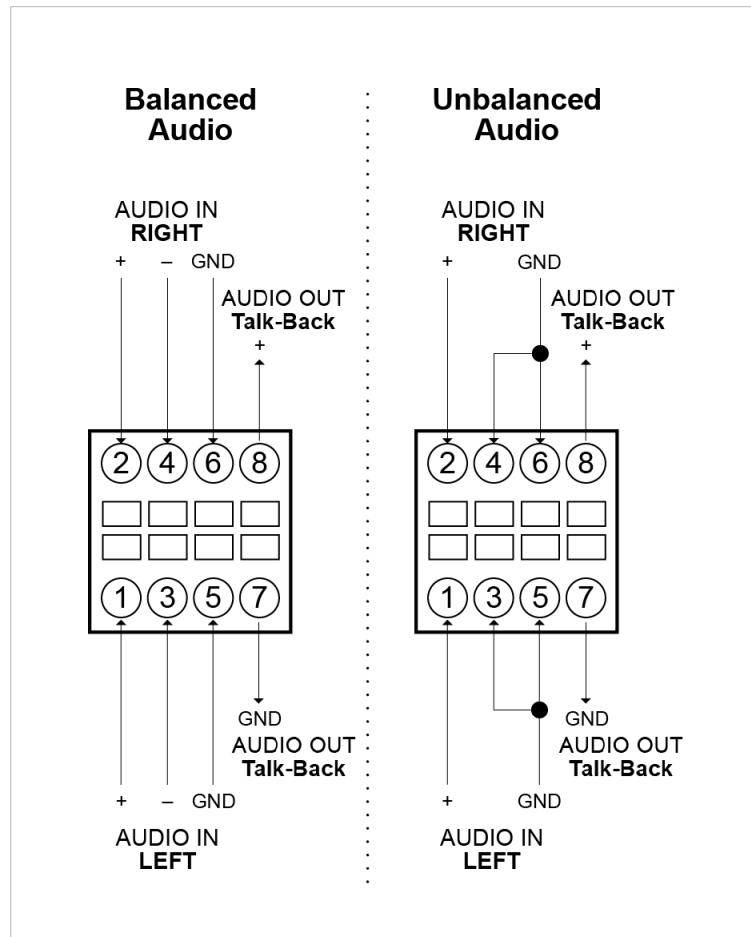
Related Topics

*   For more information on the audio connections, see "Audio/Video Interfaces (Rear Panel)" on page 23.

Installing and Connecting the Makito Air

To install the Makito Air:

1. Fasten the Makito Air to a flat surface (such as an equipment bay or rack) using the four (4) threaded mounting holes (#10-32 screws).

2. Customers are responsible for assembling their own cables. Please refer to "Connector Mapping" on page 45 for connector pinouts.

⚠️ **CAUTION** Special care must be taken when wiring the supply. This unit is not protected against polarity reversal, and if it occurs, the unit will be damaged (servicing will be required). The cabling must be done in such a way as to maintain the safety, electrical and environmental integrity of the product.

3. Connect the DC input power cable to the power input [J10] at the rear of the unit (shown below).

Figure 2-10   Makito Air Rear View
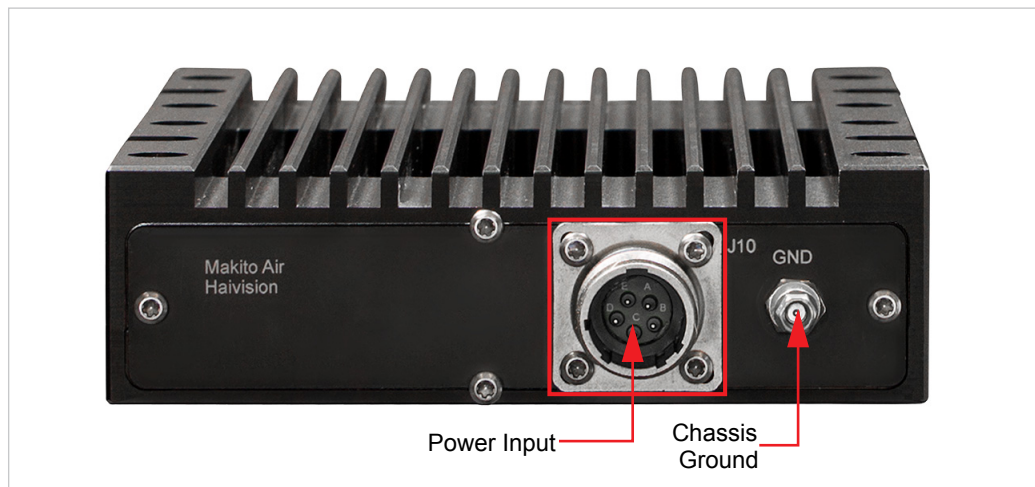
ℹ️ **NOTE** Required supply voltage: 28VDC.

4. Connect the chassis ground wire to the ground lug at the rear of the unit.

To connect the Makito Air to the Network and A/V Sources:

1. Connect the Makito Air's Ethernet port [J1] to the IP network using a Type Cat 5E cable.

Figure 2-11   Makito Air Front View

J3: SDI + Embedded Audio Input / Composite Video   **J2:** Serial + Analog Audio Input   **J1:** Gigabit Ethernet port
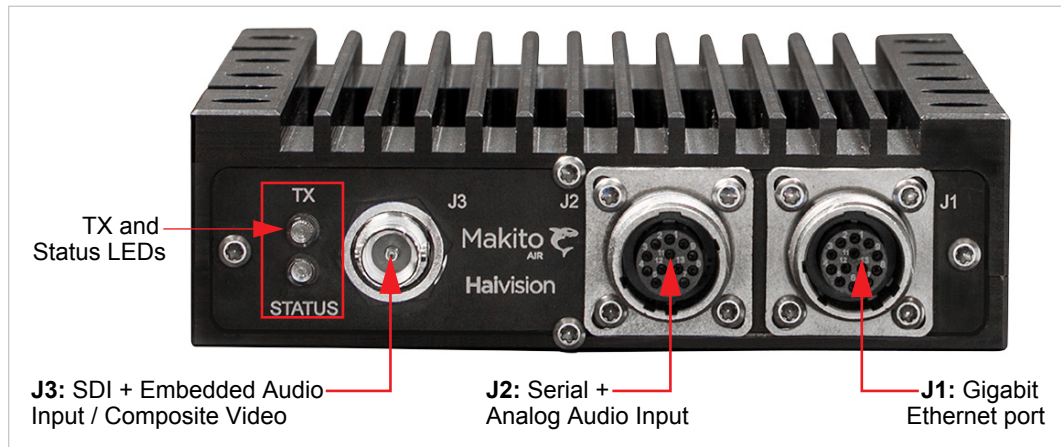
2. Connect the Makito Air's Serial port [J2] to the metadata source using a Serial RS-232 cable.

3. Video In: Connect the Makito Air's Video/Embedded Audio Input [J3] to your Audio/Video sources using the BNC connector and a coaxial cable, for either Composite (CVBS) Video or SDI Video/Audio.

4. Analog Audio In: Connect the Makito Air's Analog Audio port [J2] to your Audio Source cable.

> **i** NOTE   For wiring unbalanced or balanced audio, see "Connector Mapping" on page 45.

Connector Mapping

The following tables show the Makito Air connector pinouts:

Table 2-3   J1 Connector Pinout (Ethernet)
(13 pin female Amphenol MIL-DTL-38999/ 20MB35SN)

	Pin Name	Type	Description
1	ETH_DAP	BI	10/100 BASE-T Transmit differential pair /
2	ETH_DAN	BI	Gigabit Ethernet differential pair A (bi-dir)
3	ETH_DBP	BI	10/100 BASE-T Receive differential pair /
4	ETH_DBN	BI	Gigabit Ethernet differential pair B (bi-dir)
5	ETH_DCP	BI	10/100 BASE-T (Unused) /
6	ETH_DCN	BI	Gigabit Ethernet differential pair C (bi-dir)
7	ETH_DDP	BI	10/100 BASE-T (Unused) /
8	ETH_DDN	BI	Gigabit Ethernet differential pair D (bi-dir)
9	NC		Not Connected
10	NC		Not Connected
11	NC		Not Connected
12	RESETN	IN	Hardware Reset (signal is asserted LOW)
13	GND	REF	Ground

Table 2-4   J3 Connector Pinout (Video Coaxial)
(75-ohm BNC)

	Pin Name	Type	Description
1	VID	IN	SDI / Composite video signal
2	VID_GND	REF	SDI / Composite ground (Cable shield)

Table 2-5   J2 Connector Pinout (Serial Port / Analog Audio)
(13 pin female Amphenol MIL-DTL-38999/ 20MB35SA)

Pin #	Pin Name	Type	Description
1	COM_TXDP	OUT	Serial Interface: RS-232/RS-422 Transmit Data
2	COM_TXDN	OUT	[only use J2-Pin2 in RS232 mode (shaded in gray)]
3	GND	REF	Shield

Table 2-5   J2 Connector Pinout (Serial Port / Analog Audio)
(13 pin female Amphenol MIL-DTL-38999/ 20MB35SA)

Pin #	Pin Name	Type	Description
4	COM_RXDP	IN	Serial Interface: RS-232/RS-422 Receive Data [only use J2-Pin4 in RS232 mode (shaded in gray)]
5	COM_RXDN	IN	
6	GND	REF	Shield
7	AUD_IN_LP	IN	Analog Audio interface: LEFT channel differential pair
8	AUD_IN_LN	IN	
9	AUD_LGND	REF	Audio Ground
10	AUD_IN_RP	IN	Analog Audio interface: RIGHT channel differential pair
11	AUD_IN_RN	IN	
12	AUD_RGND	REF	Audio Ground
13	NC		Not Connected

Table 2-6   J10 Connector Pinout (DC Power)
(5 pin male Amphenol MIL-DTL-38999/ 20MB5PN)

	Pin Name	Type	Description
A	PWR_IN	REF	PSU +28VDC Input
B	PWR_GND	REF	PSU ground return
C	NC		No connection
D	NC		No connection
E	NC		

Powering Up the Unit

Once all the cables are in place, the Makito is ready to be powered up.

Single Blade Chassis

Figure 2-12   Rear View (Single Chassis) showing Locking Power Connector

Connect power supply here (Power Input jack)
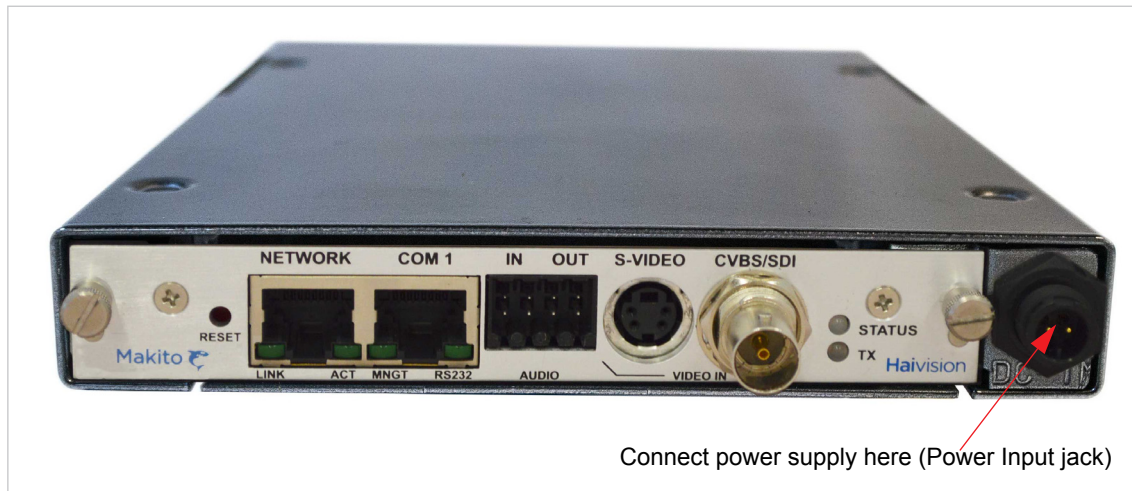
Figure 2-13   Single Chassis Power Adapter 5VDC with Conxall Connector

Conxall Connector
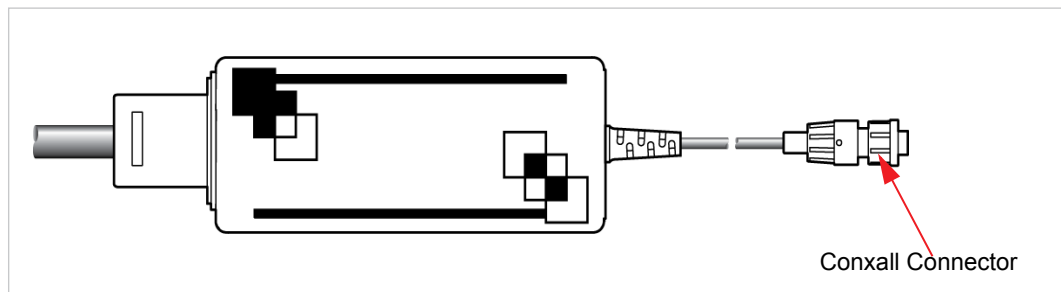
> ⓘ NOTE   There is no power switch on the Makito appliance. The power is automatically on when the unit is plugged in. The power supply cord is used as the main disconnect device.
>
> Ensure that the AC socket outlet is located near the equipment and is easily accessible.

To power up the Single Blade Chassis:

1. Insert the Conxall connector on the 5V power supply into the Power input jack at the rear of the Makito.

⚠ CAUTION   To prevent damage to the encoder and/or power supply, be sure to connect the power supply to the chassis *first* and then to the AC source.

Make sure the connector is properly inserted and locked to avoid intermittent power problems.

---

2. Connect the power cord to the power supply and plug the cord into an earthed AC power source.

   The Status LED will start blinking green, indicating that the encoder is booting up.

3. Wait until the Status LED stays solid green, indicating that the encoder is ready for operation.

To begin configuring video streams, you can either open the Web interface, or log in to the CLI.

- To use the Web interface, see "Logging In to the Web Interface" on page 65.
- To enter CLI commands, see "CLI Command Reference" on page 186.

MB21 (Twenty-One Slot) Chassis

⚠️ **WARNING** To prevent electric shock, do not remove the cover of the MB21 chassis. There are no user-serviceable parts inside. The MB21 chassis is to be installed and serviced by qualified personnel only.

Figure 2-14   MB21 Chassis Rear View showing Power Connectors
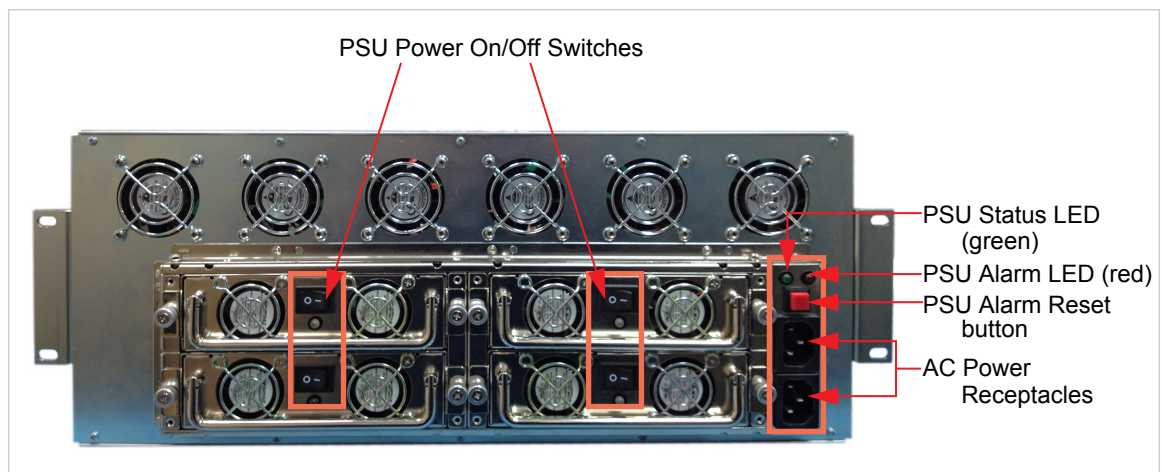
Each socket on the PDU (Power Distribution Unit) powers a pair of PSUs (Power Supply Units). Two PSUs are sufficient to power a fully loaded chassis.

The MB21 chassis is designed to tolerate the following without loss of installed card functionality:

• The loss of one AC supply (120/240V) source.

Since there are two power inlets on the MB21 chassis, the cards in the chassis can operate with only one powered; however, the chassis would not be fully redundant.

• The loss of one or two PSUs of the four PSUs in the MB21 chassis in any combination.

To power up the MB21 Chassis:

1. Turn all four PSU Power On/Off switches to the ON (1) position.

2. Connect the power cords to both power receptacles.

3. Plug both cords into earthed AC power sources.

💡 TIP   To ensure redundancy, each power input should be connected to a different 120/240V circuit and be isolated.

The PSU Status LED will turn green indicating that the chassis is powered up (only if all four Power On/Off switches are On).

In the front of the chassis, the Makito Status LEDs will start blinking green, indicating that the encoders are booting up.

4. Wait until the Status LEDs stay solid green, indicating that the encoders are ready for operation.

⚠️ CAUTION   The power supply cords are used as the main disconnect devices on the MB21 chassis. Therefore, ensure that the socket-outlet is located/installed near the equipment and is easily accessible.

The MB21 chassis has more than one power supply cord. Be sure to disconnect both (2) power supply cords before servicing to avoid electric shock.

To begin configuring video streams, you can either open the Web interface, or log in to the CLI.

- To use the Web interface, see "Logging In to the Web Interface" on page 65.
- To enter CLI commands, see "CLI Command Reference" on page 186.

MB6 (Six-Slot) Chassis

The MB6 is available in three power supply types:

- MB6-AC: Redundant AC Power supply (Dual-Input, Dual-Power supply)
- MB6-MED: Medical Grade AC power supply, Non-Redundant (Single-Input, Single power supply)
- MB6-DC: DC Power supply, Non-Redundant (Single-Input, Dual-Power supply)

> **WARNING** To prevent electric shock, do not remove the cover of the MB6 chassis. There are no user-serviceable parts inside. The MB6 chassis is to be installed and serviced by qualified personnel only.

Figure 2-15 MB6-AC Chassis showing Power Connectors
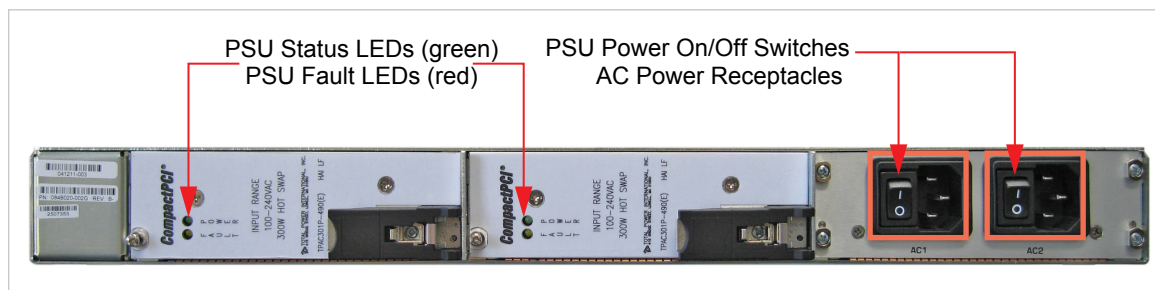
Figure 2-16 MB6-MED Chassis showing Power Connector
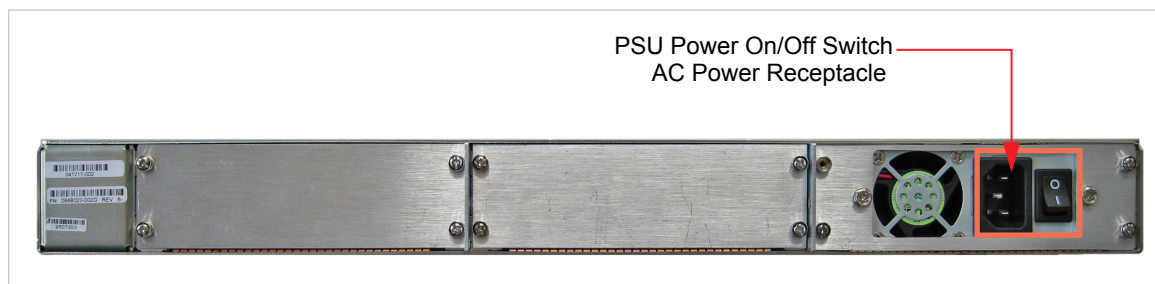
> **CAUTION** The power supply cords are used as the main disconnect devices on the MB6-AC and MB6-MED chassis. Therefore, ensure that the socket-outlet is located/installed near the equipment and is easily accessible.

The MB6-AC chassis has more than one power supply cord. Be sure to disconnect both (2) power supply cords before servicing to avoid electric shock.

To power up the MB6-AC or MB6-MED Chassis:

1. Make sure the power switch(es) on the back of the chassis are in the OFF (2) position.

2. Connect the power cord(s) to one (or both) of the power receptacles.

3. Plug the cord(s) into an earthed AC power source.

4. Turn one or both PSU Power On/Off switches to the ON (1) position.

   On the MB6-AC, the PSU Status LEDs will turn green indicating that the chassis is powered up.

   In the front of either chassis, the Makito Status LEDs will start blinking green, indicating that the encoders are booting up.

5. Wait until the Status LEDs stay solid green, indicating that the encoders are ready for operation.

To power up the MB6-DC Chassis:

1. Make sure the power switch is in the OFF (2) position.

2. Locate DC Power IN connectors BAT and RET on the back of the chassis.

3. Connect the chassis ground wire to the ground lug on the back of the chassis.

   Adhere to your organization's policy on the gauge of the ground wire (12 AWG, insulated, stranded) and the number of crimps on the lug.

4. Wrap each wire around the screw on the connector, and then tighten the screw firmly.

ⓘ NOTE Connect the screw marked BAT to a +28 VDC power source and the screw marked RET to the neutral wire.

Figure 2-17 MB6-DC Chassis showing Power Connectors
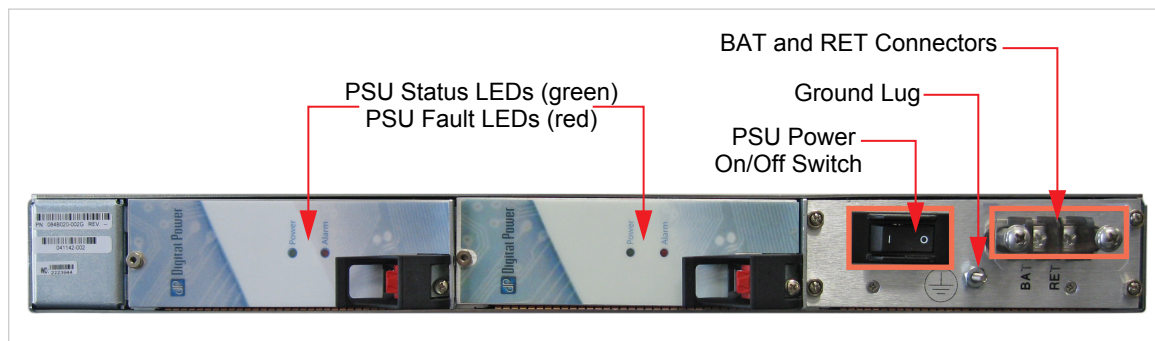
The PSU Status LEDs will turn green indicating that the chassis is powered up.

In the front of the chassis, the Makito Status LEDs will start blinking green, indicating that the encoders are booting up.

5. Wait until the Status LEDs stay solid green, indicating that the encoders are ready for operation.

To begin configuring video streams, you can either open the Web interface, or log in to the CLI.

- To use the Web interface, see "Logging In to the Web Interface" on page 65.
- To enter CLI commands, see "CLI Command Reference" on page 186.

Resetting the Encoder

This section describes the procedures to perform either a Power Reset or Factory Reset.

- A Power Reset is equivalent to simply powering the unit off and on.

- A Factory Reset powers the unit off and on, and returns the encoder to the same settings it originally had when shipped from Haivision, including the factory default IP address, subnet, and gateway.

  After a Factory reset, only the firmware revision, serial number, and MAC address are preserved. Everything else is wiped out (including saved configurations, added user accounts, modified passwords, and encoding settings).

To reset the Makito:

1. With the encoder on, insert a small plastic tool into the small opening labeled Reset on the Makito faceplate.

Figure 2-18   Reset micro switch (Sample view)
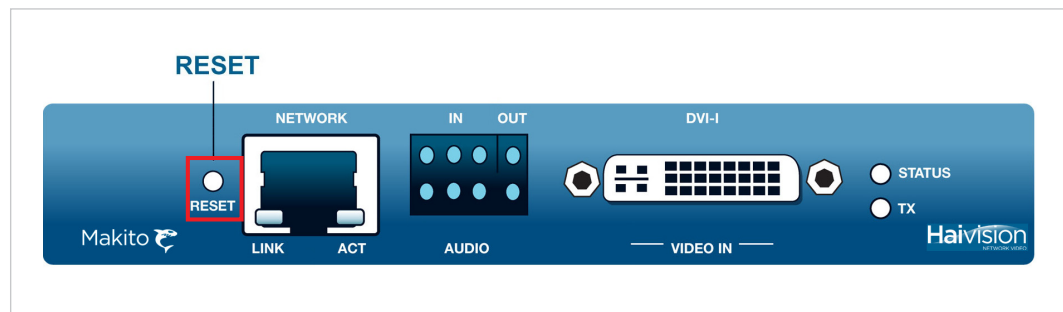
Power Reset

2. For a power reset, press the micro switch (you will feel the button depress) for at least one second and release. Be sure to release the button in less than 5 seconds.

   This resets the unit.

   -or-

Factory Reset

3. To reset the Makito to its factory default settings, press the micro switch (you will feel the button depress) and hold for five (5) seconds.

   The Makito will reboot on its own. As soon as the lights stop blinking and the Status LED is solid green, the encoder is ready.

Default Network Settings

After a factory reset, the Network settings should be:

IP Address	Subnet Mask	Gateway
10.5.1.2	255.255.0.0	10.5.0.1

Hardware Maintenance

The following maintenance tasks are recommended for the Makito appliance.

Cleaning the Ventilation (Intake/Outtake) and Filter

To clean the intake and outtake vents, use a dry cloth or an aspiration device approved for electronic equipment.

Maintenance should be done every 6 months (more often in a dusty environment).

Monitoring of the Fan Operation

There is no system level monitoring of the fan operation; however, you can check to see if the fan is operating in one of two ways:

- If the appliance is easily accessible, turn the unit over and listen (an operational fan makes a humming noise).

- Use the CLI (`temperature get` command) to get information from the built-in temperature sensors. For details, see "temperature" on page 264. If the internal temperature of the unit is rising, that is an indication that the fan may not be operating properly.

PART II: Session Configuration and Management

CHAPTER 3: Managing the Encoder

This chapter begins with a management overview of the Makito, followed by system access control information. It then explains how to set up video encoding, as well as manage and maintain the encoder using the Web interface.

NOTE   Before proceeding, make sure that the encoder is set up correctly and all necessary network and A/V connections are established. See Chapter 2: "Installing the Encoder".

Topics In This Chapter

Management Overview

All Makito interfaces and applications such as Audio/Video services and IP links may be configured, managed, and monitored through the Web interface, the Command Line Interface (CLI), or an SNMP server. All methods require access to the Makito through its Ethernet LAN port or (if applicable) the Serial Management port.

Using the Web Interface

Managing the Makito from the Web interface requires a connection from the unit's LAN port to your network. You must then connect a PC or other workstation with a Web browser to the network to access the Web interface.

The remainder of this chapter provides information on how to configure and manage the Makito from the Web interface.

Using the CLI

Management via the CLI is possible through a telnet session, SSH, or (if applicable) RS-232.

For a list and description of the CLI commands to configure and manage the Makito, see Appendix A: "CLI Command Reference".

SNMP-based Management

(Simple Network Management Protocol) SNMP-based management uses Network Management Stations (NMSs) to collect data or configure devices (SNMP agents) across a TCP/IP network. The NMS communicates with the Makito through the exchange of SNMP messages.

For information on SNMP management of the Makito, see Chapter 5: "Configuring A/V Services Using SNMP".

Accessing the Web Interface

To access the encoder configuration Web page:

1. From your computer, open a Web browser.

2. Type the encoder's IP Address in the browser's address bar (see "Default Encoder IP Address" below) and press Enter.

3. Log in (see "Logging In to the Web Interface" on page 65).

Security Steps

Only secured HTTP (HTTPS) is supported for the Web Interface; therefore, a server certificate is required. The encoder automatically generates a self-signed certificate and your browser will recommend that you do not proceed.

If you have not changed the factory defaults on the encoder, a certificate with factory default subjects exists (DNS: haivision-ace, IP: `10.5.1.2`). Proceed temporarily if you can, since this default certificate will be deleted and re-generated (see below).

If you or your system administrator do not install your own certificate, a new one will be generated upon reboot the first time a non-factory IP address is detected with the configured hostname, DNS, and IP address. Accept this certificate and proceed to the Web Interface.

NOTE   The Makito identity certificate and trusted root certificates are managed using the CLI `certificate` command or WCI Certificates page. For details, see "certificate" on page 204 or "Managing Certificates" on page 164.

Accessing the CLI

To access the encoder CLI:

1. Open a telnet session to the encoder (see "Default Encoder IP Address" below).

2. At the login prompt, type the username and password (see "Role-based Authorization" on page 63).

Default Encoder IP Address

NOTE If you haven't changed the factory presets, and if not specified elsewhere in the shipment, the encoder's IP Address is set by default to: 10.5.1.2.

To be able to log in to the Makito Web interface, your computer has to be in the same IP Address range (subnet).

You may have to temporarily change your computer's IP Address to be in the same subnet as the encoder. Only then you will be able to access the encoder and change the encoder's IP Address, and then afterwards change your computer's IP Address back.

TIP After you change the encoder IP Address, be sure to document it somewhere or label the chassis. Otherwise if you do not know the current IP Address, you will need to reset the Makito to its factory settings, which will return the unit to the default IP address (and you will lose any saved configurations and settings). For more information, see "Resetting the Encoder" on page 54.

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Role-based Authorization

The Makito uses role-based authorization control to secure the Web Interface and CLI. Administrators can create new accounts and thus allocate an account to each user of the system.

The Makito provides three defined account roles to assign privileges to users:

Role	Default Username	Default Password	Privileges
Guest	user	public	Read-only access to the system.
Operator	operator	supervisor	All rights to configure A/V and stream settings. Does *not* include rights to reboot or upgrade the system, modify the network settings, or manage accounts.
Administrator	admin	manager	All access rights and Administrator privileges.

The table below summarizes role-based access to functional modules:

Functional Module	Role		
	Guest	Operator	Administrator
Operation			
Video Settings	Read-only	Yes	Yes
Audio Settings	Read-only	Yes	Yes
Metadata Settings	Read-only	Yes	Yes
Stream Settings	Read-only	Yes	Yes
RTSP Settings	Read-only	Yes	Yes
Media Effects	Read-only	Yes	Yes
Video Profiles	Read-only	Yes	Yes
Configuration Files	-	Yes	Yes
COM Port[1]	Read-only	Yes[2]	Yes
System Status	Read-only	Yes	Yes
Administration			
Network Settings	Read-only	Read-only	Yes

Functional Module (Continued)	Role		
	Guest	Operator	Administrator
Firmware Upgrades	-	-	Yes
Services	-	-	Yes
Messages	-	-	Yes
Security			
My Account / Accounts	Yes[3]	Yes[3]	Yes[3]
Banner	-	-	Yes
Cryptographic Policies	-	-	Yes
Certificates	-	-	Yes
Security Audit	-	-	Yes

1. Only Administrator accounts can set the COM port operation mode (i.e., Metadata vs. Management). When the COM port is in Metadata mode, operators can configure the COM port settings but cannot change the mode.
2. If the COM port is in Metadata mode.
3. Guest and Operator accounts see "My Account" on the SECURITY sidebar menu and can only view/change their own account settings. Administrator accounts see "Accounts" on the SECURITY sidebar menu and can view/manage all user accounts.

All three roles provide both Web interface and CLI access to the system. These roles and their privileges are also supported using VACM (View-based Access Control Model) for SNMP access control.

Administrators can create, delete, lock, and unlock user accounts, including changing the password, from the Accounts page (see "Managing Accounts" on page 152). Operators and guests can manage their password from the My Account page (see "Changing Your Password" on page 70).

You can also change your own account password CLI using the passwd command.

Note that any changes to the default passwords, created accounts, and deleted default accounts will be lost after a Factory Reset or a firmware downgrade. Factory Reset restores the default accounts and passwords.

Related Topics:

• CLI Access Control

Logging In to the Web Interface

To log in to the Makito configuration Web page:

1. From your Web browser, type the Makito's IP Address into the address field and press Enter.

   (Optional) On some systems, you will see an Advisory and Consent Banner page, as shown in the following example.

2. Review the Advisory and Consent terms as required for your system and click OK.

   The browser will now display the Login page for the Web configuration interface.

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3. On the Login page, type the Username and Password and click Login (or press Enter).
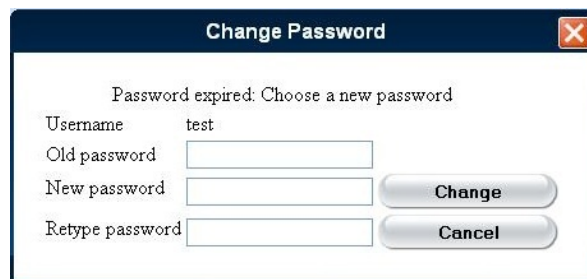
The default administrative Username and Password are:

Username: admin
Password: manager

For other default Usernames and Passwords, see the previous section, "Role-based Authorization".

NOTE   The first time you sign into a newly created account as well as any time your password has expired, you will see a Change Password dialog (as shown in the following example).

For information on changing the default password for your account, see "Changing Your Password" on page 70.

Exploring the Web Interface

> **TIP** Selecting Help from the menu bar will launch the online help. For more information, see "Online Help" on page 69.

After logging in to the Web configuration interface, you will have access to the encoder configuration settings. All of the settings can be adjusted via the Web browser.

Navigational Menus

You can access the Makito configuration settings by selecting any of the following:

1. Either SYSTEM, NETWORK, ADMINISTRATION, or SECURITY from the Main Menu (along the top bar, see example below),

2. The configuration area from the sidebar menu (for example, ENCODER or COM PORT), and

3. Where available, a further configuration level (for example, ENCODER>VIDEO, AUDIO, STREAMS, RTSP, MEDIA, or PROFILES).

Apply and Save Buttons

On most pages, you must click the Apply or Save button in order for your changes to take effect. The table below explains the differences between Apply and Save.

Table 3-1   Apply and Save buttons

Button	Description
Apply	Click Apply in order for your changes to take effect.
	The encoder will then start working with the new settings, but the changes will not be saved and will be lost after a reboot.
Save	(Where available) Same as Apply, but the configuration settings will be applied and saved to the encoder's flash memory.
	Saved settings will be used by the encoder even when the encoder is turned off and on or after a reboot.

TIP   You can save the current configuration (including the current VIDEO, AUDIO and STREAM settings) from the ADMINISTRATION>CONFIG page. See "Saving and Loading Configurations" on page 137.

Online Help

Selecting Help from the menu bar will launch the online help for the Makito. The figure below shows a sample Welcome page.
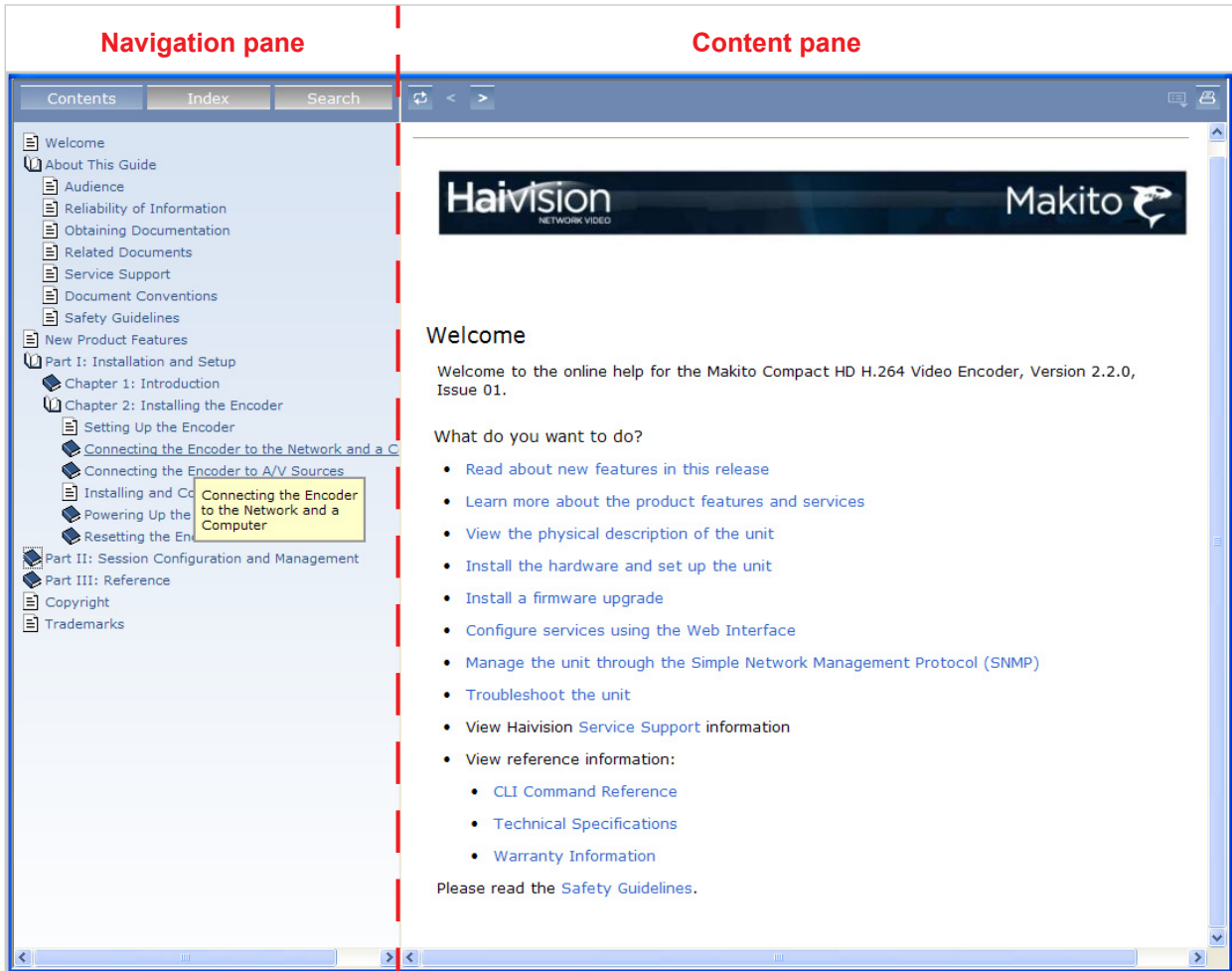
Changing Your Password

> **NOTE** The MY ACCOUNT page is available to users assigned either Operator or Guest roles. Administrative users may change their passwords from the ACCOUNTS page.

In some cases, such as the first time you sign into a new account or an account where the administrator has reset the password, you will see a Change Password dialog requiring you to change the default password.

You can also change your own password from the MY ACCOUNT page, as described in this section. This is useful to when logging into a Makito on which the factory defaults have not been changed.

To change your password:

1. Click SECURITY from the main menu, and then click MY ACCOUNT from the sidebar menu.

   The MY ACCOUNT page opens as shown in the following example.
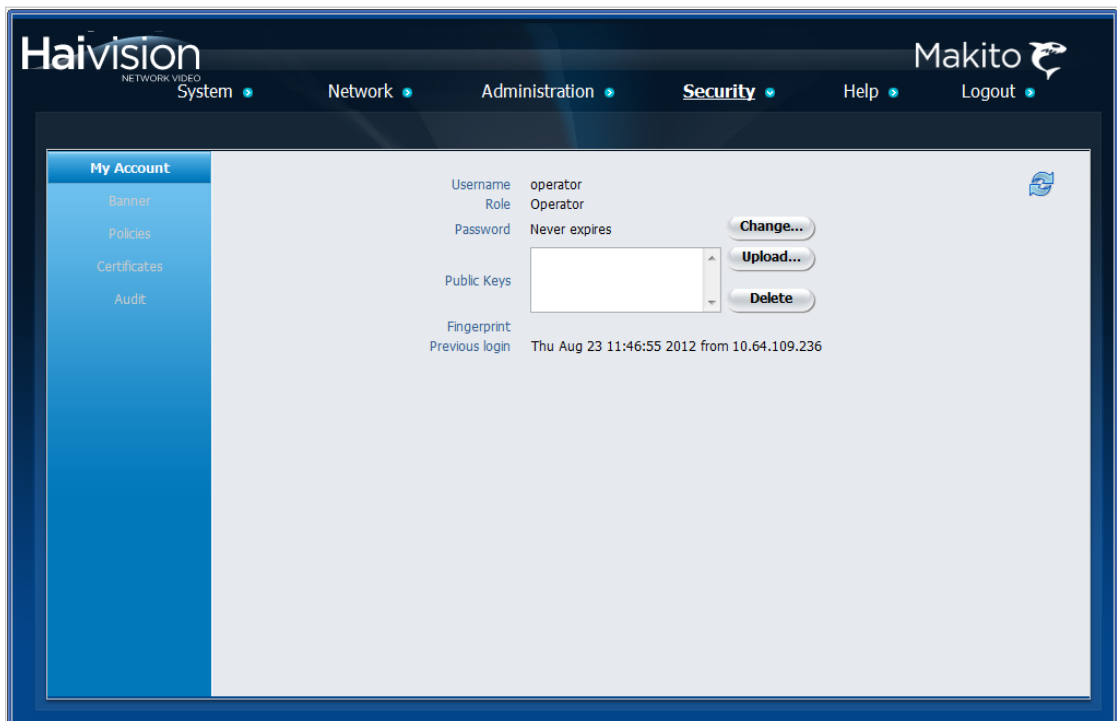
2. Click Change… next to Password.

3. In the Change Password dialog, type your current password in the Old Password field.

4. Then type the new password in the New Password field and again in the Retype Password field.

5. Click Change.

The new password will take effect immediately.

You can also upload and manage personal public keys for your account to enable public key authentication (instead of password-based authentication). Note that in the current release, this only applies to SSH CLI access to the encoder. For more information, see "Managing Public Key Authentication" on page 157.

Password Requirements

Passwords may be up to 80 characters and composed of any combination of upper and lower case letters, numbers, and the following special characters:

> "!", "@", "#", "$", "%", "^", "&", "*", "(", ")", "~", "`", "_", "-", "+", "=", "{", "}", "[", "]", ":", ";", """, "'", "<", ">", ",", ".", "?", "/", " "(space)

NOTE Basically, all printable characters of the QWERTY keyboard are supported.

Your system may have in place security policies that determine the minimum password length as well as other requirements such as minimum number of upper case characters, digits, and symbols. In this case, you will be prompted to modify your password to comply with these policies.

Configuring Video Settings

From the VIDEO page, you can define the Video Encoding properties such as the Input type, Resolution, GOP Size, and Bit Rate. Note that the available settings and resolutions vary according to the Input Format.

When configuring the Video Settings, you must select the Input type. The Makito will then auto-detect the incoming resolution and frame rate. If not detected (or outside the supported range), the Input Format field will show Unknown.

HiLo Video Streaming

You may optionally configure the encoder for "HiLo" video streaming, in which the Makito encodes a single input and emits both high and low bandwidth streams simultaneously. A typical example is a full quality SD/HD ("High") stream and a thumbnail ("Low") sample of the same stream. To configure "HiLo" video streaming, you must define the Video Encoding properties for the second encoder instance in the "Low" column. For supported HiLo video encoding resolutions, see "Video Encoding" on page 277.

To configure the Encoder Video Settings:

1. Click SYSTEM from the main menu, and then click ENCODER>VIDEO from the sidebar menus.

   The VIDEO page opens, displaying the current video encoding settings (see following example).

2. Select or enter the new value(s) in the appropriate field(s). See the following section, "Video Settings".

3. To apply your changes, click Apply.

The changes will take effect immediately but will not be saved and will be lost after a reboot.

TIP   To save the current configuration, open the ADMINISTRATION>CONFIG page. See "Saving and Loading Configurations" on page 137.

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4. To view statistics for the encoder, click Stats. For details, see "Video Statistics" on page 79.

Video Settings

The following table lists the Encoder Video settings:

Video Setting	Default	Description/Values
Input		Select the type of Video Input for the encoder:
Makito	Digital (HDMI/DVI)	• Analog (Component/RGB) • Digital (HDMI/DVI)
Makito-SDI	BNC (SDI)	• BNC (SDI) • BNC (Composite) • S-Video NOTE: Only one physical connector can be selected as the video source. If you select an inapplicable Input type, the Input Format becomes Unknown, since this is auto-detected by the system.
Input Format	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 Setting	Default	Description/Values (Continued)
Color Space Makito-DVI only	Auto	(Optional) Select the color space to use while capturing the content. Matching the encoder input color space to the source enhances and optimizes color reproduction. This is useful with source formats such as graphics cards outputting HDTV resolutions. Select either: • Auto: The encoder determines the appropriate color space to use. • YCbCr: Forces the encoder to use Y,Cb,Cr • RGB (Full Range): Forces the encoder to use RGB Full Range [0..255] • RGB (Limited Range): Forces the encoder to use RGB Limited Range [16..235]
Aspect Ratio Standard Definition only	Auto	Specifies the aspect ratio of the video source and signals it into the MPEG stream: • WSS/AFD: Aspect ratio is extracted from the incoming video source based on WSS (Wide Screen Signaling) or AFD (Active Format Description) if detected. • Auto: Aspect ratio is derived from the incoming video source resolution. • 16:9: Aspect ratio is forced to 16:9. • 4:3: Aspect ratio is forced to 4:3. NOTE: WSS is only supported with analog PAL video; AFD is only supported with SD-SDI video.
Display Logo	Disabled	(Optional) Check this checkbox to enable a pre-configured logo overlay. This option is not available if no logo has been configured. NOTE: To configure the logo, see "Configuring Media Effects" on page 109.

Video Setting	Default	Description/Values (Continued)
HDCP Makito only	Enabled	Check this checkbox to enable or disable HDCP for the DVI interface. • When enabled, HDCP sources will detect the Makito as a HDCP sink. The source will decide whether or not the content it sends to the Makito needs to be protected/encrypted. The Makito will *not* encode encrypted/protected content. • When disabled, the authentication phase where keys are exchanged will fail and the content source will detect the Makito as a device that does *not* support HDCP. At this point, the source will not send any protected content to the Makito but can still send unprotected content. NOTE: This solves a problem that arose when inter-working the Makito with Apple products such as the MacBook and iPad. Apple "protects/encrypts" content that does not actually require it when it detects the sink as HDCP capable. When you disable HDCP on the Makito, the content is sent unencrypted and can be encoded.
Copy Protected Content Makito only	n/a	(Read-only) Indicates whether or not the video source connected to the Makito DVI is protecting/encrypting its output. If Yes, the stream will not be encoded.
Total Load	n/a	The usage of the video encoding processor in percentage %. IMPORTANT: When configuring HiLo streaming, make sure the Total Load does not exceed 100%. For supported HiLo video encoding resolutions, see "Video Encoding" on page 277.
NOTE: To configure HiLo streaming, you must enable the High and Low Encoder instances and then configure the remaining fields for each instance:		

Video Setting	Default	Description/Values (Continued)
Enable: High/Low	High: Enabled Low: Disabled	Check one or both checkboxes to enable either one Encoder instance or two simultaneous instances of the video stream (i.e., the same content from a single input). • High • Low NOTE: This must correspond to the Video: High/Low selection on the STREAM page. With full HD 1080p 60 resolution input, the Low stream is not available since the High stream consumes all the encoding resources.
Profile	default.vpf	(Optional) Select a Video Profile to control the video quality for the encoder. The list provides a selection of video presets or "Profiles" defined for different contexts (e.g., ComputerGraphics, Default, Movies, News, Outdoors, Sports, and VirtualPresence). NOTE: To view the quality parameter settings for each Profile as well as create "custom" Profiles, see "Configuring Video Profiles" on page 116.
Resolution		This is the stream output resolution. Select the number of lines per frame and pixels per line to be encoded. Options depend on the Input Format detected. NOTE: See "Video Encoding" on page 277.
HD	n/a	• Auto • 1920x1080i (1080i) • 1920x1080p (1080p) • 1440x1080i • 1440x1080p • 960x1080i • 960x1080p • 1280x720 (720p) • 960x720 (720p) • 640x720 (720p)

Video Setting	Default	Description/Values (Continued)
RGB	n/a	• 1280x1024 (SXGA) • 1280x768 (WXGA) • 1024x768 (XGA) • 800x600 (SVGA) • 720x480 (480p) • 640x480 (VGA) • 352x288 (CIF)
SD	n/a	• 720x480i [NTSC] / 720x576i [PAL] • 720x480p / 720x576p • 540x480i / 540x576i • 540x480p / 540x576p • 352x480i / 352x576i • 352x480p / 352x576p • 352x288i • 352x288p
Frame Rate	Auto	Select the video frame rate per second:
		• Auto: Encodes at the same frame rate as the input • 1..85 (Makito #B-290E-DVI) • 1..60 (Makito-SDI #B-290E-HDSDI)
Framing	IP	Select the Video Compression Mode: • IP: I and P frames only
GOP Size	120	Enter the Group of Pictures size for the encoded video. 1..1000 NOTE: The GOP Size is independent for each Encoder instance.
Bitrate	6000 kbps	Enter the Video Bitrate for the encoder: • HD: 150..15000 kbps • SD: 150..8000 kbps
Closed Captioning	Enabled	(Optional) Check or clear these checkboxes to enable or disable Closed Captioning on the encoder stream. NOTE: For more information, see "Closed Captioning" on page 291.

Video Setting	Default	Description/Values (Continued)
TimeCode Source	None	Timecodes are used to mark video frames, mainly for editing purposes. This field either disables timecoding, or selects the source to "timecode" the encoded video frame. The following selections are available: • None: No time code will be inserted in the video stream (saves bandwidth if not required). • VITC: VITC is a form of SMPTE timecode extracted from the Vertical Interval TimeCode of the incoming video signal. VITC applies only to TV resolutions (i.e., not graphic resolutions). • Internal System Clock: If no timecode is included in the video feed, the encoded timecode is based on the encoder's system clock. In this case, it is a good idea to enable NTP (see "Configuring Network Settings" on page 129). This applies to both TV resolutions and graphic resolutions. NOTE: See "TimeCode Source Guidelines" below for additional information.
Estimated Load	n/a	(Read-only) The video encoding processor usage of the stream instance in percentage%. NOTE: The combined estimated loads should not exceed 100%.

TimeCode Source Guidelines
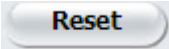
The following guidelines apply to the TimeCode Source:

• The digitized version of VITC (referred to as D-VITC) is not supported. Only ATC_VITC (Ancillary Timecode) is supported.

• The presence of multiple timecodes may cause a problem. Only one timecode will be packetised/carried with the coded picture. The one to be carried is chosen based on the time difference between the timecode STC (System Time Clock) and the coded picture STC.

• Although LTC (Linear Timecode) and VITC timecodes may be present at the same time, the current release only supports VITC and LTC ancillary packets will be ignored.

Video Statistics

The following table lists the Video Encoder statistics:

Video Encoder Statistic	Description/Values
State	The current operating status of the encoder, either: • WORKING • AWAIT FRAMING • STOPPED
Up Time	(Only available when State is WORKING) The length of time the encoder is actively encoding (dd:hh:mm:ss).
Input Present	Indicates whether an input signal is detected from the video source.
Input Format	The input signal detected from the video source.
Protected Content	Indicates that the encoder has detected protected content (HDCP).
Output Resolution	The stream output resolution.
Input Aspect Ratio	The aspect ratio of the video source.
Encoded Frames	The number of encoded frames.
Encoded Bytes	Number of encoded bytes.
Encoded Bitrate	The video bitrate used for the encoder (in kbps).
Encoder PTS	The current encoder Presentation Time Stamp (PTS) based on a 90 kHz clock: e.g., 0x138a56483
Encoder Load	The video encoding processor usage of the stream instance in percentage (%).
Closed Captioninig	Indicates whether Closed Captioning (CC) is Enabled or Disabled on the output Stream.
Timecode Source	(Displayed when the TimeCode Source selection is not None) Indicates the current timecode source. NOTE: See "TimeCode Stats" below for additional information.
Timecode	The current value of the timecode in Hours:Minutes:Seconds:Frames.
Source Switches	(Only applies to Metadata-enabled systems) The number of timecode source switches.

Video Encoder Statistic	Description/Values (Continued)
UTC	(Only applies to Metadata-enabled systems) The displayed Coordinated Universal Time (UTC) is from the High precision timecode. UTC is a microsecond precision timestamp which is either extracted from the High Precision timecode or otherwise computed.
Last Reset Occurred	Indicates the elapsed time since the last reset.
Reset	Click to reset the Video Encoder statistics.

TimeCode Stats

The following guidelines apply to the TimeCode statistics on Metadata-enabled systems:

- When VITC (video in the CLI) is selected for the timecode source, the Makito will try to extract the MISB 0605 High precision timecode in addition to the SMPTE12M timecode. The MISB 0605 specification mandates the presence of both High precision timecode and SMPTE12M timecode in every AU (Access Unit). It also specifies that if the timecode cannot be extracted from a given video source, that the system fall back to other known sources of timecode.

- The actual "in use" timecode source can change based on the availability of timing data on the video input (i.e., there may not be any timecodes). For example, if you select VITC, but the Makito fails to extract the timecode information, it then defaults to defaults to another timecode source such as Internal System Clock (system in the CLI) as the timecode source. It also displays additional statistics such as the UTC and number of switches.

- When you select Internal System Clock for the timecode source, the stats do not display the current timecode source since it is already shown in the configuration and cannot change (it would be completely redundant information).

Configuring Audio Settings

From the AUDIO page, you can configure Audio Encoding properties such as the Input connector and Audio Bitrate for the encoder.

HiLo Audio Streaming

You may optionally configure the encoder for "HiLo" audio streaming, in which the Makito encodes a single input and simultaneously sends both a "High" and "Low" audio stream to two different destinations (comparable to HiLo Video Streaming). The audio Input, Sampling Rate, and Level are common to both streams, while the audio Bitrate, Channels (Mode), and AAC-LC Algorithm must be specified for the first encoder instance in the "High" column and the second encoder instance in the "Low" column.

To configure the Encoder Audio Settings:

1. Click SYSTEM from the main menu, and then click ENCODER>AUDIO from the sidebar menus.

   The AUDIO page opens, displaying the current audio encoding settings, as shown in the following example.
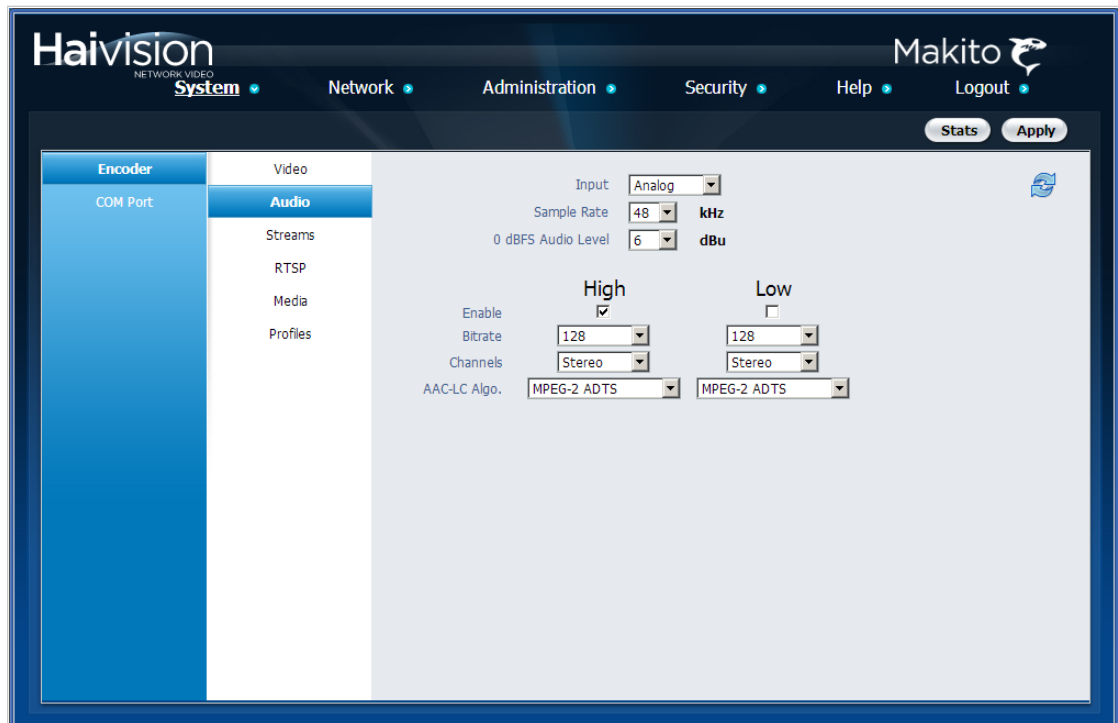
2. Select or enter the new value(s) in the appropriate field(s). See "Audio Settings" on page 82.

3. To apply your changes, click Apply.

   The changes will take effect immediately but will not be saved and will be lost after a reboot.

TIP To save the current configuration, open the ADMINISTRATION>CONFIG page. See "Saving and Loading Configurations" on page 137.

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4. To view statistics for the encoder, click Stats. For details, see "Audio Statistics" on page 83.

Audio Settings

The following table lists the Encoder Audio settings:
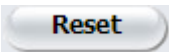
Audio Setting	Default	Description/Values
Input	Analog	Select the type of Audio Input for the encoder.
Makito		• Analog
Makito-SDI		• Analog • SDI (1-2) - SDI Audio Group 1, Ch. 1-2 • SDI (3-4) - SDI Audio Group 1, Ch. 3-4
Sample Rate	48 kHz	The number of audio samples per second taken from the incoming signal. 48 kHz only.
0 dBFS Audio Level	+6 dBu	(Analog Input only) Adjusts the maximum analog Audio Input level (0 dBfs) from +5dBU up to +20dBU. This is useful in applications such as broadcast and streaming to allow higher audio headroom.
NOTE: To configure HiLo audio streaming, you must enable the High and Low Encoder instances and then configure the remaining fields for each instance:		
Enable: High/Low	High: Enabled Low: Disabled	Check one or both checkboxes to enable either one Encoder instance or two simultaneous instances of the audio stream (i.e., the same content from a single input). • High • Low NOTE: This must correspond to the Audio: High/Low selection on the STREAM page.

Audio Setting	Default	Description/Values (Continued)
Audio Bitrate	128 kbps	Select the Audio Bitrate for the encoder: 32, 64, 96, 128, 192, 256, or 384 kbps. NOTE: At low bitrates such as 32 kbps, the audio quality may not be optimal. See Audio Channels below.
Audio Channels	Stereo	Select the number and type of audio channels to encode. Mono, Stereo TIP: If you set the Audio Bitrate to 32 kbps, use Mono.
AAC-LC Algo.	MPEG2ADTS	The audio compression algorithm:
		• MPEG-2 ADTS - Encodes audio using the ISO/IEC 13818-7 MPEG-2 AAC-LC algorithm with an ADTS header. (Default)
		• MPEG-4 ADTS - Encodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm with an ADTS header.
		• MPEG-4 LOAS/LATM - Encodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm with a LOAS/LATM header.

Audio Statistics

The following table lists the Audio Encoder statistics:

Audio Encoder Statistic	Description/Values
State	The current operating status of the encoder, either: • WORKING • STOPPED
Encoded Frames	Number of encoded frames.
Encoded Bytes	Number of encoded bytes.
Encoder Errors	Number of audio encoding errors.
Encoder PTS	The current encoder Presentation Time Stamp (PTS) based on a 90 kHz clock: e.g., 0x138a56483

Audio Encoder Statistic	Description/Values (Continued)
STC Source Interface	(Only available when State is WORKING) The audio input from which the audio STC (System Time Clock) is derived: BNC-1 or BNC-2.
Reset	Click to reset the Audio Encoder statistics.

Configuring Metadata Capture

> **NOTE** Metadata Capture is an optional feature and must be installed at the factory.

The Makito provides a METADATA OVERVIEW page and separate METADATA settings pages to configure up to eight metadata inputs, consisting of either one Serial input, one SDI input, or up to eight UDP inputs.

From the METADATA pages, you can configure the Makito to capture either KLV (Key Length Value) or CoT (Cursor on Target) metadata and then incorporate data information within the metadata elementary stream of the standard MPEG Transport Stream.

The Makito supports three metadata input types: either from the COM1 serial port, the HD-SDI interface (Makito-SDI only), or a user definable UDP port.

- Serial port – The Makito extracts either KLV or CoT metadata packets from the serial port. From the METADATA page, you must specify the Data Format, and for CoT metadata, the Max AirCraft-SPI Delta.

- SDI – (Makito-SDI only) The Makito extracts KLV metadata packets from the HD-SDI interface as per MISB RP 0605.2. Only progressive scan formats are supported (i.e., 1280x720p and 1920x1080p). The Makito can capture only 4096 bytes of KLV metadata per video frame.

- UDP – The Makito can receive either (a) KLV payload encapsulated in UDP or (b) CoT inside UDP that is converted to KLV and then streamed (see "CoT/UDP with SPI Message Filtering Based on UID" on page 86). You must specify the UDP port on which the Makito will listen for incoming metadata. The IP Address is only required for reception of multicast metadata, or if you only want to accept messages coming from a specific sender.

The Makito auto-detects the hardware setup of the encoder. If the serial port or SDI video is connected, the serial or SDI metadata source is created automatically at startup by the system. For Serial input, the COM Port Mode must also be set to Metadata (see "Mode" on page 125). UDP sources must be manually created by the user. Only one metadata source may be used per Transport Stream.

As of Version 2.2.0, the Makito supports both synchronous and asynchronous KLV metadata stream signaling and AU (Access Unit) transport support. When configuring a stream, you can select the encapsulation type to use for the associated KLV metadata source. For technical specifications, see "Asynchronous KLV Metadata Support" on page 286.

CoT/UDP with SPI Message Filtering Based on UID

As of Version 2.2.0, the Makito accepts raw CoT metadata over UDP (no SerialID wrapper) and filters the SPI (Sensor Point of Interest) messages based on a user-supplied string. If the string appears in the SPI message, then it is passed through and combined with the platform message before conversion to KLV. This allows platforms that generate multiple SPI messages to filter out unwanted incoming messages.

If the UDP port is receiving CoT, you may specify a UID filter string. If the string is present in a SPI message UID field, then the message is passed. Otherwise the message is discarded. (The format of the SPI UID filter string is a text string containing alphanumeric characters.)

In order to avoid input errors for the SPI filter string, the Makito collects a list of the received SPI messages. You can then select a string from this list for the UID filter string.

Platform and filtered SPI messages will be converted to KLV. Only a single SPI message is supported. The KLV (converted from CoT/UDP) is multiplexed into the MPEG-2 TS stream.

Only one KLV or CoT source is supported per stream. There is no multiplexing of metadata sources. The CoT SPI filtering applies to the CoT/UDP and CoT/Serial services.

Metadata Overview Page

The METADATA OVERVIEW page displays a summary of defined metadata inputs for the encoder. The METADATA OVERVIEW page displays the Name, Type, Format, and Parameters for each stream. It also provides an option for you to either start or stop the stream, and (UDP inputs only) to delete the input.

To open the Metadata Overview:

1. Click SYSTEM from the main menu, and then click ENCODER>METADATA from the sidebar menus.

   The METADATA OVERVIEW page opens, as shown in the following example, displaying the defined metadata inputs for the encoder.

Click a line to open the Metadata configuration page for that input or click + to add an input

- To view or modify input details, click a link in the table to open the METADATA page.
- To add a UDP input, click +.
- To change the status for an input, click the drop-down menu under Actions and select either Start, Stop or Delete (as applicable).

2. To apply your changes, click Apply.

   The changes will take effect immediately but will not be saved and will be lost after a reboot.

> **TIP** To save the current configuration, open the ADMINISTRATION>CONFIG page. See "Saving and Loading Configurations" on page 137.

Metadata Page

To configure existing Metadata Inputs:

1. From the METADATA OVERVIEW page, click the link for the Serial input or SDI metadata source (if available).

   The METADATA page opens, as shown in the following example for the Serial source.

> **NOTE** The METADATA page varies depending on whether the serial port or SDI video has been connected and whether the COM Port has been set to Console or Metadata.

2. Check the Enable Metadata checkbox.

3. Type in the Name for the input.

4. (Serial input only) For the Data Format, select either KLV or CoT. For details on the Metadata fields, see "Metadata Settings" on page 90.

5. To apply your changes and start the metadata stream, click Apply.

The changes will take effect immediately but will not be saved and will be lost after a reboot.

TIP To save the current configuration, open the ADMINISTRATION>CONFIG page. See "Saving and Loading Configurations" on page 137.

6. To start or stop the stream, click Start or Stop (as applicable).

7. To view metadata statistics, click Stats. For details, see "Metadata Statistics" on page 92.

To add a Network Metadata Input:

1. From the METADATA page or the METADATA OVERVIEW page, click + to add an input.

The METADATA page opens for you to specify a new metadata input (as shown in the following example).

Fill in to configure Network input

2. Check the Enable Metadata checkbox.

3. Type in the Name for the input.

4. For the Data Format, select either KLV or CoT.

5. Enter the IP address (unicast or multicast) and UDP port. For details on the Metadata fields, see "Metadata Settings" on page 90.

6. (CoT input only) To configure SPI message filtering, check the Sensor Discovery checkbox.

TIP You will need to click [icon] to refresh the page and then click back in the SPI UID text field to view the discovered SPIs.

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7. To apply your changes and start the metadata stream, click Apply.

   The changes will take effect immediately but will not be saved and will be lost after a reboot.

8. To start or stop the stream, click Start or Stop (as applicable).

9. To view Metadata statistics, click Stats. For details, see "Metadata Statistics" on page 92.

Metadata Settings

The following table lists the Encoder Metadata settings:

NOTE The fields depend on the hardware setup of the encoder; i.e., whether the serial port or SDI video is connected; UDP is always available.

Metadata Setting	Default	Description/Values
Enable Metadata	Disabled	Check this checkbox to enable Metadata Capture. NOTE: Only available if the Metadata Capture option has been installed at the factory.
Name	n/a	Enter a unique name for the input.

Metadata Setting	Default	Description/Values (Continued)
Data Format	KLV	(Serial or UDP input only) Select the data format for the metadata. • KLV (Key Length Value) or • CoT (Cursor on Target). NOTE: To configure Serial input, the COM Port Mode must first be set to Metadata (see "Mode" on page 125). CoT must be specified upon purchase. For details, refer to the *Makito CoT Addendum*.
Max AirCraft-SPI Delta	0 ms	(CoT input only) Specifies the maximum delta between SPI (Sensor Point of Interest) and Aircraft message time-stamps for them to be considered a valid pair that can be converted to KLV. 0..1000 ms NOTE: Only available if CoT has been installed at the factory.
Sensor Discovery	Disabled	(CoT input only) Check this checkbox to enable discovery of SPI UIDs that will be shown in the SPI UID field below and can then be potentially used as the SPI UID for SPI message filtering.
SPI UID	n/a	(CoT input only) Double-click the text box to display the list of the SPI messages detected by the Makito and select a string for the UID filter.
IP Address	n/a	(UDP input only, optional) The address is only required for reception of multicast metadata. In this case, you need to provide the multicast IP address to which the data is being sent. You can also specify the address if you only want to accept KLV messages coming from a specific sender.
Port	n/a	(UDP input only, required) Specifies the local UDP port on the Makito that is receiving the packets.

NOTE KLV Metadata over SDI is only used with HD-SDI, and no Closed Captioning services are presently available on HD-SDI Makito.

Metadata Statistics

The following table lists the Encoder Metadata statistics:

Metadata Source Statistic	Description/Values
State	The current operating status of the stream, either: • WORKING • STOPPED • DISABLED
Rx Bytes	Number of received bytes.
Rx OK Messages	Number of successfully received messages.
Rx Corrupt Messages	Number of corrupt or failed messages.
Source Address	(UDP input only) The IP address of the Network source.
Rx SPI Messages	(CoT input only) Number of received SPI (Sensor Point of Interest) messages.
Rx AirCraft Messages	(CoT input only) Number of received AirCraft messages.
Generated KLV Messages	(CoT input only) Number of generated KLV messages.
Generated KLV Bytes	(CoT input only) Number of generated KLV bytes.
RX Filtered SPI Messages	(Serial or KLV UDP input only) Number of filtered SPI Messages.
Reset	Click to reset the Metadata statistics.

Haivision

Configuring Stream Settings

The Makito provides a STREAM OVERVIEW page and separate STREAMS configuration pages for up to eight streams. From the STREAMS pages, you can manage the settings for each Encoder stream, start and stop the streams, as well as pause and resume streams (see "Selective Video Mute" on page 102).

The Makito supports two types of stream configurations:

- Unicast – Enter a unicast destination IP address.
- Multicast – Enter a multicast destination IP address.

(i) NOTE You can specify up to eight active streams (or 16 active RTSP streams). The supported total stream bitrate is up to:

- 30 Mbps audio/video bitrate (TS over UDP or Direct-RTP),
- 25 Mbps audio/video + metadata (TS over UDP), or
- 16 Mbps audio/video bitrate with VF AES and FEC enabled.

To configure "HiLo" Video and/or Audio streaming, you must create an encoder stream for each encoder instance. For more information on HiLo streaming, see "HiLo Video Streaming" on page 72 and "HiLo Audio Streaming" on page 81.

SAP

You can also enable or disable SAP network announcements. Session Announcement Protocol (SAP) is a protocol for advertising multicast or unicast session information. SAP periodically multicasts session description information on an industry standard multicast address and port. When received by remote participants, these announcements can be used to generate playlists and facilitate the viewing of streams by eliminating the need for user configuration. For example, they may be used to automatically create program listings to allow streams to easily be located, selected and viewed.

You can also specify the address and port to transmit SAP announcements on a stream-by-stream basis. This is useful if you do not want to multicast SAP announcements on the standard IP addresses and ports (as defined in RFC 2974). See "SAP only" on page 100.

Stream Overview Page

The STREAM OVERVIEW page displays a summary of defined streams for the encoder. The STREAM OVERVIEW page displays the Stream Protocol, IP Address, Port, Video Mode (i.e., "High" or "Low" stream instance), and selectable Actions for each stream. It also provides an option for you to either restart (Active), Stop or Remove the stream. Multiple streams can be either Multi-stream copies or HiLo stream instances or both.

This table includes streams defined using either the Streams Page or the RTSP Settings Page.

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To open the Encoder Stream Overview:

1. Click SYSTEM from the main menu, and then click ENCODER>STREAMS from the side-bar menus.

   The STREAM OVERVIEW page opens, as shown in the following example, displaying the defined streams for the encoder.

Click a line to open the Stream
configuration page for that stream instance
or click + to add a stream

2. To view stream details or add an encoder stream, click a line in the table to open the STREAMS page.

3. To change the Action status for an existing stream, click Active (under Actions) and select either Start or Stop, Pause or Remove.

4. To apply your changes, click Apply.

   The changes will take effect immediately but will not be saved and will be lost after a reboot.

TIP   To save the current configuration, open the ADMINISTRATION>CONFIG page. See "Saving and Loading Configurations" on page 137.

Streams Page

NOTE To configure the encoder to interoperate with RTSP-based software players such as QuickTime, VideoLan VLC, or Wowza Server (Flash), see "Configuring the RTSP Server" on page 107.

To configure the Encoder Stream Settings:

1. From the STREAM OVERVIEW page, click a stream or click any line in the table.

   The STREAMS page opens. Following is an example of the STREAMS page for Encoder instance #1.

2. Select or enter the new value(s) in the appropriate field(s). See "Stream Settings" on page 96.

3. To apply your changes, click Apply.

   The changes will take effect immediately but will not be saved and will be lost after a reboot.

TIP To save the current configuration, open the ADMINISTRATION>CONFIG page. See "Saving and Loading Configurations" on page 137.

If you are creating a stream, it will start streaming and the Stop and Pause buttons will appear.

4. To refresh the page, click [icon].

You will now see an Average Bandwidth for the stream. This indicates that the encoder is streaming properly.

5. (Optional) To pause the stream, click Pause. (See "Selective Video Mute" on page 102.)

6. When you are ready to resume the stream, click Resume.
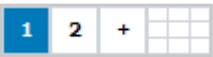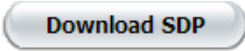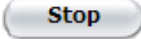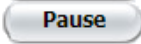
NOTE   The Multicast address range is from 224.0.0.0 to 239.255.255.255. Multicast addresses from 224.0.0.0 to 224.0.0.255 are reserved for multicast maintenance protocols and should not be used by streaming sessions. We recommend that you use a multicast address from the Organization-Local scope (239.192.0.0/14).

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7. To view stream statistics, click Stats. For details, see "Stream Statistics" on page 103.

Stream Settings

The following table lists the Encoder Stream controls and settings:

Stream Setting	Default	Description/Values
[1 2 + grid]		Click a number to display the STREAM page for an existing stream, or + to create a new stream. Click the grid to display the STREAM OVERVIEW page.
Name	n/a	(Optional) Enter a unique name for the stream.

Stream Setting	Default	Description/Values (Continued)
Protocol	TS over UDP	Select the Protocol Type for the encoded stream. • TS over UDP: MPEG2 transport stream over UDP (no RTP header) • TS over RTP: MPEG2 transport stream over RTP • Direct-RTP: RFC3984 • QuickTime: Sends video as per RFC 3984 and audio as per RFC 3640, with video and audio sent on different UDP ports. See "QuickTime SDP and Interoperability" on page 105. • RTMP: Streams to a Flash Media Server or Content Delivery Network. See "CDN and Flash Interoperability (RTMP)" on page 103.
Download SDP	n/a	This button becomes available when you create a session with QuickTime as the Encapsulation Type. Click to generate an SDP (Session Description Protocol) file which you can then download to your computer or a streaming server. TIP: Since there could be multiple unicast streams with the same QT format, be sure to give each SDP file a unique name in order to associate it to a specific stream. NOTE: For more information, see "QuickTime SDP and Interoperability" on page 105.
Stop / Pause	n/a	These buttons become available to control a stream once it has started streaming. • Click Stop to stop a stream. You can later restart it or clear it. • Click Pause to pause the stream. If a Still Image has been configured, it will be displayed. You can later resume the stream or stop it. See "Selective Video Mute" on page 102.

Stream Setting	Default	Description/Values (Continued)
Video: High/Low	High	To configure HiLo streaming, you must create a stream for each Video encoder instance and specify the settings for each stream. In this field, select the stream instance to configure: • High • Low NOTE: This must correspond to the Enable: High/Low selection on the VIDEO page.
Audio: High/Low	High	To configure HiLo streaming, you must create a stream for each Audio encoder instance and specify the settings for each stream. In this field, select the stream instance to configure: • High • Low NOTE: This must correspond to the Enable: High/Low selection on the VIDEO page.
Metadata	None	(Only available if Metadata Capture option has been installed at the factory) To enable metadata, select one of the defined inputs: • None • Serial:CoT (Serial input only) • HD-SDI (HD-SDI input only) NOTE: The options reflect the available Metadata format(s) and hardware setup of the encoder; i.e., whether the serial port or SDI video is connected. For more information, see "Configuring Metadata Capture" on page 85.
Data Carriage	Asynchronous	(Metadata must be either Serial:CoT or HD-SDI) Selects the encapsulation type to use for the metadata source, either: • Synchronous • Asynchronous • Asynchronous with Sync AU
IP Address	n/a	Enter the destination IP address in dotted-decimal format. For multicast addresses, see NOTE on page 96.

Stream Setting	Default	Description/Values (Continued)
Port(s)	n/a	Enter the destination UDP port(s). Enter a number in the range 1025..65,535. Note that RTP streams use *even numbers only* within this range. NOTE: Direct-RTP and QuickTime streams require different UDP ports for video and audio. You must specify the second port number.
MTU	1496	(Maximum Transmission Unit) Specifies the maximum allowed size of IP packets for the outgoing RTP data stream. 228..1500
TTL	16	(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
ToS	184 or 0xB8	(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 0x00..0xFF (hex) Default = 0xB8 NOTE: 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.
Still Image	None	(Optional) Select a pre-configured static image file to display when the stream is paused. (See "Selective Video Mute" on page 102.) This feature may be used for applications such as blocking out sensitive content or delivering announcements. NOTE: To configure the static images, see "Still Image Streaming" on page 112.
VF Encryption	Off	(Read-only/Only shows if enabled) Indicates whether Advanced Encryption Standard (AES) encryption has been enabled through the Furnace Server interface (VF Station Editor).

Stream Setting	Default	Description/Values (Continued)
FEC	None	(Optional) Enables Forward Error Correction (FEC). Select either: • [None] • VF NOTE: The VF FEC is a proprietary FEC and is not interoperable with devices outside of the Haivision family.
Average Bandwidth	n/a	(Read-only) The average transmit bandwidth for the unit in kbps.
Traffic Shaping		
Traffic Shaping	Disabled	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).
Idle Cells	Disabled	(Traffic Shaping must be enabled) When enabled, Idle TS cells will be inserted into a TS stream when necessary.
Ceiling %	15%	(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. 5..100% NOTE: To configure the ceiling percentage for CBR streams with metadata, see "Ceiling Percentage for CBR Streams with Metadata" on page 102.
Ceiling Bandwidth	n/a	(Traffic Shaping must be enabled, Read-only) The absolute bandwidth limit that the encoder will not exceed. The bitrate produced will not exceed this value.
SAP only		
Transmit SAP	Off	Check or clear this checkbox to enable or disable SAP announcements.
Session Name	n/a	(Transmit SAP must be enabled) Enter a unique name for the Session.

Stream Setting	Default	Description/Values (Continued)
Session Description	n/a	(Transmit SAP must be enabled, optional) Enter an expanded description of the Session.
Keywords	n/a	(Transmit SAP must be enabled, optional) Enter one or more keywords to associate with the Session. Keywords can serve as filters.
Author	n/a	(Transmit SAP must be enabled, optional) Enter the name of the program's author.
Copyright	n/a	(Transmit SAP must be enabled, optional) Enter the copyright information for the program.
Session IP Address	n/a	(Transmit SAP must be enabled, optional) Enter the multicast IP address on which to transmit the SAP announcements for this stream. The system will provide a default multicast IP address when creating a new stream (generally 224.2.127.254 but this depends on the stream destination address).
Session Port	n/a	(Transmit SAP must be enabled, optional) Enter the destination UDP port to which SAP announcements will be sent for this stream.
RTMP only		
URL	n/a	(RTMP must be selected as the Protocol type) Enter a Fully Qualified Domain Name (FQDN) for the application endpoint. NOTE: For more information, see "CDN and Flash Interoperability (RTMP)" on page 103.
Publish Name	n/a	(RTMP only) Enter a publish name for the stream. A stream publishing name is required for RTMP streaming. If you do not enter a publish name, the stream name will be used instead. NOTE: Note that stream names must be unique, while the publish name can be re-used if desired across multiple RTMP streams. See "CDN and Flash Interoperability (RTMP)" on page 103.

Stream Setting	Default	Description/Values (Continued)
Username	n/a	(RTMP only) Enter the Content Delivery Network (CDN) login username.
Password	n/a	(RTMP only) Enter the CDN login password.

Selective Video Mute

Pausing and then resuming a stream allows you to selectively and temporarily "mute" the video. For example, if you have several High and Low streams going to different destinations, you can choose to mute one or some of the streams (i.e., by pausing them). Also, if a still image has been configured, the encoder will send this image to replace the encoded video stream when the stream is paused. (See "Still Image Streaming" on page 112.)

When the video is "unmuted" (i.e., resumed), the decoder will immediately display the video stream again. In effect, this provides a "privacy mode" and avoids delays that may occur when starting and stopping a stream and waiting for a decoder to start decoding again.

As of Version 2.2.0, the encoder inserts coded silence when a stream is paused. This supports inter-working with the Furnace to ensure that when a stream is paused and a still image inserted (for example, if there is a channel change), the still image will be displayed on Stingray set-top boxes and InStream players. (Note that these players need audio before they play any content.) No user selections are required to enable this feature.

Ceiling Percentage for CBR Streams with Metadata

For CBR streams with Traffic Shaping enabled, metadata may cause the stream to exceed the Ceiling Bandwidth (audio and video bitrate + ceiling percentage). Therefore, when configuring the Ceiling Percentage, you need to take into account how much metadata is being generated.

Metadata is not part of the minimum bandwidth calculation used for CBR streams (because it is application dependent). The bandwidth for it is presumed to fit within the Ceiling Bandwidth limit which is specified at stream creation.

For example:

ceiling percentage = (metadata_bitrate / (video_bitrate + audio_bitrate)) * 100
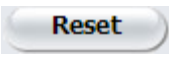
The minimum Ceiling Percentage value should be no less than 5.

For example, where metadata_bitrate = 500 Kbps, video_bitrate = 1000 Kbps, and audio_bitrate = 128 Kbps:

ceiling percentage = (500 / (1000 + 128)) * 100 = 44

Stream Statistics

The following table lists the Encoder Streams statistics:

Stream Statistic	Description/Values
State	The current operating status of the stream, either: • STREAMING • CONNECTING • STOPPED
Up Time	(Only available when State is STREAMING) The length of time the stream is actively streaming (dd:hh:mm:ss).
Sent Packets	Number of RTP or UDP packets sent for that stream.
Sent Bytes	Number of Bytes sent for that stream.
Last Error	The last known cause of error, for example, "RTMP service connection failed: Invalid username or password."
Bitrate	The stream bitrate (in kbps).
Reset	Click to reset the Output Stream statistics.

CDN and Flash Interoperability (RTMP)

You can configure the Makito to stream directly to a Flash Media Server (FMS) or Flash-based Content Delivery Network (CDN) using the Real Time Messaging Protocol (RTMP).

- The supported RTMP servers are FMS and Wowza.
- The supported Transcoders are Wowza and Haivision's KulaByte Transcoder.
- The supported CDNs are Akamai and Limelight.

This section provides the steps to set up an RTMP stream.

You may assign a single Publish Name to multiple streams, configured on separate servers or content distribution services, to provide redundancy and fail-over capability. The encoder will send multiple RTMP streams to different FMS servers using the same published name. If an FMS fails, the players will have the option of fail-over to the redundant FMS server.

To stream to a Flash Media Server or Flash-based CDN:

1. From the STREAM OVERVIEW page, set the Stream Protocol Type to RTMP (as shown in the following example).

Fill in to configure the RTMP stream
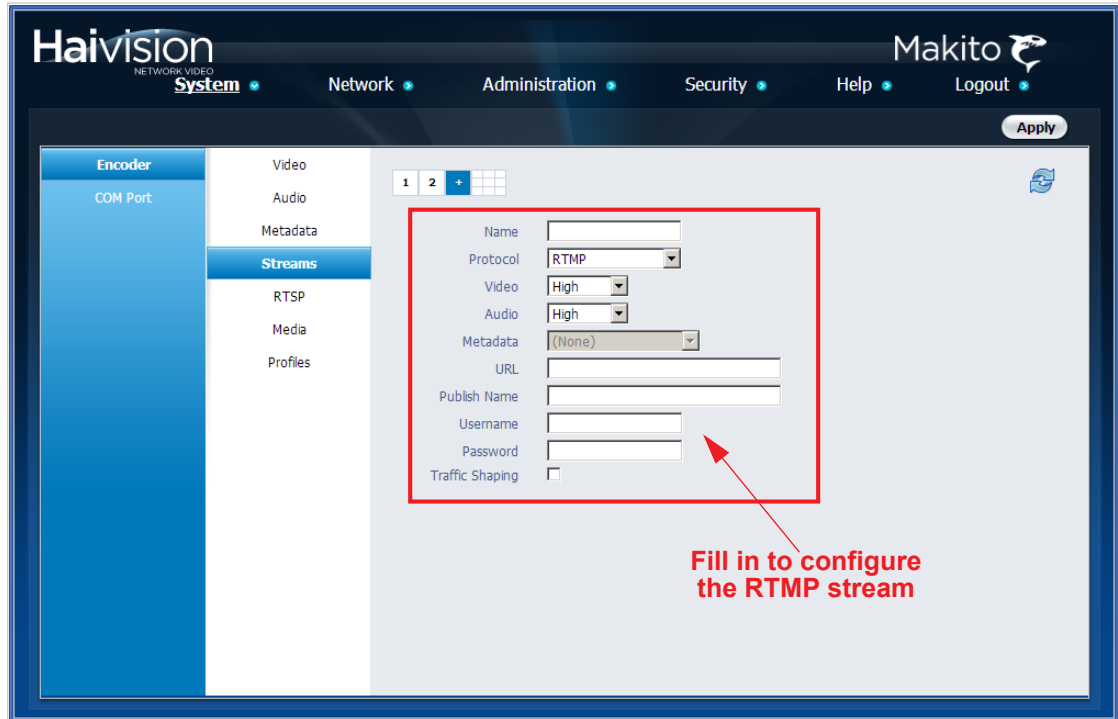
2. Type in a unique name to identify the stream.

NOTE You can optionally configure "HiLo" video streaming or either Metadata capture. For information on either of these, see "Video Settings" on page 73 or "Configuring Metadata Capture" on page 85.

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3. Type in a Fully Qualified Domain Name (FQDN) for the application endpoint of the FMS or CDN server. For details on the RTMP stream settings, see "RTMP only" on page 101.

4. Type in a Publish Name.

5. Type in the username and password for the CDN server.

6. (Optional) Check the Traffic Shaping checkbox. See "Traffic Shaping" on page 100.

7. Click Apply to start the stream.

QuickTime SDP and Interoperability

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

From the STREAMS page, you can select QuickTime as the Stream Protocol (as per RFC 3640 for audio and RFC 3984 for video), and then when the session starts, you can download the SDP file to your computer or a streaming server.

To manually set up the SDP method:

1. From the STREAM OVERVIEW page, set the Stream Protocol Type to QuickTime (as shown in the following example).

2. Select or enter the value(s) to configure the stream. For more information, see "Stream Settings" on page 96.

TIP   Remember to specify the second (audio) port.

---

3. Click Apply to start the stream.

4. Once the stream has started, click Download SDP.

5. Save the SDP file to your computer in a location that the QuickTime player can access. For example:

   QTSS/Library/QuickTimeStreamingServer/Movies

6. Start your software decoder and open the SDP file to start playing the stream.

SDP File Example

The SDP file is compliant to RFC 2327 and contains both video and audio attributes, as shown in the following example:

```
v=0
o=- 1 1 IN IP4 127.0.0.1
s=RTP session
e=NONE
c=IN IP4 231.1.1.1/128
b=RR:0
t=0 0
m=video 10000 RTP/AVP 96
a=rtpmap:96 H264/90000
a=control:trackID=0
a=fmtp:96 packetisation-mode=1; sprop-parameter-sets=
   Z0IAIIxoBQBbv/AAEAARAAADA+kAAdTAhAAAAAAAAA=,aM48gAAAAA=
m=audio 10002 RTP/AVP 97
a=rtpmap:97 mpeg4-generic/90000/2
a=control:trackID=1
a=fmtp:97 streamType=5;profile-level-id=22;mode=AAC-hbr;sizelength=
   13;indexlength=3;indexdeltalength=3;config=1190
```

Configuring the RTSP Server

From the RTSP page, you can configure the Makito to interoperate with Real-Time Streaming Protocol (RTSP)-based software players such as QuickTime, VideoLan VLC, or Wowza Server (Flash) for real-time streaming.

NOTE   The number of RTSP clients (i.e., players) is limited to 16. This applies whether using unicast or multicast IP addressing.

To configure "HiLo" streaming, you must define the RTSP settings for the second encoder instance in the "Low" column.

To generate the SDP (Session Description Protocol) file to download to your computer or server to interoperate with QuickTime or a Streaming Server, see "CDN and Flash Interoperability (RTMP)" on page 103.

To configure the RTSP Settings:

1. Click SYSTEM from the main menu, and then click ENCODER>RTSP from the sidebar menus.

   The RTSP page opens, as shown in the following example.
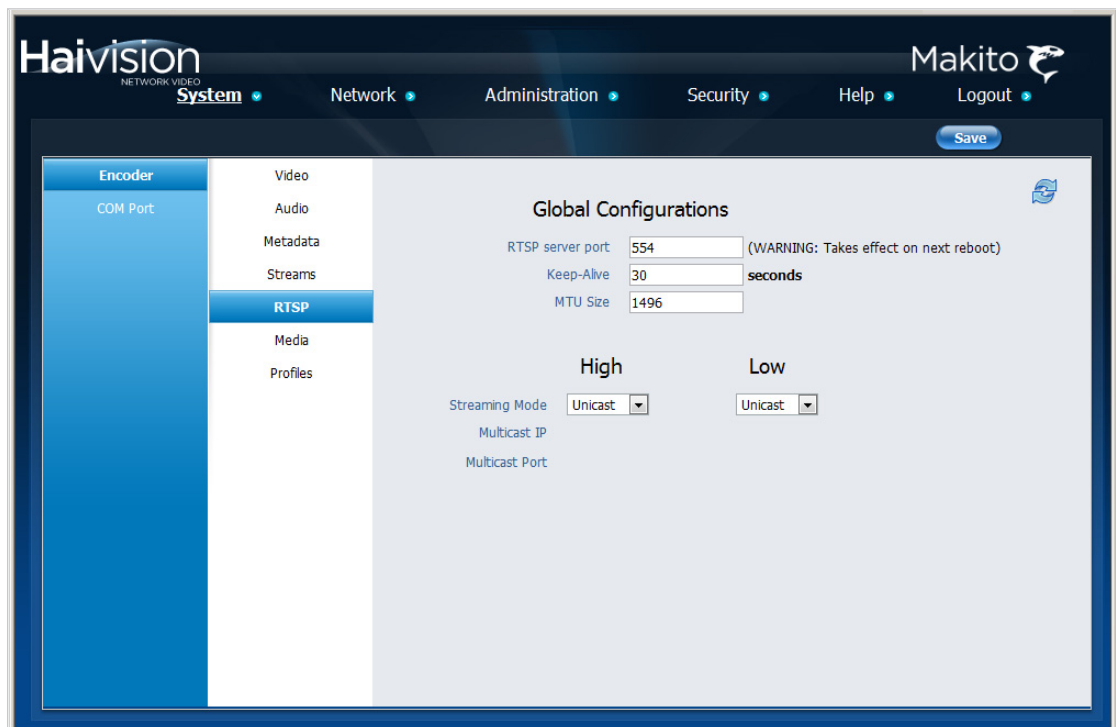
2. Select or enter the new value(s) in the appropriate field(s). You may specify the following RTSP Settings:

RTSP Setting	Default	Description/Values
RTSP Server Port	554	The UDP port# of the RTSP Server Port.
Keep Alive	30	Keep-alive is a timeout for the TCP/IP connection of the RTSP session, to prevent streaming if the client becomes unresponsive or offline. The range is: 10..900000 (seconds).
MTU Size	1496	(Maximum Transmission Unit Size) Specifies the maximum allowed size of IP packets for the outgoing data stream. 228..1500.
NOTE: To configure HiLo streaming, you must configure the remaining fields for the High and Low instance.		
Streaming Mode	Unicast	The Streaming Mode for the RTSP stream: • Unicast • Multicast
Multicast IP	n/a	If the Streaming Mode is Multicast, type in a multicast IP Address.
Multicast Port	n/a	If the Streaming Mode is Multicast, type in a UDP Port #.

3. To apply and save your changes, click Save.

NOTE To access the High or Low stream from the decoder, you must specify the correct RTSP URL. Type either:

rtsp://<Makito IP Address>/high

-or-

rtsp://<Makito IP Address>/low

Configuring Media Effects

From the MEDIA page, you can configure media effects such as a logo overlay in the encoded video and a static image to replace the encoded video stream when the stream is paused. You can also take snapshots of your video input.

NOTE   The maximum file size for logo and still image files is 10 MB.

Logo Insertion/Overlay

You can configure the Makito to display a graphic file as a logo overlay in the encoded video. There can be one logo per Makito. The image file can be uploaded in either BMP, JPEG, PNG, or GIF 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).

To configure a logo overlay:

1. Click SYSTEM from the main menu, and then click ENCODER>MEDIA from the sidebar menus.

   The MEDIA page opens, as shown in the following example.
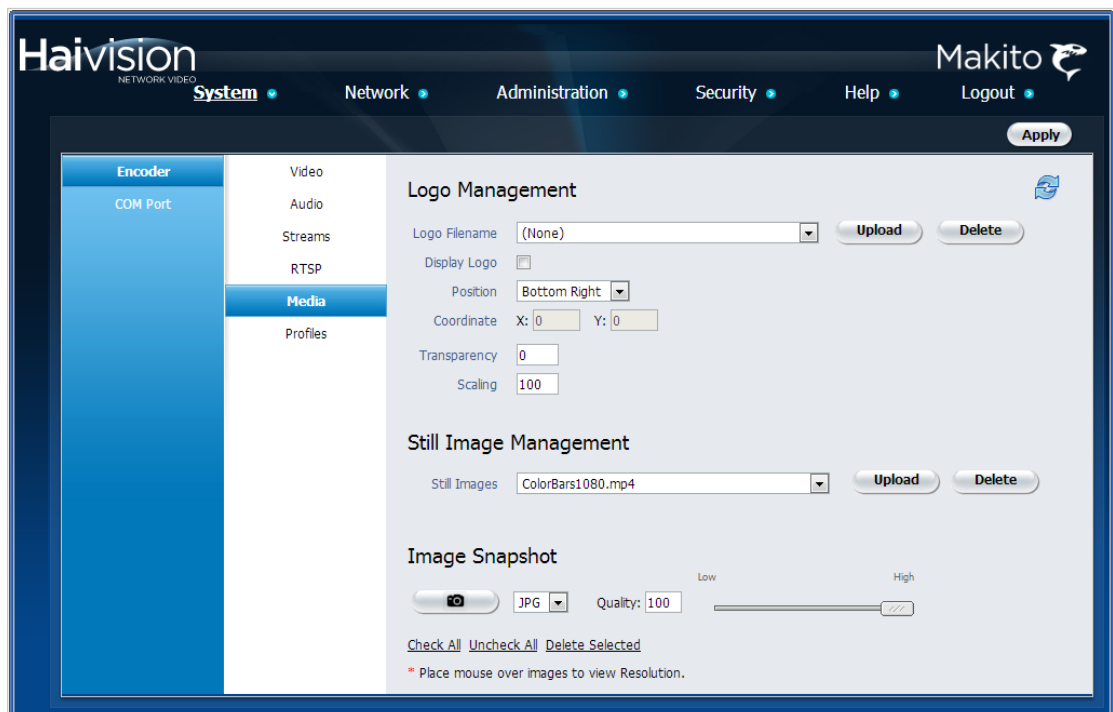
2. To upload a new image file in either BMP, JPEG, PNG, or GIF format, click Upload next to the Logo Filename field.

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

By default, the encoder will be temporarily stopped; however, you may uncheck this box to allow the encoder to continue streaming.

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. To configure a logo overlay, select or enter value(s) in the appropriate field(s). See "Logo Settings" on page 111.

5. To delete an image file from the list of available Logo Filenames, click Delete next to the Logo Filename field.

6. To apply your changes, click Apply.

NOTE Logos are stored on the Makito file system in the folder /usr/share/haivision/logos.

Logo Settings

The following table lists the Logo controls and settings:

Logo Setting	Default	Description/Values
Logo Filename	None	Select the name of the logo image file to display. NOTE: You can upload more than one image file; however, you must select one logo for the Makito.
Display Logo	Disabled	Check this checkbox to display the selected file as a logo overlay. NOTE: This duplicates the Display Logo checkbox on the Video page.
Position	Bottom Right	Select the position for the logo overlay: • Absolute • Top Left • Top Right • Bottom Left • Bottom Right • Centered NOTE: In Absolute mode, the logo will be positioned at the exact X and Y coordinates specified.
Coordinate X,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)
Scaling	100	Specifies the scale factor (percentage) for the logo: • 25% = 1/4 size • 100% = no scaling • 400% = 4x

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Still Image Streaming

When creating a stream, you can specify a static image that will be used to replace the encoded video stream when the stream is paused. This feature may be used, for example, to block out sensitive content or deliver announcements and other messages. (See "Selective Video Mute" on page 102.)

The supported source formats for the static image are BMP, JPEG, PNG, and GIF.

The supported output resolutions are 1920x1080, 1280x720, 720x480 (NTSC), and 720x576 (PAL).

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

To configure a static image:

1. Click SYSTEM>ENCODER>MEDIA to open the MEDIA page.

2. To upload a still image file, click Upload next to the Still Images field.

Still Image Management

Still Images   ColorBars1080.mp4 ▾   [Upload]   [Delete]

3. On the Still Image file dialog, select the Output Resolution for the image.

Still Image file (.bmp, .jpg, .png, .gif)
Output Resolution
1920x1080 ▾
[   ] [Browse...]   [Upload]
☑ Temporarily Stop Encoder

4. Click Browse to select the image file and then click Upload.

   By default, the encoder will be temporarily stopped; however, you may uncheck this box to allow the encoder to continue streaming.

   The static image is encoded into a single H.264 GOP sequence and will be used to replace the "real" video stream when the stream is paused.

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5. To delete an image file from the list of available Still Images, click Delete next to the Still Image field.

6. To apply your changes, click Apply.

NOTE The resulting still image files are stored on the Makito file system in the folder /usr/share/haivision/still_images.

Image Snapshot Capture

NOTE Snapshot Capture is an optional feature which may be disabled at the factory. The following section is only applicable if snapshots are enabled.

From the MEDIA page, you can take a snapshot of your video input and save it to either .jpg or .yuv image format. With .jpg snapshots, you can also specify the image quality.

When you take a snapshot, a unique snapshot name will be generated based on the current time if NTP (Network Time Protocol) is enabled, or a simple index such as snap-1.jpg if NTP is not enabled.

Thumbnails of the snapshots are displayed below the configuration fields for you to view and optionally save.

Note that the encoder must have a valid Input Format. To verify the Input Format detected by the system, see "Configuring Video Settings" on page 72.

NOTE Snapshot files are stored on the Makito file system under /usr/share/haivision/snapshots.

To take an image snapshot:

1. Click SYSTEM>ENCODER>MEDIA to open the MEDIA page.

2. Scroll down to the Image Snapshot portion of the page (shown in the following example).

3. Select the format for the image, either .jpg or .yuv color space (color model).
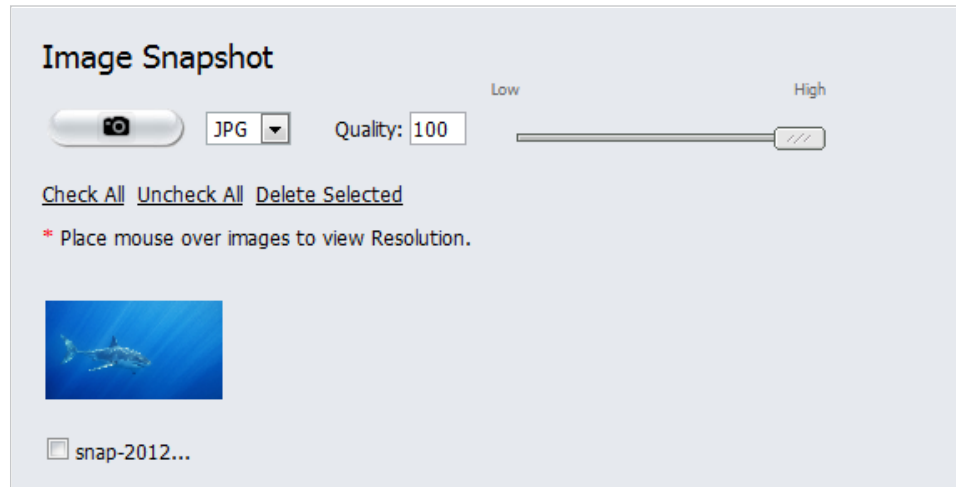
4. (.jpg format only) To adjust the image quality, either type in a value between 1 and 100 in the Quality field, or move the slider to the desired value.

5. To apply your changes, click Apply.

   This sets the system defaults for the preferred snapshot format and quality.

6. To take the image snapshot, click [camera].

   Once a snapshot has been taken, a new thumbnail is displayed below the configuration fields (as shown in the following example).
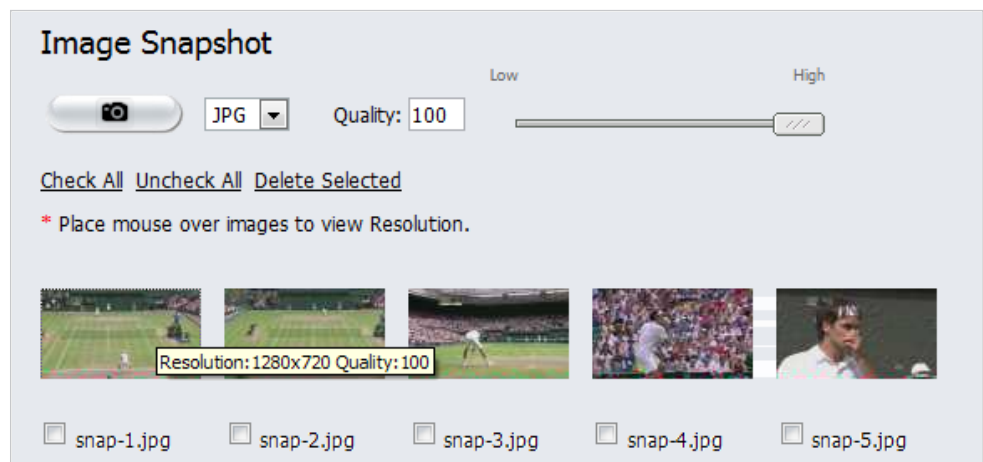
[.jpg Snapshots]

7. To view a full-size image of a snapshot in .jpg format, click the thumbnail.

   A full-size snapshot opens in a new browser window.

8. To save a snapshot in .jpg format, right-click either the thumbnail or the full-size image, and select Save Picture As…

[.yuv Snapshots]

9. To save a snapshot in .yuv format, click the thumbnail and select the filename and location in the Save As dialog.

10. To delete one or multiple snapshots, check the checkbox below the snapshot (or click Check All) and click Delete Selected.

Configuring Video Profiles

To help you manage the video quality parameters, the Makito provides a selection of video presets or "Profiles" defined for different contexts, such as computer graphics, movies, news, outdoors, sports, or "talking heads" (Virtual Presence).

From the PROFILES page, you can view the list of available video Profiles on your system and the parameter settings for each Profile. You can also create custom Profiles in which you configure each quality parameter independently, for example, to optimize efficiency of MPEG-4 encoding on your system.

Any newly created Profiles are added to the list of Profiles available for you to select from when specifying the Video Encoding properties (see "Profile" on page 76).

Profiles combine the following video quality parameters: Motion, image Complexity, Uniformity, Rate Control Buffer Size, and Deblock Filter (including Filter Strength and Level).

NOTE   Each parameter has a different impact on video quality. Some have a great visual impact, while others have more subtle impact but are nonetheless important to the overall video quality. For more information, see "Video Quality Parameters" on page 119.

To view and configure video profiles:

1. Click SYSTEM from the main menu, and then click ENCODER>PROFILES from the side-bar menus.

   The PROFILES page opens displaying the list of available video Profiles for the encoder, as shown in the following example.
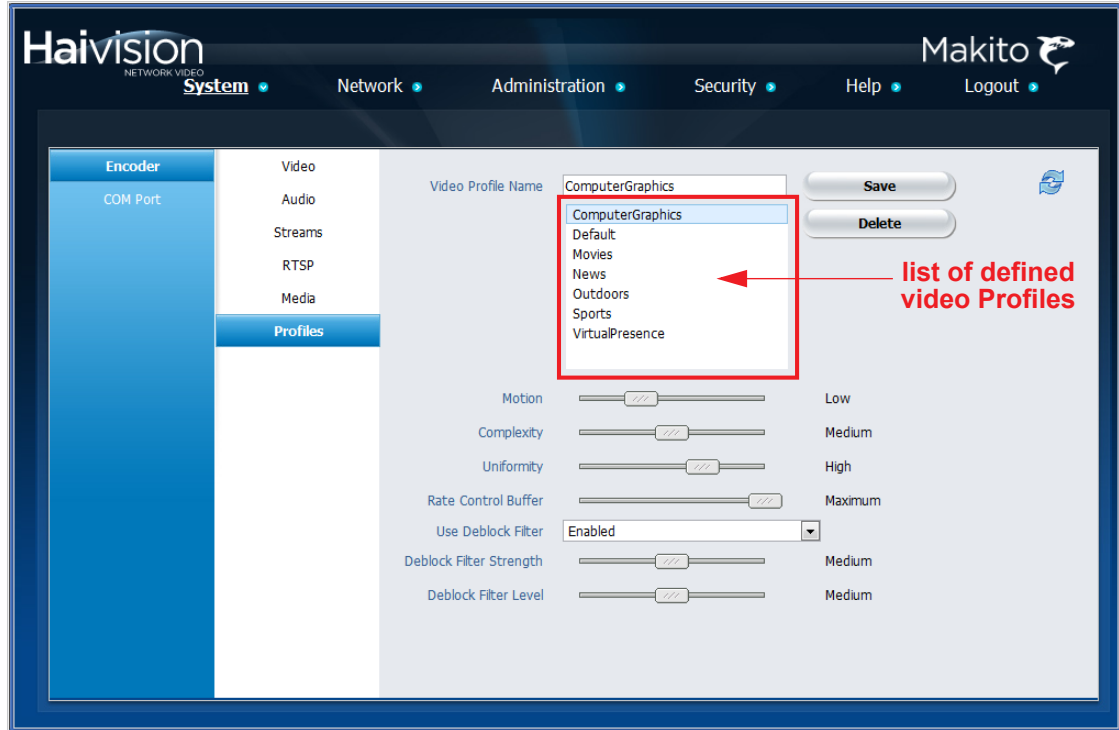
NOTE To view the list of video Profiles supplied with the Makito, refer to "Default Profiles" on page 123.

---

2. To view the parameter settings associated with a particular Profile, click the Profile name in the selection list, for example, "News".
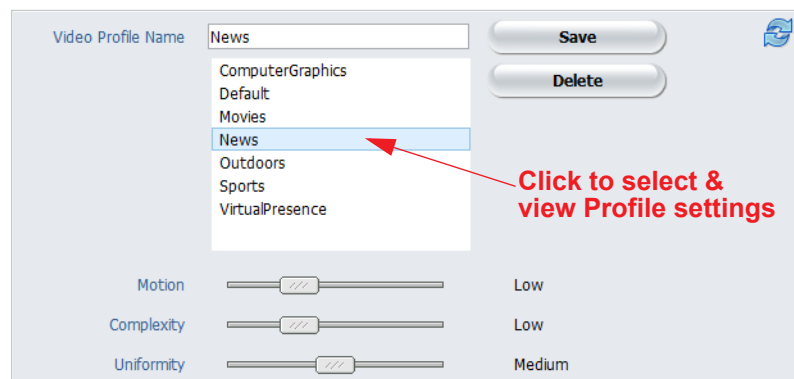
The selected Profile will load onto the page and the settings will be displayed, as shown in the example below.

3. To modify the parameter settings for the Profile, you can click and drag the sliders to adjust the settings. For a description of these parameters and the slider value ranges, see "Video Quality Parameters" on page 119.
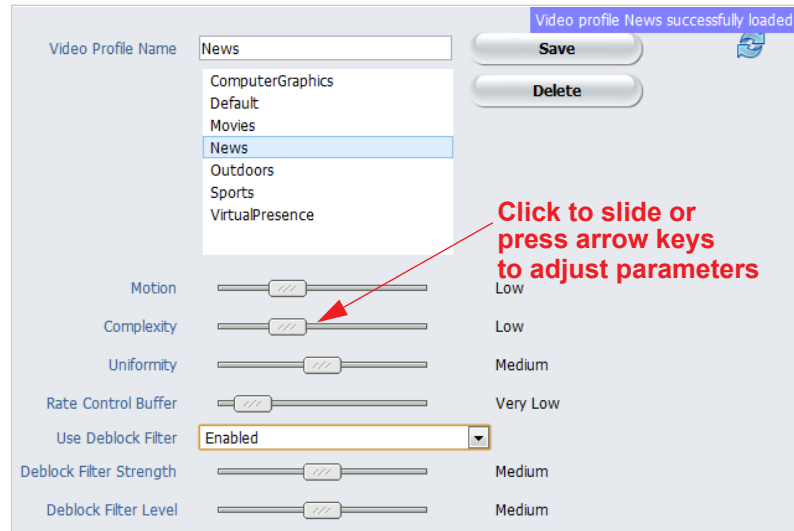
TIP You can also use the arrow keys on the keyboard to adjust the parameter settings. Simply click the slider to select the parameter and then press the arrow keys until it reaches the desired setting.

4. You can either modify the existing Profile or create a new Profile:
   • To save your changes to the existing Profile, simply click Save.
   • To create a new Profile, type the new name in the text box and click Save.

NOTE When creating a new Profile based on one of the default Profiles, it's a good idea to make a copy and save your modifications under the new name. If you do modify one of the default Profiles and wish to return to the default values, refer to "Default Profiles" on page 123 for the original settings.

5. To delete a Profile, select the Profile name in the selection list and click Delete.

TIP The video Profiles are designed to allow you to experiment with adjusting the settings to get the best output picture quality for your application. Adjusting these parameters has no other impact on encoding, audio, etc., just visual.

Video Quality Parameters

The following table summarizes the video quality parameters, the selectable values and the impact on video quality for each parameter.

Video Quality Parameter	Description	Selectable Values	Impact on Video Quality
Motion	Describes the average motion in the picture. Applies a weighting factor to other video quality parameters. In general, when the Motion setting is greater, the weighting factor tends to be less. It is assumed that quality is more critical when there is less motion because your eyes can focus on the details.	Minimum Very Low Low Medium High Very High Maximum	Minor
Image Complexity	Describes the amount of details in the picture. Details in the image are generally caused by object boundaries. For example, a picture consisting of a grass field with flowers will present a lot of detail, while a picture of a person in a meeting room will present less detail. A higher Complexity setting allows greater variation in video quality inside the same picture (i.e., in different regions of the picture). When there is a somewhat constant video quality across the picture and video frames (i.e., the complexity is lower), the step usually remains small.	Minimum (2) Very Low (4) Low (6) Medium (8) High (10) Very High (12) Maximum (15)	Moderate

Video Quality Parameter	Description	Selectable Values	Impact on Video Quality
Image Uniformity	Describes the allowed reaction speed of the rate control subsystem. This affects the video quality improvement / degradation in the picture and across pictures. • If the Uniformity setting is low (i.e., the picture quality is not uniform), the rate control subsystem will react more quickly. • If the Uniformity setting is high (i.e., the picture quality is more uniform), the rate control subsystem will react more slowly. The recommended value is in the range from Minimum to Medium. Higher Uniformity values should only be used with higher bitrates.	Minimum (0) Very Low (1) Low (1.5) Medium (2) High (3) Very High (3.5) Maximum (5)	Major *see NOTE on page 122
Rate Control Buffer	Controls the rate control subsystem buffer size. This has an impact on video quality. Generally, a larger buffer will provide a higher video stream quality and result in less degradation of the picture. NOTE: The values are a multiplication factor for the default buffer size.	Minimum (150) Very Low (300) Low (600) Medium (900) High (1200) Very High (1500) Maximum (2000)	Moderate

Video Quality Parameter	Description	Selectable Values	Impact on Video Quality
Use Deblock Filter	The Deblock Filter removes the blocking effect from the reconstructed frame before it is sent to memory. In general, the reconstructed frame will contain more blocks when the bitrate is small in comparison to the picture size (i.e., resolution). • The Deblocking filter should always be enabled in case of HD video; otherwise there will be a noticeable reduction in quality if you turn off the filter in HD. • The Deblocking filter should generally be disabled in case of SD video because it can cause false motion estimation. The Deblocking filter is somewhat adaptive so it will filter more if there is more blocking effect and less if the picture is already detailed.	Enabled (0) Disabled (1)	Moderate
Deblock Filter Strength	(Use Deblock Filter must be enabled) Deblocking filter strength affects the overall amount of deblocking to be applied to the reconstructed frame. Higher values deblock more effectively, but also destroy more details and cause the entire image to be softened (blurry). The default value of 0 is almost always sufficient to get rid of most blocking, but leaves the picture noticeably blurrier.	Minimum (-3) Very Low (-2) Low (-1) Medium (0) High (1) Very High (2) Maximum (3)	Minor

Video Quality Parameter	Description	Selectable Values	Impact on Video Quality
Deblock Filter Level	(Use Deblock Filter must be enabled) The Deblocking filter level determines whether the blocks get filtered or not. A higher filter level value allows more blocks of the reconstructed frame to be filtered. The blocks that are filtered lose details according to the filter strength parameter. NOTE: The default value of 0 is almost always sufficient to get rid of most blocking.	Minimum (-3) Very Low (-2) Low (-1) Medium (0) High (1) Very High (2) Maximum (3)	Minor

NOTE   Keep in mind that the Bitrate remains the main determiner of video quality.

For example, even with a huge Buffer size, minimum Uniformity, and very high Complexity, if your Bitrate is "low", you will get the low quality you specified. However, if your content is rich and hard to encode, then a larger Buffer size will help achieve a better quality for the same Bitrate.

Default Profiles

The following table lists the parameter settings for the default Video Profiles supplied with your Makito. Each Profile is specific to a type of content.

Video Quality Parameters	Default Video Profiles						
	Computer Graphics	*Default	Movies	News + ticker	Outdoors	Sports	Virtual Presence
Content Motion	Low	Medium	High	Low	High	High	Low
Image Complexity	Medium	Very High	Low	Low	Very High	High	Very Low
Image Uniformity	High	Very Low	Medium	Medium	Minimum	Low	Medium
Rate Control Buffer	Maximum	Very Low	Medium	Very Low	Very Low	Low	Low
Deblock Filter	Enabled	Disabled	Enabled	Enabled	Enabled	Enabled	Enabled
Deblock Filter Strength	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Deblock Filter Level	Medium	Medium	Medium	Medium	High	Medium	Medium

NOTE *The "Default" Profile provides the same effect as the previous Makito release (v1.4.0) in terms of video quality.

Managing the COM Port

NOTE   The COM PORT page is only accessible to administrators.

The Makito Dual Height Blade and the Makito-SDI provide a serial interface which you can use to connect to a computer for management of the encoder. The COM PORT page displays the settings for the COM port.

Also, on systems with the Metadata Capture option installed, you can use the serial port interface to capture either KLV (Key Length Value) or CoT (Cursor on Target) metadata, which will then be incorporated within the metadata elementary stream of the standard MPEG Transport Stream. For more information, see "Configuring Metadata Capture" on page 85.

Before you can configure the Metadata settings, you will need to set the COM Port Mode to Metadata and then reboot the encoder.

To display the COM Port Settings:

1. Click SYSTEM from the main menu, and then click COM PORT from the sidebar menu.

   The COM PORT page opens, as shown in the following example.
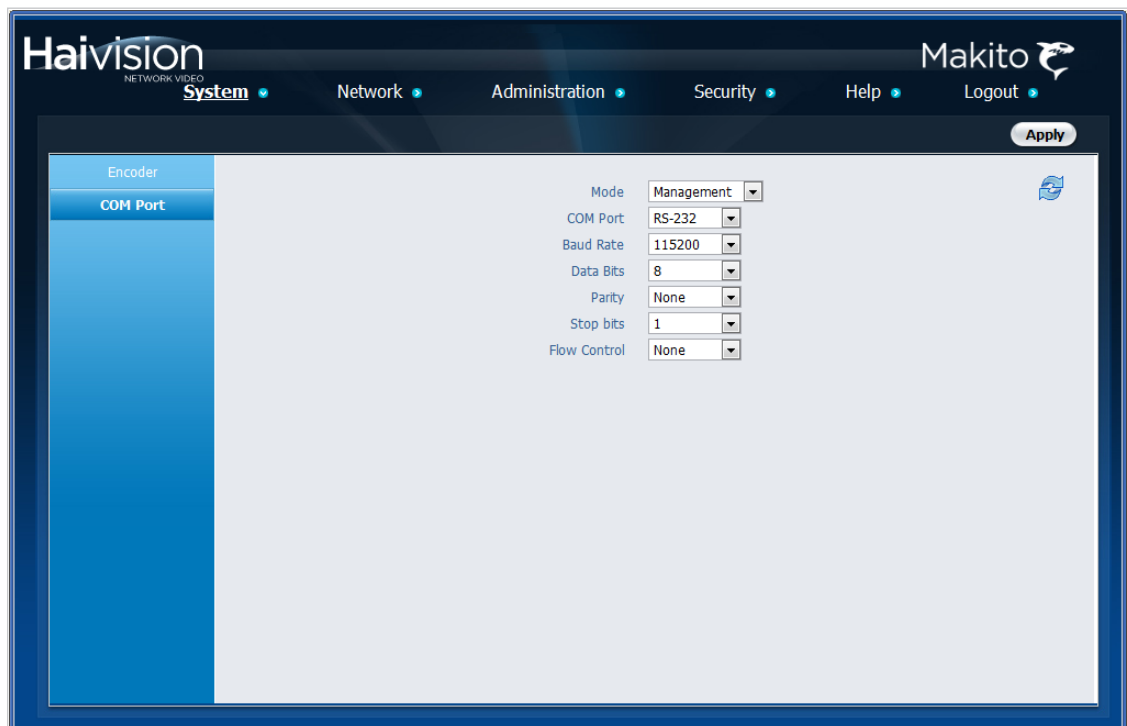
The COM Port settings are as follows:

COM Port Setting	Default	Description/Values
Mode	Management	Specifies the type of activity: • Management or • Metadata (required in order to configure the Metadata settings) NOTE: You must reboot the encoder when you change the Mode.
COM Port	RS-232	Specifies the type of serial interface: • RS-232 or • RS-422 (only available if the Metadata Capture option is installed).
Baud Rate	115200	The COM Port bitrate: 115200
Metadata Capture only	115200	Set the COM Port bitrate to match the protocol for connected RS-232/422 equipment. Choose from: 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.
Data Bits	8	The COM Port databits: 8
Parity	None	The COM Port parity: None
Stop Bits	1	The COM Port stopbits: 1
Flow Control	None	The COM Port flow control: None

2. To apply your changes, click Apply.

The changes will take effect immediately but will not be saved and will be lost after a reboot.

For information on connecting a computer to the COM1 port, see "Connecting the Encoder to the Network and a Computer" on page 34.

Logging Out

After you finish using the Makito, be sure to log out. To do so, select LOGOUT from the Main Menu.

Logging out prevents misuse and unauthorized access to the encoder.

CHAPTER 4: Managing Users and Security

This chapter explains how to set up accounts and configure security settings for the encoder using the Web interface.

> NOTE   The Security menu provides the options to configure Makito encoders to be "hardened". For more information, see "Hardening" on page 31.

Topics In This Chapter

Configuring Network Settings

From the NETWORK SETTINGS page, you can modify the network interface settings for the encoder, including the unit's IP Address. You can also configure Network Time Protocol (NTP) support to synchronize the encoder clock with the selected time zone.

⚠️ CAUTION   When you make changes to the Network Settings, be sure to write down the new encoder IP Address or label the chassis. After you save your changes and reboot, you will have to redirect the browser to the new IP address and log in again in order to access the encoder.

To view and configure the Network Settings:

1. Click NETWORK from the main menu.

   The NETWORK SETTINGS page opens, as shown in the following example.

2. Select or enter the new value(s) in the appropriate field(s). See "Network Settings" on page 130.

3. To save your changes, click Save.

   You must reboot the system for the changes to take effect.

4. To apply your saved changes, click Reboot.

The encoder will reboot and you will be returned to the Login page.

Network Settings

The following table lists the Encoder Network settings:

Network Setting	Description/Values
Link	Determines whether the Ethernet parameters are set automatically or manually (i.e., enables or disables autonegotiation): • 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. See following settings. NOTE: Always use Auto with Gigabit Ethernet (GigE) speed (1000 Mbps).
Ethernet Speed	If Link is set to Auto, the actual value for the Ethernet Speed (read-only). -or- If Link is set to Manual, select the Ethernet Speed (in Mbps): • 1000 • 100 • 10
Duplex	If Link is set to Auto, the actual value for the Duplex Mode (read-only). -or- If Link is set to Manual, select the Duplex Mode: • Full • Half
DHCP	Check or clear this checkbox to enable or disable the Dynamic Host Configuration Protocol. NOTE: When DHCP is enabled, the encoder will get an IP Address from a DHCP server on the network. When it is disabled, you must manually enter the encoder's IP Address, Netmask & Gateway Address.
IP Address	Displays the IP Address for the Makito. This is a unique address that identifies the unit in the IP network. NOTE: If DHCP is disabled, you may enter an IP address in dotted-decimal format.

Network Setting	Description/Values (Continued)
Netmask	Displays the Subnet Mask for the Makito. This is a 32-bitmask used to divide an IP address into subnets and specify the network's available hosts. NOTE: If DHCP is disabled, you may enter a Netmask in dotted-decimal format.
Gateway	Displays the gateway address of the network (typically the address of the network router). NOTE: If DHCP is disabled, you may enter a gateway address in dotted-decimal format.
Hostname	You may, optionally, enter a unique name for the Makito.
DNS Server Address	(Optional) Enter the DNS server address for your network.
Domain Name	(Optional) Enter the domain for the Makito.
MAC Address	(Read-only) The Media Access Control address assigned to the Makito.
Total TX Bandwidth Limit	The maximum transmit bandwidth for the unit in kbps. Specifies the bandwidth "ceiling" for the Ethernet port.
Enable NTP	Check this checkbox to connect to an NTP (Network Time Protocol) server to synchronize the encoder clock.
NTP	If NTP is enabled, enter the IP address of the NTP server.
Timezone	Select the desired time zone and corresponding city. NOTE: The times are based on hours added to or subtracted from Greenwich Mean Time (GMT).

Viewing System Status Information

From the STATUS page, you can view status information about the Makito, such as the operating system up time, along with information about the hardware and software components. The page displays a "snapshot" of the encoder faceplate that shows the A/V interface.

The STATUS page displays the Card Status, Card Type, Part Number, Serial Number, System Uptime, Encoding Chipset Load (%), Firmware Version, Firmware Date, Hardware Version, and Boot Revision for the encoder.

You can also reboot the encoder and take a system snapshot from the STATUS page.

The STATUS page is available Operator and Guest users as well as Administrators.

To view status information:

1. Click ADMINISTRATION from the main menu and then click STATUS from the sidebar menu.

   The STATUS page opens, as shown in the following example.

   The STATUS settings are read-only. For details, see the following section, "Status Settings".

2. To reset the video encoder, click Reset (see "Reset" on page 134).

3. To reboot the encoder, see "Rebooting the Encoder" on page 134.

4. To display a snapshot of system information, see "Taking a System Snapshot" on page 134.

Status Settings

The following table lists the Status settings and controls. Status information can be useful for troubleshooting and may be forwarded to Haivision Technical Support if you are requesting technical support.

Status Setting	Description/Values
Card Status	OK (or error message if applicable).
Card Type	The type of encoder, e.g., Makito-SDI Encoder Gen-II or Makito-DVI Encoder Gen-II.
Part Number	The Haivision part number for the encoder, e.g., B-290E-DVI, B-290E-HDSDI, B-290E-DVI-M or B-290E-SDI-M
Serial Number	The serial number for this encoder appliance or card.
Firmware Version	The firmware version of the encoder, e.g., v2.3-3
Firmware Date	The firmware release date.
Firmware Options	(If applicable) Firmware options installed at the factory, e.g., SW-290E-KLV-COT (Metadata Capture KLV & COT). For more information, see "Configuring Metadata Capture" on page 85.
Hardware Version	The hardware version of the encoder.
Hardware Compatibility	A1 (basic card assembly).
CPLD Version	The CPLD firmware version of the encoder.
Boot Version	The Boot version of the encoder.
System Uptime	The length of time (mm:ss) the encoder has been "up" and running.
Encoding Chipset Load	The combined video encoding processor usage in percentage% (combining both Hi and Lo streams).
Reboot	Reboots the encoder. See the following section, "Rebooting the Encoder".

Status Setting	Description/Values (Continued)
System Snapshot	Displays a snapshot of system information in a new window. See "Taking a System Snapshot" on page 134.
Reset	Resets the video encoder. Performs the equivalent of the CLI command videnc 0 reset. NOTE: This is *not* equivalent to a Hardware Reset (see "Resetting the Encoder" on page 54).

Rebooting the Encoder

To reboot the Encoder:

1. Click ADMINISTRATION>STATUS to open the STATUS page.

2. Click Reboot.

   The encoder will reboot and you will be returned to the Login page. Any active streaming sessions will be momentarily disrupted.

TIP You can also reboot the encoder from the NETWORK SETTINGS page. See "Configuring Network Settings" on page 129.

Taking a System Snapshot

Taking a system snapshot can be useful for troubleshooting and may be forwarded to Haivision Technical Support if you are requesting technical support.

The system snapshot lists information such as component versions, network settings, loaded modules, running processes, system traces, configured streams and stream status checks, configured video encoders and status checks, configured audio encoders and status checks, startup config file contents, global settings file contents, debug logging settings file contents, downloaded software packages, last software update log, and OS statistics.

To take a system snapshot:

1. From the STATUS page, click System Snapshot.

   The system will display a snapshot of system information in a new window, as shown in the example on the following page:

```
================================================
START OF SYSTEM SNAPSHOT
================================================


--------------------------------------------------------------------------------
Local Time:
--------------------------------------------------------------------------------
Wed Jul 24 11:02:02 EDT 2013


--------------------------------------------------------------------------------
Universal Time:
--------------------------------------------------------------------------------
Wed Jul 24 15:02:03 UTC 2013


--------------------------------------------------------------------------------
System UP Time:
--------------------------------------------------------------------------------
 11:02:03 up 22:09,  1 user,  load average: 1.47, 1.39, 1.36


--------------------------------------------------------------------------------
Manufacturing Information:
--------------------------------------------------------------------------------
MAC Address : 00:50:c2:c6:18:fd
Serial Number : HAI-100039900125
Boot Revision : 1.1 Enc


--------------------------------------------------------------------------------
Card Temperature:
--------------------------------------------------------------------------------
Temperature Status:
  Current Temperature: 45 Celsius measured 1s ago
  Maximum Temperature: 47 Celsius measured 2h9m20s ago
  Minimum Temperature: 43 Celsius measured 22h7m38s ago


--------------------------------------------------------------------------------
System Information:
--------------------------------------------------------------------------------
Card Type             : "Makito-DVI Encoder"
Part Number           : B-290E-DVI
Serial Number         : HAI-100039900125
MAC Address           : 00:50:c2:c6:18:fd
Firmware Version      : 2.2.0-28
Firmware Date         : "Jul 22 2013"
Firmware Options      : SW-290E-KLV-COT
Hardware Version      : A-
Hardware Compatibility : A1
--------------------------------------------------------------------------------
```

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> 💡 **TIP** You can also take a system snapshot from the CLI using the system_snapshot.sh command.

Saving and Loading Configurations

NOTE   The CONFIG page is only accessible to administrators.

Configuration Management

Each Makito is configured by users' selecting and setting values of applicable system settings, such as Encoder settings and the stream destination. Although these configuration settings are not automatically saved, you can save a list of text-based configuration directives in a file which is stored in the encoder's flash memory. Saved configuration settings will continue to be used after a reboot, or when the unit is turned off and on.

You can then direct the system to read this configuration file to restore these settings when the system startup process performs the configuration autoload.

From the CONFIG page, you can view the list of saved configurations, load a saved configuration, and save the current settings as a configuration file. You can also view the contents of a configuration file, delete configurations, and select the configuration file to load at startup.

To view and manage configurations:

1. Click ADMINISTRATION from the main menu and then click CONFIG from the sidebar menu.

   The CONFIG page opens displaying the list of saved configurations for the encoder, as shown in the following example.
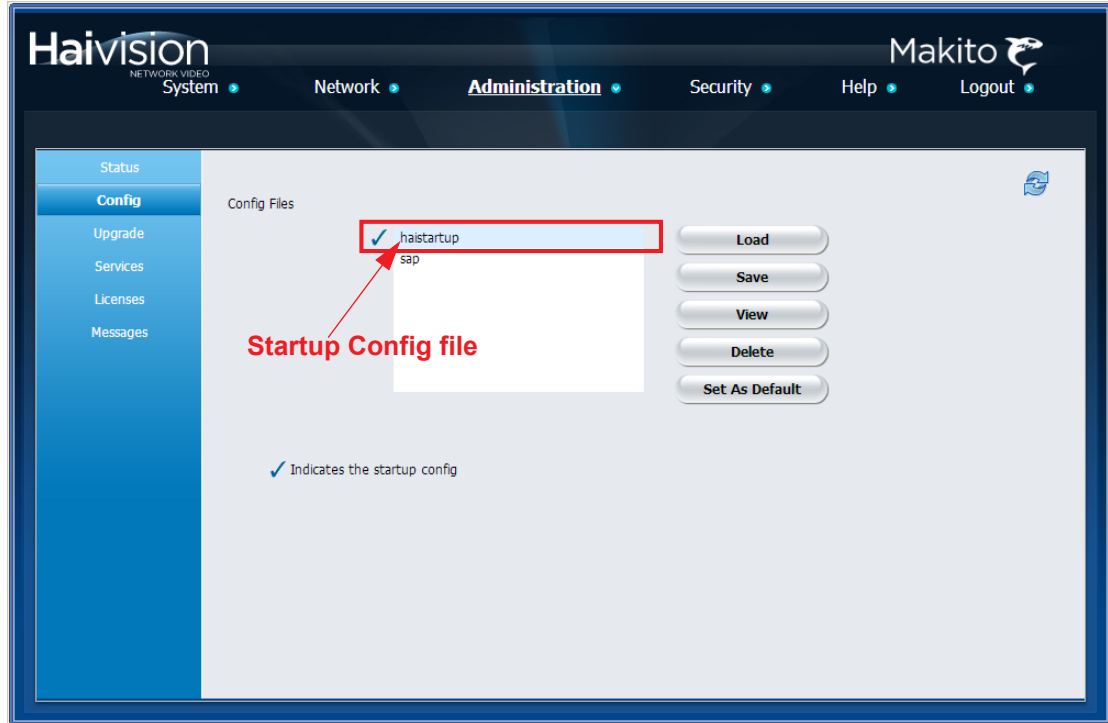
The selected configuration is highlighted in blue, and the startup configuration is indicated with a checkmark.

2. To load a different configuration into the current session, select the filename from the list of Config Files and click Load.

3. To save the current settings as a configuration file, click Save and type a new filename in the Save Config text box.

To select this Config File to load at startup, check the Set as default config checkbox.

ℹ   NOTE   Avoid spaces and special characters such as the following in configuration filenames: " ' ` \ / . , ; : ( ) { } [ ] | ~ ! & ?

---

4. To set the default configuration (i.e., to set the configuration file to load at startup), select the filename from the list of Config Files and click Save.

   The selected configuration will be saved as the startup configuration and will be loaded into the current session as well.

5. To view the details of a configuration file, select the filename from the list of Config Files and click View. (See "Viewing Configuration File Details".)

6. To delete a configuration file, select the filename from the list of Config Files and click Delete.

Viewing Configuration File Details

To display a detailed view of a configuration file:

1. From the CONFIG page, click the configuration file to view.

2. Click View to display a list of the current configuration settings in a new window, as shown in the example on the following page:

```
[HDCP]
Enabled=No

[HD Video Encoder 0]
Profile=/usr/share/haivision/video_profiles/Default.vpf
VideoBitRate=6000
EncodedResolution=Auto
VideoFormat=Auto-Detect
PTSOffset=50
EncodedPictureRate=0
GopSize=120
VideoInput=SDI
AspectRatio=Auto
ColorSpace=Auto
TimeCode=None
ClosedCaption=Off
AutoStart=Yes

[HD Video Encoder 1]
Profile=/usr/share/haivision/video_profiles/Default.vpf
VideoBitRate=6000
EncodedResolution=960x720p
VideoFormat=Auto-Detect
PTSOffset=50
EncodedPictureRate=0
GopSize=120
VideoInput=SDI
AspectRatio=Auto
ColorSpace=Auto
TimeCode=None
ClosedCaption=Off
AutoStart=No

[Audio Encoder 0]
AudioBitRate=128
PTSOffset=0
AudioInput=Analog
AudioSampleRate=48
AudioMode=Stereo
AudioAlgorithm=MPEG2-AAC-LC-ADTS
Capture=No
MaxCaptureSize=0
AudioLevel=5
AutoStart=Yes

[Audio Encoder 1]
AudioBitRate=128
...
```

Installing Firmware Upgrades

NOTE   The UPGRADE page is only accessible to administrators.

When you first receive the Makito, the necessary firmware is pre-installed on it. Upgrades of the firmware are issued through Haivision's Download Center on our website at:
http://www.haivision.com/download-center/

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

When a firmware upgrade becomes available, 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 firmware upgrade comes in the form of a file with the extension .hai, which when loaded will replace the application on your Makito. The firmware upgrade components are digitally signed, and these signatures are all verified before performing the installation.

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

To install a firmware upgrade:

1. Click ADMINISTRATION from the main menu, and then click UPGRADE from the sidebar menu.

   The UPGRADE page opens displaying the currently installed firmware version, as shown in the following example.
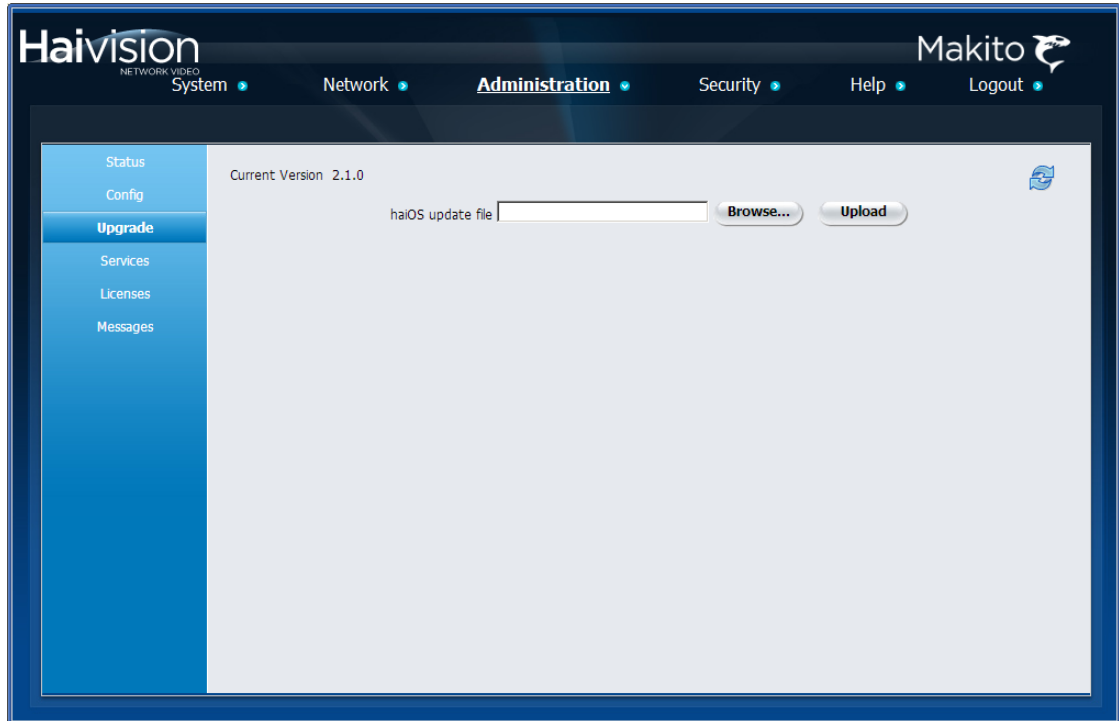
2. Click Browse to select the file.

3. Click Upload.

   The Uploading File page opens, followed by the Verifying and the Syncing file system pages.

IMPORTANT Wait for the file to be uploaded and verified and the file system synced. Remain on this page and do *not* click anything else in the Makito Web interface during the upload.

If any of the package components has been modified or is not signed by a valid certificate, the verification will fail and the downloaded package will be discarded.

When the file is uploaded and verified successfully, you will see a confirmation page listing the package contents and release date and files (as shown in the following example).
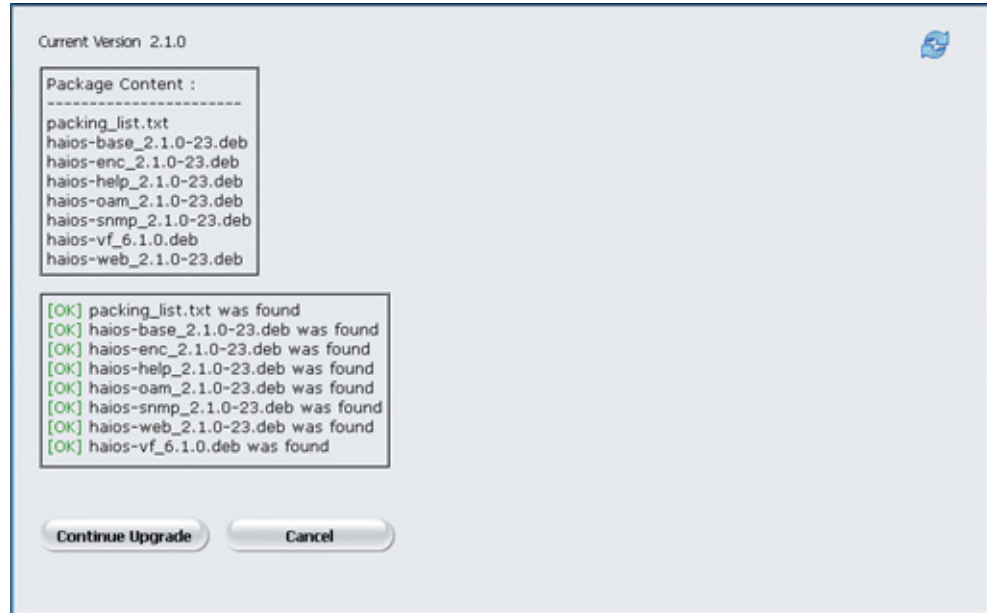
4. Click Continue Upgrade.

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.

5. Click Reboot.

While the unit is rebooting, the Status LEDs will flash, and you will see a warning page.

⚠️ CAUTION   Do not proceed or shut down the system while the Status 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.

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

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NOTE   You can verify the result of the installation on the MESSAGES page. One of the following messages will be listed:

Tue Sep 4 17:16:37 EDT 2012: Failed to install software package haios_enc_v2.1.0-22.hai. Check /var/log/bootupdate.log

Wed Sep 5 15:50:41 EDT 2012: Software package haios_enc_v2.1.0-23.hai was successfully installed.

TIP   As a firmware maintenance step, we recommend that you periodically delete old copies of unused firmware. To do so, use the CLI package command (list and delete options). See "package" on page 235.

Enabling and Disabling Network Services

> **NOTE** The SERVICES page is only accessible to administrators.

For security purposes, an administrator may need to stop one or more network services from accessing the Makito. From the Services page, you can enable and disable the following network services: HTTP, RTSP, SNMP, SSH, Talkback, Telnet, and VF.

To enable or disable network services:

1. Click ADMINISTRATION from the main menu, and then click SERVICES from the sidebar menu.

   The SERVICES page opens displaying 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. See the following section, "Service Settings".

3. To save your changes, click Save.

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

> **IMPORTANT** If the COM1 serial port is used for metadata capture, and HTTP, Telnet, SNMP, and SSH services are disabled, the only way to re-enable these services will be by a Factory Reset. (For details, see "Resetting the Encoder" on page 54.) Once the serial port is dedicated for metadata capture, it is no longer usable for CLI management.

Service Settings

The configurable Services are as follows:

Service	Description
HTTP	Hypertext Transfer Protocol, used for Web browsers acting as a client. NOTE: Only secured HTTP (HTTPS) is supported. See "Managing Certificates" on page 164 to manage HTTP TLS certificates.
RTSP	Real Time Streaming Protocol, a network control protocol used to control streaming media servers.
SNMP	Simple Network Management Protocol, a 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.
Talkback	Audio Talkback (a Makito feature) allows the audience to "talk back" to the people taking or making the video (i.e., at the encoder). The talkback is played out of the encoder's 8-pin terminal block connector (see "Audio Interface" on page 25).
Telnet	Telnet, a network protocol used on the internet or local area networks to provide a bidirectional communications via a virtual terminal connection.
VF	Any Furnace servers that may be communicating with the encoder. Note that VFPilot provides access to encoder configuration settings.

Managing Licenses

Feature licensing allows you to add new functionality to already deployed systems. As of Version 2.3, you may add the following features to a base Makito.

Feature	SKU
KLV	SW-290E-KLV
KLV&CoT	SW-290E-KLV-COT

To acquire a new license, please contact your Authorized Reseller or Haivision at: http://support.haivision.com. Indicate the appropriate feature SKU and provide the hardware serial number (or list of numbers in the case of multiple devices) to which it applies.

The license is delivered by email as a plain-text ASCII license file with the extension .lic to be installed on your Makito.

You may install and manage licenses from the Web interface or from the CLI using the license command. Both methods allow you to view the content and status (valid/invalid) of the license file to confirm the ordered features.

The licensing of the unit will survive a factory reset and upgrade of the firmware.

This section provides instructions to install a license from the Web interface.

To install a license file:

1. Click ADMINISTRATION from the main menu, and then click LICENSES from the sidebar menu.

   The LICENSES page opens, displaying the currently installed licences (if applicable), as shown in the following example.
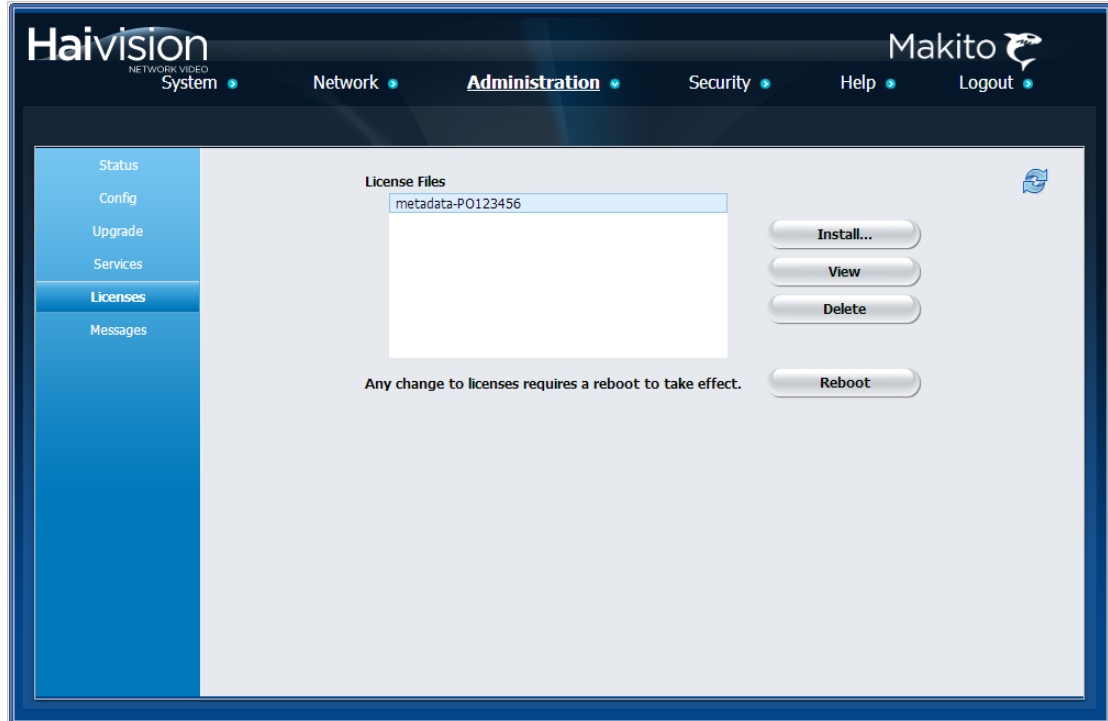
2. To install a new license, click Install….

3. In the Install License text box, click Browse to select the license file and then click Install.
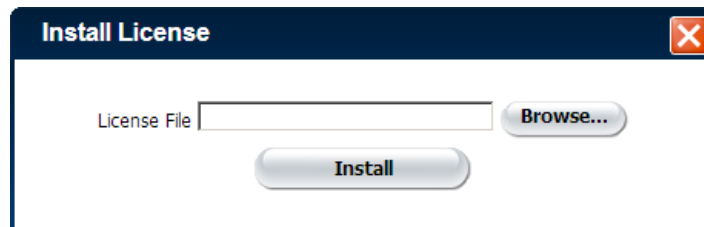
4. To apply your changes, click Reboot.

The encoder will reboot and you will be returned to the Login page.

5. To view a previously installed license file, select the file in the list and click View.

6. To delete a previously installed license, select the file in the list and click Delete.

License File Errors

The license file signature check occurs at license installation and system startup time. The following table lists the possible validation errors.

Validation Error	Description
Unrecognized license file format or extension	The file extension or content is not recognized as a licensed features license.
Not for this device (serial number)	The current device's serial number is not specified in the license.
File integrity compromised	Invalid signature: The license file has been corrupted or altered.
File authenticity cannot be confirmed	The license signing certificate cannot be authenticated.

Managing Messages

The MESSAGES page displays a limited number of important administrator actions recorded such as installation of a software package, failure to establish or maintain connectivity with a remote syslog server, Power-On Self Test (POST) errors, and other noteworthy events.

These events will result in a message being displayed at the next administrative Web Interface or CLI login.

The log of the actions recorded includes the following:

- The user initiating the action and the action being initiated.
- The time of the action.
- The results of the action (success/failure).

NOTE   Messages starting with "POST" are Power-On Self Test events. If you repeatedly get POST errors, the cryptographic module of the encoder may be compromised, and it is recommended to re-installed the firmware.

To view the messages:

1. Click ADMINISTRATION from the main menu, and then click MESSAGES from the sidebar menu.

   The MESSAGES page opens displaying the log as shown in the following example.
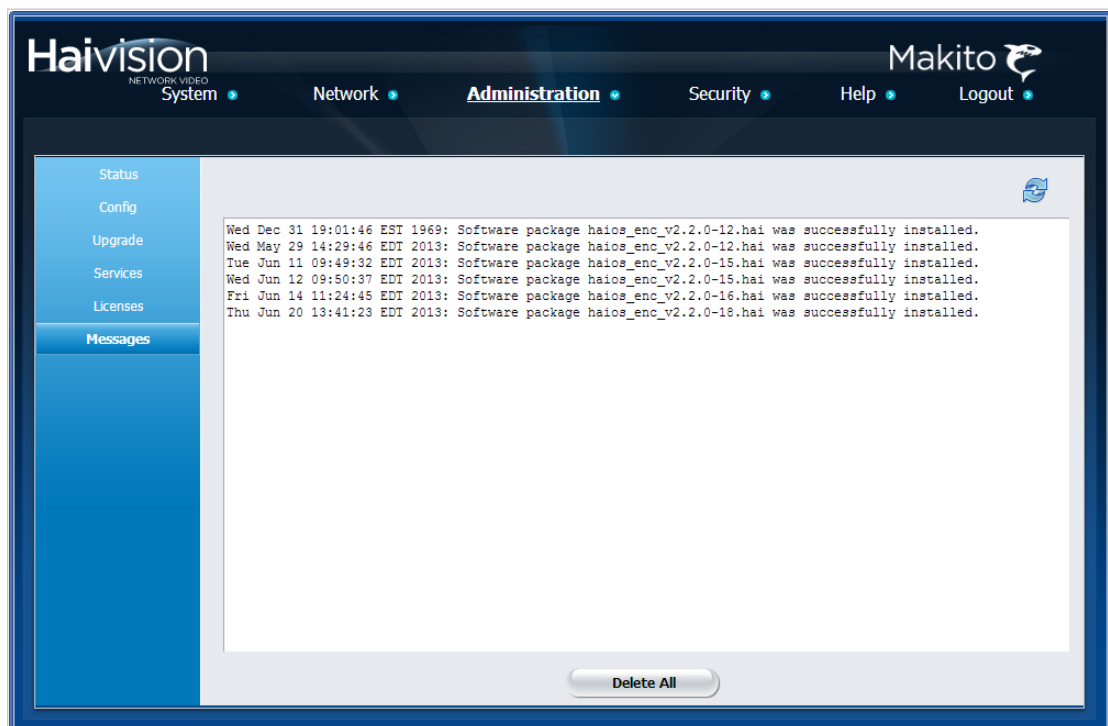
2. To delete the messages, click Delete All.

   The messages will be deleted immediately.

Managing Accounts

> ℹ️ **NOTE** The ACCOUNTS page is available to administrators only (i.e., users assigned Administrator role). From here, administrators can create and manage user accounts for the Makito (including their own accounts).
>
> The MY ACCOUNT page is available to users assigned either Operator or Guest roles to change their own account passwords. For information, see "Changing Your Password" on page 70.

The Makito provides an ACCOUNT OVERVIEW page and separate ACCOUNTS pages for administrators to use to create, delete, and modify user accounts.

As of Version 2.1.0, an account can be allocated to each user of the system so that the identity of the user can be uniquely determined. The Makito provides three defined account roles to assign privileges to users: Administrator, Operator and Guest. For details, see "Role-based Authorization" on page 63.

Using system-wide parameters, administrators can configure the allowable password strength and composition (i.e., to force the selection of strong passwords), as well as the periodic change of passwords. For details, see "Managing Security Policies" on page 161.

The Makito can also be configured for WCI and CLI account sessions to log out after an idle session timeout period. The session timeout period is selectable via a system-wide parameter. For details, see "Managing Security Policies" on page 161.

From the ACCOUNTS page, administrators can also upload and manage personal public keys for accounts to enable public key authentication (instead of password-based authentication). Note that in the current release, this only applies to SSH CLI access to the encoder.

Account Overview Page

The ACCOUNT OVERVIEW page displays a summary of defined user accounts for the encoder, including the Name, defined Role, State (Enabled or Locked), and Password Expiry Status for each account. It also provides an option to lock/unlock or delete an account.

To open the Account Overview:

1. From the ACCOUNTS page, click the grid to display the ACCOUNT OVERVIEW page.

   The ACCOUNT OVERVIEW page opens as shown in the following example.

**Click a line to open the Accounts
page for that account
or click + to add an account**

2. To view account details or add an account, click a line in the table to open the ACCOUNT page.

3. To lock/unlock an account, click –Select– (under Actions) and select either:

   • Lock (if the current State is Enabled) or

   • Unlock (if the current State is Locked).

4. To delete an account, click –Select– (under Actions) and select Delete.

5. To apply your changes, click Apply.

Accounts Page

TIP It is recommended to set the Policies for your system before creating users.

The Password Policies do not apply to administrators creating user accounts or setting passwords for accounts other then their own.

To view, add or edit an account:

1. Click SECURITY from the main menu, and then click ACCOUNTS from the sidebar menu.

   The ACCOUNTS page opens as shown in the following example.
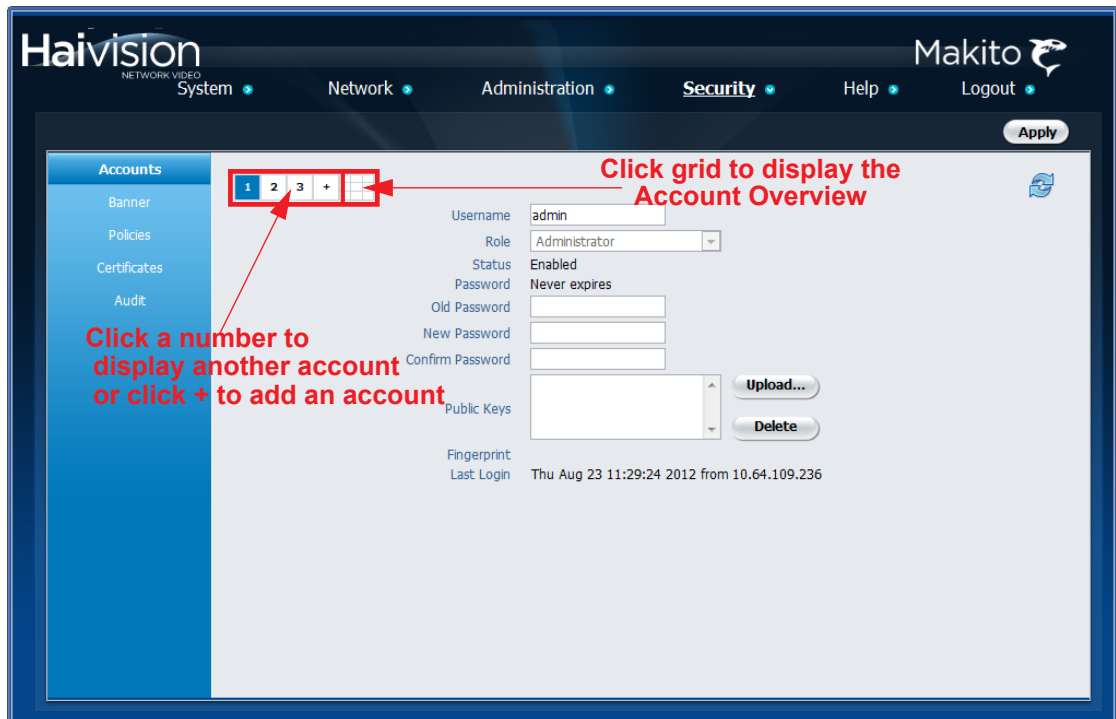
2. To view details for a different user, click the numbers to browse through the user accounts.

3. To create a new user, click the +.

4. To view a summary of defined user accounts for the encoder, click the grid.

   This opens the ACCOUNT OVERVIEW page. For details, see page 152.

5. To change your password, type the current password in the Old Password field, type the new password in the New Password field and again in the Confirm Password field. For the allowed characters, see "Password Requirements" on page 71.

   -or-

   To change the password for another account (not your own), type the new password in the New Password field and again in the Confirm Password field.

6. To apply password changes, click Apply.

   The new password will take effect immediately.

> **NOTE** New users must change their passwords the first time they log in as well as when the administrator resets the password of an existing account.
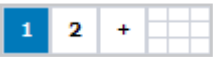
7. To upload a public key for the account, follow the steps in <u>"Managing Public Key Authentication"</u> on page 157.

8. To get the fingerprint for a public key, select the public key in the list.

   For more information, see <u>"Account Settings"</u> on page 155.

Account Settings

The following table lists the Accounts controls and settings:

Account Setting	Default	Description/Values
[1 2 + grid]		Click a number to display the ACCOUNT page for an existing account, or + to create a new account. Click the grid to display the ACCOUNT OVERVIEW page.

Username	n/a	(Read-only for existing accounts) Displays the user name for the account.
		(New account) Type in a unique name for the account, meeting the following requirements:
		• Maximum length = 20 characters.
		• All characters must be lowercase.
		• The first character cannot be a number.
		  - Can start with [a-z]
		  - After the first character, can contain [a-z 0-9]

Role	n/a	(Read-only for existing accounts) Displays the Role assigned to the account. (New account) Select the Role for the user account, either: • Administrator • Operator • Guest For details on roles, see <u>"Role-based Authorization"</u> on page 63.

Account Setting	Default	Description/Values (Continued)
Status	n/a	Displays the account status, either Enabled or Locked. To change this, see "Account Overview Page" on page 152.
Password	n/a	The expiry status for the current password, either: • Never expires • Expired on <date> • Expires on <date> NOTE: Password Policies are defined for the system. For details on roles, see "Managing Security Policies" on page 161.
Old Password	n/a	(Your own account only) Type in your current password. NOTE: This is not required for other accounts since an administrator is frequently asked to change the password by users who have forgotten their passwords.
New Password	n/a	Type in the new password. For the allowed characters, see "Password Requirements" on page 71.
Confirm password	n/a	Re-type the new password.
public keys	n/a	Lists any public key files that have been uploaded for this account. • To add a public key, click Upload. • To delete a public key, select it from the list and click Delete. See "Managing Public Key Authentication" on page 157.
Fingerprint	n/a	Displays the fingerprint for the selected public key (when you click a filename in the public keys list). Shows (null) if you click in the text box when no public keys have been uploaded. TIP: A public key fingerprint is a short sequence of bytes which you can copy and use to identify or look for a public key.
Last Login	n/a	(Existing account) Displays the date and time of the previous login.

Managing Public Key Authentication

In order to use a public key for account authentication (instead of password-based authentication), you must first get the public key of your SSH client. Note that in the current release, this only applies to SSH CLI access to the encoder.

To upload a public key file for an account:

1. Open the ACCOUNTS page for the account to modify.

2. To upload a new public key file (with a .pub extension), click Upload….
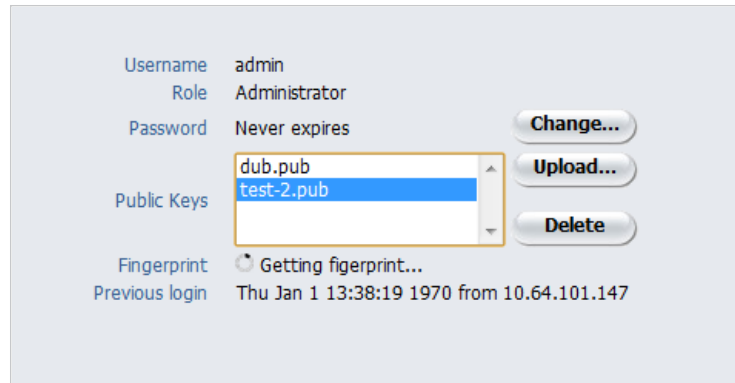
3. Click Browse to select the file.

    The file is then added to the list of public keys (as shown in the example below).
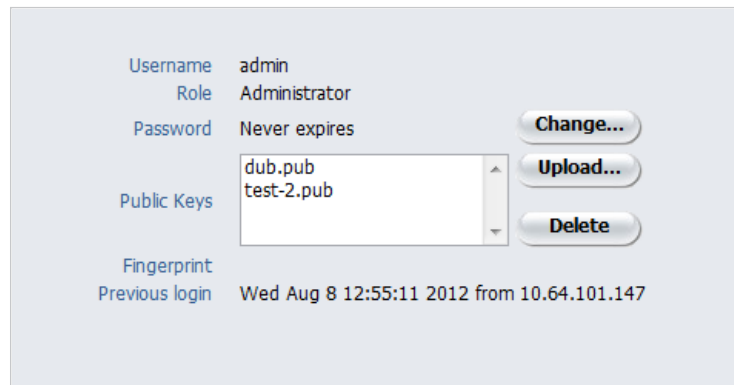
4. To get the fingerprint for the key (e.g., for identification purposes), select the filename in the list.

    You will see a progress message (as shown in the example below) and then the key will be displayed.

5. To delete a previously uploaded public key file, select the filename in the list and click Delete.

TIP You can now access the CLI interface from you SSH client without providing your account password. You may have to provide a password to decrypt your private key but this is done by your SSH client. If you no longer use password-based authentication to access your account, it is recommended to set a very long password.

Managing Banners

NOTE The BANNER page is only accessible to administrators.

From the BANNER page, administrators can upload a text file for the Advisory and Consent Banner page. The banner is typically an advisory/warning notice to be displayed before the Login page.

In the current release, only ASCII file format is supported for the banner file. The banner is a single text file with a maximum file size of 4KB.

To upload a text file for the Banner page:

1. Click SECURITY from the main menu, and then click BANNER from the sidebar menu.

   The BANNER page opens, displaying the current banner text (if enabled), as shown in the following example.
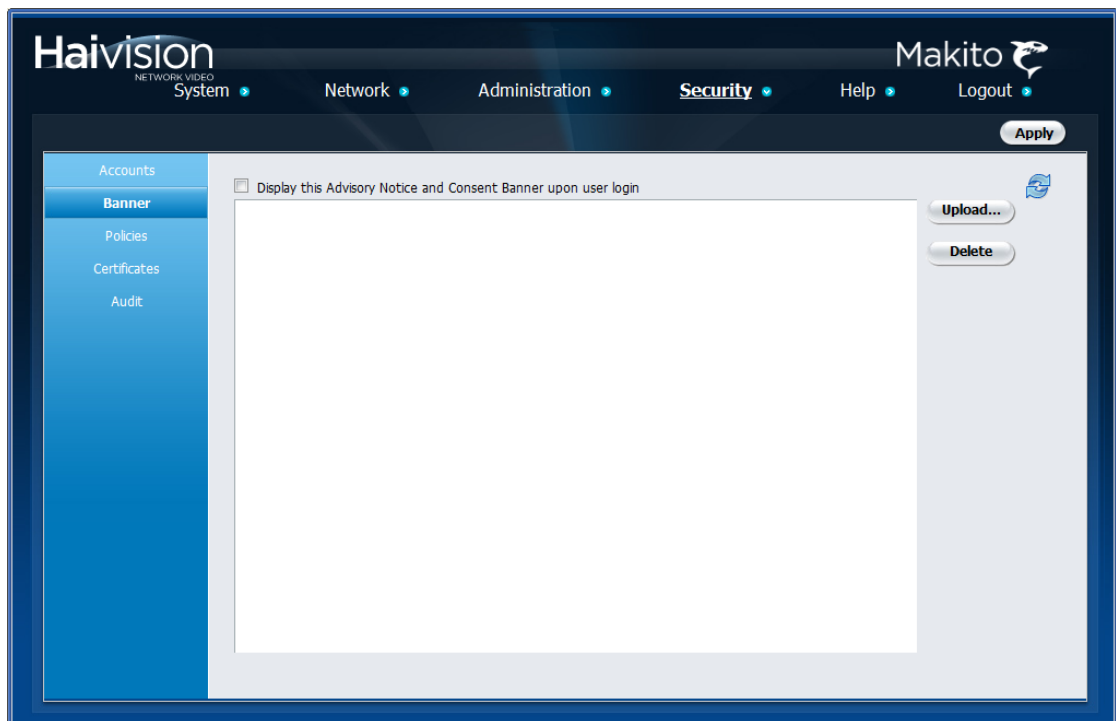
2. To upload a new text file for the banner, click Upload….

3. On the banner dialog, click Browse to select the file.
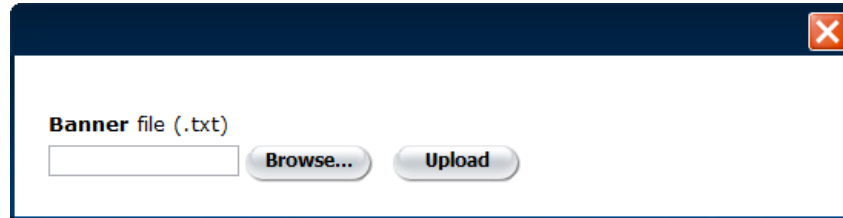
4. Click Upload.

NOTE   If the banner is enabled, the time when the banner actually gets displayed may vary with the service in use (such as SSH, Telnet, serial port, or Web Interface) and how the services are configured. For example, in some cases, the banner will be displayed right after the login and before the password is entered, whereas with the Web Interface, the banner will be displayed before the user gets to the Login page.

TIP   You can also upload and download files from the CLI using the banner command. As of Version 2.1, the Makito supports FTP and TFTP client, as well as SCP client and server.

Managing Security Policies

NOTE   The POLICIES page is only accessible to administrators.

From the POLICIES page, administrators can set policies for passwords, session timeout, and cryptographic strength for Makito user accounts. These policies will apply to all user accounts; therefore, it is recommended to set the policies before beginning to create accounts.

To view and manage the Security policies for the encoder:

1. Click SECURITY from the main menu, and then click POLICIES from the sidebar menu.

   The POLICIES page opens as shown in the following example.

2. Select or enter the new value(s) in the appropriate field(s). See "Policy Settings" on page 162.
3. To apply your changes, click Apply.

Policy Settings

The following table lists the Policy settings for the encoder:

Policy Setting	Default	Description/Values
Password Policies		
Minimum password length	6 characters	Type in the minimum password length (from 6-40 characters). NOTE: Passwords can be up to 80 characters.
Password quality	Basic	Select the required password quality; works in conjunction with Password requires at least below: • Basic: Sets the minimum password length as the only requirement to accept a new password. • Strong: Adds more strict requirements to the password structure. Checks for minimum length as well as other criteria such as minimum number of required upper case characters, digits, and symbols.
Password requires at least	n/a if Basic 0 characters if Strong	(Password quality must be Strong) Specify the minimum required number of: • uppercase letters • digits • symbols The range is from 0 to 40 for all 3.
Password expiration	Disabled	To enable Password expiration, check the checkbox.
Change password after	n/a if Disabled 90 days if Enabled	(Password expiration must be enabled) Type in the number of days after which users must change their passwords (from 1-180 days).
Session Policies		
Auto Logout	Disabled	To enable Auto Logout, check the checkbox. See the following section, "Auto Logout".
Logout when idle for	n/a if Disabled 15 minutes if Enabled	(Auto Logout must be enabled) Type in the maximum length of time the system may be idle before the user will be logged out (from 1 - 1440 minutes).

Policy Setting	Default	Description/Values (Continued)
Cryptography Policies		
Compliance	None	Specifies the required cryptographic compliance, either: • None • Makito 2.1 Security Target In order to bring the encoder to the Common Criteria evaluated configuration, cryptographic security must be activated. This will reinforce security for all management functions of the encoder in terms of cryptography. To do so, select Makito 2.1 Security Target. This setting will take effect upon the next reboot. NOTE: For more information, see "Hardening" on page 31.

Auto Logout

Systems that are left logged on may represent a security risk for an organization. Therefore, you can configure the Makito to automatically log the user out after a specified period of idle time. If the user has been inactive for longer than this period of time, then the user is automatically logged out and redirected to the Login page.

Managing Certificates

> NOTE   The CERTIFICATES page is only accessible to administrators.

The CERTIFICATES page shows the list of Identity and CA certificates installed on the Makito.

- An Identity Certificate identifies the Makito during the authentication process when trying to establish a TLS connection in Audit or HTTPS session startup. Its Common Name or Alternate Subject Names must match the encoder's IP address and/or its FQDN (Fully Qualified Domain Name) if DNS is used.

- A CA Certificate is normally a root certificate from a certificate authority that is generally widely known and trusted. CA Certificates are stored on the encoder so they can be used to authenticate CA-signed certificates from audit servers. You will need to import the root certificate from the CA that signed the certificate of the configured remote audit server. It is also recommended to import the root certificate of the CA that signed your Makito identity certificate in order to increase your list of trusted root certificates.

From the CERTIFICATES page, you can generate, import, view, and delete Identity Certificates, as well as select the default Identity Certificate. You can also import, view, and delete CA Certificates.

To manage system certificates:

1. Click SECURITY from the main menu, and then click CERTIFICATES from the sidebar menu.

   The CERTIFICATES page opens as shown in the following example.
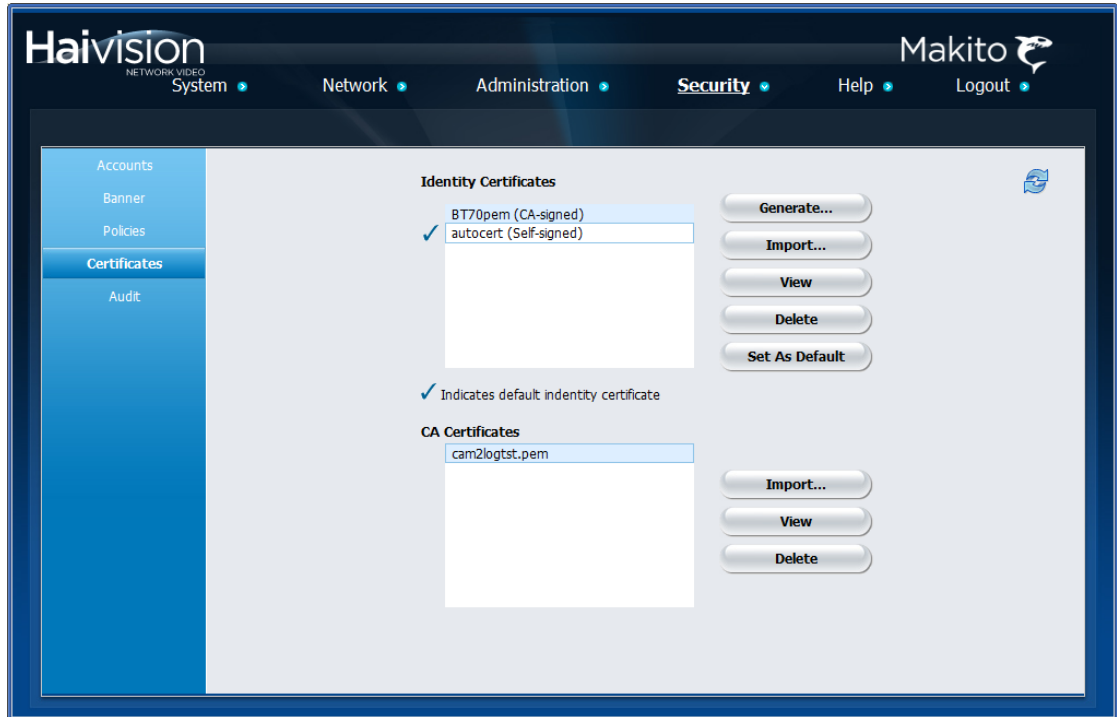
2. To generate a Certificate Signing Request, click Generate.

3. Select either Self-signed or Certificate Signing Request from the drop-down list.
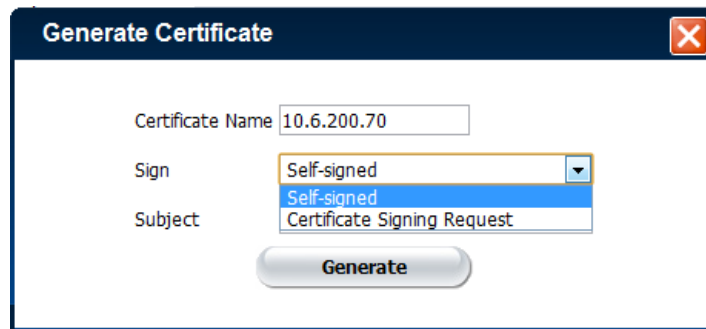
For more information, see "Sign" on page 168.

4. For the subject, type in information about the device that the Identity Certificate represents.

Generate Certificate

Certificate Name	10.6.210.42
Sign	Self-signed
Subject	/CN=10.6.210.42

Generate

For more information, see "Subject" on page 169.
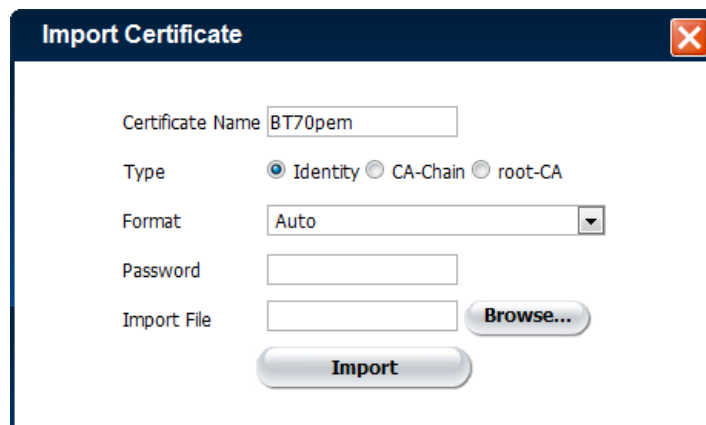
5. Click Generate.

If the Certificate Signing Request was selected, the generated CSR file needs to be sent to a Certificate Authority to be signed. A copy of it is saved in the current administrator's home directory, or it can be copied and pasted from the CSR view. You can import it back later by clicking on the Import button (using the same name as the request).

NOTE Keep in mind that there is a difference between importing a new certificate (that was generated externally) and importing a newly signed certificate whose request was previously generated on the Makito and exported for signing.

6. To import an Identity Certificate, click Import.

Import Certificate

Certificate Name	BT70pem
Type	⦿ Identity ○ CA-Chain ○ root-CA
Format	Auto
Password	
Import File	Browse...

Import

7. Select or enter the new value(s) in the appropriate field(s). See the following section, "Certificate Settings".

8. To view the details of a certificate file, select the certificate name from the list of Identity Certificates and click View. (See following example.)

```
Certificate:
    Data:
        Version: 1 (0x0)
        Serial Number:
            cc:a3:07:cd:52:ad:40:96
    Signature Algorithm: sha1WithRSAEncryption
        Issuer: C=CA, ST=Quebec, O=Haivision, OU=Firmware,
CN=m2logtst.haivision.com
        Validity
            Not Before: Aug  3 15:50:05 2012 GMT
            Not After : Aug  3 15:50:05 2013 GMT
        Subject: CN=10.6.200.70
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
                Modulus:
                    00:ae:49:eb:53:d0:ea:d4:9c:dc:3e:a9:29:12:e1:
                    37:63:6b:a7:81:69:ae:26:e5:b8:7a:10:da:1d:cc:
                    b5:a0:a7:d3:ff:33:0a:88:74:42:18:e2:7d:c6:eb:
                    43:2b:07:74:6e:fc:e1:85:8c:5f:a3:d3:31:db:36:
                    fb:02:44:e6:d5:a2:a3:0e:f1:e2:b4:13:bc:4c:33:
                    04:50:e7:43:12:78:66:3c:de:71:d7:72:f0:d2:34:
                    39:1c:df:e8:0a:03:66:2c:cc:48:ca:48:a7:6d:47:
                    2c:36:44:1e:4a:c7:00:c2:8e:9e:97:ba:93:5a:69:
                    df:da:51:bc:2c:5f:bc:73:a2:72:5d:8a:ff:77:73:
                    44:4d:38:b6:3f:4b:ea:8f:49:19:29:a0:ed:2b:a5:
                    92:2b:47:a6:ca:83:c8:16:41:86:93:bc:6f:72:c9:
                    87:96:3b:f1:9f:81:db:11:73:0e:c7:2b:1b:8f:d3:
                    04:fd:ef:2e:0d:6b:cd:57:4c:7b:ef:09:23:ef:7f:
                    9a:3a:6b:be:51:a8:fc:46:45:50:40:7a:4a:de:27:
                    12:eb:e7:f7:61:ad:ec:95:67:15:8f:38:ac:bf:09:
                    ec:d9:12:66:26:f4:ac:e6:38:4d:8e:8b:23:e3:18:
                    c5:f6:53:9d:bc:09:5d:90:b8:33:a8:d0:b1:30:88:
                    8f:e3
                Exponent: 65537 (0x10001)
    Signature Algorithm: sha1WithRSAEncryption
        42:46:33:5f:80:30:6d:af:e8:49:96:40:31:81:b9:fd:6c:b3:
```

9. To delete a certificate file, select the certificate name from the list of Identity Certificates and click Delete.

10. To set the default Identity Certificate (i.e., to set the Identity Certificate that is used to represent the device during Audit and HTTPS authentication), select the certificate name from the list of Identity Certificate and click Set As Default.

The selected certificate will be saved as the default certificate, and its effect will be directly applied to the Audit but does not apply to HTTP until the next service restart or system reboot.

Certificate Settings

The following table lists the Certificate controls:

Certificate Setting	Default	Description/Values
Generate Identity Certificate		
Certificate Name	n/a	Type in a unique name under which the certificate will be stored on the Makito as well as listed on the Certificate page.
Sign	Self-signed	Select the Signature Type: • Self-signed: The certificate will be generated and signed by the system, and the name will be added to the list of Identity Certificates. • Certificate Signing Request: A request will be generated, and its name will be added to the list of Identity Certificates. The request will be located in your home directory (accessible through the CLI), or you may export it by clicking on the View button and copying the content into a new file in a text editor. In its generated form, this certificate is still a request and cannot be used as an Identity Certificate before it is signed by a CA, and imported back.

Certificate Setting	Default	Description/Values (Continued)
Subject		The Subject identifies the device being secured, in this case, the Makito.
		The special value "auto" used with Generate sets the Subject Common Name to the device's FQDN if DNS is set, or the IP address otherwise. Also, for self-signed certificates, the Subject Alternative Name extension is also set to FQDN, hostname, and IP Address of the device (there is no other method to set the Subject Alternative Name).
		Type in the subject in the form: "/C=US/ST=Maine..." where the most common attributes are:
		• /C Two Letter Country Name
		• /ST State or Province Name
		• /L Locality Name
		• /O Organization Name
		• /OU Organizational Unit Name
		• /CN Common Name
		TIP: For successful authentication, the Common Name in the certificate should be the IP address (by default) or domain name of the device.
	Import Identity or CA Certificate	
Certificate Name	n/a	The Certificate Name is the name under which the certificate will be stored on the device.
		• If the certificate is a new certificate generated outside of the Makito, the file should also contain the certificate Private Key, and its chosen name should be one that isn't already installed on the device.
		• If the certificate is a newly signed one that was sent as a certificate signing request and is returned by the CA, the certificate name should be the same as its CSR (Certificate Signing Request) counterpart in the list.

Certificate Setting	Default	Description/Values (Continued)

Type		Select the type of the imported certificate:
		• Identity: If you are importing an identity certificate.
		• CA-Chain: If the import is a chain of certificate authorities leading to the root certificate authority. The imported CA-chain can contain one or more certificates linking its associated identity certificate to the root-CA and may or may not include the root-CA itself (that will only be trusted if imported as a root-CA).
		• root-CA: If you are importing a root CA certificate.These certificates are the anchor of trust of the certificate authorities you decide to trust and are generally publicly available from the CA Web sites. They are used by the device when validating the chain of trust of an identity certificate and its CA-chain.
		NOTE: Even though you can see the Type buttons if you click Import in either the ID or CA sections:
		   - If you select CA-root in import from ID, you'll get an error.
		   - If you select Identity or CA-chain in import from ca-root, you might get an error.

Format	Auto	Select the file format for the Certificate (the formats differ in the way the file is encrypted) • Auto: detected from the file extension • pem: Privacy Enhanced Mail Base64 encoded DER certificate • der: Distinguish Encoding Rules • pkcs #7 • pkcs #12 • pfx
Password	n/a	Password: if the imported certificate contains a password protected private key, type its password in this field. Leave this field empty if the file is not password-protected.
Import File	n/a	Click Browse to select the file.

> TIP   Importing a CA Certificate is the same as importing an Identity Certificate, except that you need to select the Import, View and Delete buttons in the CA Certificate section.

Managing Audits

> **NOTE** The AUDITS page is only accessible to administrators.

From the AUDITS page, administrators can set up logging to an Audit server for the Makito.

To configure an Audit server:

1. Click SECURITY from the main menu, and then click AUDIT from the sidebar menu.

   The AUDIT page opens as shown in the following example.
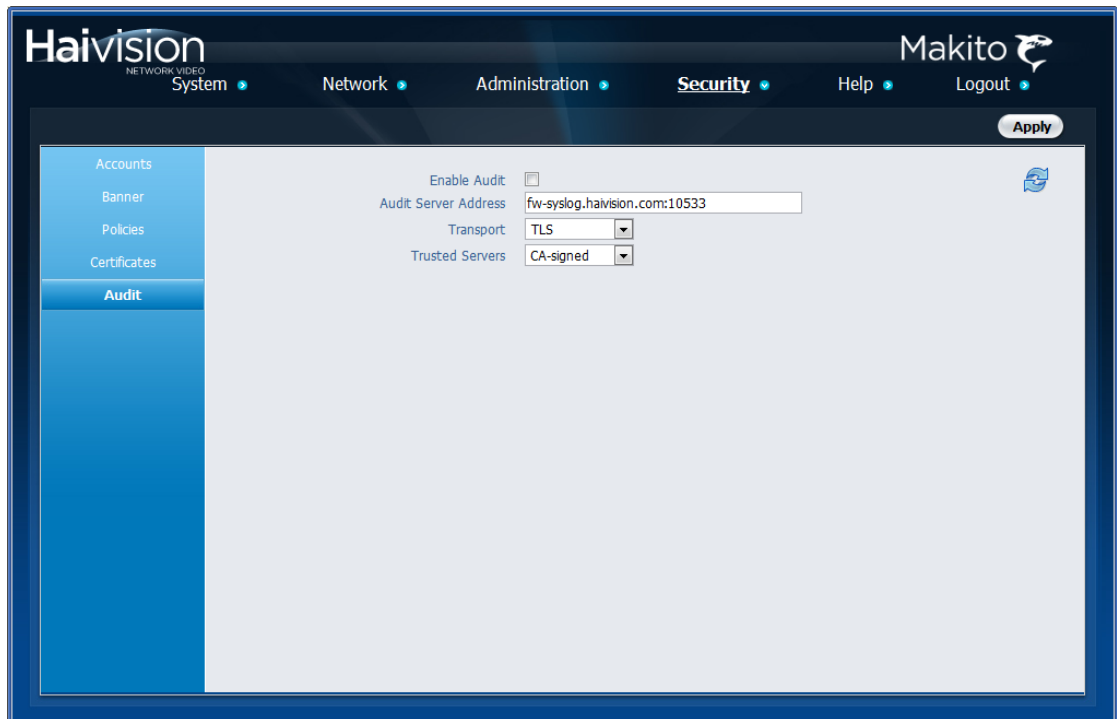
2. Check the Enable Audit checkbox to start logging to the audit server.

3. Type the audit server address and port in the Audit Server Address field. See "Audit Settings" on page 173 for more details.

   The server address must be the Common Name or one of the Subject Alternative Names in the server's certificate for successful authentication if TLS and CA-signed trusted server is set.

4. Set the type of transport protocol that will be used to send the logs to the audit server. See details in "Audit Settings" on page 173.

5. If TLS is selected as Transport, choose the type of audit server to be accepted as a trusted server: either All (no server authentication), CA-signed or Self-signed.

If Trusted Servers is set to CA-signed, the root-CA certificate of the audit server cer-tificate chain must be imported in the encoder (see "Managing Certificates" on page 164) for the TLS connection to succeed.

6. If Trusted Servers is set to Self-signed, fill in the Fingerprint field to identify the certificate trusted for this TLS connection.

Enable Audit	☐
Audit Server Address	
Transport	TLS ▾
Trusted Servers	Self-signed ▾
Fingerprint	

The fingerprint should be that of the certificate that belongs to the audit server which was set in "Audit Server Address".

7. To apply your changes, click Apply.

Audit Settings

The following table lists the Audit controls and settings:

Audit Setting	Default	Description/Values
Enable Audit	disabled	Check or clear this checkbox to enable or disable audits for the system.
Audit Server Address	n/a	Type in the address and port of the remote server, in one of the following formats: • fqdn[:port] • ipaddr[:port] • hostname[:port] If the port is not provided, the default port for the chosen transport will be used:
Transport	UDP	Select the Transport Type from the drop-down list: • UDP (default port: 514) • TLS (Transport Layer Security, default port: 6514)

Audit Setting	Default	Description/Values (Continued)
Trusted Servers	ALL	(TLS must be selected for Transport). Select the type of certificate exchange: • All: Server authentication is disabled. Any server that is set in the Audit Server Address field will be accepted as a trusted server, and the authentication step is skipped. • CA-signed: Enables server authentication during the startup of audit. The encoder will only accept connection with the set server if its presented certificate is signed by a trusted Certificate Authority (i.e., The certificate of that certificate authority is present in the Makito's CA Certificates list). • Self-signed: Enables server authentication. The set server will be accepted if its certificate is self-signed, but its fingerprint matches the one configured on the Makito.
Fingerprint	n/a	(Only appears if Self-signed is selected for Trusted Servers) Enter the certificate fingerprint of the server certificate. The fingerprint should be the SHA-1 or MD5 fingerprint of the certificate that belongs to the audit server which was set in Audit Server Address.

CHAPTER 5: Configuring A/V Services Using SNMP

This chapter provides information required to manage the Makito through the Simple Network Management Protocol (SNMP). SNMP-based management uses Network Management Stations (NMSs) to collect data or configure devices (SNMP agents) across an 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 Makito.

TIP To develop new SNMP applications, see the list of "Supported MIBs" on page 177.

Topics In This Chapter

Overview

To support management of the Makito 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 streams.

NOTE   The Makito uses Net-SNMP Version 5.5 and supports SNMP v1, v2c, and v3.

The Makito 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 182.

Supported MIBs

The Makito SNMP agent supports the MIB-II (RFC 1213) standard and its updates, SNMPv3 MIBs, as well as the Haivision 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).
• HAI-VISION-MIB.txt • HAI-AVT-STREAM-MIB.txt • HAI-HDC-MIB.txt	Haivision Enterprise	Supports configuration, status, and statistics.
• HAI-MAKITO-ENC-CAPS.txt	Haivision Enterprise	This MIB formally specifies the capabilities of the MAKITO (encoder) SNMP AGENT. It specifies which object groups from the listed MIB files are implemented, and furthermore, it specifies implementation constraints and deviations from the MIB OBJECT specification such as differences in ranges.

SNMP Agent Components

This section provides key information for system administrators responsible for setting up SNMP-management on the Makito.

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 Makito 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 files /usr/share/snmp/snmpd.conf and /usr/share/snmp/snmpd.local.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). However, for most settings, it is preferable to use the nmcfg configuration script. On the Makito, the snmpd.conf file includes:

- access control setup (i.e., community and user privileges),
- system information setup (e.g., system location, services and contact),

snmpd.conf is located in the directory /usr/share/snmp.

For a detailed description, see the snmpd.conf file.

snmpd.local.conf

snmpd.local.conf is the configuration file that defines the VACM (View-based Access Control Model) views modeling the privilege levels of the Makito user groups: admins, operators, and users. These groups can be used for v1/v2c communities and v3 USM users.

Unless you need to modify the access control model, there is no need to edit this file. Access groups are used in place of the traditional ro (read-only) and rw (read-write) permissions when setting communities' and users' access with the nmcfg configuration script.

SNMP Community Names

Following are the default SNMP community names and their privileges for accessing the Makito MIBs.

SNMP Community Name	Access Rights
admin	Read and write permission from local network and local host
public	Read-only permission from local network

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) and the assignment of VACM (View-based Access Control Model) access rights to communities and users. 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
system parameter          value
-----------------------------  --------------------------------------------
engineid                  0x80001f88030050c2c611ad
contact                   "john doe <jdoe@example.net>"
location                  "QA lab"

model   perm/group      level       user/community      source
-------  ---------------  -------------  ----------------------  -------------
usm     guest           auth         guest                -
usm     administrator   priv         johndoe              -
v2c     administrator   noauth       admin                localhost
v2c     administrator   noauth       admin                localnet
v2c     guest           noauth       public               localnet
v2c     rw              noauth       tech                 any

auth protocol             priv protocol       user
--------  -------------  -----------------------  --------------------
MD5                       DES               admin
MD5                       nopriv            guest
SHA                       AES               johndoe
# nmcfg help
usage: nmcfg
    nmcfg help
    nmcfg access help
    nmcfg access usm permit <uname> {<group>|ro|rw}
  [{noauth|auth|priv}]
    nmcfg access usm delete <uname>
    nmcfg community help
    nmcfg community permit <community> {<group>|ro|rw} [<host>]
    nmcfg community delete <community> [{<group>|ro|rw} [<host>]]
    nmcfg system help
    nmcfg system define <param> "<value>"
    nmcfg system delete <param>
    nmcfg user help
    nmcfg user define <uname> [{MD5|SHA} "<apwd>" [{DES|AES}
  ["<ppwd>"]]]
    nmcfg user delete <uname>
```

Related Topics

- <u>"nmcfg"</u> on page 230

SNMPv3

For SNMPv3, the definition of a user and its access permission are separate steps, whereas for v1/v2c community-based security, a single command (e.g., nmcfg community permit admin rw) defines both.

The following command creates the user "johndoe" and defines its authentication protocol and password, and its privacy (encryption) protocol and password.

These examples use MD5 for authentication and DES for privacy. They provide broader compatibility but if your SNMP client supports SHA (authentication) and AES (privacy), use these as they provide better security. (Note that you can type nmcfg user help to view the supported protocols and pass phrase restrictions.)

```
# nmcfg user define johndoe MD5 "password" DES "pass phrase"
```

The new user has no permissions until its access rights are defined. The command below assigns the operator role to the user.

```
# nmcfg access usm permit johndoe operator auth
```

Note that the Makito administrative user roles are preferred over the read-only or read-write permissions (to the whole MIB). These roles provide to SNMP v1/v2c communities and SNMPv3 users access privileges modeled on the Makito Accounts roles.

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 MD5 –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 MD5 -A "password" -x DES -X "pass phrase" -l
  authPriv localhost haiAvtStreamEncapsulation.1 i directRtp

HAI-AVT-STREAM-MIB::haiAvtStreamEncapsulation.1 = INTEGER:
  directRtp(1)
#
```

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 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

The Haivision Audio/Video Transport Stream MIB (HAI-AVT-STREAM-MIB) is composed of multiple tables described below.

Table	Index	Description
haiAvtStreamNewID.0	none	Next available stream ID
haiAvtStreamInverseTable	IP address type IP address Port	Table to retrieve the stream ID from the IP address and port
haiAvtStreamTable	Stream ID	Stream configuration and status
haiAvtStreamStatsTable	Stream ID	Stream statistics
haiAvtStreamPgmTable	Stream ID Program Index	Transport Stream programs. Only SPTS (Single Program Transport Stream) supported. Not present for non Transport Streams (directRTP, QuickTime).
haiAvtStreamContentTable	Stream ID Program Index Content Index	Contents (video, audio, and/or metadata). Elementary Streams (ES) for Transport Stream. Only one entry for non-TS in which case Program Index is 1. One to three entries exist for Transport Streams.

MIB object names and values are similar to their CLI parameter counterparts while following MIB syntax (for example, haiAvtStreamPort for port, directRtp for direct-RTP).

Streams are created and deleted using the SNMPv2 RowStatus object (haiAvtStreamRowStatus). All RowStatus values are supported (active, notInService, notReady, createAndGo, createAndWait, destroy). See the description in the SNMPv2-TC.txt file of the MIBs directory. Stream writable objects can only be set at creation time (RowStatus is createAndGo or createAndWait) or while the stream is not active (RowStatus is notInService or notReady).

Objects from the haiAvtStreamPgmTable and haiAvtStreamContentTable cannot be set before the corresponding haiAvtStreamTable row is created and can only be set when the stream entry is not active (haiAvtStreamRowStatus is not active).

The haiAvtStreamPgmTable entry for a given stream only exists if the corresponding stream in the haiAvtStreamTable is a Transport Stream (TS). The default number of haiAvtStreamContentTable entries at creation time is 2 (video, audio) for TS-based encapsulation, and 1 for non TS-based encapsulation. An already created stream for which

Encapsulation is changed from non-TS to TS will only have one content entry defined. The number of haiAvtStreamContentTable entries is controlled by the haiAvtStreamPgmNbContents object.

The example below, using netsnmp CLI commands on the Makito, creates a streaming session to IP Address 198.51.100.106 at port 2000, and starts streaming immediately. The Stream ID 0 (haiAvtStreamTable index) is used to create a stream; this value will be set to the first available Stream ID (>=1) on createAndGo or when set to active after createAndWait:

```
snmpset -v2c -c admin localhost haiAvtStreamAddr.0 d 198.51.100.106
     haiAvtStreamPort.0 u 2000 haiAvtStreamRowStatus.0 i createAndGo
```

The example below shows the same command, using the prefix (-IS) and suffix (-Is) options to remove repetition:

```
snmpset -v2c -c admin –IS haiAvtStream –Is .0 localhost Addr d 198.51.100.106
     Port u 2000 RowStatus i createAndGo
```

To retrieve the Stream ID of the stream just created, the haiAvtStreamInverseTable is used:

```
snmpget -v2c -c admin localhost
     haiAvtStreamInverseID.ipv4.4.198.51.100.106.2000
HAI-AVT-STREAM-MIB::haiAvtStreamInverseID.ipv4.”198.51.100.106”.2000 =
     HaiAvtStreamID: 5
```

To create a Stream with a known ID, the haiAvtStreamNewID.0 object reports the next available Stream ID. In the example below, the Transport Stream Program number is set to 7 and the video encoder 1 is selected for the video content. Note that createAndWait is used so the program and content table can be set after stream creation.

```
snmpget -v2c -c admin localhost haiAvtStreamNewID.0
HAI-AVT-STREAM-MIB::haiAvtStreamNewID.0 = HaiAvtStreamID: 5
snmpset -v2c -c admin –IS haiAvtStream –Is .5 localhost Addr d
  198.51.100.106
     Port u 2000 Encapsulation i tsUdp RowStatus i createAndWait
snmpset -v2c -c admin –IS haiAvtStream localhost
     PgmNumber.5.1 i 7 PgmNbContents.5.1 i 2
     ContentType.5.1.1 i video ContentToolID.5.1.1 i 1
     ContentType.5.1.2 i audio ContentToolID.5.1.2 i 0
snmpset -v2c -c admin localhost haiAvtStreamRowStatus.5 i active
```

PART III: Reference

APPENDIX A: CLI Command Reference

This alphabetical command reference lists and describes the available Makito Command Line Interface (CLI) commands and their parameters.

Commands In This Appendix

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 or placeholders 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 Parameter names and enumerated values are case-insensitive and can be abbreviated.

Command Summary and Usage Information

The Makito CLI commands are divided into two main groups: operation and administration:

- Operation Commands are used to manage the Audio/Video data path, processing, and features, including audio/video/metadata content selection, logo, audio/video encoding, H.264 streaming, and image snapshots. Operation command effects are immediate but not persistent (i.e., between reboots) unless the current operating configuration is explicitly saved (using the config command).

- Administration Commands address the security and network configuration. Their effects are persistent but not always immediate; some require system reboot to take effect. Administration commands are divided into two subgroups: Network and Management and Security.

Operation Commands

Table A-1   Operation Commands

Command	Description
videnc	Use to manage video encoding parameters, including starting and stopping encoding of the video input.
audenc	Use to manage encoder audio acquisition settings, including starting and stopping encoding of the audio input.
stream	Use to create and manage audio/video streams.
metadata	Use to manage metadata sources to capture metadata (either KLV or CoT) and then incorporate data information within the MPEG Transport Stream.
logo	Use to manage logo overlays (i.e., a graphic file to display as a logo overlay in the encoded video).
mklogo	Use to convert a graphic file to Haivision's overlay image format (.oly) in order to display the image as a logo overlay.
mkstill	Use to convert a static picture into a file containing an encoded single H.264 GOP sequence. This is required in order to configure a Makito stream with a static image that will replace the "real" video stream when streaming is paused.
profile	Use to display the list of the available video Profiles, as well as the parameter settings for a specified Profile.
snapshot	Use to take and manage snapshots from the video input.
still	Use to manage still image files on the Makito file system. Static images are used to replace the "real" video stream when streaming is paused.
talkback	Use to manage audio talkback settings to allow two-way audio communication using the encoder's Audio Output.
date	Use to view the current date.
temperature	Use to display the current temperature of the unit.

Administration Commands

Table A-2   Administration Commands

Command	Description
Network and Management	
haiversion	Use to display the Firmware Build ID, Build Time, and serial number for the Makito.
package	Use to view and manage software packages, including firmware upgrades.
config	Use to manage configurations on the Makito.
ethercfg	Use to view, manually control, and save the Ethernet configuration parameters.
ipconfig	Use to set and view the parameters that specify the networking context for the Makito, including the IP settings, hostname, and DNS.
license	Use to manage licensed features on the Makito.
nmcfg	Used by system administrators or GUI/Web Interface applications in the configuration of SNMP for the Makito.
service	Use to enable and disable network services, including HTTP, RTSP, SNMP, SSH, Telnet, and VF.
system_snapshot.sh	Use to take a system snapshot for the purpose of troubleshooting, which may be forwarded to Haivision Technical Support if you are requesting technical support.
dtconfig	Use to set the date and time on the encoder.
tzconfig	Use to configure the timezone on the encoder.
passwd	Use to change the password for a user account.
pubkey	Use to manage the user's own authorized SSH public keys.
reboot	Use to halt and restart the Makito
Security	
account	Use to manage user accounts for the encoder.
audit	Use to enable remote logging of security and administrative events and configure the remote audit (syslog) server connection.
banner	Use to manage the Advisory Notice and Consent Banner.

Table A-2   Administration Commands

Command	Description (Continued)
certificate	Use to manage the TLS certificates for the Web interface HTTPS server and the secured TLS connection to the remote audit server.
messages	Use to view and manage administrative login messages.
policy	Use to manage security policy settings.

CLI Access Control

Below is a list of CLI commands and other functionalities supported by the system and the privileges for each role.

Command	Role		
	Administrator	Operator	Guest
Web access	Yes	Yes	Yes
Telnet to/from Encoder	Yes	Yes	Yes
Serial access to Encoder	Yes	Yes	Yes
Operation			
videnc	Yes	Yes	"get" only
audenc	Yes	Yes	"get" only
stream	Yes	Yes	"get" only
metadata	Yes	Yes	"get" only
logo	Yes	Yes	"get" and "list" only
mklogo	Yes	Yes	No
mkstill	Yes	Yes	No
profile	Yes	Yes	"get" and "list" only
snapshot	Yes	Yes	"get" and "list" only
still	Yes	Yes	No
talkback	Yes	Yes	Yes
date	Yes	Yes	Yes
temperature	Yes	Yes	"get" only
Network and Management			
haiversion	Yes	Yes	Yes
package (for upgrade)	Yes	No	No
config	Yes	Yes	"list" only
ethercfg	Yes	No	No
ipconfig	Yes	No	No
license	Yes	No	No

Command (Continued)	Role		
	Administrator	Operator	Guest
nmcfg	Yes	No	No
service	Yes	No	No
system_snapshot.sh	Yes	Yes	Yes
dtconfig	Yes	No	No
tzconfig	Yes	No	No
passwd	Yes	Yes	Yes
pubkey	Yes	Yes	Yes
reboot	Yes	No	No
iperf	Yes	Yes	Yes
ping	Yes	Yes	Yes
traceroute	Yes	Yes	Yes
Security			
account	Yes	No	No
audit	Yes	No	No
banner	Yes	No	No
certificate	Yes	No	No
messages	Yes	No	No
policy	Yes	No	No

For an overview of system access control on the Makito, see "Role-based Authorization" on page 63.

account

SYNOPSIS

```
account uname create [role=admin]
account uname/all get
account uname/all list
account uname passwd
account uname pubkey add|remove keyfile
account uname pubkey list
account uname lock
account uname unlock
account uname delete
```

DESCRIPTION

The account command is used to create, delete and modify administrative user accounts for the Makito.

NOTE The account command can only be used by the Administrator.

ACTIONS

create	Creates a new user account. See account Parameters below for roles. You will be prompted to enter and confirm the initial password.
get	Displays the account information for the user or the Makito, including account name, role, state, password expiry status, and public key(s).
list	Lists the account information for the user or the Makito in table format.
passwd	Modifies the user account password. You will be prompted to enter and confirm the password (which the user will have to change upon first login). For the allowed characters, see "Password Requirements" on page 71.

pubkey add|remove keyfile	Adds or removes a public key to or from the user account. See "Managing Public Key Authentication" on page 157 for more information.
pubkey list	Lists any public key files that have been uploaded for this account.
lock	Locks the user account (if Enabled).
unlock	Unlocks the user account (if Locked).
delete	Deletes the user account.

ACCOUNT PARAMETERS

Parameter	Default	Description/Values
role		Use with account create command to specify the role for the user account, either: • Admin • Operator • Guest For details on roles, see "Role-based Authorization" on page 63.

ACCOUNT EXAMPLES

# account all list	name	role	state	pwd expiry	pubk
	-----------	----------------	---------	----------------	----
	admin	Administrator	Enabled	never	No
	fdfdf	Guest	Enabled	never	No
	mrmichel	Operator	Enabled	by admin	No
	operator	Operator	Locked	never	No
	user	Guest	Enabled	never	No

SEE ALSO

- Managing Accounts on page 152

audenc

SYNOPSIS

audenc ID start

audenc ID stop

audenc ID set parameter=value [parameter=value ...]

audenc ID get [config, stats, all]

DESCRIPTION

The audenc command is used to manage encoder audio acquisition settings. The audenc start and audenc stop commands can be used to start and stop encoding of the audio input.

ID is either the Encoder ID (0 or 1) or all. (Note that 0 corresponds to "High" and 1 corresponds to the "Low" stream. See "HiLo Audio Streaming" on page 81.) By default, the High audio encoder is activated.

ACTIONS

start	Activates encoding of the audio input.
	For HiLo audio streaming (i.e., to send "High" and "Low" bitrate streams to two different destinations), you need to manually start the Low audio encoder (audenc 1 start) because it is disabled by default.
stop	Stops (mutes) encoding of the audio input.
set	Modifies encoder audio parameter(s).
	A series of one or more parameter=value pairs can be specified at once. See audenc Parameters below.
get	Displays encoder audio status information.
	You can specify configuration, stats, or all audio information.
help	Displays usage information for the audenc command.

AUDENC PARAMETERS

Parameter	Default	Description/Values
input	Analog	The type of Audio Input for the encoder:
Makito		• Analog

Parameter	Default	Description/Values (Continued)
Makito-SDI		• SDI1CH12 - SDI Audio Group 1, Ch. 1-2 • SDI1CH34 - SDI Audio Group 1, Ch. 3-4 • Analog
level	6	The maximum analog Audio Input level from +5dBU up to +20dBU. NOTE: Only applies to Analog Audio Input.
mode	stereo	The number and type of audio channels to encode. mono, stereo TIP: If you set the bitrate to 32 kbps, use mono.
algorithm	mpeg2adts	The audio compression algorithm:
		• [mpeg2]adts - Encodes audio using the ISO/IEC 13818-7 MPEG-2 AAC-LC algorithm with an ADTS header. (Default)
		• mpeg4adts - Encodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm with an ADTS header.
		• loas - Encodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm with a LOAS/LATM header.
		• raw - Encodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm without any encapsulation.
bitrate	128 kbps	The Audio Bitrate for the encoder. 32..448 kbps. NOTE: At low bitrates such as 32 kbps, the audio quality may not be optimal. See mode above.
SampleRate	48 kHz	(Read-only) The number of audio samples per second taken from the incoming signal. 48 kHz only.

audenc Examples

# audenc 0 set input=SDI1CH12	Sets the Audio Input Type to SDI1CH12
# audenc 0 set bitrate=128	Sets the Audio Bitrate to 128. You will receive the following confirmation: Audio encoder configured successfully
# audenc 0 set algorithm= mpeg4adts	Changes the default Audio Algorithm to MPEG4 ADTS encapsulated audio.

# audenc 0 get 	
-or-
# audenc 0 get config 	
	Returns audio configuration information for the encoder, such as:
	Encoder ID : 0
	  Name : "Audio Encoder 0"
	  Configuration:
	    Audio Input : SDI1CH12
	    Audio Bitrate : 128 kbps
	    Audio Samplerate : 48 KHz
	    Audio Mode : Stereo
	    Audio Algorithm : ADTS

# audenc 0 get stats	Returns audio status information for the encoder, such as: 	
	Encoder ID : 0
	  Name : "Audio Encoder 0"
	  Statistics:
	  State : WORKING
	  Encoded Frames : 22,396
	  Encoded Bytes : 7,644,453
	  Encoder Errors : 0
	  Encoder PTS: 0x03a1db3cb

See Also

- Configuring Audio Settings on page 81

audit

SYNOPSIS

audit start

audit stop

audit set parameter=value [parameter=value ...]

audit get [config|stats|all]

audit verify [debug]

DESCRIPTION

The audit command is used to enable remote logging of system events and configure the remote audit (syslog) server connection.

NOTE The audit command can only be used by the Administrator.

ACTIONS

start	Establishes a connection from the encoder to a remote audit server and enables logging to it.
stop	Disables the connection to the remote audit server.
set	Modifies the audit parameters. A series of one or more parameter=value pairs can be specified at once. See audit Parameters below.
get	Displays audit configuration and connection status information.
verify	Verifies the validity of the TLS connection parameters. TIP: Connect to the audit server in verbose mode to help diagnose connection or certificate problems.

AUDIT PARAMETERS

Parameter	Default	Description/Values
server	n/a	The server IP address. Enter an IP address in one of the following formats:
		• fqdn[:port]

Parameter	Default	Description/Values (Continued)
		• ipaddr[:port]
		• hostname[:port]
transport		The transport protocol, either:
		• UDP (User Datagram Protocol): Default UDP port = 514
		• TLS (Transport Layer Security): Default TLS port = 6514
trusted		If transport is TLS, the type of server authentication:
		• All: No server authentication
		• CA-signed: Root-CA certificate imported
		• Self-signed: Fingerprint
fingerprint		If trusted is self-signed, specify the audit server certificate fingerprint (md5 or sha1):
		• md5-fingerprint:
		• sha1-fingerprint:

AUDIT EXAMPLE

# audit get	Configuration: 	
	  Audit server address : syslog.example.com:10533
	  Transport : TLS
	  Trusted servers : CA-signed

SEE ALSO

• Managing Audits on page 172

banner

banner enable
banner disable
banner install <bannerfile>
banner get
banner delete

DESCRIPTION

The banner command is used to manage the Advisory Notice and Consent Banner. This is a single text file that will be displayed to users who log in for interactive sessions on the Makito.

ℹ️ NOTE The banner command can only be used by the Administrator.

In the current release, only ASCII file format is supported for the banner file; the maximum file size for the banner is 4KB.

ACTIONS

enable	Enables display of the installed Advisory and Consent Banner page at login (a banner must be installed).
disable	Disables display of the current Advisory and Consent Banner page at login.
install	Installs a text file as the Advisory and Consent Banner page.
	IMPORTANT: The text file must be downloaded to the encoder and locally stored in the current (administrative) user's directory before it can be installed. As of Version 2.1, the Makito supports FTP and TFTP client, as well as SCP client and server for downloading and uploading files.
get	Displays banner status information.
delete	Deletes the banner file from the system.

BANNER PARAMETERS

Parameter	Default	Description/Values
bannerfile	n/a	The name of the .txt file to display as the Advisory Notice and Consent Banner for the encoder.

BANNER EXAMPLES

# banner get	The Advisory Notice and Consent Banner is disabled. If enabled, the following banner is displayed upon user login: ------------------------------- *** * WARNING * *** THIS IS A PRIVATE COMPUTER SYSTEM. This computer system including all related equipment and network devices are provided only for authorized use. All computer systems may be monitored for all lawful purposes, including to ensure that their use is authorized, for management of the system, to facilitate protection against unauthorized access, and to verify security procedures, survivability and operational security. *** * Haivision Systems - Makito SDI #4 * ***

SEE ALSO

- [Managing Banners](#) on page 159

certificate

SYNOPSIS

certificate name/all get

certificate name/all list

certificate name view

certificate name create [sign=self] [subject=query]

certificate name delete [type=id]

certificate name import infile=<certfile> [type=id] [fmt=auto]

certificate name select

certificate name verify

DESCRIPTION

The certificate command is used to manage the system's certificates that are used to establish TLS connections to the audit server as well as secure HTTPS sessions.

NOTE The certificate command can only be used by the Administrator.

The autocert file is a default certificate file, generated when the IP address is changed from factory settings, or when an audit or an HTTPS session starts with no selected certificate.

ACTIONS

get	Displays the information for the specified certificate or all certificates, including certificate name, type, signature, subject, issuer, expiration, and fingerprint.
list	Lists the specified certificate or all certificates installed on the encoder, including the type and name.
view	Displays the content of the named certificate file.
create	Generates a Self-signed certificate or a Certificate Signing Request. The sign and subject can be specified. See certificate Parameters below.

delete | Deletes the selected certificate.

The type can be specified. See certificate Parameters below.

NOTE: The type specification may be added to specify the deletion of the Identity certificate, the chain associated with it, or the CA certificate with the given name.

import | Imports a certificate to be installed on the device.

The infile, i.e., the file to import the certificate from, must be provided. The file's type and format can also be specified. See certificate Parameters below.

select | Selects the certificate used when establishing a TLS connection with the audit server or starting an HTTPS session.n.

verify | Verifies the validity of the specified certificate.

CERTIFICATE PARAMETERS

Parameter	Default	Description/Values
sign	self	The signature type for the certificate: • self: Creates a self-signed identity certificate. • Request: Creates an identity Certificate Signing Request (CSR)
subject	query	Sets the certificate's distinguished name parameters: • auto: Automatically gets the subject Common Name which is HOSTNAME.DOMAIN if DNS is configured, or IPADDR otherwise. The subject Alt Name is set to DNS:HOSTNAME.DOMAIN, DNS:HOSTNAME,IPAddress:IPADDR • query: Prompts the user for Distinguished Name (DN) attributes • DN: Distinguished Name in the form: "/C=US/ST=Maine..." where the most common attributes are: /C Two Letter Country Name /ST State or Province Name /L Locality Name /O Organization Name /OU Organizational Unit Name /CN Common Name

Parameter	Default	Description/Values (Continued)
type	id	The type of certificate to either import or generate: NOTE: Only ID certificates can be generated. Chain and CA certificates can only be imported. • id: Identity certificate (for HTTPS service and audit) • chain: Identity certificate CA chain (Import only) • ca: Certificate Authority Certificate (for peer certificate validation, Import only)
fmt	auto	The format in which the certificate is encrypted: • auto: Detects the certificate format based on file extension when importing. • pem: Privacy Enhanced Mail Base64 encoded DER certificate • p7: PKCS#7 • p12: PKCS#12 • pfx: PKCS#12 • der: Distinguish Encoding Rules
infile	n/a	The name of the file to import. NOTE: The administrator has previously downloaded/uploaded the certificate file to import in its home directory (using SCP, for example).

SEE ALSO

config

SYNOPSIS

config save [cfgname] [startup=yes,no]
config load [cfgname]
config delete [cfgname]
config list

DESCRIPTION

The config command is used to manage configurations on the Makito. This includes saving the current configuration, loading a saved configuration, and specifying the configuration file to load at startup.

ACTIONS

save	Saves the current configuration. Saves every parameter in the system, including encoder settings and stream destination and status (excluding the system IP address).
	All configuration files are stored in /usr/share/haivision/config.
	NOTE: Avoid spaces and special characters such as the following in configuration filenames: " ' ` \ / . , ; : ( ) { } [ ]	~ ! & ?
load	Loads a previously saved configuration identified by <cfgname>. Reassigns every parameter in the system, including Encoder settings and stream destination and status (excluding the system IP address).
delete	Deletes a previously saved configuration identified by <cfgname>.
	If no filename is specified, the system deletes the default configuration (haistartupcfg.ini).
list	Displays a list of the available configuration files.
help	Displays usage information for the config command.

CONFIG EXAMPLES

# config save Class430 startup= yes	Saves the current configuration under the name "Class430" and sets it to be the startup configuration
# config load Class430	Loads a previously saved configuration identified by the name "Class430" (located in the active (local) directory).

SEE ALSO

- Saving and Loading Configurations on page 137

date

SYNOPSIS

date

DESCRIPTION

The date command is used to view the current date.

DATE EXAMPLE

# date	Displays the current date, e.g.: Tue Aug 28 11:23:56 EDT 2012

SEE ALSO

- dtconfig on page 210
- tzconfig on page 265

dtconfig

SYNOPSIS

dtconfig YYYYMMDDhhmm[.ss]

DESCRIPTION

The dtconfig command is used to set the date and time on the encoder.

NOTE Setting the encoder to a date in the past (compared to the current date) may cause the encoder to reboot.

DTCONFIG EXAMPLE

# dtconfig 201208201100	Sets the encoder clock to Monday August 20 11:00:00 EDT 2012

SEE ALSO

- date on page 209
- tzconfig on page 265

ethercfg

ethercfg [-a on|off] [-s 10|100|1000] [-d half|full] [-c bandwidth] [-w yes| no]

DESCRIPTION

The ethercfg command is used to view, manually control, and save the Ethernet configuration parameters.

When the Makito 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.

If no options are specified, the system displays the current settings, for example:

```
$ ethercfg
  Speed          : 1000mbps
  Duplex         : Full
  Auto-Negociation: On
  Advertised Mode : All
  Link Detected   : Yes
  Ceiling         : 100000kbps
```

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" (in kbps or Mbps) on the bandwidth available to the Ethernet port
-w	--write	Skips the save settings prompt

NOTE   Always enable autonegotiation with Gigabit Ethernet (GigE) speed (1000 Mbps).

ETHERCFG EXAMPLE

# ethercfg -s 100	Sets the line speed to 100 Mbps (and in doing so, disables autonegotiation, see following example).

```
$ ethercfg -s 1000
  Speed        : 1000mbps
  Duplex       : Full
  Auto-Negociation: On
  Advertised Mode : 1000mbps Full-Duplex
  Link Detected   : Yes
  Ceiling       : 100000kbps

Do you wish to save these settings ? (y,n): y
Settings saved successfully.
```

```
$ ethercfg -s 100
Autonegotiation disabled to permit speed/duplex mode configuration.
        Speed: 100mbps
        Duplex: Full
        Auto-negotiation: off
        Link detected: yes
Do you wish to save these settings ? (y,n): y
Settings saved successfully.
$
```

SEE ALSO

- Configuring Network Settings on page 129

haiversion

SYNOPSIS

haiversion

DESCRIPTION

The haiversion command is used to display status information about the Makito. Status information can be useful for troubleshooting and may be forwarded to Haivision Technical Support if you are requesting technical support.

HAIVERSION EXAMPLE

# haiversion	Displays information about the hardware and software components.

```
$ haiversion
Card Type           : "Makito-SDI Encoder Gen-II"
Part Number         : B-290E-HDSDI
Serial Number       : HAI-100041610069
MAC Address         : 00:50:c2:c6:1e:a4
Firmware Version    : 2.2.1-6
Firmware Date       : "Jan 10 2014"
Firmware Options    : SW-290E-KLV-COT
Hardware Version    : --
Hardware Compatibility: A1
CPLD Version        : B-
Boot Version        : "1.1 Enc"
$
```

SEE ALSO

- <u>Viewing System Status Information</u> on page 132

ipconfig

SYNOPSIS

ipconfig [configure | display]

DESCRIPTION

The ipconfig command is used to set and view the parameters that specify the networking context for the Makito, including the IP settings, hostname, and DNS. It may also be used to set the Network Time Protocol (NTP) server address and Time Zone.

As shown in the following example, when you enter the ipconfig configure command, the system displays the current IP settings and takes you through a series of prompts enabling you to change the IP settings, optionally enable DHCP, and change the hostname, DNS settings, NTP settings, and/or Time Zone setting.

You must reboot for any changes to take effect.

The ipconfig display command returns the current IP settings.

IPCONFIG EXAMPLES

#ipconfig configure	Prompts you as follows to modify current settings:

	Current IP Settings:
	    ip address : 10.5.1.2
	    network mask : 255.255.0.0
	    gateway : 10.5.0.1
	Change IP settings: (Y,N): y
	Use DHCP to obtain IP address automatically: (Y,N): n
	Enter ip address: 192.0.2.42
	Enter netmask: 255.255.255.0
	Enter default gateway: 192.0.2.24
	
	Current hostname: Makito
	Change hostname? (Y,N): y
	
	Current DNS settings:
	   domain: example.com
	   server: 192.0.2.46
	Change DNS settings? (Y,N): n

#ipconfig configure (continued)	Current NTP settings:
	  server : 10.5.0.1
	  timezone : "America/Chicago"
	Change NTP settings? (Y,N): n
	
	Current Time Zone settings:
	  America/Chicago
	Change system Time Zone? (Y,N): n

# ipconfig display	Returns current IP settings for encoder configured to use DHCP: 	
	Current IP Settings:
	    ip address : Obtained via DHCP
	    hostname : Makito
	Current NTP Settings:
	  server : 192.0.2.100
	  timezone : "America/Montreal"

# ipconfig display	Returns current IP settings for encoder that does not use DHCP: 	
	Current IP Settings:
	    ip address : 192.0.2.42
	    network mask : 255.255.255.0
	    gateway : 192.0.2.24
	    hostname : Makito
	Current NTP Settings:
	  server : 192.0.2.100
	  timezone : "America/Montreal"

SEE ALSO

- Configuring Network Settings

license

SYNOPSIS

license list

license view <features.lic>

license install <features.lic>

license verify <features.lic>

license delete <features.lic>

DESCRIPTION

The license command is used to manage licensed features.

The license is delivered as a plain-text ASCII license file with the extension .lic to be installed on your Makito.

For more information, see "Managing Licenses" on page 147).

NOTE   Multiple licenses may be installed on the same device at the same time.

ACTIONS

list	Displays a list of installed licenses.
	Licenses are stored on the Makito file system in the folder /usr/share/haivision/licenses.
view	Displays the content of the specified license file.
install	Installs the specified license file.
	IMPORTANT: The license file must be uploaded to the encoder and locally stored in the current (administrative) user's folder before it can be installed. As of Version 2.1, the Makito supports FTP and TFTP client, as well as SCP client and server for downloading and uploading files.
verify	Verifies the specified license (either installed or uploaded).
delete	Deletes a previously installed license file from the system.

$ license list	Displays a list of licenses currently installed on the system: License Files (in /usr/share/haivision/licenses): metadata-PO123456.lic
license view metadata-PO123456.lic	Displays the contents of the specified license: #----BEGIN LICENSED FEATURE---- metadata.lcf ---- [INFO] Feature=Metadata Description=Metadata KLV CoT [KLV] Enabled=On [CoT] Enabled=On #----END LICENSED FEATURE---- metadata.lcf ---- #----BEGIN LICENSING DATA----------------------- [LIC-SIGNATURE] CreatedOn=2013-06-13 09:27:06 CreatedBy=support@haivision.com Sequence=fw100001_metadata.lic [LIC-DEVICES] HAI-031233010018=Yes HAI-090022300016=Yes HAI-100022230061=Yes HAI-100009820054=Yes #----END LICENSING DATA------------------------

$ license verify metadata-PO123456.lic	Verifies the specified license:
	Verifying license
	  /usr/share/haivision/licenses/metadata-
	  PO123456.lic...
	License verification successful.
	
	NOTE: This command first checks to see if the specified license is in the current working directory.
	• If Yes, it will verify that one.
	• If No, it will look for it in the installed licenses directory (/usr/share/...)
	
	This allows the verification of licenses before they are installed.

logo

SYNOPSIS

logo enable

logo disable

logo set parameter=value [parameter=value ...]

logo get

logo list

logo delete

DESCRIPTION

The logo command is used to manage logo overlays. You can configure a graphic file to display as a logo overlay in the encoded video. There can be one logo per Makito.

The logo position can either be relative (top left, top right, centered, etc.) or absolute (positioned at the exact X and Y coordinates specified). You can also specify the scaling and transparency display settings.

The graphic file can be uploaded in either BMP, JPEG, PNG, or GIF format.

NOTE You can upload the graphic file either using the mklogo command, or from the Web interface (MEDIA SETTINGS page, see "Logo Insertion/Overlay" on page 109).

ACTIONS

enable	Displays the logo when configured properly.
disable	Hides the logo.
set	Configures logo settings. A series of one or more parameter=value pairs can be specified at once. See logo Parameters below.
get	Displays information on the logo.
list	Lists the available logo files. Logos are stored on the Makito file system in the folder /usr/share/haivision/logos.
delete	Deletes a logo file from the list.

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LOGO PARAMETERS

Parameter	Default	Description/Values
filename	n/a	The name of the .oly file to display as a logo overlay. NOTE: The file must be in Haivision's overlay image (.oly) format. See mklogo on page 227.
display	Off	Enables the display of the specified file as a logo overlay. On, Off
opacity	100	Specifies the opacity percentage of the logo. 0..100% NOTE: 0 = an invisible logo, and 100 = a solid logo.
transparency	0	Alternatively, you can specify the visibility of the logo by its transparency percentage. 0..100% NOTE: 0 = no transparency (i.e., completely solid/opaque logo); 100 = fully transparent (i.e., completely transparent/invisible logo)
scaling	100	Specifies the scale factor (percentage) for the logo: • 25 = logo is 1/4 its original size • 100 = no scaling • 400 = logo is 4 times its original size
relative	Off	If enabled, keeps the logo in proportion to the display area regardless of the input resolution. On, Off NOTE: The original scaling is vis-à-vis a 1920x1080 grid.
positioning	BottomRight	Specifies the position for the logo: • BottomRight • TopRight • BottomLeft • TopLeft • Centered • Absolute: Uses the exact X and Y coordinates. • Relative: Uses the X, Y coordinates in relation to a 1920x1080 display area.

Parameter	Default	Description/Values (Continued)
x		Horizontal coordinate used to position the top left point of origin in Absolute or Relative positioning modes.
		When using Absolute positioning, this is the exact horizontal position of the logo's top left point of origin.
y		Vertical coordinate used to position the top left point of origin in Absolute or Relative positioning modes.
		When using Absolute positioning, this is the exact vertical position of the logo's top left point of origin.

logo Example

logo set filename= HaivisionLogoTransparent.oly opacity= 65 positioning=bottomright display=on	Configures the file HaivisionLogoTransparent.oly to display as a logo on the system.

See Also

- mklogo on page 227
- Logo Insertion/Overlay on page 109

messages

SYNOPSIS

messages add <msgtext>

messages get

messages delete

DESCRIPTION

The messages command is used to manage administrative login messages. This is a log of a limited number of important events recorded such as installation of a software package, failure to establish or maintain connectivity with a remote audit server, Power-On Self Test (POST) errors, and other noteworthy events that require the administrator's attention.

These events will result in a message being sent directly to all logged-in administrators and will appear on their terminals. The message will also be displayed at the next administrative Web Interface or CLI login.

NOTE The messages command can only be used by the Administrator.

Messages starting with "POST" are Power-On Self Test events. If you repeatedly get POST errors, the cryptographic module of the encoder may be compromised, and it is recommended to re-installed the firmware.

ACTIONS

add <msgtext>	Adds the message text to the log. This could be used to send messages to other administrators.
get	Displays messages.
delete	Deletes the messages.

SEE ALSO

- Managing Messages on page 150

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metadata

> 🛑 **IMPORTANT**   Metadata capture is an optional feature and must be installed at the factory.

SYNOPSIS

metadata ID start

metadata ID stop

metadata create port=udpport [addr=ipaddr] [name=text]

metadata ID delete

metadata ID set parameter=value [parameter=value ...]

metadata ID get

metadata ID clear

enable_metadata_on_serial_port

enable_console_on_serial_port

DESCRIPTION

The metadata command is used to manage metadata sources. This command configures the Makito to capture either KLV (Key Length Value) or CoT (Cursor on Target) metadata and then incorporate data information within the metadata elementary stream of the standard MPEG Transport Stream.

The Makito supports three metadata input types: either from the COM1 serial port, the HD-SDI interface (Makito-SDI only), or a user definable UDP port. Only one metadata stream may be included in the Transport Stream at a time, so you must specify the metadata source ID in the stream command (datasrc): either 0 (serial port), 1 (HD-SDI), or 2 (UDP).

ACTIONS

start	Starts the metadata source.
stop	Stops the metadata source.
create	Creates a new UDP metadata source.
	A series of one or more parameter=value pairs can be specified at once. See metadata Parameters below.
delete	Deletes a UDP metadata source.

set	Configures metadata source settings.
	A series of one or more `parameter=value` pairs can be specified at once. See [metadata Parameters](#) below.
get	Displays information on the metadata source.
	You can specify configuration, stats, or all metadata information.
clear	Clears the metadata source's statistics.

enable_metadata_on_serial_port	Enables metadata capture from the serial port.
enable_console_on_serial_port	Enables console management from the serial port. (default)

METADATA PARAMETERS

Parameter	Default	Description/Values
General parameters:		
name	n/a	(optional) A name of up to 63 characters.
Network Source-specific parameters:		
port	n/a	Specifies the UDP source for a network metadata source. When creating a UDP metadata source, you must specify the port on which to listen for KLV messages. `1025..65,535`
addr	n/a	(optional) The address is only required if you need to receive messages from a source that is multicasting. In this case, you need to provide the multicast IP address to which the data is being sent.
		You also specify the address if you only want to accept KLV messages coming from a specific sender.
Serial and UDP Source-specific parameters:		
format	KLV	Selects the data format for the metadata. • KLV • CoT NOTE: CoT is only available from the serial port. For details on setting up CoT, refer to the *Makito CoT Addendum*.

Parameter	Default	Description/Values (Continued)
spiuid	n/a	(CoT input only) Specifies the UID of SPI (Sensor Point of Interest) messages to ingest.
discovery	Off	(CoT input only) When set to On, enables the discovery of SPI UIDs (User Identifiers) that will be shown in the stats output and can then be potentially used as the spiuid for SPI message filtering.
delta	0	(CoT input only) Specifies the maximum delta between SPI and Air Craft message time-stamps for them to be considered a valid pair that can be converted to KLV.
Serial Source-specific parameters:		
standard	RS232	Specifies the transceiver mode for the metadata capture: • RS232 • RS422 NOTE: Only valid for the serial port.
baudrate	115200	Specifies the baud rate for the serial port: • 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 NOTE: Only required when configuring the encoder for metadata capture.

EXAMPLE #1: CREATING A STREAM WITH SERIAL METADATA [SOURCE ID=0]

1. Set the baud rate for the serial port to 115,200 using the following command:

   #metadata 0 set baudrate=115200

2. Start the serial metadata encoder instance:

   #metadata 0 start

3. Create a stream with video, audio and metadata using the following syntax:

   #stream create addr=<IPaddr> port=<UDPport> vid=0 aud=0 data=0

4. Verify the metadata encoder stats:

   # metadata 0 get all

   The system will return the metadata information:

   ```
   Metadata ID          : 0
   Name                 : (None)
   Configuration:
   ```

```
    Type                : serial
    Format              : KLV
    Device              : "/dev/tts/0"
    Standard            : RS-232
    Baud Rate           : 115200
  Statistics:
    State               : STOPPED
    Rx Bytes            : 0
    Rx OK Messages      : 0
    Rx Corrupt Messages : 0
```

EXAMPLE #2: CREATING A STREAM WITH SDI METADATA [SOURCE ID=1]

1. Start the SDI metadata encoder instance using the following command:

   `#metadata 1 start`

2. Create a stream with video, audio and metadata using the following syntax:

   `#stream create addr=<IPaddr> port=<UDPport> vid=0 aud=0 data=1`

3. Verify the metadata encoder stats:

   `# metadata 1 get all`

   The system will return the metadata information:

```
Metadata ID           : 1
Name                  : (None)
Configuration:
  Type                : HD-SDI
  Format              : KLV
Statistics:
  State               : STOPPED
  Rx Bytes            : 0
  Rx OK Messages      : 0
  Rx Corrupt Messages : 0
```

EXAMPLE #3: STREAMING WITH UDP METADATA [SOURCE ID=2]

1. Create a UDP metadata encoder instance using the following syntax:

   `metadata create [addr=<IP source>] port=<dest port>`

   Ex: `# metadata create port=8500`

   The system will return the following message, including the UDP metadata ID:

   `Metadata source created successfully - ID: 2.`

2. Start the UDP metadata encoder using the following syntax:

   `# metadata <ID> start`

   Ex: `# metadata 2 start`

3. Create a stream with video, audio and metadata using the following syntax:

stream create [addr=<dest IP>] port=<dest port> vid=<id> aud=<id>
   data=<id>

Ex: # stream create port=2222 vid=0 aud=0 data=2

4. Verify the metadata encoder stats using the following syntax:

metadata <ID> get all

Ex: # metadata 2 get all

The system will return the metadata information:

```
Metadata ID          : 2
Name                   : (None)
Configuration:
  Type                 : Network
  Format               : KLV
  Address              : 0.0.0.0 (Any)
  UDP Port             : 8500
Statistics:
  State                : WORKING
  Rx Bytes             : 0
  Rx OK Messages       : 0
  Rx Corrupt Messages  : 0
  Source Address       : 0.0.0.0
```

SEE ALSO

• Configuring Metadata Capture on page 85

mklogo

SYNOPSIS

mklogo <infile>

where:

infile is the name of the image file to convert into a logo.

DESCRIPTION

In order to display an image as a logo overlay on the Makito, you need to copy a still image file to the Makito file system and then convert the file to Haivision's overlay image format (.oly). The image file can be in either BMP, JPEG, PNG, or GIF format.

The mklogo command is used to convert the graphic file to .oly format.

The Makito supports logos up to a maximum of 256 x 256 pixels. If you supply a larger image file, the converter will scale it down, while keeping the aspect ratio.

Logo files are stored on the Makito file system under /usr/share/haivision/logos.

The .oly file can then be configured to display as a logo overlay in the encoded video. There can be one logo per Makito.

MKLOGO EXAMPLE

# mklogo mylogo.jpg	Converts the file mylogo.jpg to mylogo.oly.

SEE ALSO

- logo on page 218
- Logo Insertion/Overlay on page 109

mkstill

SYNOPSIS

mkstill <infile> resolution

where:

infile   is the name of the image file to convert into a still image.

DESCRIPTION

The mkstill command is used to convert a static picture into a file containing an encoded single H.264 GOP sequence. This is required in order to configure a Makito stream with a static image that will replace the "real" video stream when streaming is paused.

The supported source formats for the static image are BMP, JPEG, PNG, and GIF. The supported output resolutions are 1920x1080, 1280x720, 720x480 (NTSC), and 720x576 (PAL).

NOTE   The maximum size of the source image is 2048x2048 pixels.

The resulting still image files are stored on the Makito file system under /usr/share/haivision/still_images.

MKSTILL PARAMETER

Parameter	Default	Description/Values
resolution	n/a	Specifies the desired resolution of the still image. Supported values are: • 1080 for 1920x1080 • 720 for 1280x720 • 480, NTSC for 720x480 • 576, PAL for 720x576 • VGA for 640x480 • SVGA for 800x600 • WXGA for 1280x768 • SXGA for 1280x1024

MKSTILL EXAMPLE

# mkstill myimage.jpg resolution=1080	Converts the image file myimage.jpg into a 1920x1080 still image.

SEE ALSO

- still on page 251
- Still Image Streaming on page 112
- Selective Video Mute on page 102

nmcfg

> **NOTE** You must be logged in with administrative privileges to enter nmcfg commands.

SYNOPSIS

```
nmcfg help
nmcfg access help
nmcfg access usm permit <uname> {<group>|ro|rw} [{noauth|auth|priv}]
nmcfg access usm delete <uname>


nmcfg community help
nmcfg community permit <community> {<group>|ro|rw} [<host>]
nmcfg community delete <community> [{<group>|ro|rw} [<host>]]


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/Web Interface applications in the configuration of SNMP for the Makito. The nmcfg script reads and edits the standard SNMP configuration files, and then restarts the SNMP agent (snmpd) to apply the new settings.

The nmcfg script supports the configuration of v1/v2c community-based security model and v3 USM (User-based Security Model). The script supports the traditional access permissions (read-only, read-write) and VACM (View-based Access Control Model) views modeling the Makito user groups (administrator, operator, and guest).

A detailed help, describing the options is available for each command option (for example, nmcfg <u>access</u> help or nmcfg <u>user</u> help).

For more information, see <u>"nmcfg"</u> on page 179 (in <u>"SNMP Agent Components"</u>).

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 Makito.
system	Defines contact and location system parameters.
user	Defines user-based (v3) security configuration for the Makito.

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.
	NOTE: Access permissions may be additive. For example, permitting a new source for an existing community adds to the existing one if it complements it.
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 Makito settings which are lost when the unit is rebooted unless saved as a configuration.

EXAMPLE #1: INITIALIZING A COMMUNITY-BASED (V1/V2C) SYSTEM

In the example below, a system with default settings is configured to add a distant host access (198.51.100.122) to the existing localhost and localnet accesses of the admin community. Note that the localnet source is a special keyword that translates at runtime to the network settings of the LAN interface. System parameters are also defined.

```
# nmcfg
parameter          value
--------------- -------------------------------------
contact            <undefined>
location           <undefined>

perm/group         community            source
-------------- -------------------- ---------------------
rw                 admin                localhost
rw                 admin                localnet
ro                 public               localnet
# nmcfg system define contact "myname <myname@example.org>"
# nmcfg system define location "Media Lab"
# nmcfg community permit admin rw 198.51.100.122
#
```

EXAMPLE #2: CREATING AN SNMPV3 USER

Two commands are required to create a USM (v3) user and define its access:

```
# nmcfg user define johnsmith SHA "arfds23dsjs" AES "2394urscxkvn"
# nmcfg access usm permit johnsmith operator
```

EXAMPLE #3: INITIALIZING A USM-ONLY (SNMPV3) SYSTEM

In the example below, system security is enforced by completely disabling SNMPv1/v2c access, and by requiring v3 USM authentication only for users group-based access, and encryption for admins and operators group-based access.

```
# nmcfg
system parameter      value
---------------------- ------------------------------------
contact               <undefined>
location              <undefined>

perm/group            community           source
----------------- -------------------- ---------------------
rw                    admin               localhost
rw                    admin               localnet
ro                    public              localnet

# 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 public
# nmcfg user define joenet SHA "arfds23dsjs" AES "2394urscxkvn"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg user define johnsmith SHA "89ss5dkj" AES "jfdsf78998sd"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg user define guest MD5 "nososecret"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg access usm permit joenet administrator priv
# nmcfg access usm permit johnsmith operator priv
# nmcfg access usm permit guest guest
# nmcfg agent start
# nmcfg

system parameter      value
---------------- -------------------------------------
engineid              0x80001f88802054a68b4b75388e
contact               "joe net <jnet@example.org>"
location              "Media Lab"

model           perm/group   level   user/community       source
--------------- ------------- ------- -------------------- ---------
usm             guest         auth    guest                -
usm             administrator priv    joenet               -
usm             operator      priv    johnsmith            -
```

```
auth protocol         priv protocol   user
---------------------- --------------- -----------
MD5                    nopriv          guest
SHA                    AES             joenet
SHA                    AES             johnsmith
#
```

SEE ALSO

- "nmcfg" on page 179 (in "SNMP Agent Components")

package

package list

package info [<pkgfile>.hai]

package verify <pkgfile>.hai

package install <pkgfile>.hai

package download <pkgfile>.hai <tftpipaddr>

package delete <pkgfile>.hai | all

package cancel <pkgfile>.hai

DESCRIPTION

The package command is used to view and manage software packages.

NOTE The package command can only be used by the Administrator.

When package is entered without any actions or parameters, the system displays usage information for the command.

Package files are digitally signed to ensure integrity and authenticity. Package component signatures and their certificate validity are verified when downloading, manually with the verify action, and when actually performing the installation upon reboot.

If the verification fails after downloading, an error message is reported by the download command and the downloaded package is discarded. If verification fails while actually installing upon reboot, installation is cancelled and a package install failure notice is added to the messages displayed to the Administrators (see messages CLI command). A successful package installation notice is added to the messages upon successful installation.

EXAMPLE #1: PACKAGE DOWNLOAD AND INSTALLATION

```
$ package download haios_enc_v2.1.0-22.hai mytftp.example.com
1/5) Temporarly pausing encoder(s)...
2/5) Downloading package haios_enc_v2.1.0-22.hai from
   mytftp.example.com...
3/5) Verifying integrity of downloaded package... Package verified
   successfully.
4/5) Synching file system...
5/5) Resuming encoder(s)...
Package downloaded successfully.
$ package install haios_enc_v2.1.0-22.hai
Package haios_enc_v2.1.0-22.hai will be installed on next boot sequence.
You must REBOOT to complete the update process!
$
```

EXAMPLE #2: PACKAGE DOWNLOAD VERIFICATION FAILURE

```
$ package download haios_enc_v2.1.0-22.hai mytftp.example.com
1/5) Temporarly pausing encoder(s)...
2/5) Downloading package haios_enc_v2.1.0-22.hai from
   mytftp.example.com...
3/5) Verifying integrity of downloaded package... Package verification failed!
Try downloading the package again.
$
```

ACTIONS

list	Displays a list of downloaded packages.
info	Displays information about the currently installed package. If a filename is specified, displays information about the package.
verify	Verifies the authenticity and integrity of the specified package.
install	Installs the specified package. The package will be automatically verified before installation.
download	Downloads the specified package file using TFTP and then verifies it.
delete	Deletes a previously downloaded package file. You can specify the package file or all.
cancel	Cancels installation of a package scheduled for the next reboot.

PACKAGE EXAMPLES

# package info haios_v1_2_0.hai	Displays information about the package
# package install haios_v1_2_0.hai	Installs the package

passwd

SYNOPSIS

passwd

DESCRIPTION

The passwd command is used to change the user's own password.

ℹ️ NOTE   To modify the password for other users' accounts, see the account command on page 195.

EXAMPLES

# passwd	Changes the password for the current user account. The system prompts you to enter the old password and then the new password.
	NOTE: Passwords can be up to 80 characters long. See "Password Requirements" on page 71 for the supported character set. Password policies set by the administrator may enforce the selection of strong passwords.

SEE ALSO

- Role-based Authorization on page 63
- Managing Accounts on page 152

policy

SYNOPSIS

policy password set [quality=basic] [minlen=6] [minuppers=0] [mindigits=0]
  [minsymbols=0] [expiry=yes] [lifetime=90]

policy session   set [autologout=yes] [idletimeout=15]

policy crypto   set [compliance=None]

policy pname/all get

DESCRIPTION

The policy command is used to configure and manage security policy settings. Policies are needed to define security criteria such as the required quality, length and composition of passwords. The security policies are: Password, Session, and Cryptographic Strength.

Security policies may be applied to bring the encoder to its CC evaluated configuration. During the hardening procedure, it is important for the administrator to set the policies before creating accounts.

NOTE The policy command can only be used by the Administrator.

ACTIONS

policy password set	Modifies the password policy parameters. A series of one or more parameter=value pairs can be specified at once. See password under policy Parameters below.
policy session set	Modifies the session policy parameters. A series of one or more parameter=value pairs can be specified at once. See session under policy Parameters below.
policy crypto set	Specifies the cryptographic policy. The compliance parameter can be specified. See crypto under policy Parameters below.
policy pname/all get	Displays the policy information for either the policy (i.e., password, session, or crypto) or the encoder.

POLICY PARAMETERS

Parameter	Default	Description/Values
crypto		
compliance	None	Specifies the required cryptographic compliance, either: • None • Makito21ST IMPORTANT: In order to bring the encoder to the Common Criteria evaluated configuration, cryptographic security must be activated. This will reinforce security for all management functions of the encoder in terms of cryptography. To do so, select Makito21ST (Makito 2.1 Security Target). This setting will take effect upon the next reboot. NOTE: For more information, see "Hardening" on page 31.
password		
quality	Basic	Specifies the required password strength, either: • Basic • Strong
minlen	6	Specifies the minimum password length: • 6..40
minuppers	n/a if Basic 0 if Strong	(Password quality must be Strong) Specifies the minimum number of uppercase letters: • 0..40
mindigits	n/a if Basic 0 if Strong	(Password quality must be Strong) Specifies the minimum number of digits: • 0..40
minsymbols	n/a if Basic 0 if Strong	(Password quality must be Strong) Specifies the minimum number of symbols: • 0..40
expiry	No	Enables or disables password expiration: • Yes, No
lifetime	90 days	(Password expiry must be Yes) Type in the number of days after which users must change their passwords: • 1..180 days (password expiration)

Parameter	Default	Description/Values (Continued)
session		
autologout	No	Enables or disables Auto Logout: • Yes, No
idletimeout	15 minutes	(autologout must be Yes) Specifies the maximum length of time the system may be idle before the user will be logged out: • 1..1440 minutes (inactivity timeout)

POLICY EXAMPLES

#policy crypto set compliance= Makito21ST	

#policy password set quality= strong
minlen=10 minuppers=1 minsymbols=1 expiry=yes lifetime=30
	Sets the password policy for the encoder to be Strong, requiring passwords to be at least 10 characters in length, with one uppercase letter, one symbol. Passwords will expire in 30 days.

SEE ALSO

profile

SYNOPSIS

profile list

profile <profilename> get

DESCRIPTION

To help you manage the video quality parameters, the Makito provides a selection of video presets or "Profiles" defined for different contexts, such as computer graphics, movies, news, outdoors, sports, or "talking heads" (Virtual Presence).

The profile command is used to display the list of the available Profiles on the encoder, as well as the parameter settings for a specified Profile.

You can modify the settings and create new Profiles from the Web Interface. For information on the video quality parameters and the default Profiles supplied with your Makito, see "Configuring Video Profiles" on page 116.

To create a new Profile, you can (optionally) make a copy of an existing Profile and edit the settings using a text editor. Profile files should be saved with *.vpf extension.

NOTE The profile command is for information only. You must apply the quality Profile when specifying the Video Encoding properties, using the videnc set command. For example, videnc 0 set profile=Outdoors.

ACTIONS

list	Displays a list of available Profiles on the Makito.
	Profiles are stored on the Makito file system in the folder /usr/share/haivision/video_profiles.
get	Displays the settings for the named profile.

EXAMPLES

# profile list	Displays the list of default Profiles.

# profile Sports get	Displays the following output for the Sports Profile: 	
	Parameters:
	  Motion : High
	  Complexity : High
	  Uniformity : Low
	  RateControlBuffer : Low
	  UseDeblockFilter : Enabled
	  DBFStrength : Medium
	  DBFLevel : Medium

SEE ALSO

-
-
-

pubkey

SYNOPSIS

pubkey add <KEYFILE.pub>
pubkey remove <KEYFILE.pub>
pubkey list

DESCRIPTION

The pubkey command is used to manage your account's authorized SSH public keys.

You must first get the public key of your SSH client. Note that in the current release, this only applies to SSH CLI access to the encoder.

NOTE The pubkey command can only be used by the Administrator.

ACTIONS

pubkey add	Uploads a new public key file (.pub extension) to the encoder.
pubkey remove	Removes the specified public key file from the encoder.
pubkey list	Lists the public key files currently loaded on the encoder.

PUBKEY EXAMPLES

#pubkey add makito.pub	Uploads the public key file makito.pub to the encoder.

#pubkey list	Lists all public key files currently loaded on the Encoder along with their fingerprints. In this example, there is one public key file:
	makito.pub : rsa[2048]
	  b7:ae:79:92:0d:86:f9:8d:2d:ee:99:fc
	  :ff:24:95:87:ee:78:1d:fd

SEE ALSO

- <u>Managing Accounts</u> on page 152

reboot

SYNOPSIS

reboot

DESCRIPTION

The reboot command is used to halt and restart the Makito. Any unsaved configurations will be lost. The encoder will restart with the saved startup configuration.

EXAMPLE

# reboot	Reboots the Makito.
	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 Encoder on page 134

service

SYNOPSIS

`service name action`

where:

name   can be: all, http, rtsp, snmp, ssh, telnet, vf

DESCRIPTION

For security purposes, you may need to stop one or more network services from accessing the Makito. The `service` command is used to enable and disable the following network services: HTTP, RTSP, SNMP, SSH, Telnet, and VF.

IMPORTANT If the COM1 serial port is used for metadata capture, and HTTP, Telnet, SNMP, and SSH services are disabled, the only way to re-enable these services will be by a Factory Reset. (For details, see "Resetting the Encoder" on page 54.) Once the serial port is dedicated for metadata capture, it is no longer usable for CLI management.

ACTIONS

start	Activates the service immediately and configures the unit so that the service will be started automatically when the unit is rebooted.
stop	De-activates the service immediately and configures the unit so that the service will be disabled when the unit is rebooted.
status	Displays the current status of the service, i.e., if it has been started or stopped.

EXAMPLES

# service telnet stop	Stops telnet connection to the Makito.
# service all stop	Stops all network connections to the Makito.

SEE ALSO

• Enabling and Disabling Network Services on page 145

snapshot

NOTE Snapshot Capture is an optional feature which may be disabled at the factory. The following section is only applicable if snapshots are enabled. See "Disabling Snapshots" on page 250.

SYNOPSIS

snapshot take [format=value] [<filename>] [quality=value]

snapshot set [format=value] [quality=value] [maxsize=value]

snapshot get

snapshot list

snapshot delete [<filename>, all]

DESCRIPTION

The snapshot command is used to take and manage snapshots from your video input. You can save the snapshots in either .jpg or .yuv format, and for .jpg you can also specify the image quality.

When taking a snapshot of the current video input, the file name is optional. If none is specified, a unique name will be generated based on the current time if NTP is enabled, or a simple index such as snap-1.jpg if NTP is not enabled.

You can specify different formats and quality per snapshot in the snapshot take command. You can also set system-wide defaults for the preferred snapshot format and quality via the snapshot set command.

ACTIONS

take	Takes a snapshot from the current active video. You can optionally specify the format and image quality per snapshot, as well as the filename.
set	Sets system-wide defaults for the preferred snapshot format and quality.
get	Displays the current format and quality defaults for the snapshot utility.

list   Displays the available snapshots on the system along with the resolution.

Snapshot files are stored under /usr/share/haivision/snapshots.

delete   Deletes either the snapshot specified by <filename> or all snapshots stored under /usr/share/haivision/snapshots.

SNAPSHOT PARAMETER

Parameter	Default	Description/Values
format	jpeg	Specifies the image format: yuv, jpg When saving in jpg format, you can specify the desired image quality. YUV snapshots always have the best possible quality but take the most amount of space.
quality	100	Specifies the desired image quality from 1 (lowest) to 100 (highest). 1..100 NOTE: This setting only applies for jpg snapshots.

SNAPSHOT EXAMPLE

# snapshot take format=jpg filename=mysnapshot.jpg quality=80	Takes a single image snapshot (immediately) in .jpg format at 80% image quality and stores it under the filename mysnapshot.jpg.
# snapshot set format=jpg quality=80	Sets the system-wide defaults for the preferred snapshot format to jpg at 80% image quality.
#snapshot set maxsize=0	An admin user can disable snapshots by setting the maximum size to 0.

# snapshot get	Returns the current system-wide settings for the snapshot format, for example: 	
	
	Current Defaults:
	  Format : JPEG
	  Quality : 100
	  Max Storage : 20,480 KBytes

`# snapshot list`	Lists the contents of the snapshot folder: Snapshot Files (in /usr/share/haivision/snapshots/): snap-1.jpg (1280x720) snap-10.jpg (1280x720) snap-2.jpg (1280x720) snap-3.jpg (1280x720) snap-4.jpg (1280x720) snap-5.jpg (1280x720) snap-6.jpg (1280x720) snap-7.jpg (1280x720) snap-8.yuv (1280x720) snap-9.jpg (1280x720) 10 snapshot files are available.

Disabling Snapshots

The Snapshot capability can be disabled to prevent captured content from being stored on the Makito. Disabling Snapshots is typically done at factory staging when the feature request is part of the P.O. Any Snapshot related functionality (such as Web Interface buttons or CLI command options) is greyed-out, made unavailable, or removed when Snapshots are disabled. The functionality will remain disabled after a firmware upgrade, factory reset, power cycle, or reboot.

Makito Air systems are shipped with Snapshots disabled by default.

Snapshots can only be disabled by an `admin` user from the CLI, by setting the maximum size to `0`. Users are prevented from re-enabling Snapshots for security reasons.

SEE ALSO

- Image Snapshot Capture on page 113

still

SYNOPSIS

still list

still delete <filename>

DESCRIPTION

The still command is used to manage available still image files on the Makito file system.

Static image files must already have been converted into files containing encoded single H.264 GOP sequences and be located the folder /usr/share/haivision/still_images on the Makito file system.

Static images may be used to replace the "real" video stream when streaming is paused. You can then configure a Makito stream with a static image using the stream set command with the parameter [stillimage=fname].

NOTE You can convert the image file either using the mkstill command, or from the Web interface (MEDIA SETTINGS page, see "Still Image Streaming" on page 112).

ACTIONS

list	Lists the available still image files in /usr/share/haivision/still_images
delete	Deletes a still image file

STILL EXAMPLE

# still delete myimage.mp4	Deletes the image file myimage.mp4

SEE ALSO

- mkstill on page 228
- stillimage on page 256
- Still Image Streaming on page 112
- Selective Video Mute on page 102

stream

SYNOPSIS

stream create addr=ipaddr port=udpport [id=number] [name=text]
    [rtcp=on [rtcpport=udpport]] [ttl=64] [tos=0xB8] [mtu=1496]
    [encapsulation=ts-rtp | ts-udp | direct-rtp | rtmp | qt] [start=yes]
    [videosrc=id/name] [audiosrc=id/name] [datasrc=id/name]
    [videopid=pid] [audiopid=pid] [datapid=pid]
    [pcrpid=pid] [pmtpid=pid]
    [program=num] [tsid=id]
    [stillimage=fname]
    [shaping=yes,no [ceiling=percentage] [idlecells=yes,no]]
    [datacarriage=sync]
    [publish=streampubname] [username=uname] [password=pwd]
    [fec=yes,no]
stream id/name start
stream id/name stop
stream id/name pause
stream id/name resume
stream id/name delete
stream id/name/all get
stream id/name clear

DESCRIPTION

The stream command is used to manage audio/video streams.

ACTIONS

create	Creates a streaming session from the encoder.
	A series of one or more parameter=value pairs can be specified at once.
start	Starts the specified stream ID or name.
	NOTE: By default, a stream will start immediately since start=yes by default. To delay the start of a stream, include the parameter start=no.
stop	Stops the specified stream ID or name.

pause	Pauses the specified stream ID or name. See "Selective Video Mute" on page 102.
	NOTE: If configured, a still image will be streamed instead of the configured video source. See "stillimage" on page 256.
resume	Resumes the specified stream ID or name.
delete	Deletes the specified stream ID or name.
get	Gets stream status information. See stream Parameters below.
	You can specify a stream or all streams.
clear	Clears all active sessions on the encoder.
help	Displays usage information for the stream command.

STREAM PARAMETERS

Parameter	Default	Description/Values
addr	n/a	The destination IP address. Enter an IP address in dotted-decimal format.
		For multicast addresses, see IMPORTANT on page 257.
port	n/a	The destination UDP port. Enter a number in the range 1025..65,535. Note that RTP streams use *even numbers only* within this range.
Optional stream Parameters		
id	n/a	A unique number assigned to the stream.
		NOTE: When creating a stream, you can specify a unique id to assign to it or let the system assign one (a sequential number) for you.
		Most commands will accept the stream id or name (see below) in order select the proper stream to manage.
name	n/a	(Optional) When creating a stream, you can also specify a name for the stream. 1 to 32 characters

Parameter	Default	Description/Values (Continued)
rtcp	on	(Optional) When rtcp is On, the stream is activated in RTCP mode. This causes the system to establish one RTP stream and one RTCP session for monitoring purposes. RTP/RTCP is useful to collect network metrics such as network jitter, packet loss, etc. Note that this requires a remote decoder capable of supporting this feature as well.
rtcpport	n/a	(Optional, rtcp must be On) The destination UDP port for the RTCP session.
ttl	16	(Optional) Time to Live. The number of router hops that IP packets from this stream are allowed to traverse before being discarded. 1..255
tos	0xB8	(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 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.
mtu	1496	(Maximum Transmission Unit) Specifies the maximum allowed size of IP packets for the outgoing RTP data stream. 228..1500
encapsulation	ts-udp	(Optional) The Encapsulation Type for the encoded stream.
		• ts-rtp - MPEG2 transport stream over RTP
		• ts-udp - MPEG2 transport stream over UDP (no RTP header)
		• direct-rtp - RFC3984
		• rtmp - Streams to a Flash Media Server or Content Delivery Network (see "CDN and Flash Interoperability (RTMP)" on page 103).
		• qt - QuickTime (see "QuickTime SDP and Interoperability" on page 105).

Parameter	Default	Description/Values (Continued)
start	yes	(Optional) By default, the stream will start immediately. To delay the start of a stream, specify start=no. You can enter a stream start command later.
videosrc	0*	(Optional) The video source. id/name The id is either 0 or 1 (corresponding to "High" and "Low" in the Web interface, see "HiLo Video Streaming" on page 72). NOTE: *By default, if you don't specify the source, the stream will use video encoder 0 and audio encoder 0 for a TS stream (UDP or RTP), and video encoder 0 for DirectRTP and other encapsulations. Once you specify an audio or video source, you have to enter all of them explicitly. For example, even though a TS stream with no sources specified will automatically use video 0 and audio 0, if you specify that video 0 is your source, then you must enter the audio source or else the stream will not have any audio in it. TIP: Combined videosrc/audiosrc/datasrc status shown under Contents in return output.
audiosrc	0*	(Optional) The audio source. id/name The id is either 0 or 1 (corresponding to "High" and "Low" in the Web interface, see "HiLo Audio Streaming" on page 81). See also NOTE: and TIP: above.
datasrc	n/a	(Optional) The data (metadata) source. id/name (0=serial, 01=SDI, 2..=UDP) See "metadata" on page 222.
videopid	33	(Optional) Video Packet Identifier. 16..8190
audiopid	36	(Optional) Audio Packet Identifier. 16..8190
datapid	40	(Optional) Data (metadata) Packet Identifier. 16..8190
pcrpid	34	(Optional) (Program Clock Reference) Packet Identifier. Timestamp in the TS from which the decoder timing is derived. 16..8190
pmtpid	32	(Optional) (Program Map Table) Packet Identifier. 16..8190

Parameter	Default	Description/Values (Continued)
program	1	(Optional) Program Identifier used in the Program Map Table (PMT) of the TS stream. 0..65535
tsid	0	(Optional) Transport Stream ID. Identifies the transport stream in the Program Association table (PAT) of the TS stream. 0..65535
stillimage	n/a	(Optional) Specifies the filename of a static image that will replace the "real" video stream when streaming is paused. NOTE: The static image file must already have been converted into a file containing an encoded single H.264 GOP sequence. You can either use the mkstill command, or the Web interface MEDIA SETTINGS page (see "Still Image Streaming" on page 112).
shaping	no	(Optional) To enable Traffic Shaping for the stream, specify shaping=yes. 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 will create audio/video artifacts.
ceiling	n/a	(Optional, shaping must be yes) 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. 5..100%, default = 15 NOTE: To configure the ceiling percentage for CBR streams with metadata, see "Ceiling Percentage for CBR Streams with Metadata" on page 102.
idlecells	no	(Optional, shaping must be yes) When enabled, Idle TS cells will be inserted into a TS stream when necessary. yes,no

Parameter	Default	Description/Values (Continued)
datacarriage	sync	Specifies the method of KLV data carriage: • `sync`: synchronous metadata AU (ISO/IEC 13818-1) • `async`: asynchronous private data (SMPTE RP 217) • `async-syncau`: asynchronous private data carrying sync metadata AU See "Data Carriage" on page 98.
publish	n/a	(Optional when streaming to a CDN using RTMP) Enter a Publish Name. NOTE: A single Publish Name may be assigned to multiple streams, configured on separate servers or content distribution services, to provide redundancy and fail-over capability. The encoder will send multiple RTMP streams to different FMS servers using the same published name. If an FMS fails, the players will have the option of fail-over to the redundant FMS server.
username	n/a	(Required when streaming to a CDN using RTMP) Enter the CDN login username.
password	n/a	(Required when streaming to a CDN using RTMP) Enter the CDN login password.
fec		To enable Forward Error Correction (FEC), specify `fec=yes`.

🛑 IMPORTANT   For encoding and streaming limits, please see "Configuring Stream Settings" on page 93.

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 should not be used by streaming sessions. We recommend that you use a multicast address from the Organization-Local scope (239.192.0.0/14).

STREAM EXAMPLES

# stream create addr=192.0.2.106 port=2000 start=yes	Creates a streaming session to IP Address 192.0.2.106 at port 2000; starts streaming immediately.
# stream create addr=192.0.2.235 port=1234 stillimage=haivision.mp4	Creates and starts a streaming session. Specifies a static image to replace the "real" video stream when streaming is paused. Returns the following confirmation and stream ID: Stream created successfully - ID : 3
# stream 3 pause	Pauses the stream created above, which activates the still image.
# stream 3 resume	Resumes the stream created above.
# stream create addr=192.0.2.235 port=1234 vid=0 aud=0 # videnc 1 start # audenc 1 start # stream create addr=198.51.100.106 port=1234 vid=1 aud=1	Creates two "HiLo" streams, the first using the High Video and Audio encoder, and the 2nd using the Low Video and Audio encoder. TIP: The videnc and audenc commands are required to activate the Low Video and Audio encoder because the High encoders are activated by default.

# stream 1 get all	Returns configuration information and statistics for all encoder streams, for example:
	Stream ID : 1 Name : "web1" Configuration : 　Address : 192.0.2.235 　UDP Port : 1234 　Encapsulation : TS-RTP 　Contents : Video ("HD Video Encoder 0" :0), 　　Audio ("Audio Encoder 0" :0) 　Still Image File : (None) 　Video PID : 33 　Audio PID : 36 　PCR PID : 34 　PMT PID : 32 　Transport Stream ID : 0 　Program Number : 1 　MTU : 1500 　TOS : 0xB8 　TTL : 18 　Bandwidth : 6,510 kbps 　Traffic Shaping : Off 　AES Encryption : On 　FEC : On 　Persistent : No Statistics : 　State : STREAMING 　Up Time : 1h16m8s 　Sent Packets : 1,040,512 　Sent Bytes : 1,252,450,560 　Bitrate : 198 kbps
# stream 2 show stats	Returns status information for Stream #2, such as: Session ID : 2 　Name : "web1" 　Statistics: 　State : STREAMING 　Up Time : 10m50s 　SSRC : 0x94328a6a (2486340202) 　Sent Packets : 413,274 　Sent Bytes : 417,249,304 　Unsent Packets : 1,214 　Unsent Bytes : 1,272,100 　Last Error : 11, Resource temporarily 　unavailable Occurred : 6hr44m4s ago RTCP : Off

| # stream 1 del | Deletes Stream #1. |

SEE ALSO

- [Configuring Stream Settings](#) on page 93
- [Configuring the RTSP Server](#) on page 107

system_snapshot.sh

SYNOPSIS

system_snapshot.sh > <filename>

where:

filename   is the name of the file to store the system snapshot.

DESCRIPTION

The system_snapshot.sh command is used take a system snapshot for the purpose of troubleshooting and may be forwarded to Haivision Technical Support if you are requesting technical support.

The system snapshot lists information such as component versions, network settings, loaded modules, running processes, system traces, configured streams and stream status checks, configured video encoders and status checks, configured audio encoders and status checks, startup config file contents, global settings file contents, debug logging settings file contents, downloaded software packages, last software update log, and OS statistics.

SEE ALSO

- <u>Taking a System Snapshot</u> on page 134

talkback

SYNOPSIS

talkback start
talkback stop
talkback set
talkback get
talkback clear

DESCRIPTION

The talkback command is used to manage audio talkback settings. The audio talkback feature allows two-way audio communication using the Makito encoder's audio output to function like an audio decoder.

The talkback is sent by a software player application (such as Haivision's InStream) to the Makito, where it is played out of the encoder's 8-pin terminal block connector. See "Audio Interface" on page 25.

The talkback application receives the 16-bit audio (mono) at 22.05 kHz rate, packetizes it to 440 16-bit samples (the last 4 bytes are reserved), and transmits them to Makito UDP port 9177.

NOTE   The source UDP port of sender does not matter; however, the destination has to match what is configured on the encoder (9177 by default).

There is no audio mixer on the Makito, so the encoder handles the talkback sessions on a first-come first-serve basis. To prevent a single user from monopolizing the Makito talk-back, the software player application must provide "push-to-talk" functionality, which requires that the talkback user physically push and hold a button (for example by pressing the mouse button). When the button is released, the talkback application stops sending audio. The Makito considers the session terminated if it does not receive a packet for a duration of one second (i.e., after at least one second of inactivity). The Makito is then ready to accept the session (talk-back packets) from another device.

Talkback audio is configured and controlled using CLI commands only. It is not configurable through the Web interface, or SNMP in the current release.

ACTIONS

start	Starts reception of talkback audio
stop	Stops reception of talkback audio

set	Configures talkback settings
get	Displays talkback information (i.e., volume and UDP port). You can specify configuration, stats, or all talkback information.
clear	Clears talkback statistics

TALKBACK PARAMETER

Parameter	Default	Description/Values
volume	10	Controls the volume on the Encoder's audio output port. 0..10

TALKBACK EXAMPLE

# talkback start	Starts reception of audio talkback on the Makito.
# talkback set volume=6	Sets the volume of the audio talkback to 6.

# talkback get	Returns audio talkback configuration, such as: 	
	  Volume : 10
	  UDP Port : 9177
	TIP: To view audio talkback statistics relevant when troubleshooting, enter:
	# talkback get all

SEE ALSO

- Audio Talkback on page 29
- Setting up Audio Talkback on page 296

temperature

SYNOPSIS

temperature get

DESCRIPTION

The temperature command is used to display the current temperature of the unit.

ACTIONS

get   Displays the current temperature status of the unit.

EXAMPLE

# temperature get	Displays the current temperature for the unit, see example below:

	Temperature Status:
	    Current Temperature : 35 Celsius measured 2s ago
	    Maximum Temperature : 36 Celsius measured
	        5d2h9m2s ago
	    Minimum Temperature : 32 Celsius measured
	        5d5h34m2s ago

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tzconfig

SYNOPSIS

tzconfig

DESCRIPTION

The tzconfig command is used to configure the timezone on the encoder. tzconfig displays the current timezone and prompts you to change the timezone (Y,N).

To change the timezone, type Y and follow the prompts for information about the current location. When you have completed your selections, the encoder saves the newly configured time zone information

TZCONFIG EXAMPLE

# tzconfig	Please identify a location so that time zone rules can be set correctly. Please select a continent or ocean. 1) Africa 2) Americas 3) Antarctica ... $? 2 Please select a country. 1) Antigua & Barbuda 2) Anguilla 3) Netherlands Antilles 4) Argentina 5) Aruba 6) Barbados 7) Bolivia 8) Brazil 9) Bahamas 10) Belize 11) Canada 12) Chile ... $? 11 Please select one of the following time zone regions 1) St_Johns 2) Halifax 3) Glace_Bay 4) Goose_Bay 5) Montreal 6) Toronto ... $? 5

SEE ALSO

- date on page 209
- dtconfig on page 210

videnc

SYNOPSIS

videnc ID start

videnc ID stop

videnc ID set parameter=value [parameter=value ...]

videnc ID get [config, stats, all]

videnc ID clear

videnc ID reset

DESCRIPTION

The videnc command is used to manage video encoding parameters. The videnc start and videnc stop commands can be used to start and stop encoding of the video input.

ID is either the Encoder ID (0 or 1) or all. (Note that 0 corresponds to "High" and 1 corresponds to the "Low" stream. See "HiLo Video Streaming" on page 72.) By default, the High Video encoder is activated.

ACTIONS

start	Activates encoding of the video input.
	For HiLo video streaming (i.e., to send "High" and "Low" bitrate streams to two different destinations), you need to manually start the Low video encoder (videnc 1 start) because it is disabled by default.
stop	Stops (mutes) encoding of the video input.
set	Modifies encoder video parameter(s).
	A series of one or more parameter=value pairs can be specified at once. See videnc Parameters below.
get	Displays encoder video status information.
	You can specify to display the configuration (config), stats, or all.
clear	Clears the encoder's statistics.
reset	Resets the encoder.
help	Displays usage information for the videnc command.

VIDENC PARAMETERS

Parameter	Default	Description/Values
input	SDI	The type of video input for the encoder:
Makito	Component	• Component/RGB (Analog) • HDMI/DVI (Digital)
Makito-SDI	BNC (SDI)	• SDI • Composite • SVideo
format Makito only	Auto	The input format of the signal to be encoded. Auto-detect is sufficient for most resolutions. • Auto • 1080p 1920x1080p60 • 1080p59 1920x1080p59 • 1080p50 1920x1080p50 • 1080p30 1920x1080p30 • 1080p29 1920x1080p29 • 1080p24 1920x1080p24 • 1080i 1920x1080i30 • 1080i29 1920x1080i29 • 1080i25 1920x1080i25 • 1080i24 1920x1080i24 • 720p 1280x720p60 • 720p59 1280x720p59 • 720p50 1280x720p50 • NTSC 720x480i30 • 480i29 720x480i29 • 480p 720x480p60 • 480p59 720x480p59 • PAL 720x576i25 • 576p 720x576p50 NOTE: 1080p video inputs not supported on #S/B-290E-DVI-M or #S/B-290E-SDI-M.

Parameter	Default	Description/Values (Continued)
		• SXGA+ 1400x1050p60 • SXGA 1280x1024p85 • SXGA60 1280x1024p60 • WXGA 1280x768p85 • WXGA75 1280x768p75 • WXGA60 1280x768p60 • XGA 1024x768p85 • XGA75 1024x768p75 • XGA60 1024x768p60 NOTE: Computer resolution inputs of 1400x1050p and 1280x1024p not supported on #S/B-290E-DVI-M or #S/B-290E-SDI-M.
colorspace Makito only		The color space to use while capturing the content. Matching the encoder input color space to the source enhances and optimizes color reproduction. This is useful with source formats such as graphics cards outputting HDTV resolutions. • Auto: The encoder determines the appropriate color space to use • YCbCr: Forces the encoder to use Y,Cb,Cr • RGBFull: Forces the encoder to use RGB Full Range [0..255] • RGBLimited: Forces the encoder to use RGB Limited Range [16..235]

Parameter	Default	Description/Values (Continued)
timecode	None	Timecodes are used to mark video frames, mainly for editing purposes. This parameter either disables timecoding, or selects the source to "timecode" the encoded video frame. • None: No time code will be inserted in the video stream (saves bandwidth if not required). • Video: Timecode will be extracted from the Vertical Interval TimeCode of the incoming video signal. VITC applies only to TV resolutions (i.e., not graphic resolutions). • System: If no timecode is included in the video feed, the encoded timecode is based on the encoder's system clock. In this case, it is a good idea to enable NTP (see "ipconfig" on page 214). This applies to both TV resolutions and graphic resolutions. NOTE: See "TimeCode Source" on page 78 and "TimeCode Stats" on page 80 for currently supported TimeCode features.
aspectratio Standard Definition only	Auto	Specifies the aspect ratio of the video source and signals it into the MPEG stream: • Auto: Aspect ratio is derived from the incoming video source resolution. • 4:3: Aspect ratio is forced to 4:3. • 16:9: Aspect ratio is forced to 16:9. • WSS/AFD: Aspect ratio is extracted from the incoming video source based on WSS (Wide Screen Signaling) or AFD (Active Format Description) if detected. NOTE: WSS is only supported with analog PAL video; AFD is only supported with SD-SDI video.
bitrate	6000 kbps	The Video Raw Elementary Stream bitrate (kbps): • HD: 150..15000 • SD: 150..8000
gopsize	120	The Group of Pictures size for the encoded video. 1..1000

Parameter	Default	Description/Values (Continued)
picrate	Auto	The video frame rate per second: • Auto: Encodes at the same frame rate as the input • 1..85 (Makito #B-290E-DVI) • 1..60 (Makito-SDI #B-290E-HDSDI)
closedcaption	Off	This parameter enables Closed Captioning on the encoder stream. Off, On NOTE: For more information, see "Closed Captioning" on page 291.
ptsoffset	50 ms.	Offset video timestamps by this value in ms. -1000..1000
profile		The name of the video quality Profile to use with this encoder. NOTE: For information on the available Profiles, see "profile" on page 242.
resolution	n/a	The stream output resolution. Specifies the number of lines per frame and pixels per line to be encoded. Options depend on the Input Format detected. • Auto (output resolution is the same as the input)
HD	n/a	• 1080p, 1920x1080p (only works if input is 1080p) • 1080i, 1920x1080i (only works if input is 1080i) • 1440x1080p (only works if input is 1080p) • 1440x1080i (only works if input is 1080i) • 960x1080p (only works if input is 1080p) • 960x1080i (only works if input is 1080p) • 720p, 1280x720 (only works if input is 1080p or 720p) • 960x720 (only works if input is 720p) • 640x720 (only works if input is 720p) NOTE: 1080p video inputs not supported on #S/B-290E-DVI-M or #S/B-290E-SDI-M.

Parameter	Default	Description/Values (Continued)
SD	n/a	• 480p, 720x480p (only works if input is 1080p, 720p, 480p, 480i, WXGA, XGA, SVGA or VGA) • 480i, 720x480i (only works if input is 1080i, 480i) • 576p, 720x576p (only works if input is 1080p, 720p, 576p or 576i) • 576i, 720x576i (only works if input is 1080i or 576i) • 540x480p (only works if input is 480p or 480i) • 540x480i (only works if input is 480i) • 540x576p (only works if input is 576p or 576i) • 540x576i (only works if input is 576i) • 352x480p (only works if input is 480p or 480i) • 352x480i (only works if input is 480i) • 352x576p (only works if input is 576p or 576i) • 352x576i (only works if input is 576i) • 352x288p (only works if input is 480p,480i, 576p, 576i, WXGA, XGA, SVGA or VGA) • 352x288i (only works if input is 480i or 576i)
RGB	n/a	• SXGA+, 1400x1050p60 • SXGA, 1280x1024 (only works if input is SXGA) • WXGA, 1280x768 (only works if input is SXGA or WXGA) • XGA, 1024x768 (only works if input is WXGA or XGA) • SVGA, 800x600 (only works if input is WXGA, XGA or SVGA) • VGA, 640x480 (only works if input is WXGA, XGA, SVGA or VGA) NOTE: Computer resolution inputs of 1400x1050p and 1280x1024p not supported on #S/B-290E-DVI-M or #S/B-290E-SDI-M.
		NOTE: See "Video Encoding" on page 277.

VIDENC EXAMPLES

# videnc 0 set gopsize=120	Sets the video GOP size to 120. You will receive the following confirmation: Encoder configured successfully.
# videnc 0 set bitrate=6000	Sets the video bitrate to 6000.
# videnc 0 set bitrate=6000 gopsize=120 resolution= 1280x720 Input= SDI	Combines multiple video parameters in a single line.

# videnc 0 get	Returns video configuration information for the encoder: 	
	Encoder ID : 0
	Name : "HD Video Encoder 0"
	Configuration:
	  Video Input : SDI
	  Video Bitrate : 6000 kbps
	  Video GOP Size : 30
	  Encoded Picture Rate: 60
	  Output Resolution : Input/Auto
	  Closed Captioning : On
	  PTS Offset : 50 ms

# videnc 0 get stats	Returns encoder statistics: 	
	Encoder ID : 0
	  Name : "HD Video Encoder 0"
	  Statistics:
	  State : WORKING
	  Uptime : 15m22s
	  Input Present : Yes
	  Input Format : 1280x720p60
	  Proected Content : Yes
	  Output Resolution : 1280x720
	  Aspect Radio : 16:9
	  Encoded Frames : 6,748
	  Encoded NALs : 85,189
	  Encoded Bytes : 326,715,604
	  Encoded Bitrate : 5,266 kbps
	  Encoder Errors : 2
	  Encoder Resets : 2
	  Encoder PTS : 0x1708c8ce8
	  Encoder Load : 50%
	  Closed Captioning : Disabled

# videnc videnc 0 set profile= Outdoors	Selects the quality Profile for video encoding.

SEE ALSO

- Configuring Video Settings on page 72

APPENDIX B: Technical Specifications

This appendix lists the technical specifications for the Makito.

Topics In This Appendix

Audio/Video Interfaces

AUDIO/VIDEO INTERFACES		
Video (Input) - Makito #S/B-290E-DVI or #S/B-290E-DVI-M		
	Y,Pb,Pr / RGBHV	Component Analog video
	Y,Cb,Cr / DVI	Component Digital video
Video (Input)- Makito-SDI #S/B-290E-HDSDI or #S/B-290E-SDI-M		
	S-Video NTSC/PAL/PAL-M	
	Composite NTSC/PAL/PAL-M	RS-170A
	SD-SDI SMPTE-259M-C	270 Mbps interface
	HD-SDI SMPTE-292M	1,485 Gbps interface
	SMPTE-274M	1920 x 1080 video format
	SMPTE-296M	1280 x 720 video format
	3G-SDI SMPTE-424M	3 Gbps interface
	SMPTE-425M	1080p 60 video format
Audio (Input)	2 audio channels (analog or digital)	
	Available through Terminal Block connector: • Balanced Stereo Analog Audio • Unbalanced Stereo Analog Audio	
	Digital Embedded Audio • SD-SDI: SMPTE-272M • HD-SDI: SMPTE ST 299-1:2009	

Video Encoding

VIDEO ENCODING – H.264 AVC (MPEG-4 part 10)		
HD-SDI/SDI Input Resolution	1920x1080p	60, 59.94, 50, 30, 29.97, 25, 24, 23.98 Hz
	1920x1080i	60, 59.94, 50 Hz
	1280x720p	60, 59.94, 50 Hz
	720x480/576i	60, 59.94, 50 Hz
	720x480/576p	60, 59.94, 50 Hz
	*Interlaced shown in fields per second.	
	NOTE: 1080p *not* supported on #S/B-290E-DVI-M and #S/B-290E-SDI-M.	
	For supported video and graphic encoding resolutions, see tables on following page.	
DVI Input Resolution / Scan Rate	1400x1050	60
	1280x1024	75, 60
	1280x768	85, 75, 60
	1024x768	85, 75, 60
	800x600p	85, 75, 60
	640x480p	85, 75, 60
	NOTE: 1400x1050p and 1280x1024p *not* supported on #S/B-290E-DVI-M.	
Video Bitrates	HD from 150 kbps to 15 Mbps	
	SD from 150 kbps to 8 Mbps	
Maximum Throughput	50 Mbps video bitrate (without AES and FEC)	
	35 Mbps video bitrate with AES and FEC enabled	
Rate Control	Constant (CBR)	
	*The video encoder will generate a constant number of bits over a period of time.	
Encoding Latency	Less than 70ms	
Compression Standards	ITU H.264 AVC (MPEG-4 part 10) / ISO/IEC 14496-10 • Baseline / Main Profile • Level 4.2 and lower Intermediate Levels • I, IP framing only • Configurable Group of Picture (GOP) size • Configurable frame rate • Deblocking filter	

Supported Video Encoding Resolutions (Makito with DVI)

Table B-1   Makito #S/B-290E-DVI or #S/B-290E-DVI-M Available Video Resolutions

Output Resolutions		Y,Pb,Pr & Y,Cb,Cr TV Input Resolutions /Scan Rates										
		1080p†			1080i		720p		480i	480p	576i	576p
Name	Resolution	60*/30*	50/25	24*	30*	25	60*	50	30*	60*	25	50
HD 1080	1920x1080	High	High	High	High	High	-	-	-	-	-	-
3/4 HD 1080	1440x1080	High	High	High	High	High	-	-	-	-	-	-
1/2 HD 1080	960x1080	All	All	All	All	All	-	-	-	-	-	-
HD 720	1280x720	High	High	High	-	-	High	High	-	-	-	-
3/4 HD 720	960x720	-	-	-	-	-	All	All	-	-	-	-
1/2 HD 720	640x720	-	-	-	-	-	All	All	-	-	-	-
SD 480	720x480	All	-	All	All	-	All	-	All	All	-	-
SD 576	720x576	-	All	All	-	All	-	All	-	-	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	-	-	-	-	-	-	-	All	All	All	All

Legend:

"High" resolutions can only be used for the High bandwidth stream.

Resolutions marked "All" may be used for either High or Low bandwidth streams (see NOTE below).

*Also includes 1/1.001 frame rates such as 23.98, 29.97 and 59.94.

1080p23.98 and 1080p24 resolutions are not supported in Analog Component (Y,Pb,Pr).

Support of 1600x1200 input resolution is not possible.

† Video inputs at 1080p are not supported on the #S/B-290E-DVI-M.

NOTE   When configuring HiLo streaming, make sure the Total Load does not exceed 100%.

For best results, the "Low" encoder stream may be downscaled, but the "High" stream should be encoded at native resolution.

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Supported Graphic Encoding Resolutions (Makito with DVI)

Table B-2   Makito #S/B-290E-DVI or #S/B-290E-DVI-M Graphic Resolutions

Output Resolutions		RGB & RGBHV Computer Graphic Input Resolutions /Scan Rates					
		1400x1050†	1280x1024†	1280x768	1024x768	800x600	640x480
Name	Resolution	60	75/ 60	85/75/60	85/75/60	85/75/60	85/75/60
HD 1080	1920x1080	-	-	-	-	-	-
3/4 HD 1080	1440x1080	-	-	-	-	-	-
1/2 HD 1080	960x1080	-	-	-	-	-	-
HD 720	1280x720	High	High	High	-	-	-
3/4 HD 720	960x720	-	-	-	-	-	-
1/2 HD 720	640x720	-	-	-	-	-	-
SD 480	720x480	All	All	All	All	All	-
SD 576	720x576	All	All	All	All	All	-
4SIF	704x480	-	-	-	-	-	-
4CIF	704x576	-	-	-	-	-	-
3/4 D1 NTSC	540x480	-	-	-	-	-	-
3/4 D1 PAL	540x576	-	-	-	-	-	-
2SIF	704x240	-	-	-	-	-	-
2CIF	704x288	-	-	-	-	-	-
Half-D1 NTSC	352x480	-	-	-	-	-	-
Half-D1 PAL	352x576	-	-	-	-	-	-
SIF	352x240	-	-	-	-	-	-
CIF	352x288	All	-	-	All	All	All
UXGA	1600x1200	-	-	-	-	-	-
WSXGA+	1680x1050	-	-	-	-	-	-
SXGA+	1400x1050	-	-	-	-	-	-
SXGA	1280x1024	-	High	-	-	-	-
	1280x960	-	-	-	-	-	-
	1440x900	-	-	-	-	-	-
WXGA	1280x800	-	-	-	-	-	-
WXGA	1280x768	-	High	High	-	-	-
XGA	1024x768	-	All	All	All	-	-
SVGA	800x600	All	All	All	All	All	-
VGA	640x480	All	All	All	All	All	All

Legend:

† Computer resolution inputs of 1400x1050p and 1280x1024p are not supported on the #S/B-290E-DVI-M.

Supported Video Encoding Resolutions (Makito-SDI)

Table B-3   Makito-SDI #S/B-290E-HDSDI or #S/B-290E-DVI-M Available Video Resolutions

Encoded Output Resolutions		Input Resolutions and Frame Rates								
		1080p†			1080i		720p		480i	576i
Name	Resolution	30*/60*	25/50	23.98/24	30*	25	30*/60*	25/50	30*	25
HD 1080	1920x1080	High	High	High	High	High	-	-	-	-
3/4 HD 1080	1440x1080	High	High	High	High	High	-	-	-	-
1/2 HD 1080	960x1080	All	All	All	All	All	-	-	-	-
HD 720	1280x720	High	High	High	-	-	High	High	-	-
3/4 HD 720	960x720	-	-	-	-	-	All	All	-	-
1/2 HD 720	640x720	-	-	-	-	-	All	All	-	-
SD 480	720x480	All	-	All	All	-	All	-	All	-
SD 576	720x576	-	All	All	-	All	-	All	-	All
3/4 D1 NTSC	540x480	-	-	-	-	-	-	-	All	-
3/4 D1 PAL	540x576	-	-	-	-	-	-	-	-	All
2SIF	704x240	-	-	-	-	-	-	-	-	-
2CIF	704x288	-	-	-	-	-	-	-	-	-
Half-D1 NTSC	352x480	-	-	-	-	-	-	-	All	-
Half-D1 PAL	352x576	-	-	-	-	-	-	-	-	All
SIF	352x240	-	-	-	-	-	-	-	-	-
CIF	352x288	-	-	-	-	-	-	-	All	All

Legend:

"High" resolutions can only be used for the High bandwidth stream.

Resolutions marked "All" may be used for either High or Low bandwidth streams (see NOTE below).

Resolutions marked "-" are not supported.

* also includes 1/1.001 frame rates such as 29.97 and 59.94

† Video inputs at 1080p are not supported on the #S/B-290E-DVI-M.

NOTE   When configuring HiLo streaming, make sure the Total Load does not exceed 100%.

For best results, the "Low" encoder stream may be downscaled, but the "High" stream should be encoded at native resolution.

Audio Encoding

AUDIO ENCODING – MPEG AAC	
Audio Channels	2 per video channel
Audio Bitrates	From 32 to 384 kbps per audio pair
Frequency Response	From 20 Hz to 22 kHz
Sampling Rate	48kHz
Maximum Analog Audio Input Level	+6dBU
Compression Standards	MPEG-2 AAC-LC ISO/IEC 13818-7 MPEG-4 AAC-LC ISO/IEC 14496-3

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 Makito 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 Makito 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 Makito over a relatively error-prone medium (such as wireless), it is up to the 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 System Integrator, there will still be some corrupted KLV data messages (e.g., the 5-byte key preamble is corrupted). The Makito 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 Makito to not recover from potentially corrupted KLV data, the length of a KLV packet shall not exceed 500ms. Beyond this time limit, the Makito 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.

Asynchronous KLV Metadata Support

The Makito supports Asynchronous Key-Length-Value (KLV) metadata stream signaling and AU (Access Unit) transport support (as per MISB 0604.2).

Of the KLV sources that the Makito initially supported, only KLV over SDI is truly synchronous, whereas KLV over UDP, KLV over Serial, and CoT over Serial are inherently asynchronous. In releases previous to Version 2.2.0, all types of KLV were encapsulated only within the Synchronous format, which in some cases, caused problems with older exploitation systems which did not understand the synchronous format.

The Makito allows users to select the encapsulation type to use for each metadata source. This provides increased flexibility with regard to systems inter-working with the Makito.

The available encapsulation types are as follows:

- Synchronous: The Sync format is implemented in compliance with MISB 0604.2 Section 7.2.1 and ISO 13818-1 Section 2.12. Both content type signaling and data transport use the Sync format.

- Asynchronous: The Async format is implemented in compliance with MISB 0604.2 Section 7.2.2. See also SMPTE RP 217. Both content type signaling and data transport use the Async format.

- Asynchronous With Sync AU: The AsyncWithSyncAu format uses the Async PMT and PES header signaling format as per MISB 0604.2 Section 7.2.2 and SMPTE RP 217. However, the PES payload / metadata AU is formatted in the same manner as the Sync option in compliance with ISO 13818-1 Section 2.12.

The default value for the metadata encapsulation is Synchronous.

The encapsulation type may be selected from the Web Interface (STREAMS configuration page), the CLI (stream command), or via SNMP.

Network and Management Interfaces

IP NETWORK INTERFACES	
Networking Protocols	Ethernet 10/100/1000 Base-T, auto-detect, Half/Full-duplex
	IPv4 (Internet Protocol version 4)
	DHCP (Dynamic Host Configuration Protocol)
	IGMPv3 (Internet Group Management Protocol) for IP Multicast
Streaming Protocols	MPEG2 Transport Stream as per ITU-T Rec. H.222.0 | ISO/IEC 13818-1
	Direct RTP - H.264 over RTP (RFC 3984)
	RTP / RTCP (RFC 3550)
	SAP (RFC 2974)
	SDP (RFC 2327)
	RTSP (RFC 2326)
	QuickTime Stream (RFC 3984 video encapsulation and RFC 3640 AAC-LC audio payload)
	RTMP (implemented according to requirements of the FMS/Wowza/CDN based on Adobe RTMP specification)
Connector	RJ45

MANAGEMENT INTERFACES	
Management Protocols	HTTP (Web browser) Command line over Telnet, SSH or RS-232 serial line FTP/TFTP Client/Server SNMP Furnace (VF Pilot)
Physical Interface	RS-232 RJ45 to DB-9 Serial Management Adapter Required (provided with unit)

Chassis Options

Single Blade Appliance

SINGLE BLADE APPLIANCE (#S-290E-DVI/#S-290E-HDSDI/#S-290E-DVI-M/ #S-290E-SDI-M)	
Dimensions (H x W x D)	24mm H x 149mm W x 202 mm D (0.92" x 5.85" x 8.0")
Weight	Approximately 1.13 kg [2.5 lbs.]
Power Requirements	5VDC, 13W (each blade) 100-240VAC 15W external power supply
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

MB6 - 6 Blade Chassis

MB6 - 6 BLADE CHASSIS (F-MB6-XX)	
Dimensions (H x W x D)	19" rack mountable, 1 RU 44.45mm (H) x 438.15mm (W) x 425.25mm (D) (1.75" x 17.25" x 16.75")
Weight	4.54 kg / 10 lbs. (6 slot empty chassis) 230 g / 0.5 lbs. (single encoder blade)
Power Requirements	Single Internal Power Supply: • AC type 90-264VAC 47Hz-63Hz 200 Watt max. • Medical Grade 90-264VAC 47Hz-63Hz 300 Watt max. • DC type 20-36 VDC 200 Watt 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

MB21 - 21 Blade Chassis

MB21 - 21 BLADE CHASSIS (F-280-21DPS)	
Dimensions (H x W x D)	19" rack mountable, 4 RU 178mm (H) x 445mm (W) x 400mm (D) (7.00" x 17.50" x 15.75")
Weight	9 kg / 20 lbs. (2 x PSU empty chassis) 8 kg / 18 lbs. (1 x PSU empty chassis) 230 g / 0.5 lbs. (single encoder blade)
Power Requirements	400W PSU AC Input 115/230 VAC 14/7A 60/50 Hz Supports voltages ranging from 90 – 132V and 180 – 264V AC.
Temperature	0° to 40° C [32° to 104° F] operating -40° to 70° C [-40° to 158° F] non-operating
Relative Humidity	Up to 95% without condensation

Makito Air

Makito Air (S-290E-AIR or S-290E-AIR-COT)	
Dimensions (H x W x D)	41mm H x 143mm W x 216mm D (1.6"H x 5.6"W x 8.5"D)
Weight	1.63 kg / 3.6 lbs.
Power Requirements	28VDC, 17W MIL-STD connector MIL-STD-704
Temperature	Operating: -20° to 50° C Non-operating: -40° to 50° C
Relative Humidity	Up to 95% without condensation

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
	Makito Air: Designed for specific sections of: • RTCA-DO-160F • MIL-STD-810F • MIL-STD-704F • IEC60529:2001-02
Compliance with Environmental Regulations	RoHS2, European Union Directive 2011/65/EU
	RoHS, Marking Control for China, Regulation SJ/T 11364-2006

Closed Captioning

The Makito supports capture, multiplexing and transport of Closed Captioning (CC) and other Line 21 information over Composite and S-Video (with no 7.5 IRE setup on Line 21), as well as HD/SD SDI input interfaces.

Closed Captioning data, as defined by the EIA-608-B standard, includes the following services over Line 21 Fields 1 and 2 of an NTSC analog video signal: CC1, CC2, CC3, CC4, Text1, Text2, Text3, Text4, and XDS (see Figure B-1 below). The Makito encoder supports transport of all these services. [Note that Closed Captioning as specified by EIA-608-B does not exist over PAL.]

Figure B-1   EIA-608-B Line 21 Services
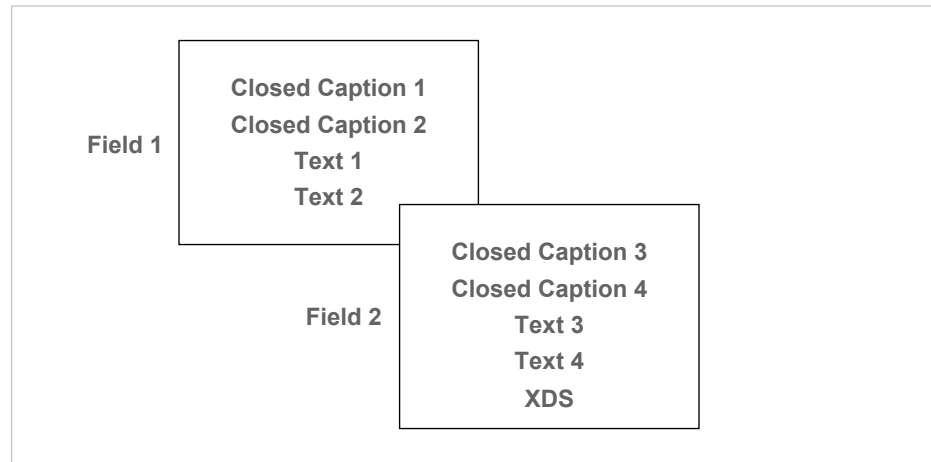
Line 21 of each field can contain up to 2 bytes of information, which can be used by any of the above services (not simultaneously but rather successively). With NTSC video at 30fps, the maximum EIA-608-B mandated throughput represents:

 2 bytes x 2 Fields x 30fps x 8 bit/byte = 960 bps

The block diagram below shows the workflow for video and CC data into the encoder.
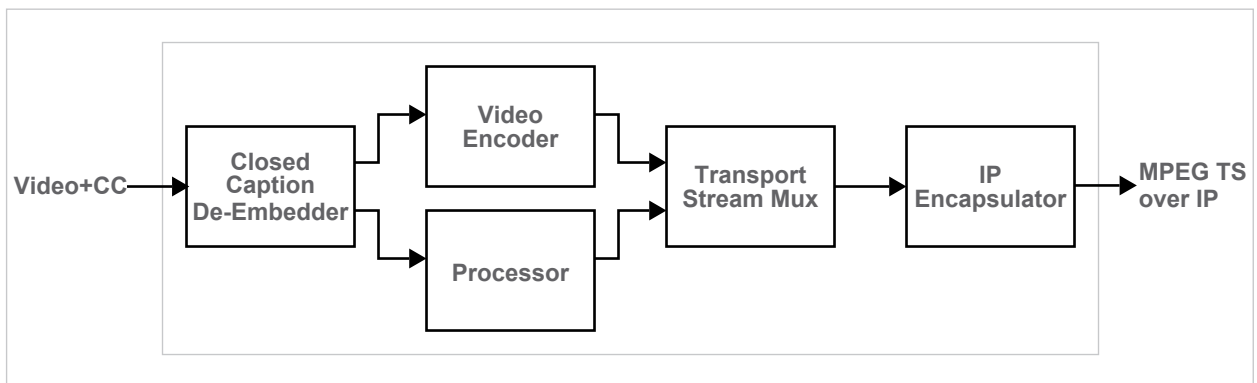
> **NOTE** The extracted CC information from Line 21 is embedded in the MPEG stream as per ATSC A/72 Part 1:2008 (ATSC A/53 Part 4:2007).
>
> Unicast and Multicast streams all carry the same CC data.

As of Version 2.0.0, the Makito Encoder supports the capture of EIA-608 and EIA-708 closed captions from the video input at the HD/SD SDI interface and encodes it in the Makito Transport Stream using the encapsulation format specified in ATSC A/72.

The Makito encoder supports the capture of EIA-608 and EIA-708 captions encapsulated in a Caption Description Packet (CDP), as described in SMPTE-334-2, within the VANC as mentioned in SMPTE 334-1. The Caption information is multiplex and transported as per ATSC A/72 in a CC SEI NAL. The caption services stored in the Caption Service Descriptor (CSD) are announced in the Program Map table (PMT) of the MPEG-2 TS as per ATSC A/65.

> **NOTE** On the Makito, we only support a maximum of three (3) Caption active services at a time plus CC1-4 Text1-4 and XDS.
>
> SMPTE 334-2 defines a Caption Distribution Packet (CDP) consisting of a sequence of bytes that can hold: the CEA-708 DTV caption data, CEA-608 caption data, caption service information, and SMPTE 12M-1 time code. CDP also includes the Caption Service Descriptor (CSD). As defined in ATSC A/65.

With the support of EIA-708, ATSC A/72 mandates a dedicated link bitrate of 9600 bits/sec. (1200 bytes/sec or 20 bytes per frame for a p60 SDI signal). Of the 9600 bits/sec, 960 bits/sec are reserved for EIA-608 captions. 8640 bits/s are dedicated to 708-CC. This is a dedicated channel, so it has to be filled with filler data if no captioning information is present.

Supported resolutions include 1080p, 720p, 1080i, 480i, and 576i.

APPENDIX C: FAQ

This FAQ provides answers to some of the most frequently asked questions relating to setting up and using the Makito.

Topics In This Appendix

General

How do I check the software version?

You can check the software version from either the Web interface or the CLI.

Web: Viewing System Status Information on page 132 (System Status page)

CLI: "haiversion" on page 213 (Appendix A)

How do I find the unit's IP Address?

You can check the unit's IP address from either the Web interface or the CLI.

Web: Network Settings on page 130 (Network Settings page)

CLI: "ipconfig" on page 214 (Appendix A)

However, if you have changed the default IP address and cannot access the unit, follow these procedures.

Makito #B-290E-DVI

If you do not know the IP address, you can reset the unit to its factory defaults (including the original IP address). For more information, see "How do I reset the unit?" (following section).

Makito-SDI #B-290E-HDSDI

If you do not know the IP address, you can connect via the serial management COM1 port. This will allow you to communicate directly from your computer to the encoder using a serial communication application such as HyperTerminal or Minicom. See "Connecting the Encoder to the Network and a Computer" on page 34.

How do I reset the unit?

You can use the Reset micro-switch on the rear panel to perform either a Power Reset or Factory Reset (i.e., reset the unit to its factory defaults, including the original IP address, subnet, and gateway). For more information, see "Resetting the Encoder" on page 54.

How do I set up the Makito to interoperate with QTSS?

The Makito has been tested with QuickTime Streaming Server (QTSS, Darwin Streaming Server, DSS).

You must use the Manual SDP method because the Automatic (Announce) method is not yet supported.

For the steps to manually set up the SDP method, see "QuickTime SDP and Interoperability" on page 105.

What are the Power Supply and Heat Dissipation requirements for the Makito?

- The Makito power supply can support a range from 100 - 240V AC.

- The Makito @ 1080i30 requires 10.7 Watts and heat dissipation of 36.5 BTU.

- The 21-slot chassis can support voltages ranging from 90 - 132V and 180 - 264V AC.

- An unpopulated 21-slot chassis (2 power supplies) requires 53 Watts and heat dissipation of 180 BTU.

Audio/Video

What are the minimum and maximum Video Bitrate values?

- HD: 150..15000 kbps
- SD: 150..8000 kbps

What are the minimum and maximum Audio Bitrate values?

- 32..448 kbps

IP Video Transport

What is RTP Protocol?

The Makito uses the Real-Time Transport Protocol (RTP) as a mechanism for encapsulating the 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-4 AVC TS cells within a UDP-only packet without using the RTP protocol. This mode can be used to interoperate with MPEG-4 AVC devices that do not use RTP.

Setting up Audio Talkback

With the Talkback feature, the Makito encoder can be configured to listen for an uncompressed PCM audio stream and output it via a mono analog audio connector.

Haivision's Furnace v6.x InStream Media Player provides a talkback audio stream to the encoder. For more information, see the Furnace Administration Guide available through Haivision's Download Center.

The following specifications are provided in case customers or system integrators choose to develop their own application to send the audio stream to the encoder.

Following is the specification required to send talkback audio to Haivision encoders:

Talkback Audio Format Specifications

Following is the exact specification required to send talkback audio to Haivision encoders:

1. Audio data in each payload is not compressed and is just PCM digitized audio. There is no encoding/decoding involved.

2. Transmitted over unicast UDP (right now only port # 9177) to the Makito.

3. Audio sampling rate = 22.05 kHz (44.1 divided by 2).

4. Each audio sample is a raw 16-bit PCM (LSB First).

5. Mono audio only.

6. Each UDP packet contains 440 samples.

7. UDP payload is 880 bytes minium. (Anything beyond the 880th byte is discarded.)

8. There is no audio mixing; one audio channel at a time: first in / first served. The talkback application software should be equipped with "push-to-talk" type of feature.

9. If the audio input is disconnected, the application does not need to send filler zero (silence) bytes, because talkback on the Makito inserts zeros (silence) to maintain the output audio clock.

10. Talkback audio is output over the "Audio Out" mono connector on the Makito encoder.

APPENDIX D: Open Source Software Credits

This appendix lists the Open Source software packages used in the Makito 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	2.6.36	GPL	www.kernel.org	Operating system
BusyBox	v1.17.3 (2012-01-30 10:59:14 EST) multi-call binary.	GPLv2	http://www.busybox.net	Copyright (C) 1998-2009 Erik Andersen, Rob Landley, Denys Vlasenko and others.
netsnmp	5.5	Modified BSD	www.net-snmp.org	Free SNMP agent and tools
Iperf	2.0.4	Custom BSD	http://sourceforge.net/projects/iperf	Iperf performance test
Openssh	6.0p1	BSD	http://www.openssh.com	Free version of the SSH connectivity tools
Openssl	1.0.1c fips-2.0	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 http://www.fsf.org/licensing.

Appendix E: Warranty Information

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(c) to damage caused by operating the product outside the permitted or intended uses described by Haivision;

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4.1. Limited Warranty.   Haivision warrants that: [i] the Product will operate substantially in accordance with the Reference Manuals provided and [ii] any media on which the Product is provided will be free of material damage and defects in materials and workmanship under normal use 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 Product to operate substantially in accordance with the Reference Manuals which is not the result of any improper or unauthorized operation of the Product 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 Product 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 Product, engages in any improper or unauthorized operation of the Product, including uses prohibited by the Entitlement or installs or uses the Product on or in connection with any hardware or software not specified in the Entitlement or product data sheets.

4.2. Warranty Disclaimers.   THE EXPRESS WARRANTIES SET FORTH IN SECTION **4.1** ABOVE IN RESPECT TO THE PRODUCT ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, OR STATUTORY, REGARDING THE PRODUCT, OR ITS OPERATION, FUNCTIONALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS (ALL OF WHICH ARE DISCLAIMED). HAIVISION DOES NOT WARRANT THAT ANY OF THE PRODUCT(S) WILL MEET ALL OF YOUR NEEDS OR REQUIREMENTS, OR THAT THE USE OF ANY OF THE PRODUCT(S) WILL BE UNINTERRUPTED OR ERROR-FREE, OR THAT ALL ERRORS WILL BE DETECTED OR CORRECTED.

4.3. Liability Limitation.   IN NO EVENT SHALL HAIVISION OR ITS OFFICERS, EMPLOYEES, AGENTS, REPRESENTATIVES, OR MEMBERS, NOR ANYONE ELSE WHO HAS BEEN INVOLVED IN THE CREATION, PRODUCTION OR DELIVERY OF THE PRODUCT, BE LIABLE

TO YOU, YOUR CUSTOMERS OR TO ANY OTHER THIRD PARTY FOR CONSEQUENTIAL, INDIRECT, INCIDENTAL, PUNITIVE OR SPECIAL DAMAGES, LOST PROFITS, LOSS OF USE, INTERRUPTION OF BUSINESS OR FOR ANY DAMAGES FOR ANY BREACH OF THE TERMS OF THIS AGREEMENT OR FOR LOST OR CORRUPTED DATA ARISING FROM ANY CLAIM OR ACTION HEREUNDER, BASED ON CONTRACT, TORT OR OTHER LEGAL THEORY (INCLUDING NEGLIGENCE)AND WHETHER OR NOT SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. HAIVISION SHALL NOT BE LIABLE FOR DAMAGES FOR ANY CAUSE WHATSOEVER IN AN AMOUNT IN EXCESS OF THE FEE PAID TO HAIVISION BY YOU FOR THE RELEVANT PRODUCT.

5. INDEMNIFICATION

5.1. Indemnification by Haivision.

(a) Haivision shall indemnify and hold You harmless against any and all actions, claims, losses, damages, liabilities, awards, costs and expenses (including reasonable attorneys' fees) ("Claims") arising out of (i) any accusation or purported violation of any third person's US and Canadian copyright, trademark, patent rights or trade secrets, proprietary information on account of Your use of the Product when used in accordance with the terms of this Agreement, or (ii) relating to or arising out of any negligence or willful misconduct on the part of Haivision or any breach by Haivision of the terms of this Agreement or any Maintenance and Support Agreement, or applicable law. You shall promptly notify Haivision in writing of any such Claim and promptly tender the control of the defense and settlement of any such Claim to Haivision. Haivision shall thereafter undertake the defense of any such Claim using counsel of its choice. You shall cooperate with Haivision, in defending or settling such Claim at the expense of Haivision; provided that Haivision shall not settle any Claim against You which would require the payment of money by You without the prior written consent of You, which consent shall not be unreasonably withheld. You shall have the right to consult and provide input into the defense with counsel of its choice at its own expense. Haivision shall not reimburse You for any expenses incurred by You without the prior written approval of Haivision, which approval shall not be unreasonably withheld.

(b) If any Product is, or in the opinion of Haivision may become, the subject of any Claim for infringement, then Haivision may, or if it is adjudicatively determined that any of the Product infringes in the manner described above (except to the extent that any translation, modification, addition or deletion or combination by You is the sole source of such Claim), then Haivision shall, at its option, either (i) procure for You the right to continue use of the Product for the term hereof, (ii) replace or modify the Product with other suitable and reasonably equivalent products so that the Product becomes non-infringing, or (iii) terminate this Agreement and refund to You a portion of the fee paid for the relevant Product.

(c) Haivision shall have no liability for: (i) the use of other than the then current release of the Product; (ii) the use of the Product other than as set forth in its accompanying documentation and as permitted herein; (iii) the modification of any of the Product by any party other than Haivision; or (iv) any infringement arising from the use of any Product by You after Haivision has issued a written notice to You requiring You to cease using such Product when Haivision exercises its option to terminate the License pursuant to Section 3.2 (collectively, "Exclusions"). SECTION 5.1 STATES HAIVISION'S ENTIRE OBLIGATION WITH RESPECT TO ANY CLAIM REGARDING THE INTELLECTUAL PROPERTY RIGHTS OF ANY THIRD PARTY.

5.2. Indemnification by You. You shall indemnify and hold Haivision harmless against any and all Claims directly or indirectly arising out of, or in any manner whatsoever associated or connected with Your performance, purported performance or non-performance of your rights and obligations under this Agreement, and against any and all Claims incurred by or on behalf of any of the foregoing in the investigation or defense of any and all such Claims.

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6. OTHER PROVISIONS

6.1. Export and Other Restrictions.   This Agreement, and all Your rights and Your obligations under this Agreement, are subject to all applicable Canadian and U.S. Government laws and regulations relating to exports including, but not limited to, the U.S. Department of Commerce Export Administration Act and its associated Regulations and all administrative acts of the U.S. Government thereunder. In the event the Product or the Hardware is exported from the United States or re-exported from a foreign destination, You shall ensure that the distribution and export/re-export of the Product or the Hardware is in compliance with all laws, regulations, orders, or other restrictions of the U.S. Export Administration Act and its associated Regulations. You agree that neither you nor any of your Affiliates will export/re-export any Product, any hardware on which the Product is loaded or embedded, technical data, process, or service, directly or indirectly, to any country for which the Canadian government or United States government (or any agency thereof) requires an export license, other governmental approval, or letter of assurance, without first obtaining such license, approval or letter.

6.2. Content.   Your data and/or your use of the Product may not: [i] interfere in any manner with the functionality or proper working of the Product; [ii] stream any material that is copyrighted, protected by trade secret or otherwise subject to third party proprietary rights, including privacy and publicity rights, unless You are the owner of such rights or have permissions from the rightful owner to post the material; [iii] constitute, promote, facilitate or permit any illegal activities, including without limitation, activities that might be libelous or defamatory, invasive of privacy or publicity rights, abusive or otherwise malicious or harmful to any person or entity; [iv] distribute, share or facilitate unauthorized data, malware, viruses, Trojan horses, spyware, worms or other malicious or harmful distributions; or [v] otherwise violate, misappropriate or infringe the intellectual property, privacy, publicity, contractual or other proprietary rights of any third party.

6.3. Consent to Use Data.   You agree that Haivision may collect and use technical data and related information, including but not limited to technical information about Your device, system and application software and peripherals, that is gathered periodically to facilitate the provision of software updates, product support and other services to You (if any) related to the Product. Haivision may use this information, as long as it is in a form that does not personally identify You, to improve its products or to provide services or technologies to You.

6.4. Transfer and Assignment.   Haivision may assign, sublicense, or transfer this Agreement and/or any or all of its rights or obligations hereunder. You may not assign, transfer or delegate any of its rights or obligations hereunder (whether by operation of law or otherwise) without the prior written consent of Haivision. For purposes of the preceding sentence, and without limiting its generality, any merger, consolidation or reorganization involving You (regardless of whether You are a surviving or disappearing entity) will be deemed to be a transfer of rights, obligations or performance under this Agreement for which Haivision's prior written consent is not required. Any unauthorized assignment, transfer or delegation by You shall be null and void. This Agreement is binding upon and inures to the benefit of the parties hereto and their respective permitted successors and assigns.

6.5. Waiver and Amendment.   No modification, amendment or waiver of any provision of this Agreement shall be effective, unless in writing signed by both parties. 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 additional legal terms and conditions submitted by You in any other documents, including but not limited to the Entitlement, shall be of no legal force or effect.

6.6. Enforcement by Third Party.   For any Product 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.

6.7. Third Party Content.   Haivision is not responsible for examining or evaluating the data, accuracy, completeness, timeliness, validity, copyright compliance, legality, decency, quality or any other aspect of any Third Party Content. Haivision does not warrant or endorse and does not assume and will not have any liability or responsibility to You or any other person for any Third Party content. You agree that any Third Party Content may contain proprietary information and material that is protected by applicable intellectual property and other laws, including but not limited to copyright, and that you will not use such proprietary content, information or materials in any way whatsoever except for permitted uses of the Third Party Content.

6.8. Third Party Royalties.   Your further reuse, retransmission, rebroadcast, display or other distribution of your Third Party Content using the Product may require that you obtain a license from and / or pay royalties to the owners of certain third party audio and video formats. You are solely responsible for obtaining such licenses and paying such royalties.

6.9. Governing Law/Submission to Jurisdiction.   This Agreement shall be governed by and construed in accordance with the laws of the Province of Québec, Canada and the Laws of Canada applicable therein (excluding any conflict of laws rule or principle, foreign or domestic), exclusive of the U.N. Convention on the International Sale of Goods. You hereby consent to the jurisdiction of any provincial or federal court located within the Province of Quebec and waive any objection which You may have based on improper venue or forum non conveniens to the conduct of any proceeding in any such court.

6.10. 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.

6.11. 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.

6.12. Entire Agreement.   This Agreement, together with the Entitlement and all other documents that are incorporated by reference herein, constitutes the sole and entire agreement between Haivision and You with respect to the subject matter contained herein, and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to such subject matter.

6.13. Language.   The parties confirm that it is their wish that this Agreement, together with the Entitlement and any other documents relating hereto, have been and shall be drawn up in the English language only. Les parties conferment que c'est leur volonte expresse que ce contrat et tous documents y etant relative, y compris les bons de commande, le avis, le anneses, les autorisations, les pieces jointes et les amendments solent rediges en langue anglais seulement.

6.14. Headings Not Controlling.   The headings used in this Agreement are for reference purposes only and shall not be deemed a part of this Agreement.

6.15. US Government Rights.   Some Products are commercial computer software, as such, term is defined in 48 C.F.R. §2.101. Accordingly, if You, as the Licensee, is the US Government or any contractor therefor, You shall receive only those rights with respect to the Product and Reference Materials as are granted to all other end users under license, in accordance with:

(a)   48 C.F.R. §227.7201 through 48 C.F.R. §227.7204, with respect to the Department of Defense and their contractors; or

(b)   48 C.F.R. §12.212, with respect to all other US Government licensees and their contractors.

6.16. Notices.   All notices, requests, consents, claims, demands, waivers and other communications hereunder shall be in writing and shall be deemed to have been given:

(a)   When delivered by hand (with written confirmation of receipt);

(b)   When received by the addressee if sent by a nationally recognized overnight courier (receipt requested);

(c)   On the date sent by facsimile (with confirmation of transmission) if sent during normal business hours of the recipient, and on the next business day if sent after normal business hours of the recipient; or

(d)   On the third day after the date mailed, by certified or registered mail, return receipt requested, postage prepaid. Such communications must be sent to the respective parties at the addresses set forth on the Entitlement (or to such other address as may be designated by a party from time to time in accordance with this Section **6.16**.

If you have questions, please contact Haivision Systems Inc., at 4445 Garand, Montréal, Québec, H4R 2H9 Canada or legal@haivision.com.

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