Haivision
NETWORK VIDEO

Makito™

Compact HD H.264 Video Encoder

User's Guide Version 2.0.0

HVS-07MAK-UG01-200
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Intelligent IP Video

Copyright

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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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About This Guide

Welcome to the user's guide for the Makito™ Compact HD H.264 Video Encoder, Version 2.0.0. 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

Audience

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

Reliability of Information

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

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

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

Obtaining Documentation

You may download the Makito firmware, Readme file, and PDF versions of the User's Guide and Quick Start Guide through Haivision's Download Center at http://www.haivision.com/download-center/.

Related Documents

In addition to this user's guide, the following documents are also available through Haivision's Download Center (see link above):

- Makito Decoder User's Guide

Service Support

Haivision Network Video 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: https://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, could result in serious injury or death.

Safety Information

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

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

New Features in Version 2.0.0

Version 2.0.0 of the Makito introduces the following new features and enhancements:

MISB-0604 High Resolution Timestamps Inserted in the H.264 Stream

MISB 0604.2 High resolution timestamps are now generated when KLV is enabled and embedded in the H.264 video elementary stream.

PCR Insertion Based on Number of TS Cells Sent in CBR Mode

ISO 13818-1/MPEG-2 CBR compliance is now enhanced with a new PCR (Program Clock Reference) injection method. The Makito now generates PCR at regular intervals for CBR TS streams when stream Shaping is enabled.

EIA-608 and EIA-708 Closed Captioning Now Supported Over HD/SD SDI Interface

The Makito Encoder now 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.

Supported resolutions include 1080p, 720p, 1080i, 480i, and 576i.

For more information, see "Closed Captioning" on page 205.

Support for PAL-M on Composite Interface

The Composite/S-Video interface now supports the PAL-M standard, which is similar to NTSC but uses the PAL color encoding scheme.

Disabling of Snapshot Capability Now Supported

The Snapshot capability can now be disabled to prevent captured content from being stored on the Makito. Disabling the Snapshot feature is typically done at factory staging when the feature request is part of the P.O. 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.

Time Zone Selection Enhanced

Time zone configuration is now part of the ipconfig utility in the CLI. As of Version 2.0.0, it is the recommended way of setting the time zone, instead of the former tzselect utility.

For more information, see “ipconfig” on page 144 (CLI).

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 Makito Compact HD H.264 Video Encoder with DVI (B-290E-DVI) and the Makito-SDI Compact HD H.264 Video Encoder with SDI (B-290E-HDSDI) unless specifically stated otherwise.

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 now 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 also 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.

Figure 1-1 Front View (Single Chassis)

Figure 1-2 Sample Rear Views (Single Chassis, stacked)

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 27.

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,
- within a 1U chassis (MB6) that can contain up to 6 Makito encoders, and
- the Makito Air Ruggedized HD/SD H.264 Video Encoder.

The 21-slot and 6-slot chassis are shown in the following figures.

Figure 1-3 Multichannel Chassis - Front View (Top - 21 slot, Bottom - 6 slot)

Figure 1-4 Multichannel Chassis (21 slot) - Rear View

NOTE The Makito Dual Height Blade may be used in either the 21 or 6 slot 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.

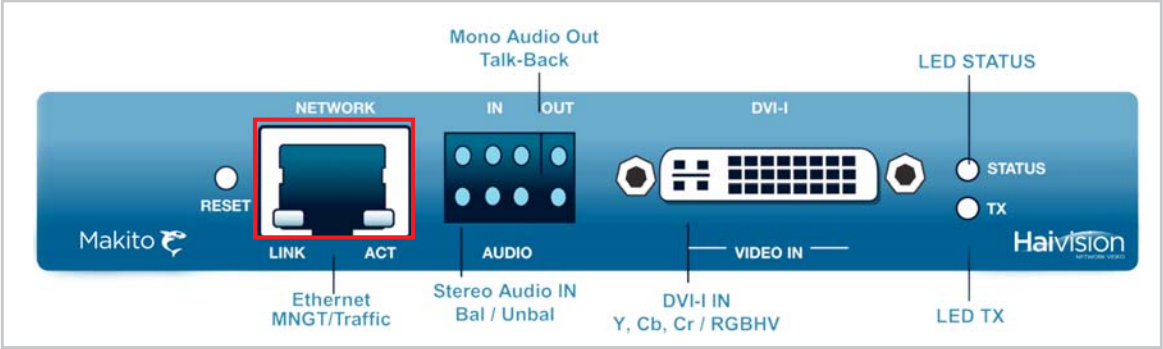
Physical Description

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

System Interfaces (Rear Panel)

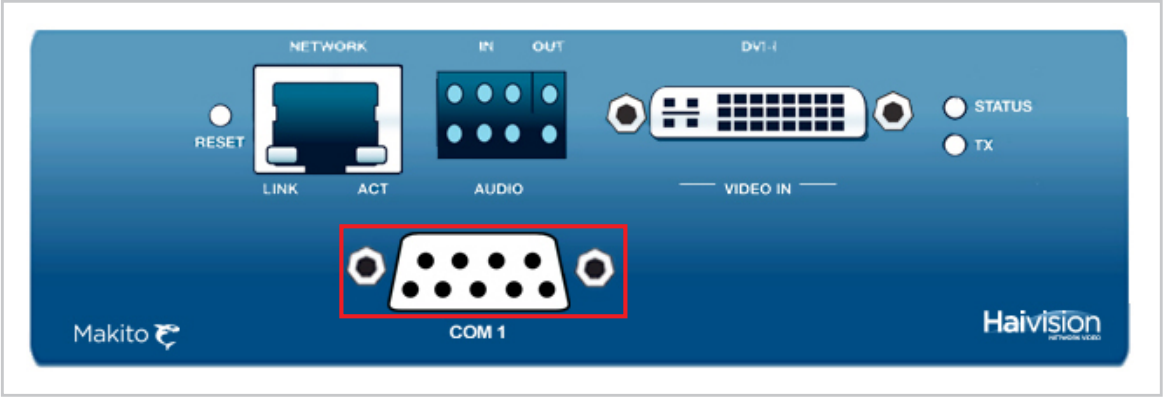
The Makito comes with a 10/100/1000 Base-T Ethernet Network interface for both traffic and management (RJ45).

Figure 1-6 Ethernet Connection (Makito #B-290E-DVI)



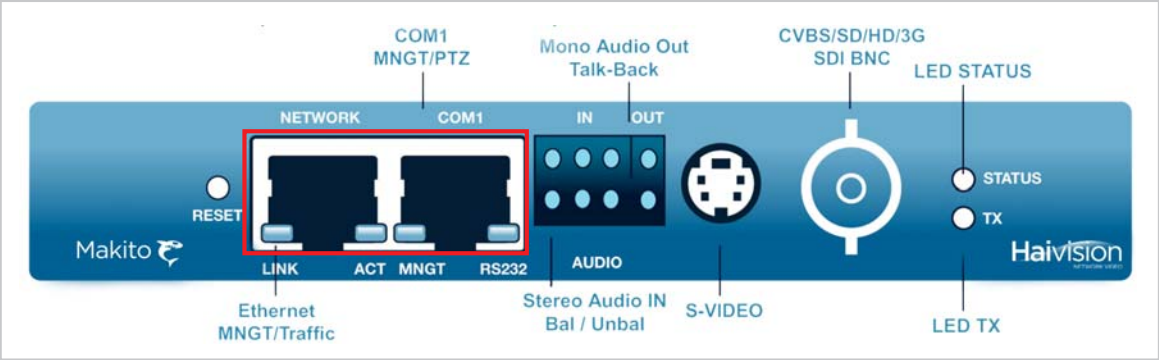
On the Makito Dual Height Blade, a computer can be connected to the COM1 serial port through its DB9 connector.

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 31
- "Serial Interface Setup" on page 33

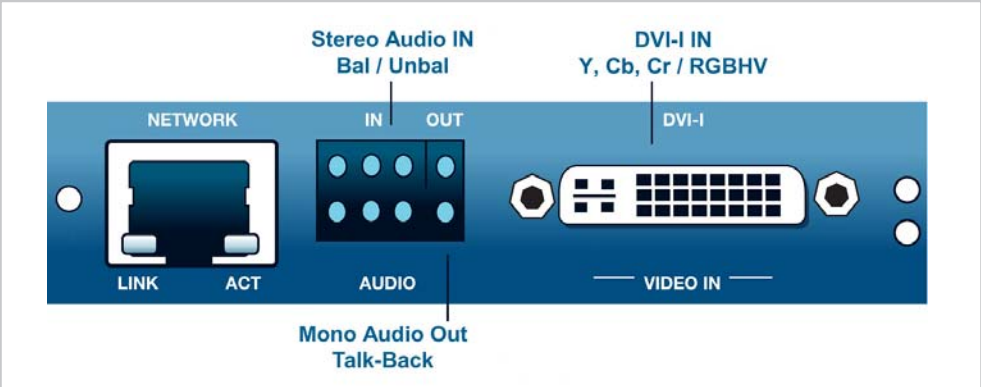
Audio/Video Interfaces (Rear Panel)

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.

NOTE If the content is HDCP copy-protected, the stream will not be encoded.

The Makito encoder supports EDID resolution capabilities negotiation.

Related Topics

- “Supported Video Encoding Resolutions (Makito #B-290E-DVI)” on page 194
- “Connecting the DVI-I Interface (Makito)” on page 36

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

- "Connecting the BNC/S-Video Interface (Makito-SDI)" on page 37
- "Connecting the Encoder to A/V Sources" on page 36

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 "Audio Terminal Block Connector Pinout" on page 39.

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 "Modifying the RCA-Terminal Dongle for Balanced Audio" on page 38.

Related Topics

- "Connecting the Encoder to A/V Sources" on page 36

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 (Cont.)

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 Pass-through Mode (PTZ) or Metadata capture
		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

- "Powering Up the Unit" on page 44

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 42.

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)

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 25.

Related Topics

- "Installing and Connecting the Makito Air" on page 40

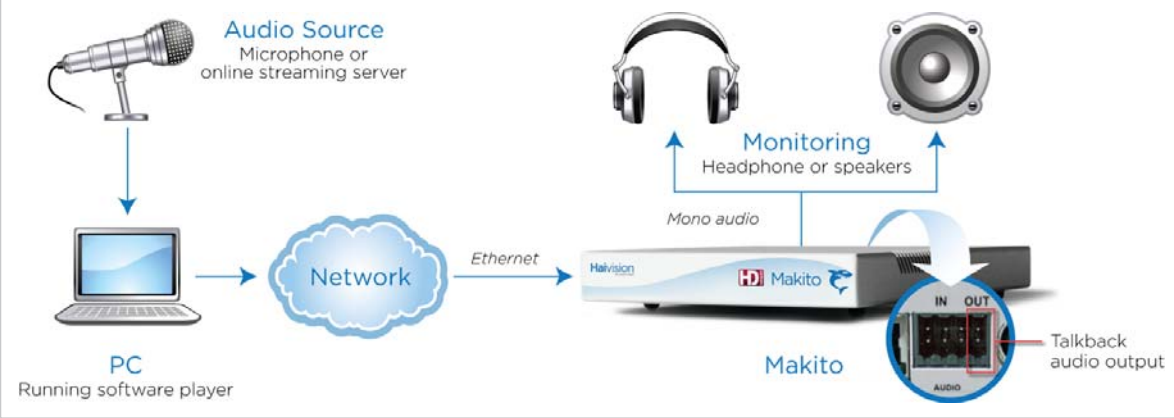
Audio Talkback

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 the audience to "talk back" to the people taking or making the video (i.e., at 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.

Implementing the Audio Talkback feature requires a software player application such as HaiPLAY that sends the talkback to the Makito (see "Setting up Audio Talkback" on page 211). The talkback is played out of the encoder's 8-pin terminal block connector (see "Audio Interface" on page 24).

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. It is recommended that the software player application provide "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.

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 181 (CLI). Talkback audio is not configurable through the Web interface or SNMP in the current release.

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

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 or 4U chassis.

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.

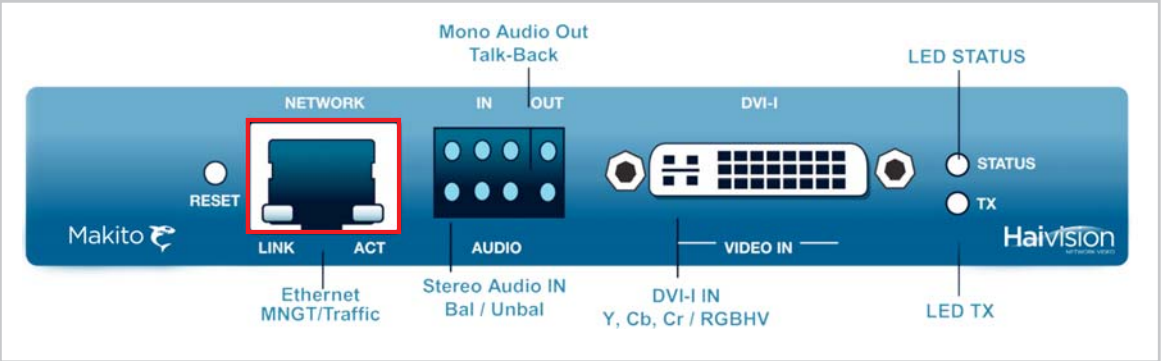
Connecting the Encoder to the Network and a Computer

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 33.

Figure 2-2 Serial Connector (Makito Dual Height Blade #B-290E-DVI-S)

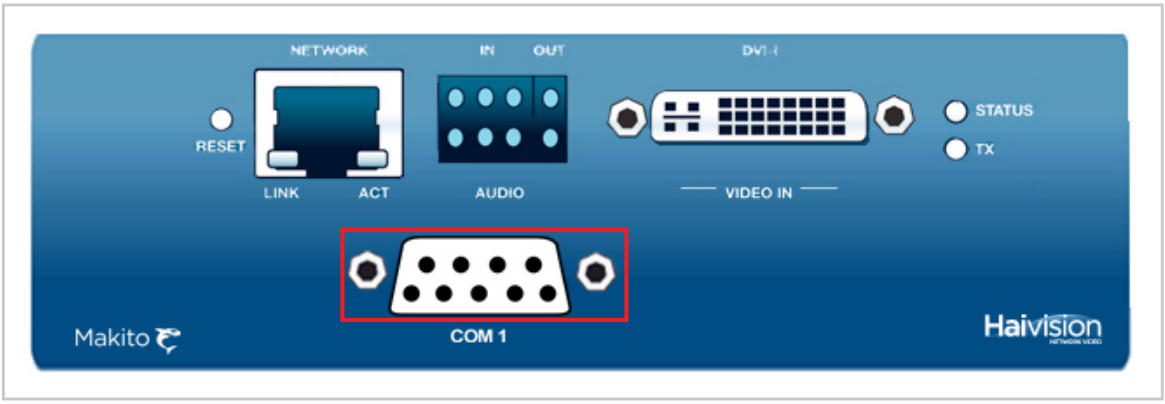


Figure 2-3 Network and Serial Connectors (Makito-SDI #B-290E-HDSDI)

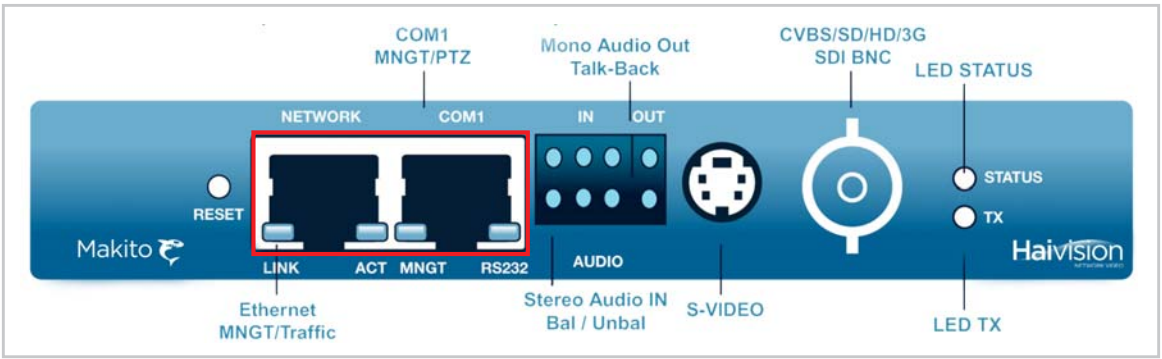
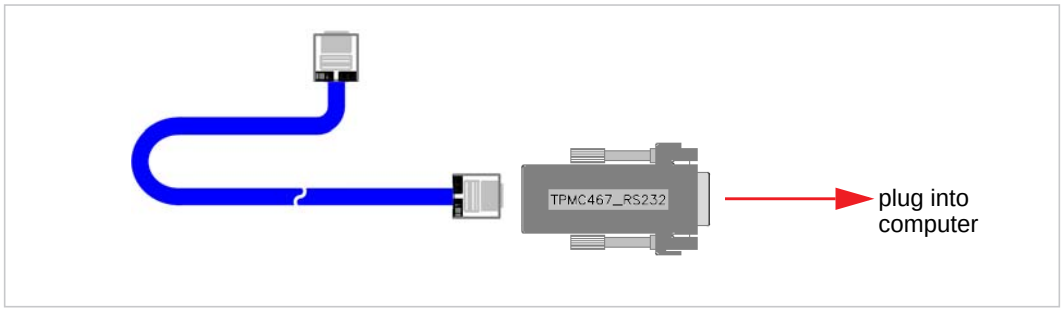


Figure 2-4 Serial Management Adaptor (Makito-SDI #B-290E-HDSDI)



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 20.
- 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 44.)

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 101.

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 Figure 2-4 on page 32) is included in the package.

Connecting the Encoder to A/V Sources

Connecting the DVI-I Interface (Makito)

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 62 (Web interface), or "videnc Parameters" on page 185 (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 38.

Figure 2-5 DVI-I Input Connections

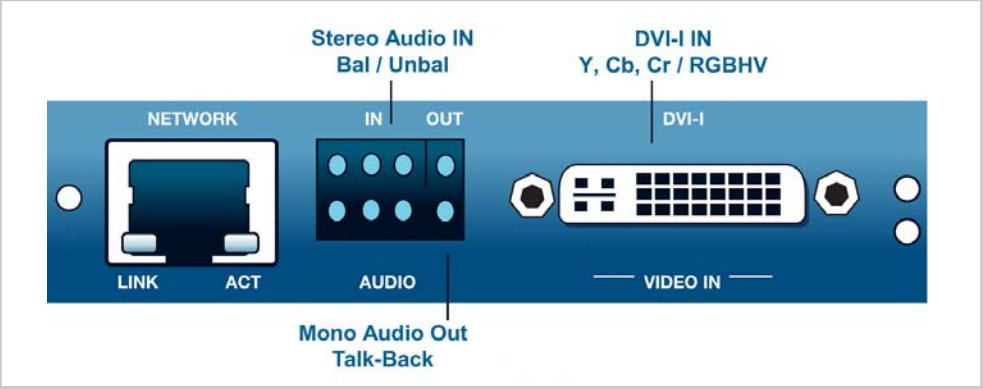
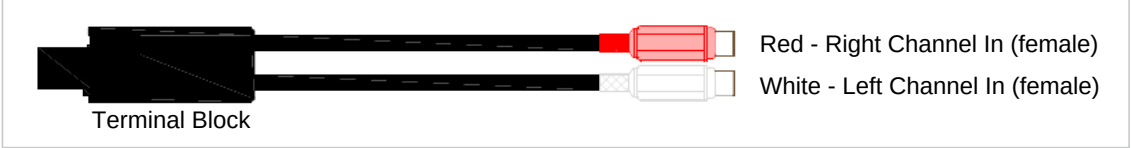


Figure 2-6 Audio RCA to Terminal Dongle (unbalanced audio)



Related Topics

- "Modifying the RCA-Terminal Dongle for Balanced Audio" on page 38
- "Audio Terminal Block Connector Pinout" on page 39

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

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 62 (Web interface), or "videnc Parameters" on page 185 (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 38.

Figure 2-7 BNC/S-Video Connections

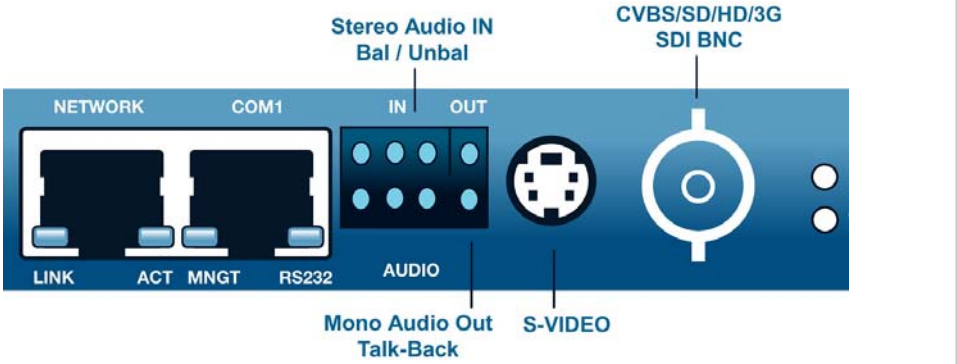
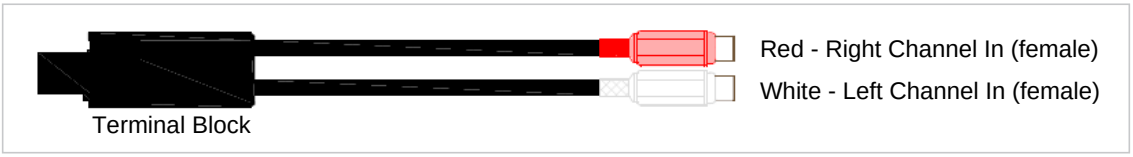


Figure 2-8 Audio RCA to Terminal Dongle (unbalanced audio)

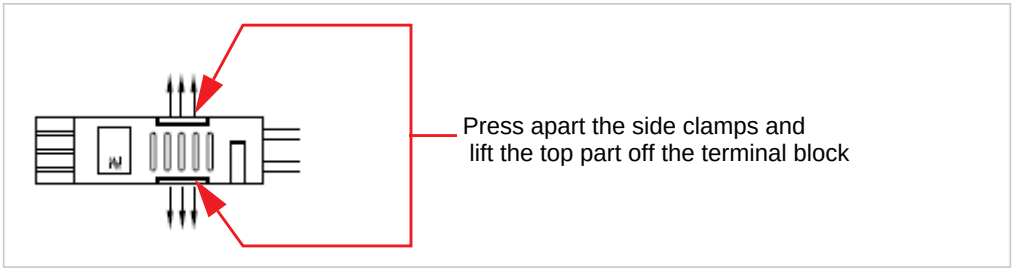


Modifying the RCA-Terminal Dongle for Balanced Audio

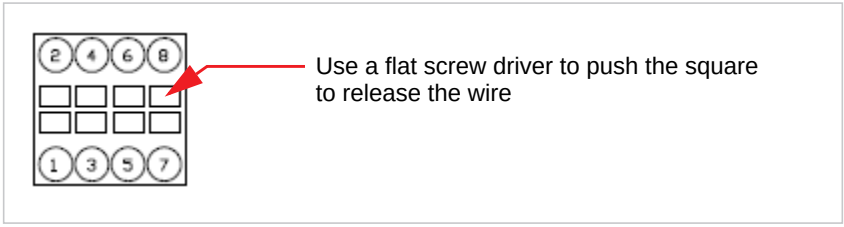
For balanced audio, you can modify the audio RCA to Terminal dongle provided in the package to re-use the terminal block connector.

To modify the RCA-Terminal dongle for Balanced Audio:

1. Remove the cover from the terminal block connector.



2. To release each wire, use a flat screw driver and push it in the rectangular area. (The terminal block has tension clamp connections.)



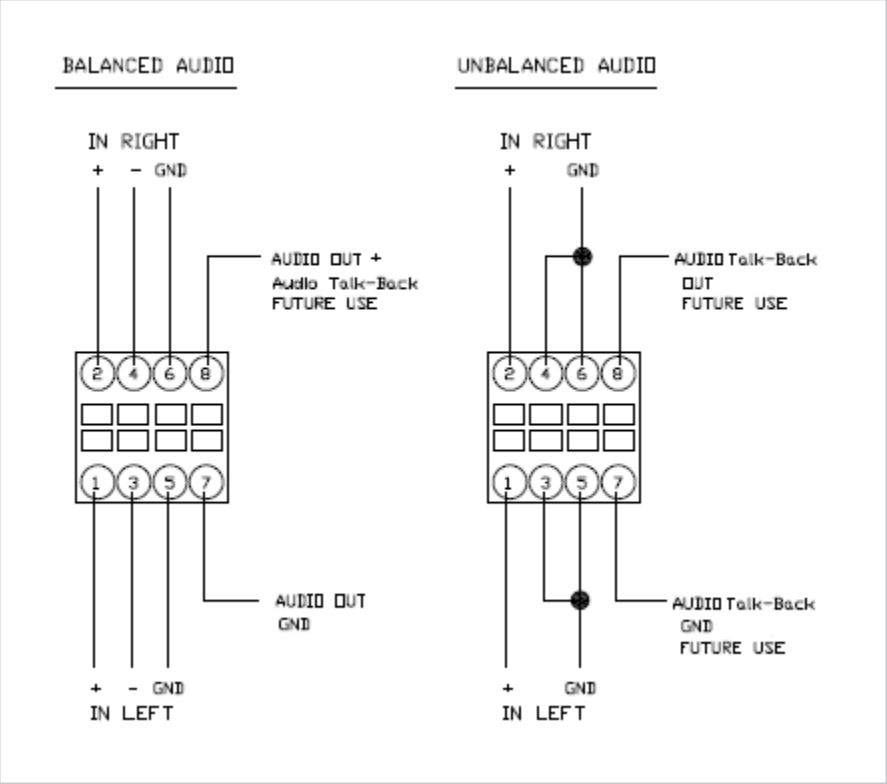
3. Pull each wire to remove it from the terminal block.
4. Prepare your new audio wires by removing about .150 inch of the wire's insulation.
5. Insert the new wires by pressing the tension clamp and then removing the screw driver to release the tension clamp.

   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 22.

Installing and Connecting the Makito Air

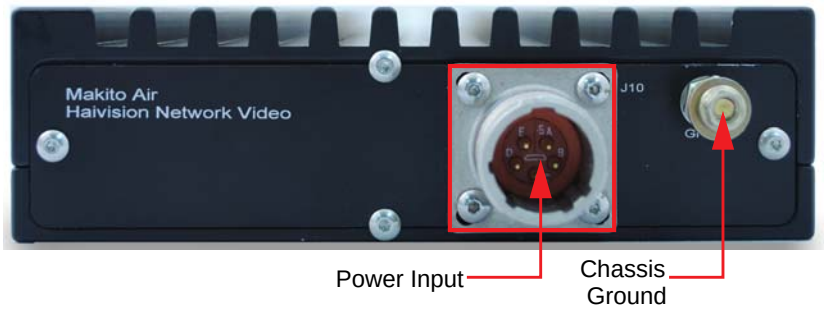
To install the Makito Air:

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 42 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



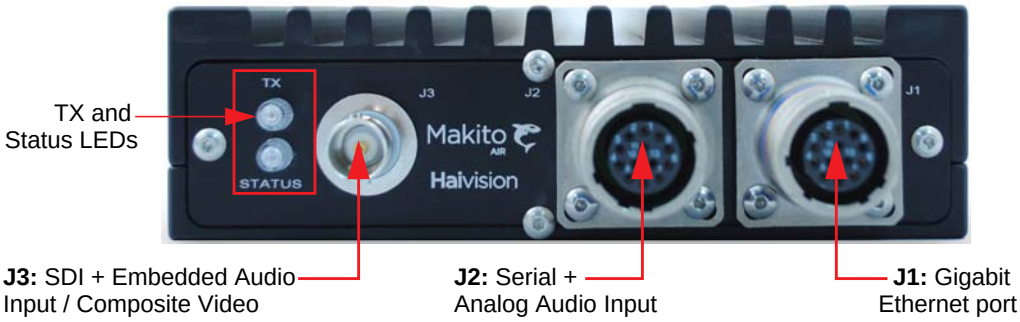
NOTE Required supply voltage: 28VDC.

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



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.

NOTE For wiring unbalanced or balanced audio, see "Connector Mapping" on page 42.

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 / Gigabit Ethernet differential pair A (bi-dir)
2	ETH_DAN	BI	
3	ETH_DBP	BI	10/100 BASE-T Receive differential pair / Gigabit Ethernet differential pair B (bi-dir)
4	ETH_DBN	BI	
5	ETH_DCP	BI	10/100 BASE-T (Unused) / Gigabit Ethernet differential pair C (bi-dir)
6	ETH_DCN	BI	
7	ETH_DDP	BI	10/100 BASE-T (Unused) / Gigabit Ethernet differential pair D (bi-dir)
8	ETH_DDN	BI	
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 [only use J2-Pin2 in RS232 mode (shaded in gray)]
2	COM_TXDN	OUT	
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		
D	CH_GND	REF	Chassis ground
E	NC		

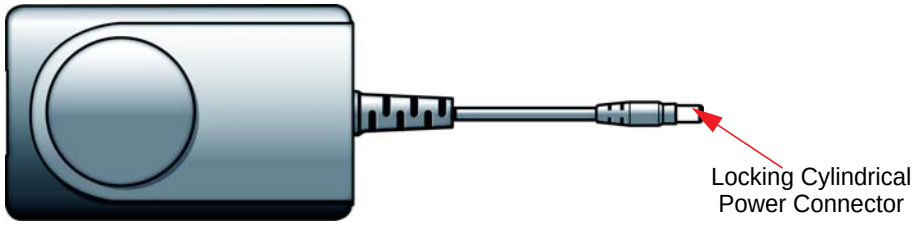
Powering Up the Unit

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

Figure 2-13 Single Chassis Power Supply



NOTE There is no power switch on the Makito. 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 power outlet is located near the equipment and is easily accessible.

To power up the Single Blade Chassis:

1. Insert the locking cylindrical 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 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.

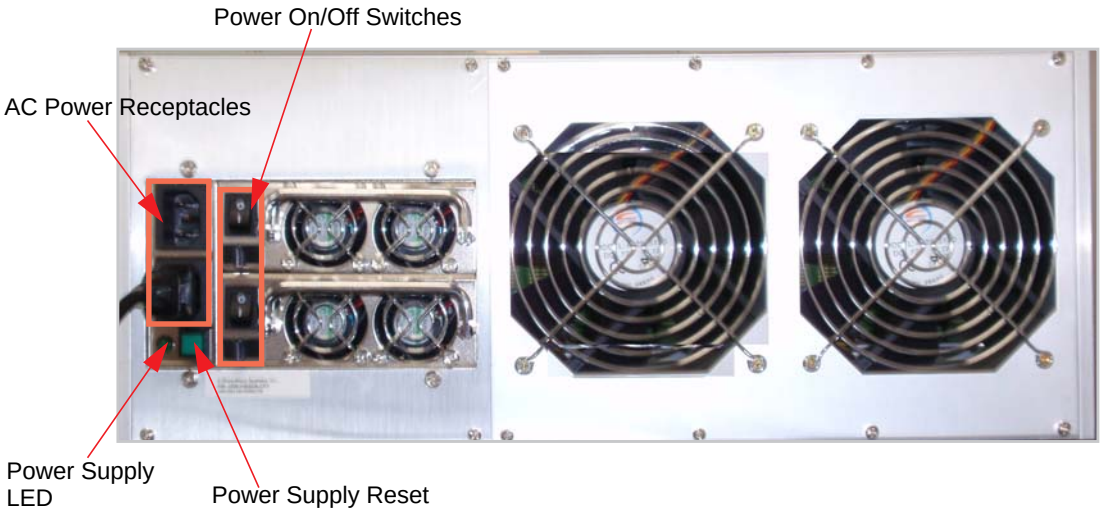
To begin configuring video streams, you can either open the Web interface, or log in to the CLI.

- To use the Web interface, see "Logging In to the Web Interface" on page 57.
- To enter CLI commands, see "CLI Command Reference" on page 132.

Multichannel Chassis

WARNING To prevent electric shock, do not remove the cover of the 21-slot chassis. There are no user-serviceable parts inside. The 21-slot chassis is to be installed and serviced by qualified personnel only.

Figure 2-14 Multichannel Chassis showing Power Connectors



To power up the Multichannel Chassis:

1. Connect the power cord(s) to one (or both) of the power receptacles on the back of the 21-slot or 6-slot chassis.
2. Plug the cord(s) into an AC power source.

   The Power Supply LED 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.
3. 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 57.
- To enter CLI commands, see "CLI Command Reference" on page 132.

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, modified passwords, and encoding settings).

Hardware Version 3 Reset

NOTE These instructions apply to Makito (#B-290E-DVI) and Makito-SDI (#B-290E-HDSDI) Hardware Version 3 only. If you have Makito-SDI Hardware Version 0 (which does *not* have a Reset micro switch), please refer to the following section "Hardware Version 0 Reset".

To check the Hardware Version of your Makito-SDI from the Web interface, see "Viewing System Status Information" on page 106.

To reset the Makito (B-290E-DVI) and Makito-SDI (B-290E-HDSDI) Hardware Revision 3:

1. With the encoder on, insert a small tool such as a straightened paper clip into the small opening labeled Reset on the Makito faceplate.

Figure 2-15 Reset micro switch (Sample view)

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.

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 Version 0 Reset

NOTE These instructions apply to Makito-SDI (#B-290E-HDSDI) Hardware Version 0 only (which does *not* have a Reset micro switch).

To check the Hardware Version of your Makito-SDI from the Web interface, see "Viewing System Status Information" on page 106.

To power reset the Makito-SDI:

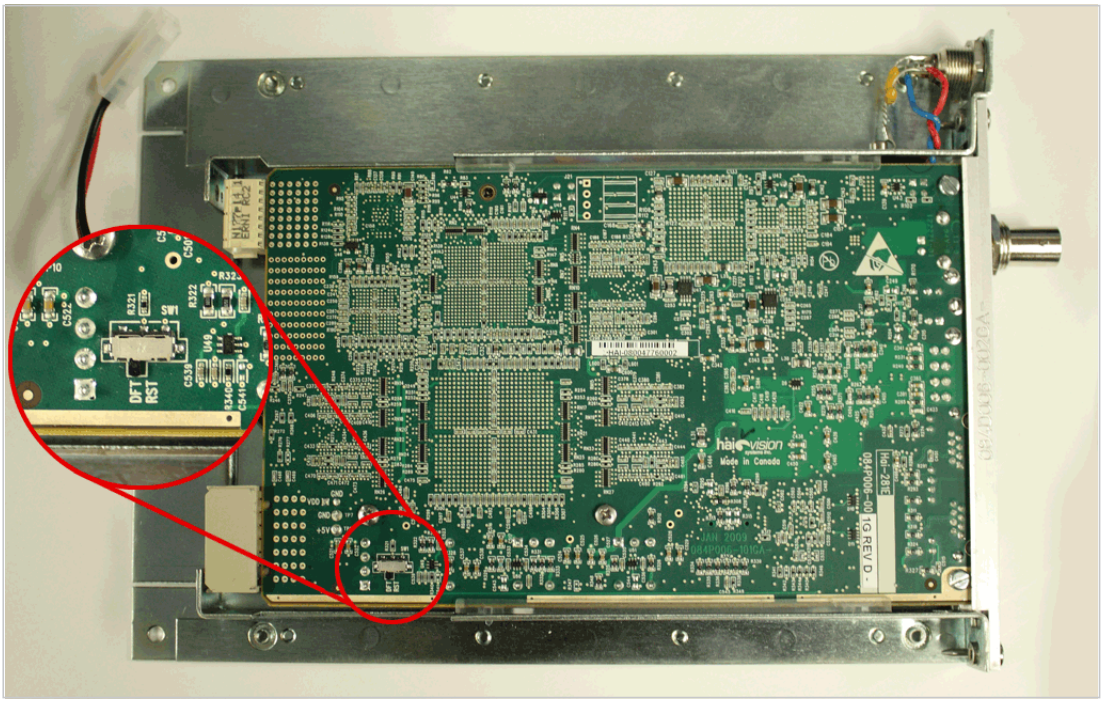
1. Power the encoder off and on again. You can either:
   - Unplug and then re-plug the power cord into the AC power source. -or-
   - Remove and then re-insert the locking cylindrical connector on the 5V power supply into the Power jack at the rear of the Makito.

   This resets the unit.

To reset the Makito-SDI to its factory default settings:

To perform a factory reset on the Makito-SDI, you need to open the chassis and use the on-board Reset switch. The following sections provide the reset procedure for a single unit chassis and the 21-slot chassis.

Figure 2-16 Underside of Board showing Factory Reset Switch



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.

Reset Procedure for Single Unit Chassis

1. Remove power from the chassis.
2. Using a Phillips screwdriver, unscrew the four screws underneath the chassis (keep the screws close by).
3. Open the chassis by sliding the top and bottom chassis pieces apart.
4. Locate the reset switch on-board (see inset in Figure 2-16).
5. Slide the switch to the “RST” position (reset).

6. Apply power to the chassis.

   The encoder Status LED will flash RED

   The encoder Status LED will become solid RED after 5 seconds indicating that the reset process is completed.

7. Remove power again from the chassis.
8. Slide back the reset switch on-board to the “DFT” position (default).
9. Close the chassis by sliding back the top and bottom chassis pieces, making sure the screw holes are aligned.
10. Put back the four screws underneath the chassis and tighten them.
11. Apply power to the chassis.

Reset Procedure for 21-Slot Chassis (Already Powered Chassis)

1. Locate the encoder to be factory reset.
2. Using a Phillips screwdriver, unscrew the two “knob” screws on the encoder faceplate.
3. Pull the encoder gently out of the chassis.
4. Locate the reset switch on-board (see inset in Figure 2-16).
5. Slide the switch to the “RST” position (reset).
6. Insert the encoder back to the end of the chassis.

   The encoder Status LED will flash RED.

   The encoder Status LED will become solid RED after 5 seconds indicating that the reset process is completed.

7. Pull the encoder gently out of the chassis again.
8. Slide back the reset switch on-board to the “DFT” position (default).
9. Insert the encoder back to the end of the chassis.
10. Tighten the two “knob” screws on the encoder faceplate.

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 4: "Configuring A/V Services Using SNMP".

Accessing the Encoder

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 57).

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 "Access Control" on page 56).

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 47.

Access Control

The Makito provides the following pre-defined user groups with different privilege levels.

- The user account provides read-only access to the system.
- The operator account provides all rights to configure A/V and stream settings and reboot the system. However, it does not include rights to upgrade the system, modify the network settings, or manage accounts.
- The admin account provides all access rights.

Group	Default Username	Default Password	System Upgrade	Account Mgmt	Network Settings	Encoder/ Stream Settings	System Reboot
Admins	admin	manager	Yes	Yes	Yes	Yes	Yes
Operators	operator	supervisor	No	No	No	Yes	Yes
Users	user	public	No	No	No	No (Read-only)	No

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

You can change the password for these accounts from the CLI using the passwd command.

Note that any changes to the default passwords will be lost after a Factory Reset or a firmware downgrade.

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.

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

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

   The default Web interface Username and Password are:

   Username: admin
   Password: manager

   The default password may be changed from the CLI. For information on the pre-defined user groups for the Makito, see the previous section, "Access Control".

NOTE Selecting Help from the menu bar will launch the online help. For more information, see "Online Help" on page 60.

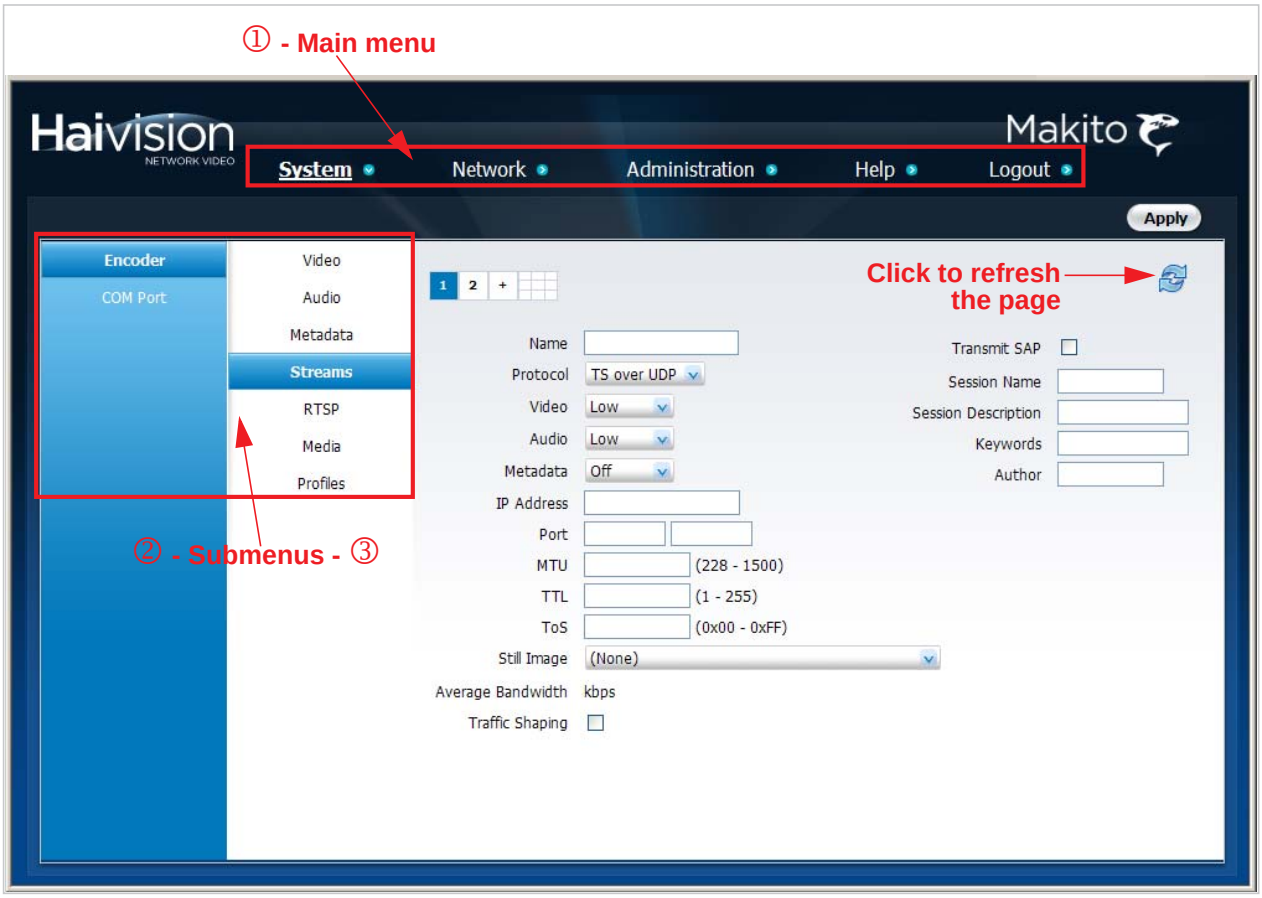
Exploring the Web User Interface

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, or ADMINISTRATION from the Main Menu (along the top bar, see example below),
2. The configuration area from the submenu (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

You must click the Apply or Save button in order for your changes to take effect. Note the following differences between Apply and Save.

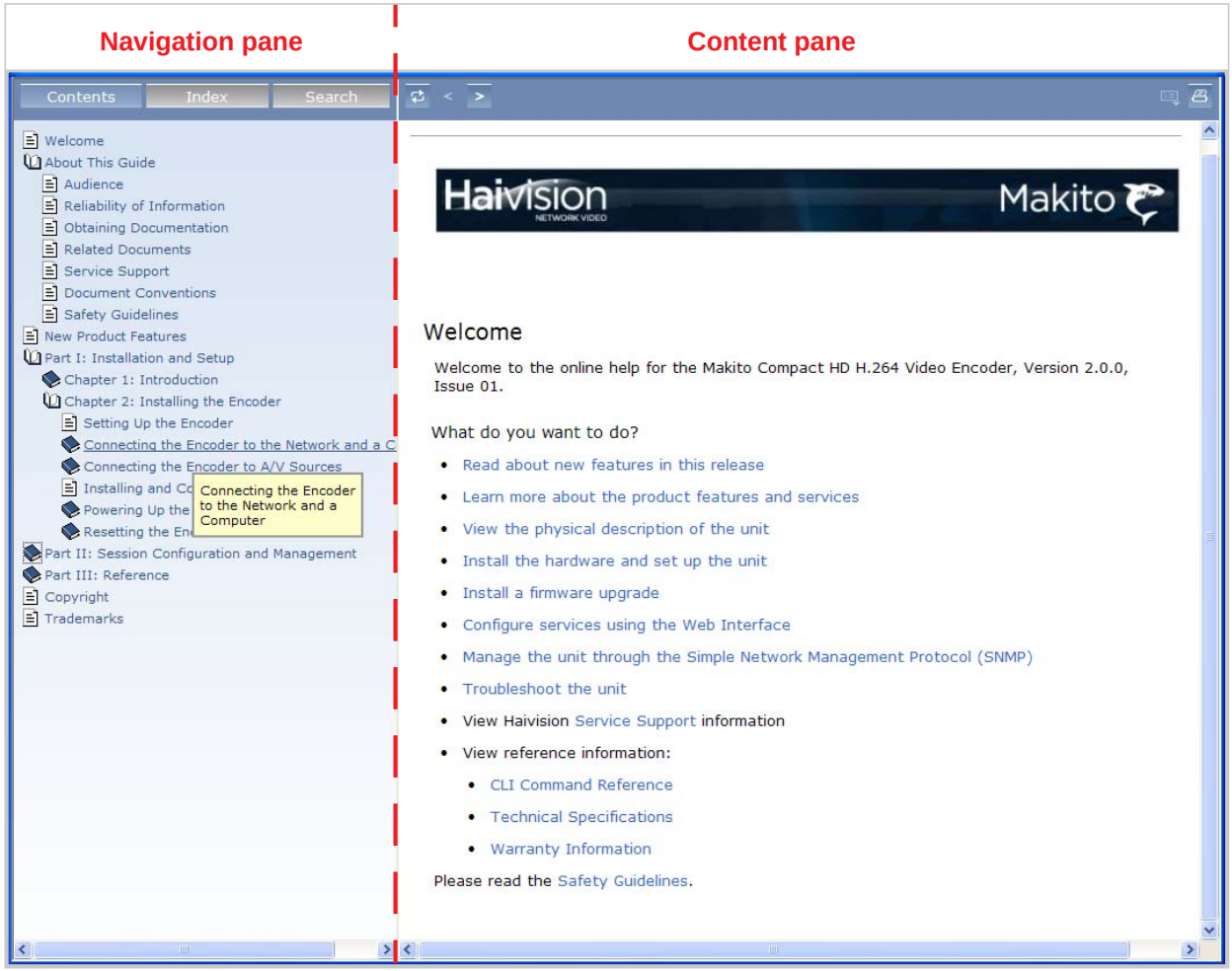
Table 3-1 Apply and Save buttons

Button	Description
Apply	You must 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	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. In the current release, you can save NETWORK and RTSP settings, as well as the entire current configuration (which includes the current VIDEO, AUDIO and STREAM settings).

TIP To refresh the page, click  .

Online Help

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



Configuring the Video Settings

From the Video Settings 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.

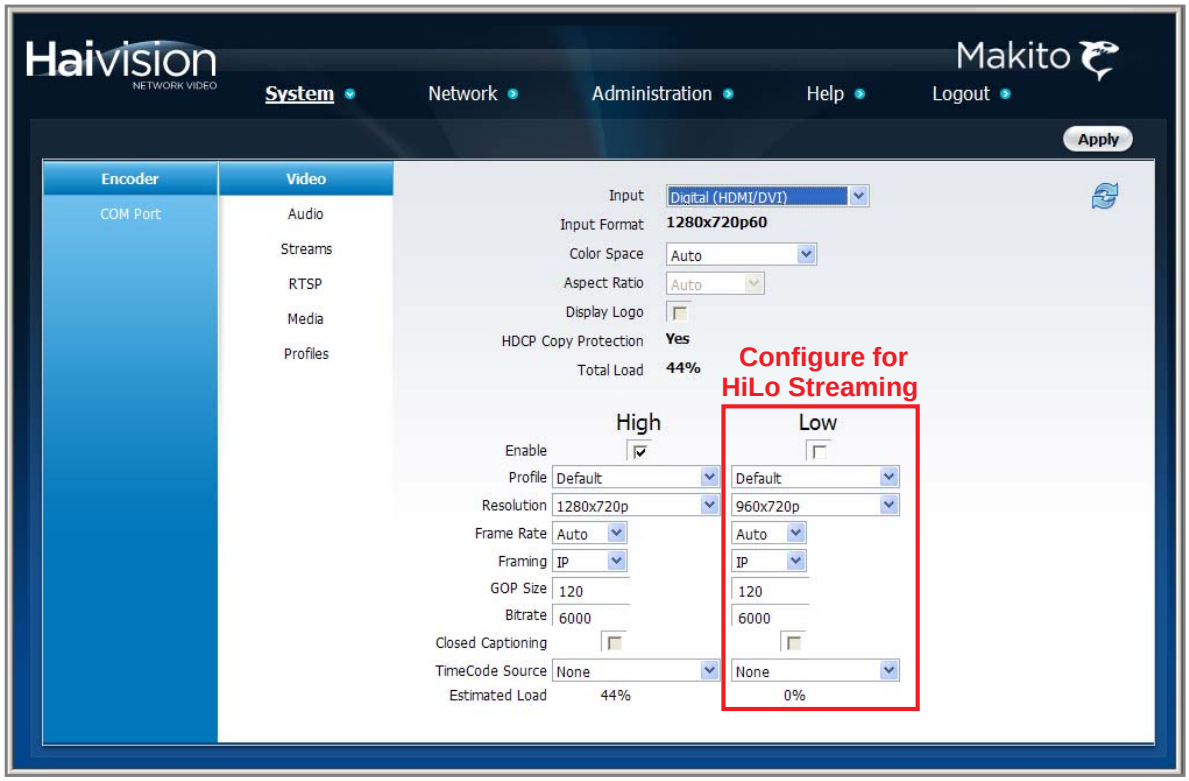
HiLo Video Streaming

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 193.

To configure the Encoder Video Settings:

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

   The VIDEO SETTINGS 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 110.

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 (Cont.)	Description/Values (Cont.)
Color Space Makito 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 86.
HDCP Copy Protection Makito only	n/a	(Read-only) Indicates whether an HDCP stream is copy-protected. 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 193.

Video Setting	Default (Cont.)	Description/Values (Cont.)
NOTE: To configure HiLo 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 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 SETTINGS 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 93.
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 193.
HD	n/a	• 1920x1080i (1080i) • 1920x1080p (1080p) • 1440x1080i • 1440x1080p • 960x1080i • 960x1080p • 1280x720 (720p) • 960x720 (720p) • 640x720 (720p)

Video Setting	Default (Cont.)	Description/Values (Cont.)
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. 0..1000 NOTE: With a GOP Size of 0 (referred to as "Infinite GOP" mode), the Encoder only generates one I-Frame at the beginning of the stream, followed by an infinite sequence of P-Frames. If the remote decoder is not started before the stream is created, the decoder will "miss" that I-Frame and will not be able to decode the stream. (An MPEG decoder requires an I-Frame to start decoding.) The GOP Size is the same for both Encoder instances.
Bitrate	6000 kbps	Enter the Video Bitrate for the encoder: • HD: 150..15000 kbps • SD: 150..8000 kbps

Video Setting	Default (Cont.)	Description/Values (Cont.)
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 205.
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 103.). This applies to both TV resolutions and graphic resolutions. NOTE: See "TimeCode Source" 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

The following guidelines apply to the TimeCode Source in the current release:

- 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.

Configuring the Audio Settings

From the AUDIO SETTINGS 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 sub-menus.

   The AUDIO SETTINGS 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 69.

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 110.

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 SETTINGS page. With full HD 1080p 60 resolution input, the Low stream is not available since the High stream consumes all the encoding resources.

Audio Setting	Default	Description/Values (Cont.)
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.

Configuring Metadata Capture

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

From the METADATA page, 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.

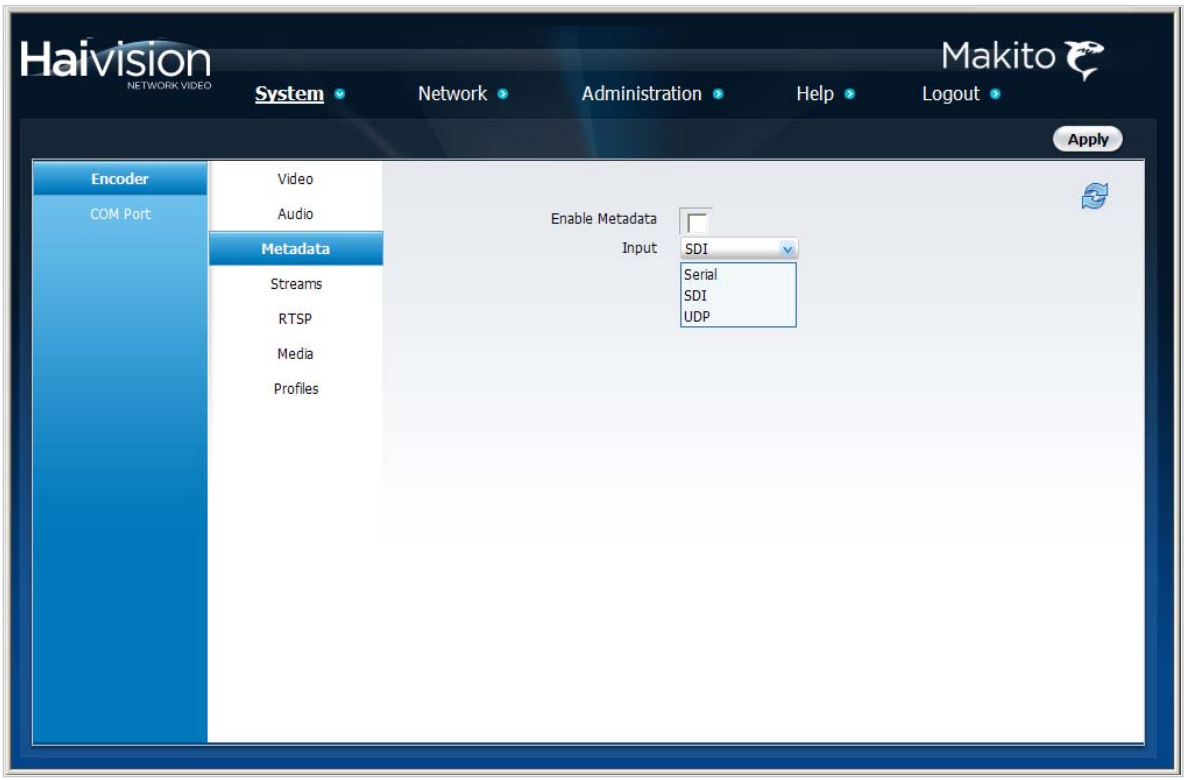
The Makito supports three metadata input types: either from the COM1 serial port, the HD-SDI interface (Makito-SDI only), or a user definable UDP port. Only one metadata stream may be included in the Transport Stream at a time, so you must select the metadata source:

- Serial port: From the METADATA page, you specify the Data Format. For CoT metadata, you also specify the Max AirCraft-SPI Delta. Serial port input is required for the CoT metadata capture option.
- 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 encodes and converts UDP packets to KLV, and inserts them into the Transport Stream.You must specify local UDP Port on the Makito that is receiving the packets. The IP Address is only required for reception of multicast metadata, or if you only want to accept KLV messages coming from a specific sender.

To configure the Metadata Settings:

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

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



2. Check the Enable Metadata checkbox.
3. Select the Metadata Input type, and where required, select or enter the remaining value(s). For details on the Metadata fields, see "Metadata Settings" on page 73.
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 110.

Metadata Settings

The following table lists the Encoder Metadata settings:

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.
Input	n/a	Select the input source for metadata capture. • Serial, HD-SDI, or UDP port NOTE: To select Serial input, the COM Port Mode must first be set to Metadata (see "Mode" on page 102).
Data Format	KLV	(Serial input only) Select the data format for the metadata. • KLV (Key Length Value) or • CoT (Cursor on Target). NOTE: 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 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.
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) 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.

Configuring the Stream Settings

The Makito provides a STREAM OVERVIEW page and separate STREAM SETTINGS configuration pages for up to eight streams. From the STREAM SETTINGS pages, you can manage the Encoder stream settings for each Encoder instance, start and stop the streams, as well as pause and resume streams (see "Selective Video Mute" on page 81).

The Makito supports two types of stream configurations:

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

IMPORTANT You can specify up to eight streams – up to a maximum of 50 Mbps video bitrate (or 35 Mbps video bitrate with 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 61 and "HiLo Audio Streaming" on page 68.

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.

Stream Overview Page

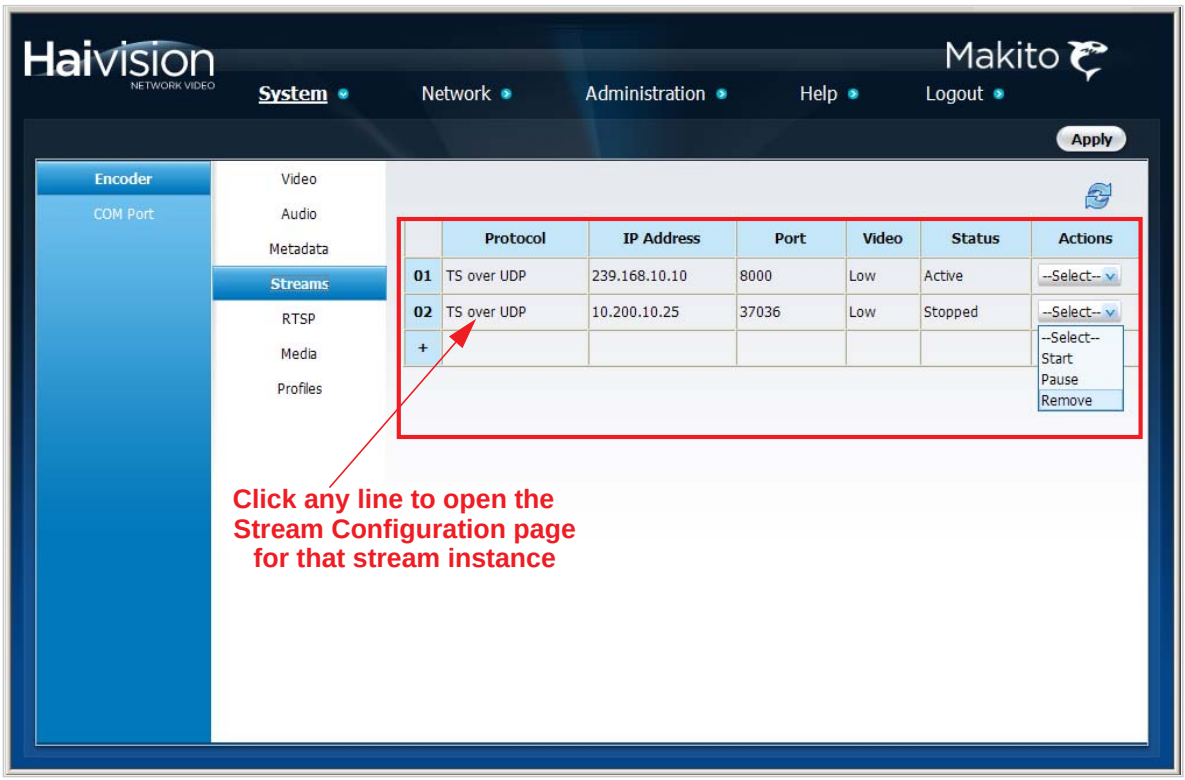
The STREAM OVERVIEW page displays a summary of defined streams for the encoder. The STREAM OVERVIEW page displays the Stream Protocol, IP Address, Stream Port, Video Mode (i.e., "High" or "Low" stream instance), and Action status for each stream. It also provides an option for you to either restart (Active), 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 Stream Settings Page or the RTSP Settings Page.

To open the Encoder Stream Overview:

1. Click SYSTEM from the main menu, and then click ENCODER>STREAMS from the submenus.

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



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

3. To change the Action status for an existing stream, click Active (under Actions) and select either Active, Stopped 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 110.

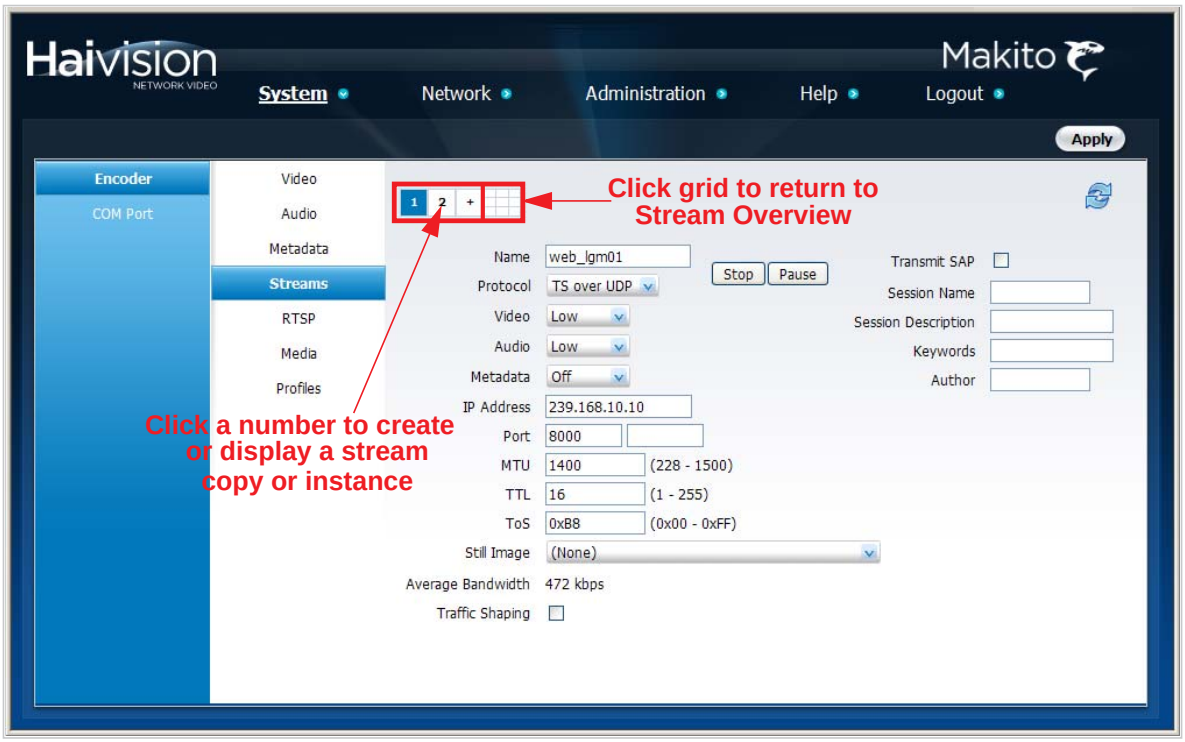
Stream Settings Page

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 84.

To configure the Encoder Stream Settings:

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

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



2. Select or enter the new value(s) in the appropriate field(s). See "Stream Settings" on page 77.
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 110.

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

4. To refresh the page, click  .

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

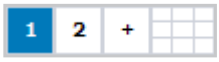
5. (Optional) To pause the stream, click Pause. (See "Selective Video Mute" on page 81.)

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).

Stream Settings

The following table lists the Encoder Stream controls and settings:

Stream Setting	Default	Description/Values
		Click a number to display the STREAM SETTINGS 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.
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.

Stream Setting	Default (Cont.)	Description/Values (Cont.)
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 SETTINGS 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 SETTINGS page.
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 82.
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 81.

Stream Setting	Default (Cont.)	Description/Values (Cont.)
Metadata	Off	To enable metadata, select On: • Off • On
IP Address	n/a	Enter the destination IP address in dotted-decimal format. For multicast addresses, see NOTE on page 77.
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 81.) 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 89.

Stream Setting	Default (Cont.)	Description/Values (Cont.)
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).
VF FEC	Off	(Read-only/Only shows if enabled) Indicates whether Forward Error Correction (FEC) has been enabled from the Furnace Server interface (VFStation Editor). 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	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. 0..100% NOTE: To configure the ceiling percentage for CBR streams with metadata, see "Ceiling Percentage for CBR Streams with Metadata" on page 81.
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.
Transmit SAP	Off	Check or clear this checkbox to enable or disable SAP announcements.

Stream Setting	Default (Cont.)	Description/Values (Cont.)
Session Name	n/a	If SAP is enabled, enter a unique name for the Session.
Session Description	n/a	(Optional) Enter an expanded description of the Session.
Keywords	n/a	(Optional) Enter one or more keywords to associate with the Session. Keywords can serve as filters.
Author	n/a	(Optional) Enter the name of the program's author.

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 89.)

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.

Ceiling Percentage for CBR Streams with Metadata

In CBR streams with Traffic Shaping enabled, metadata may cause the stream to exceed the ceiling (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 limit which is specified at stream creation. However, as the video bitrate drops, the overhead needed to accommodate the worst case bandwidth usage of the metadata must increase.

For example:

```
ceiling = ( metadata_bitrate / ( video_bitrate + audio_bitrate ) ) * 100
```

Minimum ceiling value should be no less than 5.

e.g.: metadata_bitrate = 500 Kbps, video_bitrate = 1000 Kbps, audio_bitrate = 128 Kbps

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

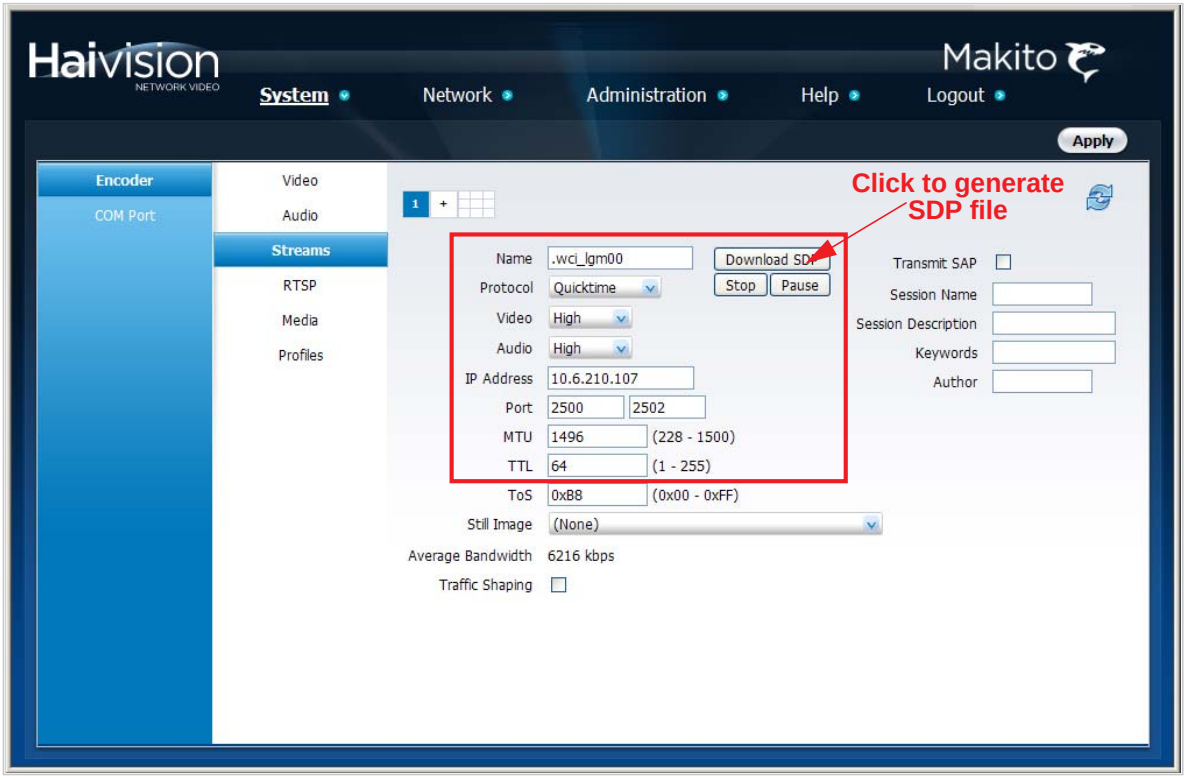
QuickTime SDP and Interoperability

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

From the STREAM SETTINGS 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 Type to QuickTime (as shown in the following example).



2. Select or enter the value(s) to configure the stream. 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 the QTSS movies folder:
   QTSS /Library/QuickTimeStreamingServer/Movies
6. From your decoder, access the live stream URL:
   rtsp://<QTSS hostname or IP>/<HaiVision>.sdp

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 224.30.30.30/128
b=RR:0
t=0 0
m=video 2500 RTP/AVP 96
a=rtpmap:96 H264/90000
a=control:trackID=0
a=fmtp:96 packetisation-mode=1; sprop-parameter-sets=
  Z0IAIIxsC0JF/4AIAAeIAAAfQAAGGoQQAAAAAA==,aM48gAAAAAA=
m=audio 2502 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
```

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

Configuring the RTSP Server

From the RTSP SETTINGS page, you can configure the Makito to interoperate with RTSP-based software players such as HaiPLAY, 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.

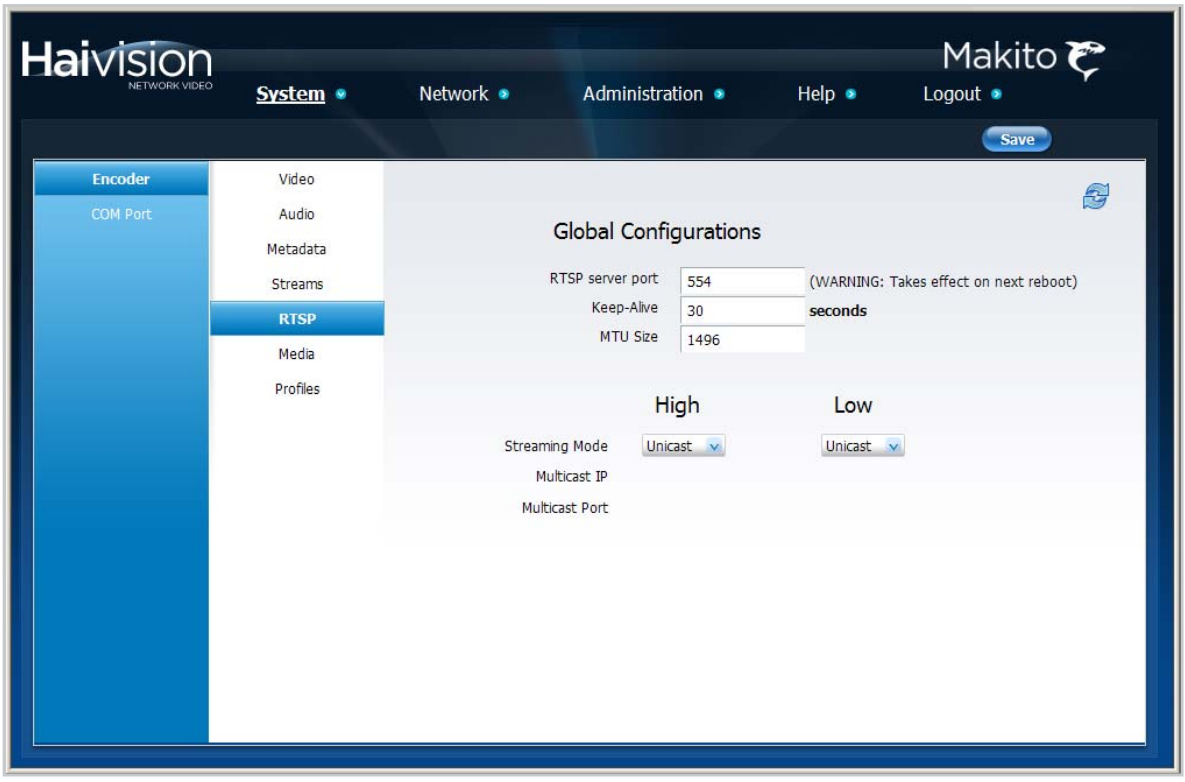
To configure “HiLo” streaming, you must define the RTSP settings for the second encoder instance in the “Low” column.

To generate the SDP (Session Description Protocol) file to download to your computer or server to interoperate with QuickTime or a Streaming Server, see “Stream Settings” on page 77.

To configure the RTSP Settings:

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

   The RTSP SETTINGS 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 SETTINGS 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.

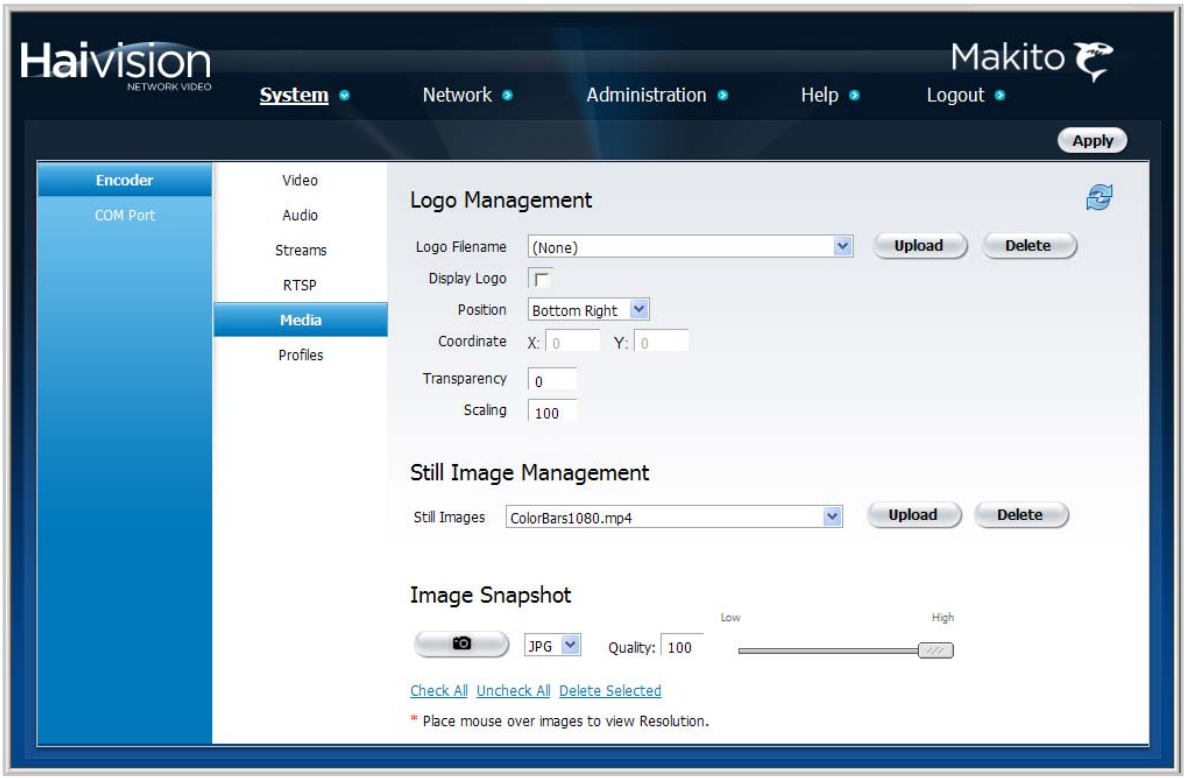
Logo Insertion/Overlay

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 sub-menus.

   The MEDIA SETTINGS 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.

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 the logo overlay for the encoder, select or enter value(s) in the following field(s).

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 Settings 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.

Logo Setting	Default (Cont.)	Description/Values (Cont.)
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

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.

Still Image Streaming

When creating a stream, you can specify a static image that will 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 81.)

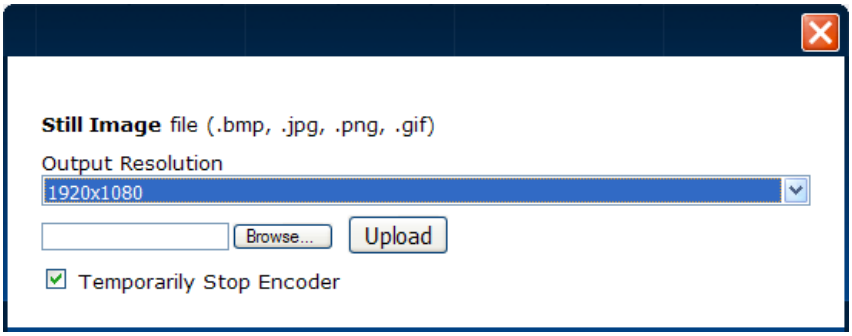
The static picture is encoded into a single H.264 GOP sequence. The supported source formats for the static image include BMP, JPEG, PNG, and GIF. The supported output resolutions include 1920x1080, 1280x720, 720x480 (NTSC), and 720x576 (PAL).

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

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



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.

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

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 SETTINGS 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.

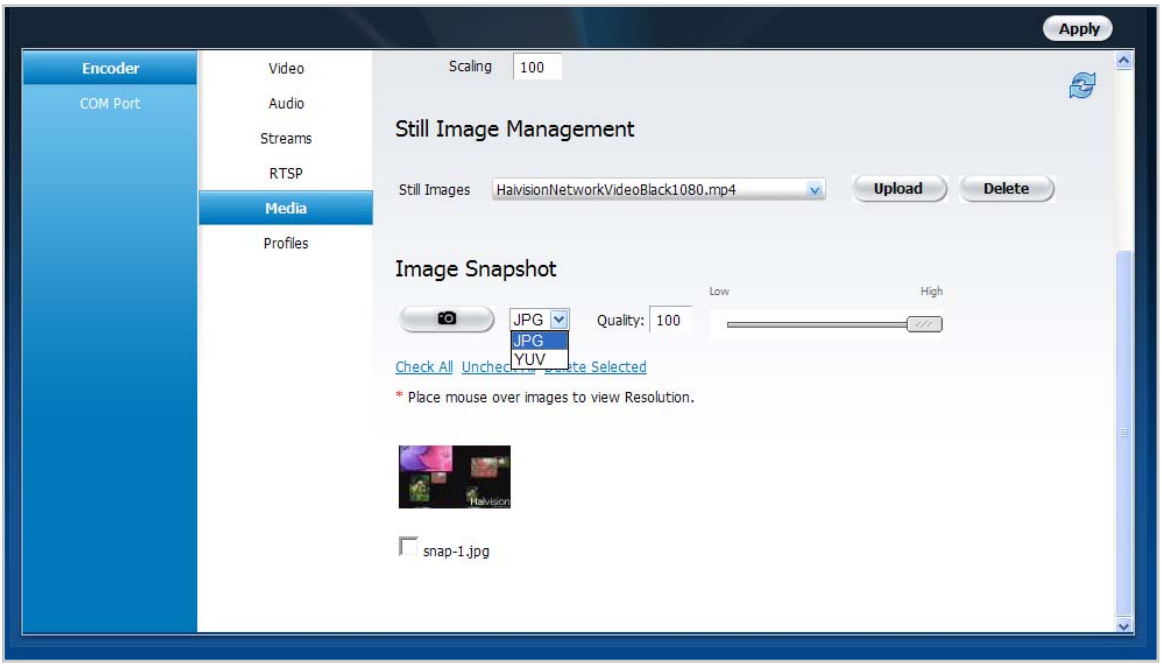
Thumbnails of the snapshots are displayed below the configuration fields for you to view and optionally save.

Note that the encoder must have a valid Input Format. To verify the Input Format detected by the system, see "Configuring the Video Settings" on page 61.

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

To take an image snapshot:

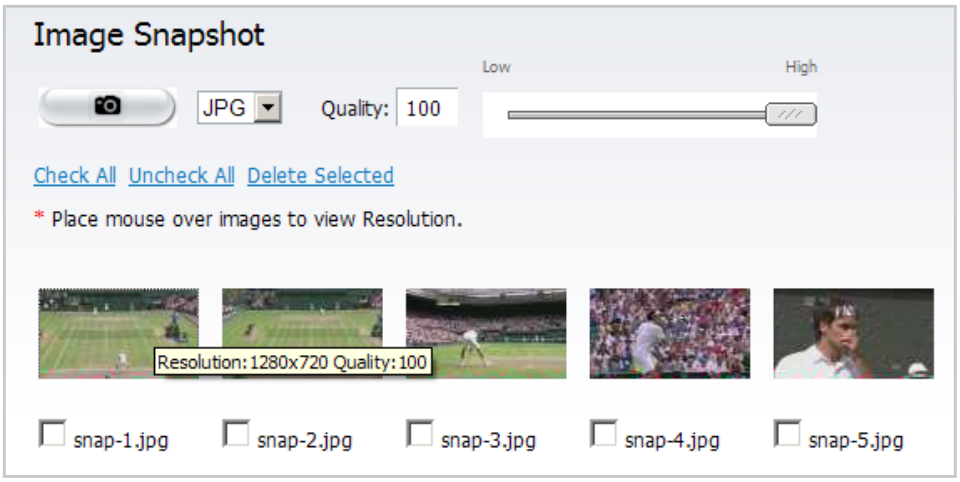
1. Click SYSTEM>ENCODER>MEDIA to open the MEDIA SETTINGS page.
2. Scroll down to the Image Snapshot portion of the page (shown in the following example).
3. Select the format for the image, either .jpg or .yuv color space (color model).



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 .

   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 64).

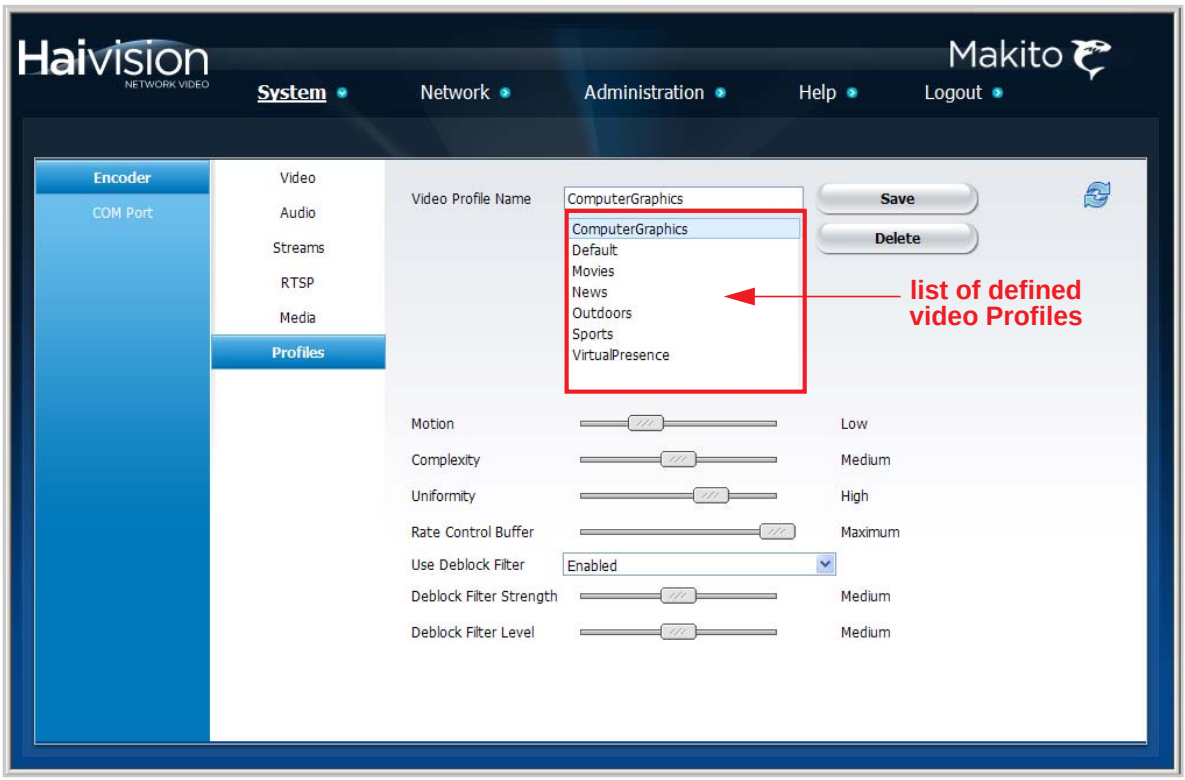
Profiles combine the following video quality parameters: Motion, image Complexity, Uniformity, Rate Control Buffer Size, and Deblock Filter (including Filter Strength and Level).

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 96.

To view and configure video profiles:

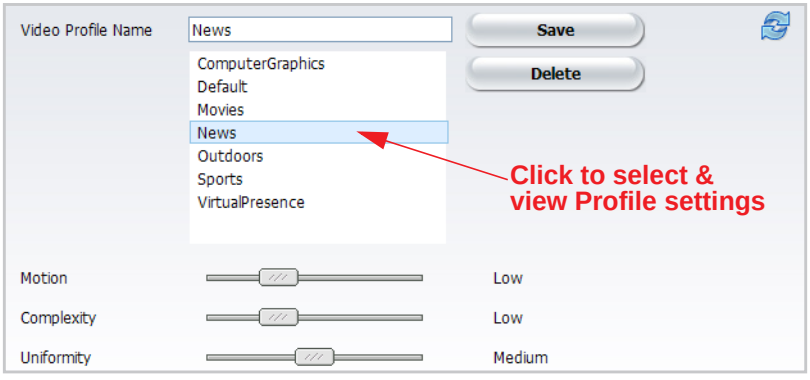
1. Click SYSTEM from the main menu, and then click ENCODER>PROFILES from the submenus.

   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 100.

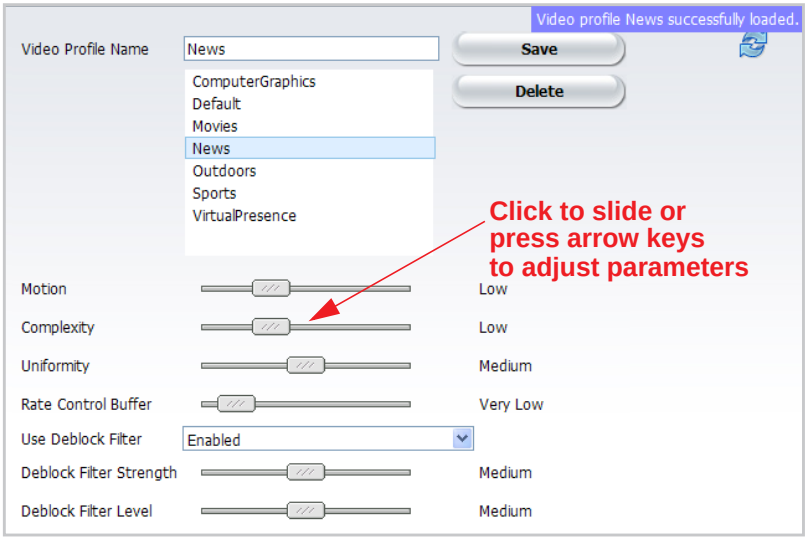
2. To view the parameter settings associated with a particular Profile, click the Profile name in the selection list, for example, "News".



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 96.



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 100 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 quality video 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	Low
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)	Very High *see NOTE on page 99
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)	Low

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)	Low

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

For example, even if you have 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 bigger 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.

	Default Video Profiles						
Video Quality Parameters	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

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.

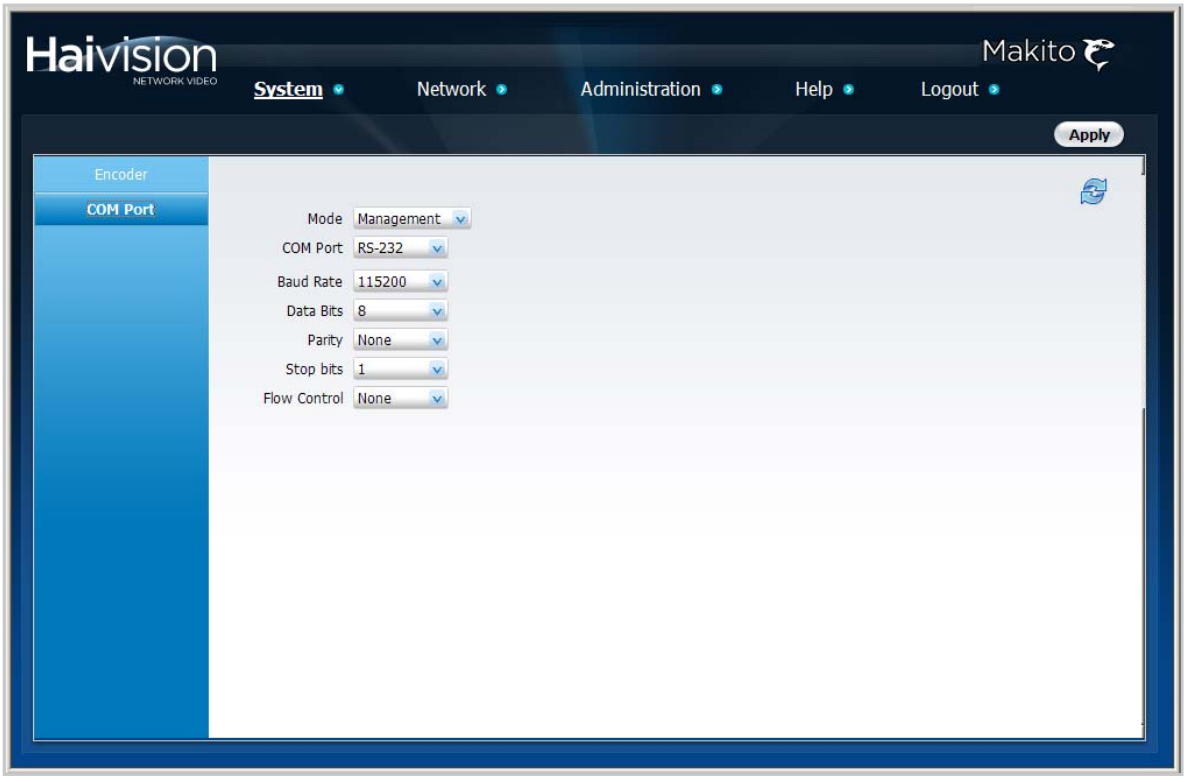
Also, on systems with the Metadata Capture option installed, you can use the serial port interface to capture either KLV (Key Length Value) or CoT (Cursor on Target) metadata, which will then be incorporated within the metadata elementary stream of the standard MPEG Transport Stream. For more information, see "Configuring Metadata Capture" on page 71.

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 submenu.

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



The COM Port Settings are as follows:

COM Port Setting	Default	Description/Values
COM Port	RS-232	Specifies the type of serial interface: • RS-232 or • RS-422 (only available if the Metadata Capture option is installed).
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.
Baud Rate	115200	The COM Port bitrate: 115200
Metadata Capture only		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 31.

Configuring Network Settings

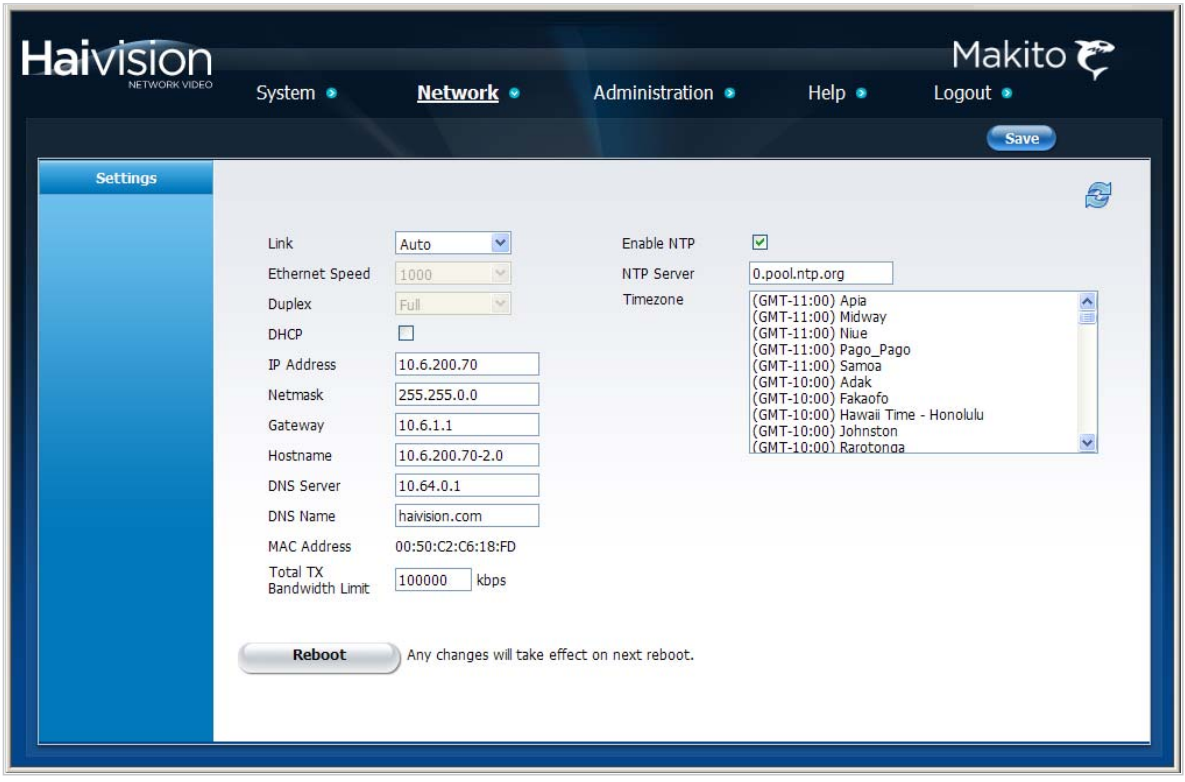
From the NETWORK SETTINGS page, you can modify the network interface settings for the encoder, including the unit's IP Address. You can also configure Network Time Protocol (NTP) support to synchronize the encoder clock with the selected time zone.

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 104.

3. To save your changes, click Save.

You must reboot the system for the changes to take effect. The Reboot button appears after you click Save.

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.

Network Setting	Description/Values (Cont.)
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.
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	(Optional) Enter the DNS server address for your network.
DNS 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.

To view status information:

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

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

The STATUS settings are read-only.

Status Setting	Description/Values
Card Status	OK or error message if applicable.
Card Type	Makito

Status Setting (Cont.)	Description/Values (Cont.)
Part Number	The Haivision part number for the encoder: B-290E-DVI or B-290E-HDSDI
Serial Number	The serial number for the encoder.
System Uptime	The length of time (mm:ss) the encoder has been "up" and running.
Encoding Chipset Load	(Read-only) The combined video encoding processor usage in percentage% (combining both Hi and Lo streams).
Firmware Version	The firmware version of the encoder, e.g., v2.0.0
Firmware Date	The firmware release date.
Hardware Version	The hardware version of the encoder. NOTE: This is important if you need to reset the encoder. For the Makito-SDI, the power and factory reset procedures depend on whether you have Hardware Version 0 (which does *not* have a Reset micro switch) or Hardware Version 3. Please see "Resetting the Encoder" on page 47.
Boot Revision	The Boot revision of the encoder.

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 103.

Taking a System Snapshot

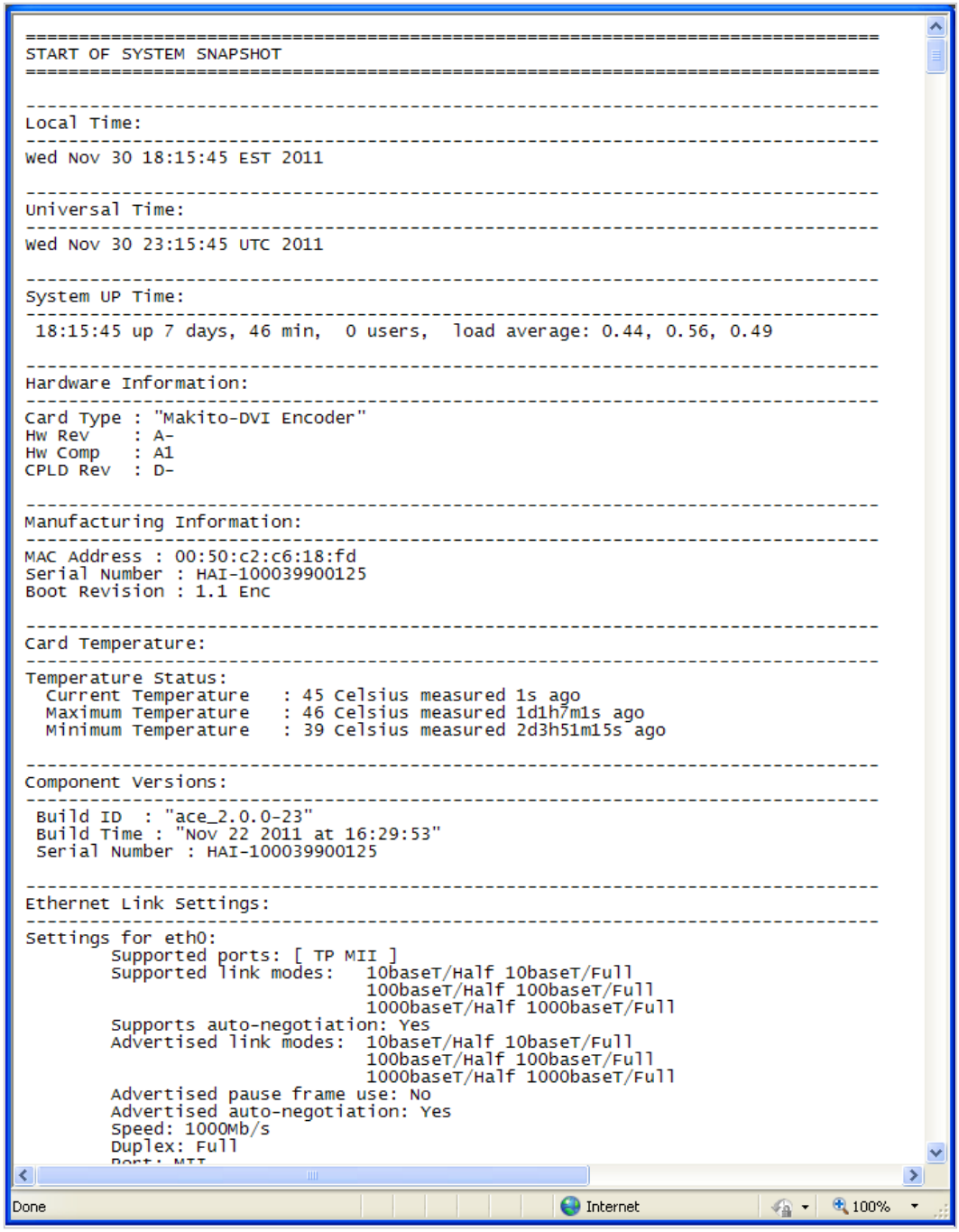
Taking a system snapshot can be useful for troubleshooting and may be forwarded to Haivision Technical Support if you are requesting technical support.

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 Nov 30 18:15:45 EST 2011

--------------------------------------------------------------------------------
Universal Time:
--------------------------------------------------------------------------------
Wed Nov 30 23:15:45 UTC 2011

--------------------------------------------------------------------------------
System UP Time:
--------------------------------------------------------------------------------
 18:15:45 up 7 days, 46 min,  0 users,  load average: 0.44, 0.56, 0.49

--------------------------------------------------------------------------------
Hardware Information:
--------------------------------------------------------------------------------
Card Type : "Makito-DVI Encoder"
Hw Rev    : A-
Hw Comp   : A1
CPLD Rev  : D-

--------------------------------------------------------------------------------
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   : 46 Celsius measured 1d1h7m1s ago
  Minimum Temperature   : 39 Celsius measured 2d3h51m15s ago

--------------------------------------------------------------------------------
Component Versions:
--------------------------------------------------------------------------------
 Build ID  : "ace_2.0.0-23"
 Build Time : "Nov 22 2011 at 16:29:53"
 Serial Number : HAI-100039900125

--------------------------------------------------------------------------------
Ethernet Link Settings:
--------------------------------------------------------------------------------
Settings for eth0:
        Supported ports: [ TP MII ]
        Supported link modes:   10baseT/Half 10baseT/Full
                                100baseT/Half 100baseT/Full
                                1000baseT/Half 1000baseT/Full
        Supports auto-negotiation: Yes
        Advertised link modes:  10baseT/Half 10baseT/Full
                                100baseT/Half 100baseT/Full
                                1000baseT/Half 1000baseT/Full
        Advertised pause frame use: No
        Advertised auto-negotiation: Yes
        Speed: 1000Mb/s
        Duplex: Full
        Port: MII
```


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

Saving and Loading Configurations

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.

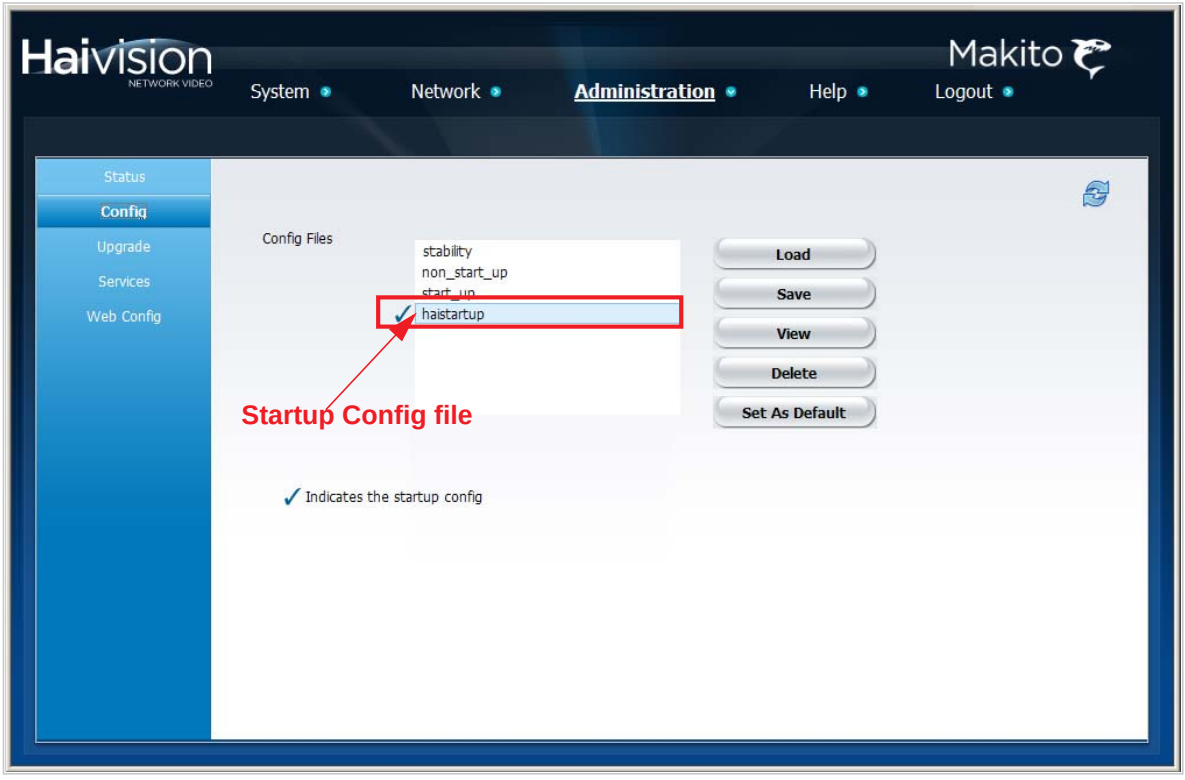
You can then direct the system to read this configuration file to restore these settings when the system start-up process performs the configuration autoload.

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 submenu.

   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.

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:

```
[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=DVI
AspectRatio=Auto
ColorSpace=Auto
TimeCode=None
ClosedCaption=On
AutoStart=Yes

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

[Audio Encoder 0]
AudioBitRate=128
PTSOffset=0
AudioInput=Analog
AudioSampleRate=48
AudioMode=Stereo
AudioAlgorithm=MPEG2-AAC-LC-ADTS
Capture=No
MaxCaptureSize=8000
AudioLevel=6
AutoStart=Yes

[Audio Encoder 1]
AudioBitRate=128
PTSOffset=0
AudioInput=Analog
AudioSampleRate=48
AudioMode=Stereo
AudioAlgorithm=MPEG2-AAC-LC-ADTS
Capture=No
MaxCaptureSize=8000
AudioLevel=6
AutoStart=No

[SNAPSHOT]
Quality=100
Format=JPEG

[TALKBACK]
Volume=10
Port=9177
AutoStart=No

[STREAM_1]
ID=1
```

Installing Firmware Upgrades

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.

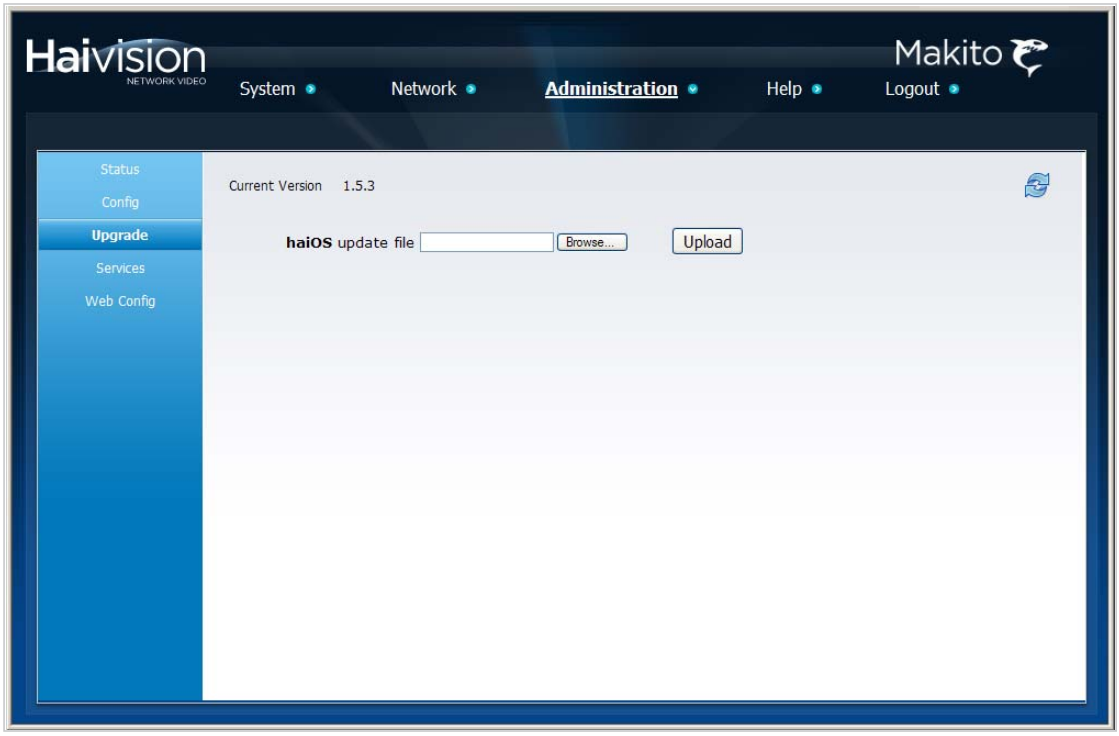
The firmware upgrade comes in the form of a file with the extension .hai, which when loaded will replace the application on your Makito.

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 sub-menu.

   The UPGRADE page opens displaying the currently installed firmware version, as shown in the following example.



2. Type the full path and name of the .hai file to upload, or click Browse to select the file.

3. Click Upload.

   The Uploading File page opens.

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

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

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).

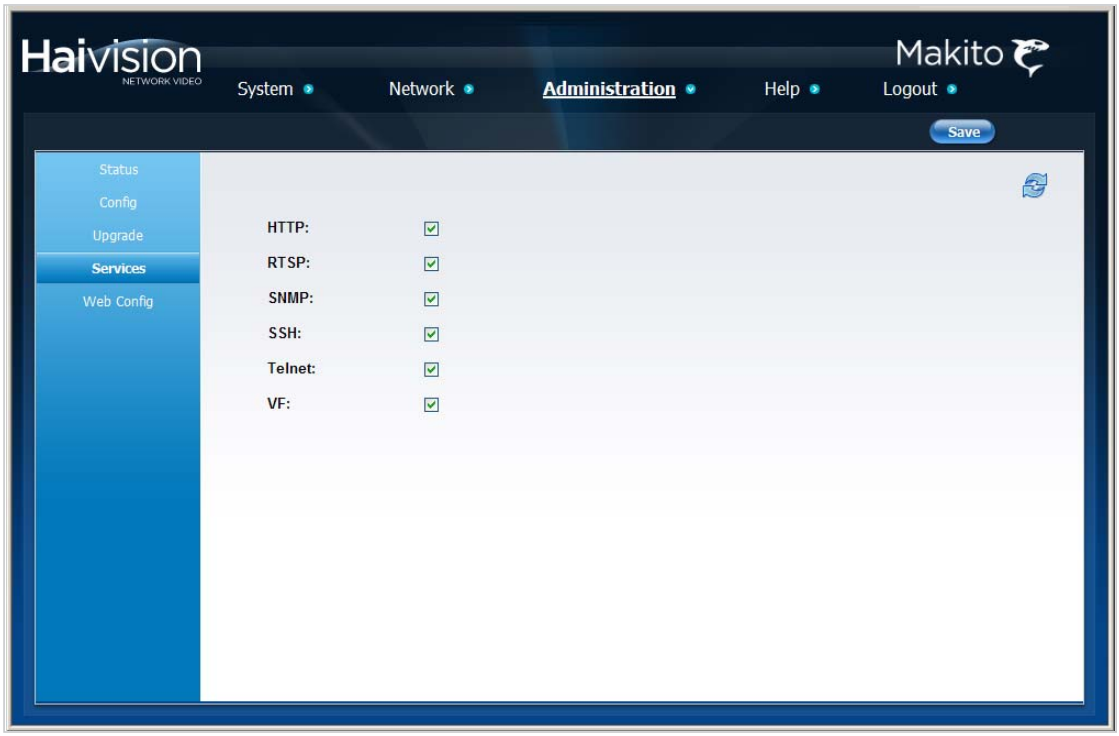
Enabling and Disabling Network Services

For security purposes, you 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, Telnet, and VF.

To enable or disable network services:

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

   The Services are as follows:

Service	Description
HTTP	Hypertext Transfer Protocol, used for Web browsers acting as a client.
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.

Service (Cont.)	Description (Cont.)
SSH	Secure Shell, a network protocol that allows data to be exchanged using a secure channel between two networked devices.
Telnet	Telnet, a network protocol used on the internet or local area networks to provide a bidirectional communications via a virtual terminal connection.
VF	Any Furnace servers that may be communicating with the encoder. Note that VFPilot provides access to encoder configuration 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 47.) Once the serial port is dedicated for metadata capture, it is no longer usable for CLI management.

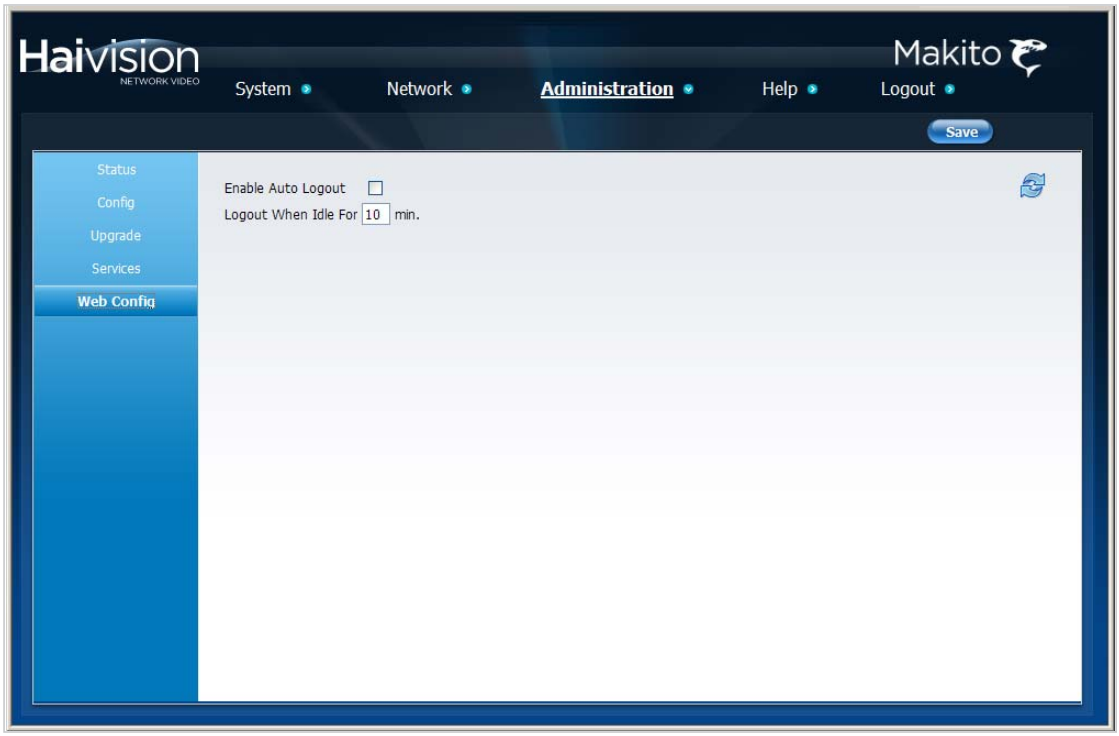
Configuring Auto Logout

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 period of idle time. If the user has been inactive for too long, then the user is automatically logged out and redirected to the Login page. You can set the maximum idle time.

To enable or disable Auto Logout:

1. Click ADMINISTRATION from the main menu, and then click WEB CONFIG from the submenu.

   The WEB CONFIG page opens as shown in the following example.



2. To enable Auto Logout, check the checkbox.
3. Type in the maximum length of time the system may be idle before the user will be logged out. The default is 15 minutes.
4. To save your changes, click Save.

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: 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 121.

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. This SNMP agent answers requests and issues traps (event notifications) to NMSs that are allowed to access the system.

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 128.

Supported MIBs

The Makito SNMP agent supports the MIB-II (RFC 1213) standard and its updates, SNMPv3 MIBs, as well as the Haivision Network Video proprietary Enterprise MIB. The following table lists the supported MIBs:

Supported MIBs	Standard	Description
• RFC1213-MIB.txt • SNMPv2-MIB.txt • IP-MIB.txt • IF-MIB.txt • TCP-MIB.txt • UDP-MIB.txt	MIB-II (RFC 1213)	Defines the general objects for use with a network management protocol in TCP/IP internets and provides general information about the unit.
• SNMP-USER-BASED-SM-MIB.txt • SNMP-USM-AES-MIB.txt • SNMP-VIEW-BASED-ACM-MIB.txt	SNMPv3	Supports SNMPv3 User-based Security Model (USM) and View-based Access Control (VACM).
• 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) and to set up traps. 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),
- trap destinations (i.e., the trap sink community to use).

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

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

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

SNMP Traps

Traps are SNMP messages that the SNMP agent sends to management stations when events, alarms or faults occur in the system or on the network. The Makito generates trap messages and sends them to active management stations that are identified as the trapcommunity in the Trap Destinations section in the snmpd.conf file.

The following traps are generated by the Makito:

SNMP Trap	Description
coldStart	A coldStart trap indicates that the sending protocol entity (i.e., the Makito) has re-initialized itself and is ready to operate. The coldStart trap is generated when the Makito is powered on. It is developed in accordance with RFC 1215 - MIB.
linkDown or linkUp	A linkDown trap signifies that the sending protocol entity (i.e., the Makito) recognizes a failure in one of the communication links represented in the SNMP agent's configuration. A linkUp trap signifies that the sending protocol entity recognizes that one of the communication links represented in the SNMP agent's configuration has come up. These traps are generated when the Ethernet interface goes down or up. These traps are developed in accordance with RFC 1215 - MIB.

nmcfg

nmcfg is the configuration script that helps the configuration of the SNMP agent. It is particularly useful for the creation and management of SNMPv3 users of the User-based Security Model (USM) 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    users       auth         guest                 -
usm    admins      priv         johndoe               -
v2c    admins      noauth       admin                 localhost
v2c    admins      noauth       admin                 localnet
v2c    users       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

- “nmcfg” on page 157

SNMPv3

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

The following command creates the user "johndoe" and defines its authentication protocol and password, and its privacy (encryption) protocol and password. (Note that you can type nmcfg user help to view the supported protocols and pass phrase restrictions.)

```
# nmcfg user define johndoe SHA "password" AES "pass phrase"
```

The new user has no permissions until a rouser or rwuser line is added in the snmpd.conf configuration file. The command below shows that read and write permission is granted if the user issues authenticated requests. Note that encryption (privacy) implies authentication.

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

The following line is added by the above command in the snmpd.conf configuration file:

```
rwuser johndoe auth
```

To assign Makito user group privileges instead of the read-only or read-write permissions (to the whole MIB), the ro or rw parameter of the nmcfg access command can be replaced by the access group admins, operators, or users. These groups provide to SNMP v1/v2c communities and SNMPv3 USM users access privileges modeled on the Makito CLI and Web interface privilege levels.

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

The following line is added by the above command in the snmpd.conf configuration file, using a VACM group defined in snmpd.local.conf:

```
group _operators_auth_ usm johndoe
```

Examples

The following examples show how the v3 parameters are used with the SNMP commands.

The following get command has the required security level (authentication) and succeeds.

```
# snmpget –v3 –u johndoe –a SHA –A "password" –l authNoPriv localhost
  sysName.0
SNMPv2-MIB::sysName.0 = STRING: razor
#
```

The following get command provides no security (no authentication, no privacy) and fails.

```
# snmpget -v3 -u johndoe -l noAuthNoPriv localhost sysName.0
Error in packet
Reason: authorizationError (access denied to that object)
#
```

The following set command provides the highest security level (authentication and privacy), even if access policy only required authentication, and succeeds.

```
# snmpset -v3 -u johndoe -a SHA -A "password" -x AES -X "pass phrase" -l
  authPriv localhost 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 send an SNMP notification to a manager.	snmptrap
To retrieve the values of *all* objects under a particular location in the MIB object hierarchy tree. Use to obtain the values of all the objects under the system and interfaces nodes. NOTE: The retrieval of a complete subtree is referred to as "walking the MIB."	snmpwalk

The SNMP utilities are located in the directory /usr/bin.

For more information on an SNMP command, enter the command with the -h (or --help) argument.

SNMP Syntax for Setting Up Streams

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.

CLI Access Control

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

Command	Admins	Operators	Users
Web access	Yes	Yes	Yes
Telnet to Encoder	Yes	Yes	Yes
Serial access to Encoder	Yes	Yes	Yes
videnc	Yes	Yes	"get" only
audenc	Yes	Yes	"get" only
stream	Yes	Yes	"get" only
haiversion	Yes	Yes	Yes
package (for upgrade)	Yes	No	No
config	Yes	Yes	"list" only
ethercfg	Yes	No	No
ipconfig	Yes	"display" only	"display" only
logo	Yes	Yes	"get" and "list" only
metadata	Yes	Yes	"get" only
mklogo.sh	Yes	Yes	No
mkstill.sh	Yes	Yes	No
nmcfg	Yes	No	No
service	Yes	Yes	"status" only
snapshot	Yes	Yes	"get" and "list" only
still	Yes	Yes	"list" only
system_snapshot.sh	Yes	Yes	Yes
talkback	Yes	Yes	Yes
temperature	Yes	Yes	"get" only
Telnet from Encoder	Yes	Yes	Yes
ping	Yes	Yes	Yes
traceroute	Yes	Yes	Yes
reboot	Yes	Yes	No
passwd	Yes	"operator" password only	"user" password only

For an overview of system access control on the Makito, see “Access Control” on page 56.

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 68.) 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 (Cont.)	Default (Cont.)	Description/Values (Cont.)
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.

NOTE If you are using HaiPLAY as the decoder, you will need to change the default audio algorithm parameter setting to mpeg4adts, because HaiPLAY only supports MPEG4 ADTS encapsulated audio.

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 (required when using HaiPLAY as the decoder).
# 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 the Audio Settings on page 68

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.
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 110

ethercfg

SYNOPSIS

```
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: 100Mbs
        Duplex: Full
        Auto-negotiation: on
        Link detected: yes
```

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 example below).

```
$ 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 103

haiversion

SYNOPSIS

haiversion

DESCRIPTION

The haiversion command is used to display the Firmware Build ID and Build Time on the Makito. It also displays the serial number for the unit.

HAIVERSION EXAMPLE

# haiversion	Displays the Build ID, Build Time, and Serial Number for the unit.

```
$ haiversion
 Build ID  : "ace_1.5.0-7"
 Build Time : "Oct 22 2010 at 15:41:32"
 Serial Number : HAI-090022300012
$
```

SEE ALSO

- Viewing System Status Information on page 106

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: haivision.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" on page 103

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.sh command, or from the Web interface (MEDIA SETTINGS page, see "Logo Insertion/Overlay" on page 86).

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.

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.sh on page 154.
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 (Cont.)	Default (Cont.)	Description/Values (Cont.)
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.sh on page 154
- "Logo Insertion/Overlay" on page 86

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 (UDP) 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 for reception of multicast metadata. 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 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 (Cont.)	Default (Cont.)	Description/Values (Cont.)
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.
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 71

mklogo.sh

SYNOPSIS

```
mklogo.sh <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.sh 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.SH EXAMPLE

# mklogo.sh mylogo.jpg	Converts the file mylogo.jpg to mylogo.oly.

SEE ALSO

- logo on page 146
- "Logo Insertion/Overlay" on page 86

mkstill.sh

SYNOPSIS

```
mkstill.sh <infile> resolution
```

where:

infile — is the name of the image file to convert into a still image.

DESCRIPTION

The mkstill.sh 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.SH 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.SH EXAMPLE

# mkstill.sh myimage.jpg resolution=1080	Converts the image file myimage.jpg into a 1920x1080 still image.

SEE ALSO

- still on page 171
- "Still Image Streaming" on page 89
- "Selective Video Mute" on page 81

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 (admins, operators, and users).

Note that traps are not supported by the nmcfg script.

A detailed help, describing the options is available for each command option (for example, nmcfg access help or nmcfg user help).

For more information, see "nmcfg" on page 123 (in "SNMP Agent Components").

OPTIONS

access	Defines the access permissions granted to the v1/v2c communities and USM (v3) users. Only the USM security model option is shown in the summary help. The v2c security model, a different format for community configuration, is only displayed in the access detailed help. Note that the v2c security model also applies to SNMP v1.
community	Defines community-based (v1v/2c) security configuration for the 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 operators
```

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 admins priv
# nmcfg access usm permit johnsmith operators priv
# nmcfg access usm permit guest users
# 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           users       auth    guest                -
usm           admins      priv    joenet               -
usm           operators   priv    johnsmith            -
```

```
auth protocol          priv protocol  user
---------------------- -------------- -----------
MD5                    nopriv         guest
SHA                    AES            joenet
SHA                    AES            johnsmith
#
```

See Also

- "nmcfg" on page 123 (in "SNMP Agent Components")

package

SYNOPSIS

```
package list
package info [<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.

When package is entered without any actions or parameters, the system displays usage information for the command.

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.
install	Installs the specified package.
download	Downloads the specified package file using TFTP.
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 [<name>]
```

DESCRIPTION

The passwd command is used to change the password for a user account. If no name is specified, it changes the password for the current user. In the current release, it is used to change the password for one of the predefined user groups: user, operator, and admin.

EXAMPLES

# passwd	Changes the password for the current user account. The system prompts you to enter the old password and then the new password.
# passwd operator	Changes the password for the operator account. The system prompts you to enter the old password and then the new password. Note that you must be logged in as admin to change the password for an account other than your current account.

SEE ALSO

- "Access Control" on page 56

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 93.

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. NOTE: The Default Profile has the UseDeblockFilter parameter disabled, but shows the value “Medium” for DBFStrength and DBFLevel. However, these parameters have no effect when the UseDeblockFilter parameter is disabled.

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

- "Configuring Video Profiles" on page 93
- "Video Quality Parameters" on page 96
- "Default Profiles" on page 100

reboot

Synopsis

```
reboot
```

Description

The `reboot` command is used to 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 107

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 47.) 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 115

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 170.

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 can be specified 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	Sets the system-wide defaults for the preferred snapshot format to jpg at 80% image quality.

# 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 90

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 are 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.sh command, or from the Web interface (MEDIA SETTINGS page, see "Still Image Streaming" on page 89).

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.sh on page 155
- stillimage on page 176
- Still Image Streaming on page 89
- "Selective Video Mute" on page 81

stream

SYNOPSIS

```
stream create addr=ipaddr port=udpport [id=number] [name=text]
    [rtcp=on [rtcpport=udpport]] [ttl=16] [tos=0xB8] [mtu=1496]
    [encapsulation=ts-rtp | ts-udp | direct-rtp | 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]]
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 81. NOTE: If configured, a still image will be streamed instead of the configured video source. See "stillimage" on page 176.

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 177.
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
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.

Parameter	Default (Cont.)	Description/Values (Cont.)
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
		• qt - QuickTime
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.

Parameter	Default (Cont.)	Description/Values (Cont.)
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 61). 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 68). 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 149.
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
prcpid	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
program	1	(Optional) Program Identifier used in the Program Map Table (PMT) of the TS stream. 0..65535

Parameter	Default (Cont.)	Description/Values (Cont.)
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.sh command, or the Web interface MEDIA SETTINGS page (see "Still Image Streaming" on page 89).
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. 0..100%, default = 15 NOTE: To configure the ceiling percentage for CBR streams with metadata, see "Ceiling Percentage for CBR Streams with Metadata" on page 81.
idlecells	no	(Optional, shaping must be yes) When enabled, Idle TS cells will be inserted into a TS stream when necessary. yes,no
persistent	yes	When enabled, the stream will be saved when the configuration is saved (i.e., using config save). NOTE: Web Interface-created streams are "persistent". CLI-created streams are persistent unless this parameter is disabled at creation time. However, RTSP/VF initiated streams are not saved in the configuration file.

IMPORTANT you can specify up to eight streams – up to a maximum of 50 Mbps video bitrate (or 35 Mbps video bitrate with AES and FEC enabled).

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 # stream 3 pause # stream 3 resume	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 Pauses the stream created above, which activates the still image. 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 the Stream Settings" on page 74
- "Configuring the RTSP Server" on page 84

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

- “Taking a System Snapshot” on page 108

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 HaiPLAY v1.4.0.4) to the Makito, where it is played out of the encoder's 8-pin terminal block connector. See "Audio Interface" on page 24.

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

SEE ALSO

- "Audio Talkback" on page 28
- "Setting up Audio Talkback" on page 211

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

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 61.) 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 • SXGA 1280x1024p85 • SXGA60 1280x1024p60 • WXGA 1280x768p85 • WXGA75 1280x768p75 • WXGA60 1280x768p60 • XGA 1024x768p85 • XGA75 1024x768p75 • XGA60 1024x768p60

Parameter	Default (Cont.)	Description/Values (Cont.)
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]
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). • 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). • 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 144). This applies to both TV resolutions and graphic resolutions. NOTE: See “TimeCode Source” on page 66 for currently supported TimeCode features.

Parameter	Default (Cont.)	Description/Values (Cont.)
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. 0..1000 NOTE: With a GOP Size of 0 (referred to as “Infinite GOP” mode), the Encoder only generates one I-Frame at the beginning of the stream, followed by an infinite sequence of P-Frames. If the remote decoder is not started before the stream is created, the decoder will “miss” that I-Frame and will not be able to decode the stream. (An MPEG decoder requires an I-Frame to start decoding.)
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 205.
ptsoffset	50 ms.	Offset video timestamps by this value in ms. -1000,,1000

Parameter	Default (Cont.)	Description/Values (Cont.)
profile		The name of the video quality Profile to use with this encoder. NOTE: For information on the available Profiles, see "profile" on page 164.
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)

Parameter	Default (Cont.)	Description/Values (Cont.)
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, 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: See "Video Encoding" on page 193.

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 the Video Settings on page 61

APPENDIX B: Technical Specifications

This appendix lists the technical specifications for the Makito.

Topics In This Appendix

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: For supported video and graphic encoding resolutions, see tables on following page.
DVI Input Resolution / Scan Rate	1280x1024 75, 60 1280x768 85, 75, 60 1024x768 85, 75, 60
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 #B-290E-DVI)

Table B-1 Makito #B-290E-DVI Available Video Resolutions

		Y,Pb,Pr & Y,Cb,Cr TV Input Resolutions /Scan Rates										
Output Resolutions		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.

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.

Supported Graphic Encoding Resolutions (Makito #B-290E-DVI)

Table B-2 Makito #B-290E-DVI Graphic Resolutions

		RGB & RGBHV Computer Graphic Input Resolutions /Scan Rates							
Output Resolutions		1280x1024		1280x768			1024x768		
Name	Resolution	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	High	High	-	-	-
3/4 HD 720	960x720	-	-	-	-	-	-	-	-
1/2 HD 720	640x720	-	-	-	-	-	-	-	-
SD 480	720x480	All	All	All	All	All	All	All	All
SD 576	720x576	-	-	-	-	-	-	-	-
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
UXGA	1600x1200	-	-	-	-	-	-	-	-
WSXGA+	1680x1050	-	-	-	-	-	-	-	-
SXGA+	1400x1050	-	-	-	-	-	-	-	-
SXGA	1280x1024	High	High	-	-	-	-	-	-
	1280x960	-	-	-	-	-	-	-	-
	1440x900	-	-	-	-	-	-	-	-
WXGA	1280x800	-	-	-	-	-	-	-	-
WXGA	1280x768	High	High	High	High	High	-	-	-
XGA	1024x768	All	All	All	All	All	All	All	All
SVGA	800x600	All	All	All	All	All	All	All	All
VGA	640x480	All	All	All	All	All	All	All	All

Supported Video Encoding Resolutions (Makito-SDI #B-290E-HDSDI)

Table B-3 Makito-SDI #B-290E-HDSDI 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

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

Audio/Video Interfaces

AUDIO/VIDEO INTERFACES			
Video (Input) - Makito #B-290E-DVI			
	Y,Pb,Pr / RGBHV		Component Analog video
	Y,Cb,Cr / DVI		Component Digital video
Video (Input)- Makito-SDI #B-290E-HDSDI			
	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-299M		

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.

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)
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

Makito - SINGLE BLADE APPLIANCE (#B-290E-DVI/B-290E-HDSDI)	
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

6 Blade Chassis

Makito - 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

21 Blade Chassis

Makito - 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

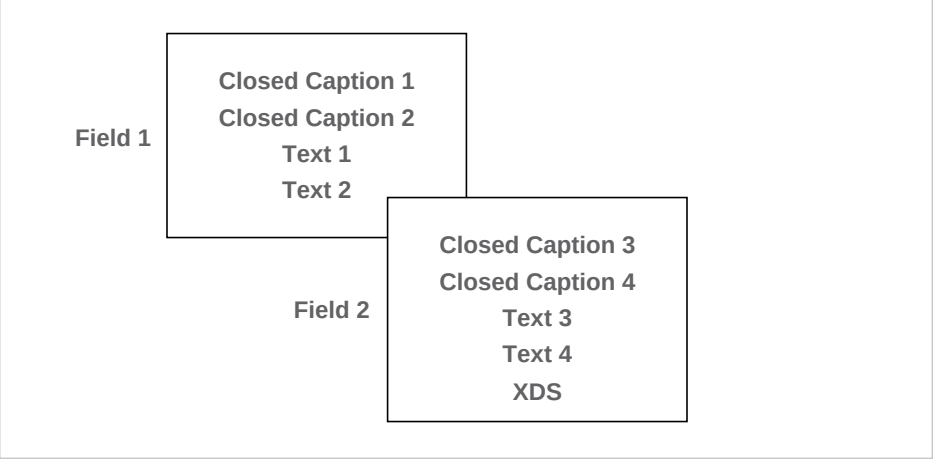
REGULATORY/COMPLIANCE	
Certification	UL / CSA / CE
Compliance	Electromagnetic Compatibility: EN 55022 (Emissions) / 55024 (Immunity)
	Safety (Low Voltage Directives): EN 60950-1 (CSA C/US) / IEC/EN 60950-1 (International /CB Scheme)
	Industry Canada Warnings: Canadian ICES-003, “Electromagnetic Compatibility” / 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	RoHS, European Union Directive 2002/95/EG
	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.]

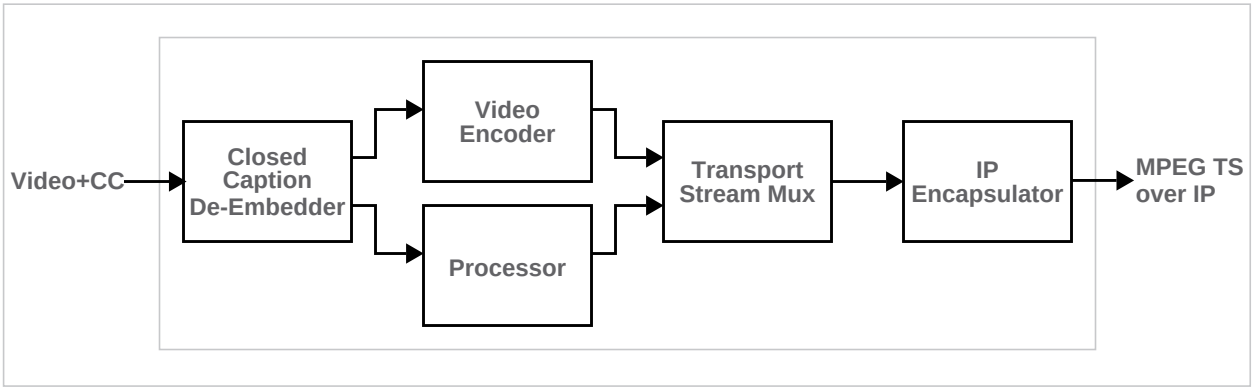
Figure B-1 EIA-608-B Line 21 Services



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 16 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 106 (System Status page)

CLI: "haiversion" on page 143 (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 104 (Network Settings page)

CLI: "ipconfig" on page 144 (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 31.

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 47.

For units that do not have a micro-switch, to perform a Power Reset, simply unplug and plug in the power connector. For more information, see "Hardware Version 3 Reset" on page 47.

To perform a Factory Reset, you need to open the chassis and slide the on-board reset switch. For more information, see "Hardware Version 0 Reset" on page 48.

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 82.

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

Why can't I hear audio in HaiPLAY from the Makito?

HaiPLAY only supports MPEG4 ADTS encapsulated audio. Therefore, to use HaiPLAY as the decoder, you need to change the default audio `algorithm` parameter setting to `mpeg4adts` (from the CLI). See "algorithm" on page 137.

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, time-stamping 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.

However, the customer or system integrator must develop their own application to send the audio stream to the encoder.

Upon request, Haivision provides a reference implementation (HaiPLAY v1.4.0.4 Commercial Version) to aid customer development.

Haivision's Furnace v6.0 with InStream 2 provides a Talkback audio stream to the encoder. For more information, see the Furnace Administration Guide available through Haivision's Download Center.

Talkback Audio Format Specifications

Below 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	2.6.10	GPL	www.kernel.org	Operating system
Distribution	MV4.0.1 Pro	MontaVista License Agreement	support.mvista.com	Target Application Packages
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	4.6p1	BSD	http://www.openssh.com	Free version of the SSH connectivity tools
Openssl	0.9.8l	Apache	http://www.openssl.org	Open Source toolkit implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) protocols
Zlib	1.2.3	Custom	http://zlib.net	Compression Library (required by openssl)

Please refer to the URLs listed above for details of each Open Source licensing agreement. Code for GPL-related components is available upon request.

For additional information, refer to http://www.fsf.org/licensing.

APPENDIX E: Warranty Information

Haivision Network Video One (1) Year Limited Warranty

Haivision warrants its hardware products against defects in materials and workmanship under normal use for a period of ONE (1) YEAR from the date of equipment shipment ("Warranty Period"). If a hardware defect arises and a valid claim is received within the Warranty Period, at its option and to the extent permitted by law, Haivision will either (1) repair the hardware defect at no charge, or (2) exchange the product with a product that is new or equivalent to new in performance and reliability and is at least functionally equivalent to the original product. A replacement product or part assumes the remaining warranty of the original product or ninety (90) days from the date of replacement or repair, whichever is longer. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes Haivision's property.

EXCLUSIONS AND LIMITATIONS

This Limited Warranty applies only to hardware products manufactured by or for Haivision that can be identified by the "Haivision" trademark, trade name, or logo affixed to them. The Limited Warranty does not apply to any non-Haivision hardware products or any software, even if packaged or sold with Haivision hardware. Manufacturers, suppliers, or publishers, other than Haivision, may provide their own warranties to the end user purchaser, but Haivision, in so far as permitted by law, provides their products "as is".

Haivision does not warrant that the operation of the product will be uninterrupted or error-free. Haivision does not guarantee that any error or other non-conformance can or will be corrected or that the product will operate in all environments and with all systems and equipment. Haivision is not responsible for damage arising from failure to follow instructions relating to the product's use.

This warranty does not apply:

(a) to cosmetic damage, including but not limited to scratches, dents and broken plastic on ports;

(b) to damage caused by accident, abuse, misuse, flood, fire, earthquake or other external causes;

(c) to damage caused by operating the product outside the permitted or intended uses described by Haivision;

(d) to a product or part that has been modified to alter functionality or capability without the written permission of Haivision; or

(e) if any Haivision serial number has been removed or defaced.

TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY AND REMEDIES PROVIDED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, STATUTORY, EXPRESS OR IMPLIED. AS PERMITTED BY APPLICABLE LAW, HAIVISION SPECIFICALLY DISCLAIMS ANY AND ALL STATUTORY OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRAN-

TIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES AGAINST HIDDEN OR LATENT DEFECTS. IF HAIVISION CANNOT LAWFULLY DISCLAIM STATUTORY OR IMPLIED WARRANTIES THEN TO THE EXTENT PERMITTED BY LAW, ALL SUCH WARRANTIES SHALL BE LIMITED IN DURATION TO THE DURATION OF THIS EXPRESS WARRANTY AND TO REPAIR OR REPLACEMENT SERVICE AS DETERMINED BY HAIVISION IN ITS SOLE DISCRETION. No Haivision reseller, agent, or employee is authorized to make any modification, extension, or addition to this warranty. If any term is held to be illegal or unenforceable, the legality or enforceability of the remaining terms shall not be affected or impaired.

EXCEPT AS PROVIDED IN THIS WARRANTY AND TO THE EXTENT PERMITTED BY LAW, HAIVISION IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY, INCLUDING BUT NOT LIMITED TO LOSS OF USE; LOSS OF REVENUE; LOSS OF ACTUAL OR ANTICIPATED PROFITS (INCLUDING LOSS OF PROFITS ON CONTRACTS); LOSS OF THE USE OF MONEY; LOSS OF ANTICIPATED SAVINGS; LOSS OF BUSINESS; LOSS OF OPPORTUNITY; LOSS OF GOODWILL; LOSS OF REPUTATION; LOSS OF, DAMAGE TO OR CORRUPTION OF DATA; OR ANY INDIRECT OR CONSEQUENTIAL LOSS OR DAMAGE HOWSOEVER CAUSED INCLUDING THE REPLACEMENT OF EQUIPMENT AND PROPERTY, ANY COSTS OF RECOVERING, PROGRAMMING, OR REPRODUCING ANY PROGRAM OR DATA STORED OR USED WITH HAIVISION PRODUCTS AND ANY FAILURE TO MAINTAIN THE CONFIDENTIALITY OF DATA STORED ON THE PRODUCT. THE FOREGOING LIMITATION SHALL NOT APPLY TO DEATH OR PERSONAL INJURY CLAIMS, OR ANY STATUTORY LIABILITY FOR INTENTIONAL AND GROSS NEGLIGENT ACTS AND/OR OMISSIONS.

OBTAINING WARRANTY SERVICE

Before requesting warranty service, please refer to the documentation accompanying this hardware product and the Haivision Support Portal http://support.haivision.com. If the product is still not functioning properly after making use of these resources, please contact Haivision or Authorized Reseller using the information provided in the documentation. When calling, Haivision or Authorized Reseller will help determine whether your product requires service and, if it does, will inform you how Haivision will provide it. You must assist in diagnosing issues with your product and follow Haivision's warranty processes.

Haivision may provide warranty service by providing a return material authorization ("RMA") to allow you to return the product in accordance with instructions provided by Haivision or Authorized Reseller. You are fully responsible for delivering the product to Haivision as instructed, and Haivision is responsible for returning the product if it is found to be defective. Your product or a replacement product will be returned to you configured as your product was when originally purchased, subject to applicable updates. Returned products which are found by Haivision to be not defective, out-of-warranty or otherwise ineligible for warranty service will be shipped back to you at your expense. All replaced products and parts, whether under warranty or not, become the property of Haivision. Haivision may require a completed pre-authorized form as security for the retail price of the replacement product. If you fail to return the replaced product as instructed, Haivision will invoice for the pre-authorized amount.

APPLICABLE LAW

This Limited Warranty is governed by and construed under the laws of the Province of Quebec, Canada.

This Limited Hardware Warranty may be subject to Haivision's change at any time without prior notice.

Haivision Network Video End User Software License Agreement

READ BEFORE USING

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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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6.4 Waiver and Amendment. No modification, amendment or waiver of any provision of this Agreement shall be effective. No failure or delay by either party in exercising any right, power or remedy under this Agreement, except as specifically provided herein, shall operate as a waiver of any such right, power or remedy. Without limiting the foregoing, any terms and conditions of the Entitlement or similar materials submitted by either party to the other shall be of no force or effect.

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6.6 Governing Law. 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).

6.7 Severability. If any provision of this Agreement is held by a court of competent jurisdiction to be contrary to law, such provision shall be changed and interpreted so as to best accomplish the objectives of the original provision to the fullest extent allowed by law and the remaining provisions of this Agreement shall remain in full force and effect.

6.8 Force Majeure. Neither party shall be liable to the other party for any failure or delay in performance to the extent that such delay or failure is caused by fire, flood, explosion, war, terrorism, embargo, government requirement, labor problems, export controls, failure of utilities, civil or military authority, act of God, act or omission of carriers or other similar causes beyond its control. If any such event of force majeure occurs, the party delayed or unable to perform shall give immediate notice to the other party, and the party affected by the other's delay or inability to perform may elect, at its sole discretion, to terminate this Agreement or resume performance once the condition ceases, with an option in the affected party to extend the period of this Agreement up to the length of time the condition endured. Unless written

notice is given within 30 calendar days after the affected party is notified of the condition, the latter option shall be deemed selected. During an event of force majeure, the affected party shall exercise reasonable effort to mitigate the effect of the event of force majeure.

If you have questions, please contact Haivision Systems Inc., 4445 Garand, Montréal, Québec, H4R 2H9 Canada.

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