

# Makito

X Series



## Makito™ X

Encoder Family  
User's Guide v2.1

HVS-ID-UG-MAKX-21  
Issue 01

# Haivision

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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.

## Waste Electrical and Electronic Equipment (WEEE) Disposal



This symbol on Haivision products or packaging means that the product should not be disposed of with general waste. It is your responsibility to dispose of your waste equipment by handing it over to a designated recycling collection point. The correct disposal of your end-of-life equipment will help prevent potential negative consequences to the environment and human health.

In accordance with the European Union (EU) WEEE Directive, Haivision products that fall within the scope of the WEEE, are labeled with the above symbol, and customers are encouraged to responsibly recycle their equipment at the time of disposal. Haivision also offers its customers the option of returning Haivision equipment to facilitate its environmentally sound disposal.

For more information, please visit our website at: <http://www.haivision.com/environment>

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# About This Guide

Welcome to the User's Guide for the Makito™ X Encoder Family, Version 2.1. This user's guide describes how to install, configure, and manage the Makito X to send audio, video, and data over an Ethernet-based IP network.

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

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## About Haivision

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

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

## Audience

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

## Reliability of Information

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

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## Obtaining Documentation

You may download the latest software, Release Notes, Getting Started Guide, and other relevant documentation from our Download Center at:

<http://www.haivision.com/download-center/>



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

---

## Related Documents

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

- Makito X Important Notice
- Makito X Getting Started Guide
- Makito XH (Harsh) Important Notice
- Makito XH (Harsh) Installation Guide
- Makito XR (Ruggedized) Important Notice
- Makito XR (Ruggedized) Installation Guide
- Makito X Decoder User's Guide
- SRT Deployment Guide
- Makito X Hardening Guide

## Service Support

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

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

## Document Conventions

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



**TIP** The light bulb symbol highlights suggestions or helpful hints.

---



**NOTE** Indicates a note, containing special instructions or information that may apply only in special cases.

---



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

---





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

---



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

---

## Safety Information

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

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

---

# New Product Features

Version 2.1 of the Makito X User's Guide introduces the following new features and enhancements:

## HEVC Encoder Support for 1080p60

A single 1080p60 input video signal can now be encoded at the native resolution (i.e., 1080p60) at a bitrate up to 15 Mbps.

## HEVC Encoders Now Support Interlaced Video

Interlaced video inputs (480i, 576i and 1080i) can now be encoded as interlaced video without the need to set the output resolution to a progressive format.

## Dual Channel HEVC Encoding

Two different input video signals with resolutions up to 720p60/1080i30/1080p30 can be encoded independently by the dual HEVC encoding cores. The total video encoder bitrate supported for all HEVC encoders is at least 15 Mbps.

## High/Low HEVC Encoding

A single video input signal of up to 1080p60 can be encoded at two lower resolutions/frame-rates. The aggregate encoding is limited to the equivalent of a 1080p60 video signal. For example, a 1080p60 input signal can be encoded as 1080p30 and 720p60. The total video encoder bitrate supported for all HEVC encoders is at least 15 Mbps.

## KLV/SDI AU (Access Unit) Rate Decimation

KLV/SDI metadata sources can now be frame decimated to reduce the bandwidth used by the metadata service.

## Unsaved Configuration Notification

Visual notifications are now displayed on systems with unsaved configurations at login, logout, or reboot to warn users to save their current configuration as a preset.

# CHAPTER 1: Introduction

This chapter provides a brief overview of the Makito X Encoder Family, along with a description of the main hardware components and key features.



**NOTE** References to the “Makito X” can be taken to include the following interfaces unless specifically stated otherwise:

- Makito X DVI (#S/B-292E-DVI)
- Makito X SDI: Dual-Channel (#S/B-292E-HDSDI2) or Single-Channel (#S/B-292E-HDSDI1)
- Makito X HEVC: Dual-Channel (#S/B-292E-SDI2-HEVC) or Single-Channel (#S/B-292E-SDI1-HEVC)
- Makito X (DVI or SDI) with Storage: Removable SSD (SKUs ending -RS) or Fixed SSD (SKUs ending -FS)
- Makito X Harsh Environment SDI: Dual-Channel (#S-292E-X2H) or Single-Channel (#S-292E-X1H)
- Makito XR (Ruggedized) SDI: with Dual Input (#S-292E-X2R) or Quad Input (#S-292E-X4R)
- Makito XCR (Compact Ruggedized) SDI: with Dual or Quad Input (#S-292E-XCR)

Unless otherwise specified, references to the “Makito X SDI” include 3G/HD/SD-SDI.

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## Product Overview

The Makito X Encoder Family delivers up to 12 HD channels of High Profile 1080p60 video with extremely low encoding latency, all within a single rack unit. The Makito X is available as an ultra compact SDI or DVI H.264 encoding appliance with optional HEVC encoding support, internal or removable storage, or within a high density 1RU (6 blades) or 4RU (21 blades) chassis.

The Makito X DVI supports HD up to 1080p60 (Component Analog or Digital) or computer resolutions up to 1920x1200 at 60 Hz (RGB or DVI-D) input via its DVI-I connector. The Makito X SDI supports SDI, HD-SDI, 3G-SDI and Composite on its BNC interface(s).

Supporting AES stream encryption and forward error correction (FEC), the Makito X is ideal for headend applications within enterprise, education, broadcast monitoring, medical, and military applications. Combined with Haivision's Furnace IP video system, the Makito X offers administrators fine-grained control over video stream access and distribution. The Makito X may be paired with the Makito decoder to achieve low end-to-end latency, as well as combined with Haivision's InStream multi-view performance player technology.

With four internal H.264 encoding engines, the Makito X can encode video at up to four different bitrates and profiles for Multi-bitrate (MBR) streaming to optimize video distribution. In addition, each engine can be then directed at multiple network destinations (unicast, multicast, TS and RTMP) concurrently, to serve desktops, laptops, mobile devices, set-top boxes, signage players, recorders, and streaming servers. The Makito X HEVC provides two HEVC encoding engines.

The Makito X with Storage dual-height model allows the compressed content to be recorded and stored locally on either a removable SSD (solid-state drive, SKUs ending -RS) or an internally installed fixed SSD (SKUs ending -FS). Recorded sessions may be exported to an FTP/SFTP server for use within Haivision media systems including Calypso and the Haivision Video Cloud (HVC), or stored locally on an SD card or USB storage device, or transferred to a network attached storage configuration drive (if installed).

Figure 1-1 Front View (Makito X Appliance with Storage, Dual Height Chassis)



Figure 1-2 Sample Rear View (DVI Blade #B-292E-DVI)

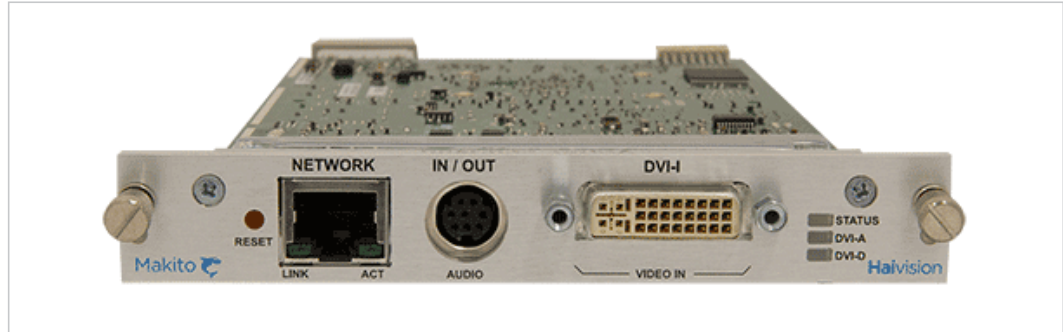
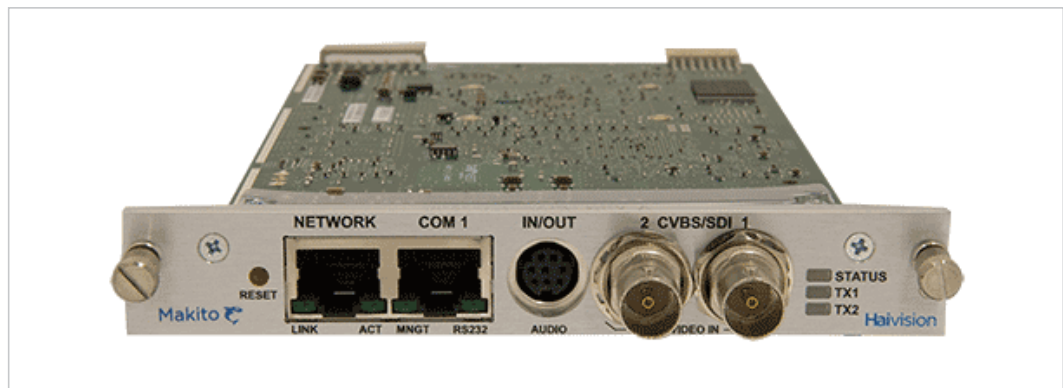


Figure 1-3 Sample Rear View (Dual SDI Blade #B-292E-HDSDI2)



## Chassis Styles

The Makito X is available in the following chassis styles:

- as an ultra-compact appliance (single-height or dual-height) for dual channel encoding,
- as a blade within a 1RU chassis (MB6X) that can contain up to six single-height or three dual-height Makito X or other Haivision encoder/decoder blades,
- as a blade within a 4RU chassis (MB21B) that can contain up to 21 single-height or ten dual-height Makito X or other Haivision encoder/decoder blades,
- the Makito X Harsh semi-ruggedized, industrial single or dual SDI encoder appliance,
- the Makito XR (“Ruggedized”) platform supporting two or four video input variants in a MIL-STD rugged appliance. Note that support for analog and embedded audio capture or encoding is not currently provided for the Makito XR.

The Makito X single chassis appliance and single blades are shown in the previous section (Figures [1-1](#), [1-2](#) and [1-3](#)). The Makito X with HEVC, MB21B and MB6X chassis, Makito X Harsh, and Makito XR are shown in the following figures.

Figure 1-4 Makito X HEVC Encoder, Rear View (#S-292E-SDI2-HEVC)



Figure 1-5 MB21B Multichannel Chassis (Top - Front, Bottom - Rear View)





Figure 1-6 MB6X Multichannel Chassis (Top - Front, Bottom - Rear View MB6X-MED)



**NOTE** The MB6X is available with a single AC, DC, or medical grade AC power supply. For details, see [“MB6X \(6-Slot\) Chassis”](#) on page 60.

Figure 1-7 Makito X Harsh (Dual SDI Encoder Appliance)





Figure 1-8 Makito XR (Ruggedized) (Quad SDI Encoder Appliance)



**NOTE** For details on the Makito X Harsh or Makito XR, please refer to the following documents available through Haivision's Download Center:

- Makito X Harsh Installation Guide
- Makito XR (Ruggedized) Installation Guide

## HEVC Encoding

The Makito X HEVC encoder is designed to support extreme low-latency broadcast and intelligence surveillance reconnaissance (ISR) applications. Features include:

- **Live Video Backhaul** - From anywhere, transport the highest quality, lowest latency, live video over any network with the Makito X HEVC encoder.
- **More Content - Less Operational Cost** With HEVC and Haivision's SRT (Secure Reliable Transport) support, the Makito X HEVC encoder makes low-cost, readily available public Internet connections secure and reliable for high quality live video transport, while saving bandwidth yet maintaining H.264 picture quality.
- **Performance Encoding with Metadata** In ISR applications, many full motion video (FMV) systems bundle additional information with video streams in the form of metadata. The Makito X HEVC optimizes the task of disseminating information in formats required by downstream networks, exploitation systems, and viewers, with the lowest possible delay, while preserving and enhancing metadata with frame accurate synchronization.

See "[Makito X HEVC Encoder, Rear View \(#S-292E-SDI2-HEVC\)](#)" on page 23 and "[Configuring HEVC Video Encoding](#)" on page 91.

## Storage and Recording

The Makito X with Storage dual-height models include 250 GB of either fixed or removable SSD (solid-state drive) storage that enables users to record content directly on the encoder, while simultaneously streaming live video from two sources.

The Makito X with Storage provides the following benefits:

- **Streaming Content Storage.** Encoded stream content may be stored for later retrieval, allowing continuous local recording of compressed content in real-time.
- **Snapshot Content Storage.** The storage module increases the amount of space that can be used to store image snapshots. Furthermore, if the storage media is removable (such as an SSD or USB thumb drive), the content can be moved without the need to download the content via the Ethernet port.
- Record streams in TS or MP4 file formats and automatically segment the recorded streams based on time and size.
- Browse recorded assets and play back MP4 recorded files directly within the Makito X user interface.
- Record high quality video (i.e., 20 Mbps) while streaming low to save on bandwidth.
- Automatically segment recordings to files (i.e., for long duration or continuous recording).
- Automatically export via FTP/SFTP.
- Ingest to Haivision Video Cloud (HVC) through a watch Folder.

For more information, see [“Storage Options \(Rear Panel\)”](#) on page 29.

## Applications

Typical examples of Makito X applications include:

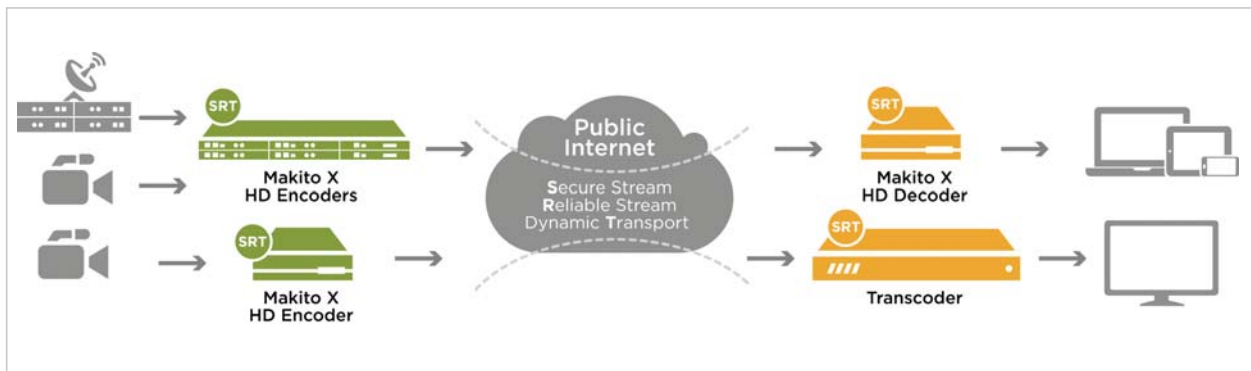
- **IPTV Distribution** – delivering video channels to viewers in schools, financial institutions, live event venues, control rooms, and within government organizations.
- **Medical Systems** – driving controlled and secure video throughout healthcare facilities enabling education, consultation, and 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)** – combining the excellent image quality and performance of 1080p60 high definition video with KLV/CoT metadata capabilities.

## Secure Reliable Transport (SRT)

Haivision's Secure Reliable Transport (SRT) technology is available on Makito X Series encoders and decoders. The SRT streaming protocol is designed to provide reliable and secure end-to-end transport between two SRT-enabled devices over a link which traverses the public Internet. SRT optimizes video streaming performance across unpredictable networks, recovering from packet loss, jitter, network congestion and bandwidth fluctuations that can severely affect the viewing experience.

SRT is applied to contribution and distribution endpoints as part of a video stream workflow. After encoding (or transcoding), SRT applies encryption and provides error recovery. Prior to decoding (or transcoding), SRT decrypts the stream and enables recovery from packet loss typical of Internet connections. At the same time, SRT detects the real-time network performance between the encode / decode / transcode endpoints. The endpoints can be dynamically adjusted for optimal stream performance and quality.

Figure 1-9 Makito X SRT Workflow



For details, see “[Configuring Secure Reliable Transport \(SRT\)](#)” on page 133. For additional information required to set up and tune SRT streams from the encoder to the decoder, please see the SRT Deployment Guide (available through Haivision's Download Center at: <http://www.haivision.com/download-center/>).

## Physical Description



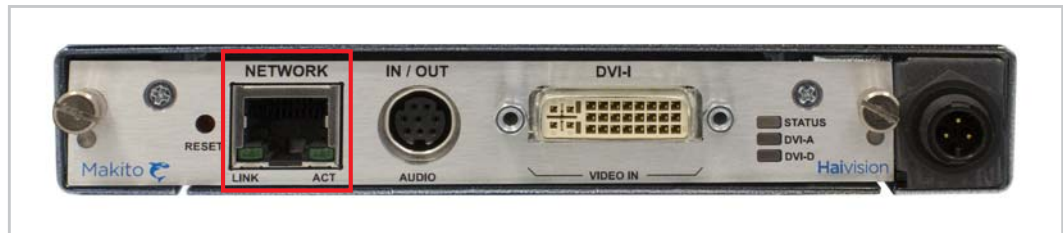
**NOTE** For details on the Makito XR and Makito X Harsh interfaces, please refer to the Installation Guides available through Haivision’s Download Center.

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

### System Interfaces (Rear Panel)

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

Figure 1-10 Ethernet Connection (DVI, #S/B-292E-DVI)



On the Makito X with SDI, a computer can be connected to the COM1 RS-232 serial port through its RJ45 connector (Serial Management adapter required, see [“Serial Management Adapter”](#) on page 47).

Figure 1-11 Serial Connection (SDI, Dual-Channel #S/B-292E-HDSDI2)



**NOTE** The COM1 port may also be used for KLV and CoT Metadata Capture and stream insertion (the KLV software option must be installed at the factory), as well as for bi-directional serial pass-through for controlling serially attached devices such as cameras.

## Related Topics

- [“Connecting the Encoder to the Network and a Computer”](#) on page 46
- [“Serial Interface Setup \(Makito X SDI only\)”](#) on page 47

## Storage Options (Rear Panel)

The Makito X provides the following mezzanine storage options for either the SDI or DVI appliances:

- Fixed (i.e., not accessible from the face-plate) mSATA SSD (solid-state drive) with USB 2.0 and SD card interfaces accessible from the face-plate.
- Removable 2.5” SATA SSD (solid-state drive), accessible from the face-plate with an Unmount push button with LED (showing mount status).

Figure 1-12 Dual SDI Appliance with Fixed (Internal mSATA SSD) Storage (#S-292E-SDI2-FS)



Figure 1-13 Dual SDI Appliance with Removable (SATA SSD) Storage (#S-292E-SDI2-RS)



Figure 1-14 DVI Rear View with Fixed (Internal mSATA SSD) Storage (#S-292E-DVI-FS)

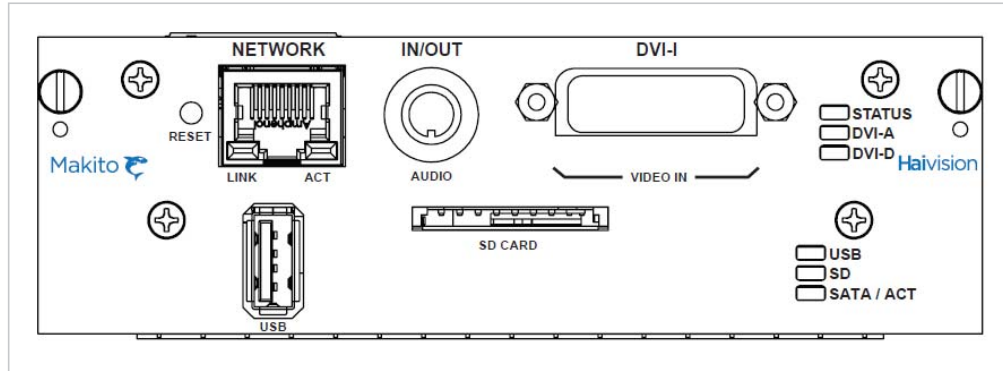
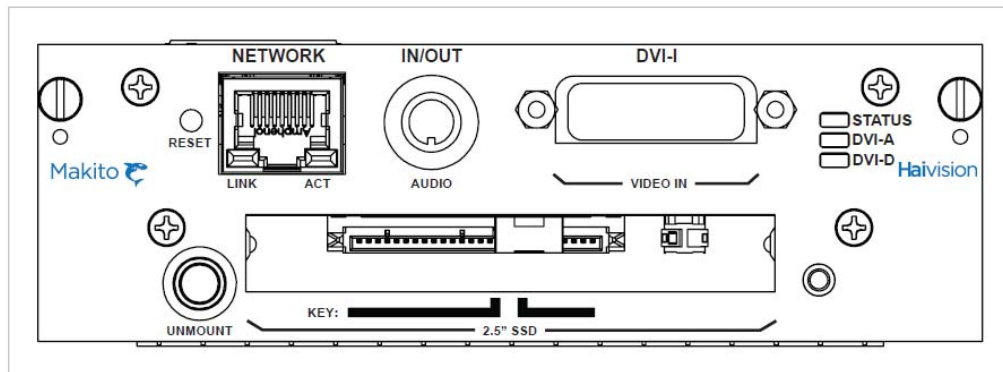


Figure 1-15 DVI Rear View with Removable (SATA SSD) Storage (#S-292E-DVI-RS)



**NOTE** The USB port and SD card port are currently limited to a destination for recording asset moves / copy operations or as a location to save image snapshots.



## Audio/Video Interfaces (Rear Panel)

**i** **NOTE** The Analog Audio interface is the same for both the Makito X DVI (#S/B-292E-DVI) and the Makito X SDI (#S/B-292E-HDSDI2).

### Makito X DVI-I Video and Embedded Audio Interface

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

Figure 1-16 DVI-I Video Interface (#S/B-292E-DVI)



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
- Two channels of DVI-I digital audio

Only one input format – either digital (DVI-D) or analog (DVI-A) – is encoded at a time.

**i** **NOTE** Additional Information:

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

### Related Topics

- [“Supported H.264 Video Encoding Input and Downscale Resolutions”](#) on page 377
- [“Supported H.264 Graphic Encoding Input and Downscale Resolutions \(Makito X #S/B-292E-DVI\)”](#) on page 379
- [“Connecting the DVI-I Interface \(Makito X-DVI\)”](#) on page 50

## Makito X SDI Video and Embedded Digital Audio Interface

The Makito X SDI video interface consists of either one or two 75Ω BNC connectors (shown below).

Figure 1-17 SDI Dual-Channel Video Interface (#S/B-292E-HDSDI2)

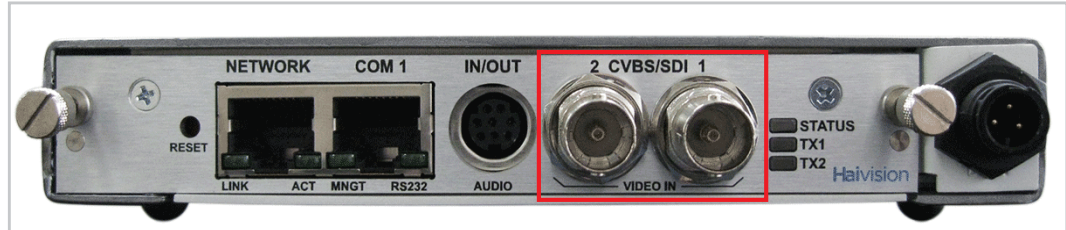


Figure 1-18 SDI Single-Channel Video Interface (#S/B-292E-HDSDI1)



The BNC connector(s) are 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(s) support auto-detection of the HD resolution and embedded digital audio.



**CAUTION** Be sure to use an HD video-capable RG-6 coaxial cable such as the Belden 1694A up to 300 feet. Otherwise, the video signal may be too attenuated and the encoder will not sync on it.

### Related Topics

- [“Supported H.264 Video Encoding Input and Downscale Resolutions”](#) on page 377
- [“Connecting the BNC/S-Video Interface \(Makito X SDI\)”](#) on page 51



## Analog Audio Interface

The Makito X analog audio interface consists of a single 8-pin Mini-DIN connector used for two-channel balanced/unbalanced analog audio input (one stereo pair) and mono audio output (for Audio Talkback).

Figure 1-19 Audio Interface



For the pinout, see [“Audio Connector Pinout”](#) on page 52.

An adapter is required to interface with the audio port. An RCA cable adapter for unbalanced audio is included in the package. An adapter for balanced audio may be ordered from Haivision. For details, see [“Audio Breakout Cables”](#) on page 55.

## Related Topics

- [“Connecting the Encoder to A/V Sources”](#) on page 50
- [“Audio Talkback”](#) on page 40

## LED Status Indicators (Rear Panel)

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

Figure 1-20 LED Status Indicators



Table 1-1 LED Status Indicators

Function	Description	Indication
STATUS	OFF	No power
	RED Solid	Error / Fault
	GREEN Blinking	Booting / Initialization
	GREEN Solid	No Fault / OK
TX1 / TX2 [SDI]	OFF	No video encoder is configured to use a given BNC. <b>NOTE:</b> Each TX LED is associated with the corresponding BNC connector.
	AMBER Solid	Either of the conditions below is sufficient to turn the LED AMBER: <ul style="list-style-type: none"> <li>Encoder booting</li> <li>Valid video input NOT detected (i.e., if you configure an encoder to use a BNC and there is no video input lock).</li> </ul>
	GREEN Solid	Valid video input detected (i.e., you have signal lock).
DVI-A / DVI-D	OFF	No valid signal is recognized; both LEDs are Off.
	GREEN Solid	DVI-D: a valid digital signal is plugged in. -OR- DVI-A: a valid analog/component signal is plugged in.

Table 1-1 LED Status Indicators (Cont.)

Function	Description	Indication
Network port		
LINK	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	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		
MNGT	OFF	Port configured in Metadata Capture Mode
	GREEN Solid	Port configured in Management Mode
RS232	OFF	Port configured in RS-422
	GREEN Solid	Port configured in RS-232

## Storage Mezzanine LED Status Indicators

The Makito X Storage Mezzanine LEDs are shown following.

Figure 1-21 Fixed Storage LED Status Indicators



Table 1-2 Fixed mSATA SSD with USB & SD LED Status Indicators

Function	Description	Indication
USB	OFF	LED remains Off until drive has booted.
	GREEN Solid	Indicates drive is ready to use.
SD	OFF	LED remains Off until drive has booted.
	GREEN Solid	Indicates drive is ready to use.
SATA/ ACT	OFF	LED remains Off until drive has booted.
	GREEN Solid	Indicates drive is ready to use.
	GREEN Blinking	SATA LED blinks briefly off when the SATA drive is being accessed.

Figure 1-22 Removable Storage Unmount Button/LED Status Indicator



Table 1-3 Removable SATA SSD LED Status Indicators

Function	Description	Indication
Mount Status LED /Unmount Button	OFF	SSD not mounted.
	BLUE Solid	SSD mounted and ready to use.
	BLUE Blinking	Blinks briefly off when the SATA drive is being accessed.
	BLUE Blinking two times per second	Slow flash occurs when Unmount button pushed. Blinking then stops, indicating that drive is unmounted and can be removed. <b>NOTE:</b> To unmount SATA drive, press button for three seconds.

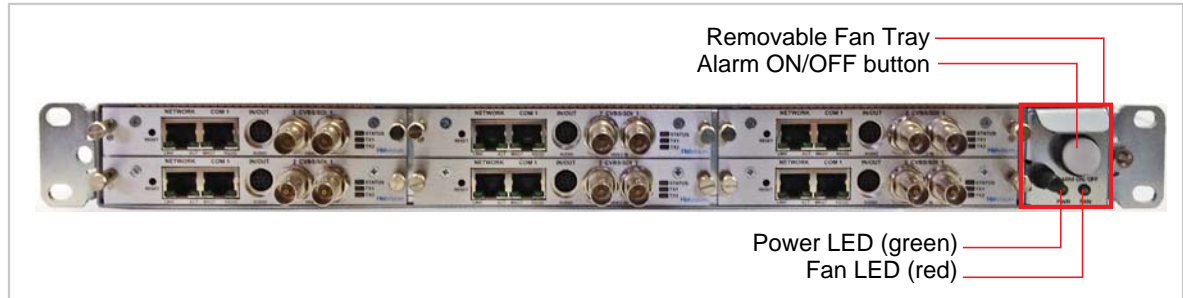
### Related Topics

- [“Powering Up the Unit”](#) on page 56

## MB6X Chassis Indicators and Alarms

Some MB6X chassis models have a removable fan tray, located on the far right side of the chassis (as shown below). The fan tray may be removed from the front of the chassis.

Figure 1-23 MB6X Chassis Front View showing Removable Fan Tray



The following table summarizes the functions of the fan tray LED indicators along with the alarm behaviors when faults occur.

Table 1-4 MB6X Fan Tray LED Status Indicators and Alarms

Indicator Color & Description			Configuration
Power LED	Fan LED	Audible Alarm	
OFF	OFF	OFF	No power to chassis.
Solid Green	Solid Green	OFF	Power applied to chassis and no issue/fault is reported.
Solid Green	Solid Red	ON	<p>Chassis Power-ON – Fault(s) Detected.</p> <p>The following faults will trigger the audible alarm and turn the FAN LED to RED:</p> <ul style="list-style-type: none"> <li>• One, some, or all fans are blocked,</li> <li>• One, some, or all fans have no power,</li> <li>• An electrical short is detected (V+ to GND) on the fan tray,</li> <li>• Thermocouple is missing,</li> <li>• Thermocouple is shorted,</li> <li>• Ambient temperature is over 55°C.</li> </ul>
Solid Green	Solid Red	OFF	<p>Chassis Power-ON – Fault(s) Detected – Mute button (Alarm ON/OFF) pushed</p> <ul style="list-style-type: none"> <li>• To mute the audible alarm, push the Alarm ON/OFF button. Once the button is pushed, the alarm is muted.</li> <li>• To re-activate the alarm, push the Alarm ON/OFF button a second time.</li> </ul>

For the procedure to replace the fan tray, see [“Replacing the MB6X Chassis Fan Tray”](#) on page 65.

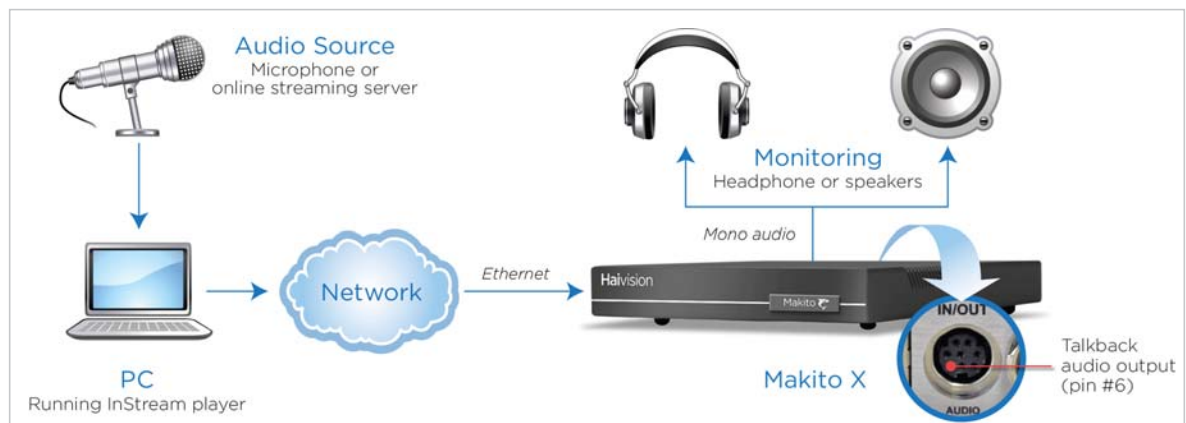
## Audio Talkback

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

The audio talkback feature uses the InStream software player application or the Makito X decoder (release 1.2 and later) to send the talkback audio to the Makito X. The talkback is played out of the encoder's 8-pin Mini-DIN connector (see [“Analog Audio Interface”](#) on page 33).

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

Figure 1-24 Audio Talkback Signal Path



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

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

The Talkback network service may be stopped or started from the Web interface (Services page, see [“Enabling and Disabling Network Services”](#) on page 189) or using the `service` command.

CLI commands are used to enable and disable reception of talkback audio, set the talkback volume, clear talkback statistics, and display talkback information. For details, see [“talk-back”](#) on page 353 (CLI). Talkback audio is not configurable through SNMP in the current release.





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

---

## Hardening

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

As of Version 1.5, the Makito X includes features that allow the administrative interface to be secured.

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



**NOTE** Any Makito X encoder at Version 1.5 or higher can be hardened by following the procedures described in this guide.

---

The Makito X Hardening Guide provides the procedures to install and configure Makito X encoders to be hardened. This guide is written for administrators and assumes that the reader is familiar with networks and network terminology. No encoder-specific knowledge is required. This guide also assumes that the reader is a trusted individual.

# CHAPTER 2: Installing the Encoder

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



**NOTE** For instructions on installing the Makito XR (Ruggedized) or Makito X Harsh, please refer to the following documents available through Haivision's Download Center:

- Makito XR (Ruggedized) Installation Guide
- Makito X Harsh Installation Guide

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<a href="#">COM1 Serial Port RJ45 Pinout (Makito X SDI only)</a>	48
<a href="#">Serial Management Adapter DB9 Pinout (Makito X SDI only)</a>	49
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## 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 the operating life span and stability of the unit(s).

Set up the encoder on a flat and reliable surface when using the single Makito X chassis, or mount in a rack, when using the 1U (MB6X) or 4U (MB21B) chassis.



**CAUTION** The MB21B chassis must either be installed on a securely fastened rack shelf, or fastened directly to the rack using support brackets. For instructions on how to properly secure or support the MB21B, refer to the MB21B Important Notice (provided in the package and available through Haivision's Download Center).

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## 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 5.
- The Makito X is an indoor appliance and should be kept in a dry, dust free environment.
- The only user-serviceable part is the RTC battery. There are no other 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 encoder's Network 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 (#S/B-292E-DVI)



To connect the Serial Interface (Makito X SDI only):

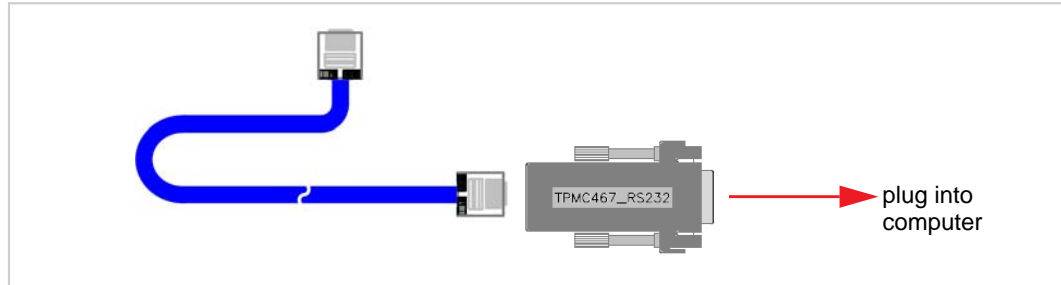
1. (Optional) Connect the encoder's COM1 port to the serial port of a computer. Use the gray RS-232 DB9 to RJ45 [Serial Management Adapter](#) (included in the package for appliances) and a standard straight Ethernet cable.

This will allow you to communicate directly from your computer to the Makito X 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 the following section, "[Serial Interface Setup \(Makito X SDI only\)](#)".

Figure 2-2 Network and Serial Connectors (#S/B-292E-HDSI2)



Figure 2-3 Serial Management Adapter



**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 28.
- To set the terminal parameters to interface with the serial COM1 port, see the following section, [“Serial Interface Setup \(Makito X SDI only\)”](#).

### Serial Interface Setup (Makito X SDI only)

The serial interface is available on the Makito X SDI Dual-Channel (# S/B-292E-HDSDI2), Single-Channel (#S/B-292E-HDSDI1), or Makito X with Storage: Removable SSD (SKUs ending -RS) or Fixed SSD (SKUs ending -FS).

Prior to logging in to the Makito X 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 X’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.

To get started, you must set the terminal parameters to communicate with the Makito X.



**TIP** The Makito X also supports bi-directional serial pass-through (RS-232/RS-422) for controlling serially attached devices such as PTZ controlled cameras. Passthrough settings are managed from the CLI. For more information, see [“passthrough”](#) on page 315.

To set up the serial interface:

1. Connect the Makito X'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 X. (See "[Powering Up the Unit](#)" on page 56.)
5. From the serial communication application, press **Enter** to get a prompt from the Makito X.

It takes approximately two minutes for the Makito X 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 194.

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

### COM1 Serial Port RJ45 Pinout (Makito X SDI only)

The COM1 serial port uses an RJ45 connector which has the following pinout:

Table 2-1 COM1 Serial Port RJ45 Pinout

Pin #	Signal RS-232	Signal RS-422
1	Not connected	Not connected
2	Not connected	Received Data -
3	Not connected	Transmitted Data +
4	Signal Ground	Signal Ground
5	Received Data	Received Data +
6	Transmitted Data	Transmitted Data -



Table 2-1 COM1 Serial Port RJ45 Pinout (Cont.)

Pin #	Signal RS-232	Signal RS-422
7	Not connected	Not connected
8	Not connected	Not connected



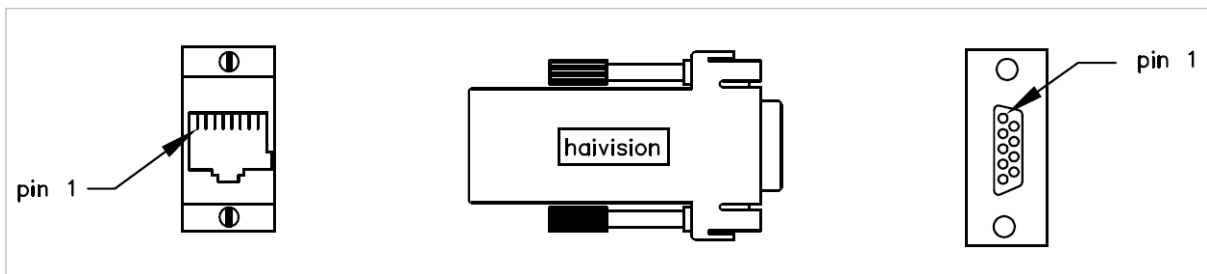
**NOTE** The COM1 Port is DTE (Data Terminal Equipment) which defines the direction of the signals (IN/OUT).

### Serial Management Adapter DB9 Pinout (Makito X SDI only)

An adapter is required to interface with the serial port. A (gray) DB9 to RJ45 Serial Management adapter (shown in [Figure 2-3](#) on page 47) is included in the package.

The Serial Management adapter has the following pinouts:

Management Port (RJ-45 Jack)			Serial Port (DSub-9 Female Connector)	
Pin #	Signal		Pin #	Signal
1	RI (Ring Indicator)	----- N/C	9	RI (Ring Indicator)
2	DCD (Data Carrier Detect)	-----	4	DTR (Data Terminal Ready)
3	DTR (Data Terminal Ready)	-----	6	DSR (Data Set Ready)
4	GND (Ground)	-----	5	GND (Ground)
5	RXD (Receive Data)	-----	3	TXD (Transmit Data)
6	TXD (Transmit Data)	-----	2	RXD (Receive Data)
7	CTS (Clear to Send)	-----	7	RTS (Request to Send)
8	RTS (Request to Send)	-----	8	CTS (Clear to Send)
			1	DCD (Data Carrier Detect)



## Connecting the Encoder to A/V Sources

### Connecting the DVI-I Interface (Makito X-DVI)



**NOTE** The same DVI connector is used for Analog (Component/RGB) or Digital (HDMI/DVI) input.

To connect the Makito X DVI-I Interface:

1. **Component Analog/Digital Video/Computer Graphics:** Connect your Video Source cable to the encoder's DVI-I Input connector.
2. **Analog Audio In:** Connect your Audio Source cable to the encoder's 8-pin Mini-DIN connector (shown below).
  - For unbalanced audio, use the 8-pin audio to 3-RCA female cable adapter (included in the package, shown [Figure 2-5](#) below).
  - A balanced audio cable adapter is available from Haivision upon request. (See ["Audio Breakout Cables"](#) on page 55.)

Figure 2-4 DVI-I Input Connections (#S/B-292E-DVI)

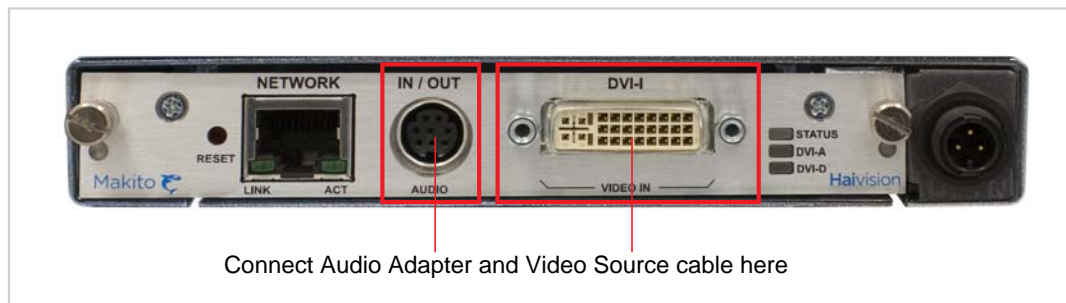


Figure 2-5 Audio to RCA Female Cable Adapter (Unbalanced)



Refer to ["Audio Connector Pinout"](#) on page 52 for the balanced/unbalanced audio pin-out.

## Related Topics

- [“Audio Connector Pinout”](#) on page 52

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



**NOTE** The same BNC connector is used for Composite and Serial Digital Interface (SDI) Video Input and Embedded Digital Audio Input.

## To connect the Audio/Video Interface:

1. **Video In:** Connect your Video Source cable(s) to one or both of the encoder’s Video Inputs, using the BNC connectors:
  - Composite (CVBS) Video
  - SDI Video/Audio (either SD, HD, or 3G-SDI)
2. **Analog Audio In:** Connect your Audio Source cable to the encoder’s 8-pin Mini-DIN connector (shown below).
  - For unbalanced audio, use the 8-pin audio to 3-RCA female cable adapter (included in the package, shown in [Figure 2-5](#) on page 50).
  - A balanced audio cable adapter is available from Haivision upon request. (See [“Audio Breakout Cables”](#) on page 55.)

Figure 2-6 SDI Input Connections (#S/B-292E-HDSDI2)



Refer to [“Audio Connector Pinout”](#) on page 52 for the balanced/unbalanced audio pinout.

**i** **NOTE** Selection between analog and digital (SDI) audio may be done via the Web interface or the Command Line Interface (CLI).

To configure the encoders, see [“Video Encoder Settings”](#) on page 92 (Web interface), or [“videnc Parameters”](#) on page 362 (CLI).

## Audio Connector Pinout

The Makito X mini-DIN-8 audio connector has the following pinout:

Figure 2-7 Mini-DIN-8 Audio Connector Pinout

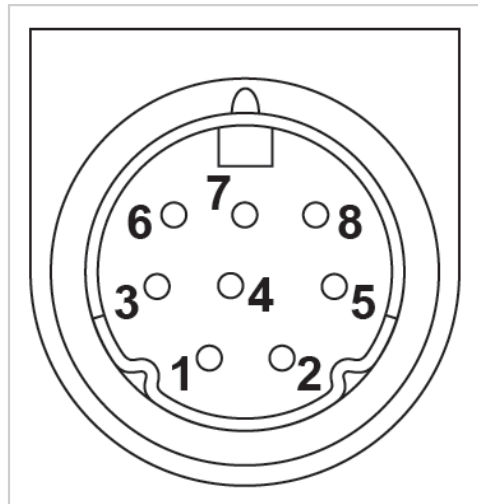


Table 2-2 Mini-DIN-8 Audio Connector Pinout

Pin #	Description
1	Reserved / Not Connected
2	Reserved / Not Connected
3	Reserved / Not Connected
4	Channel 2 Negative Signal
5	Channel 1 Negative Signal
6	Talkback Positive Signal
7	Channel 2 Positive Signal
8	Channel 1 Positive Signal

Figure 2-8 Unbalanced Audio Connection Details

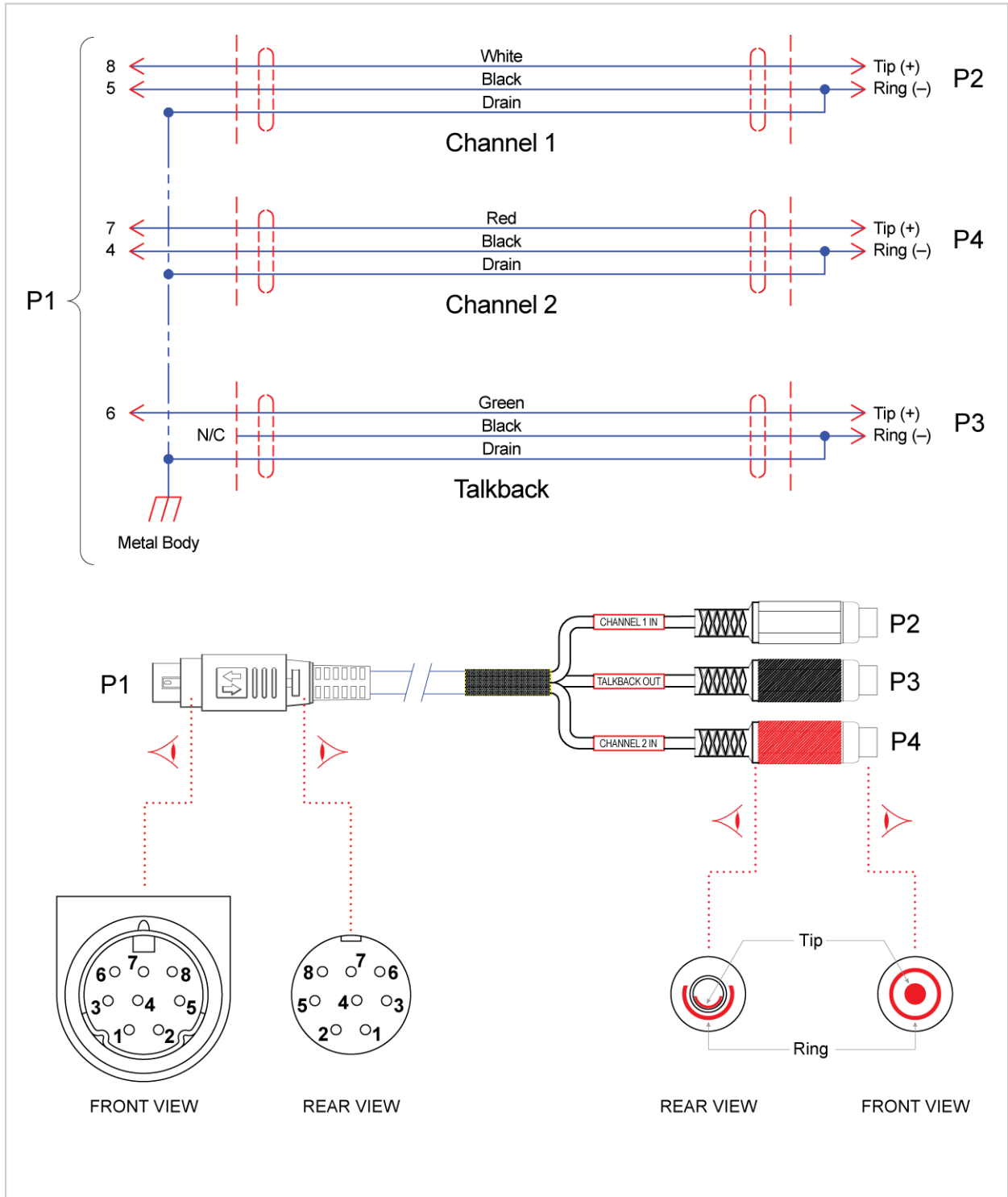
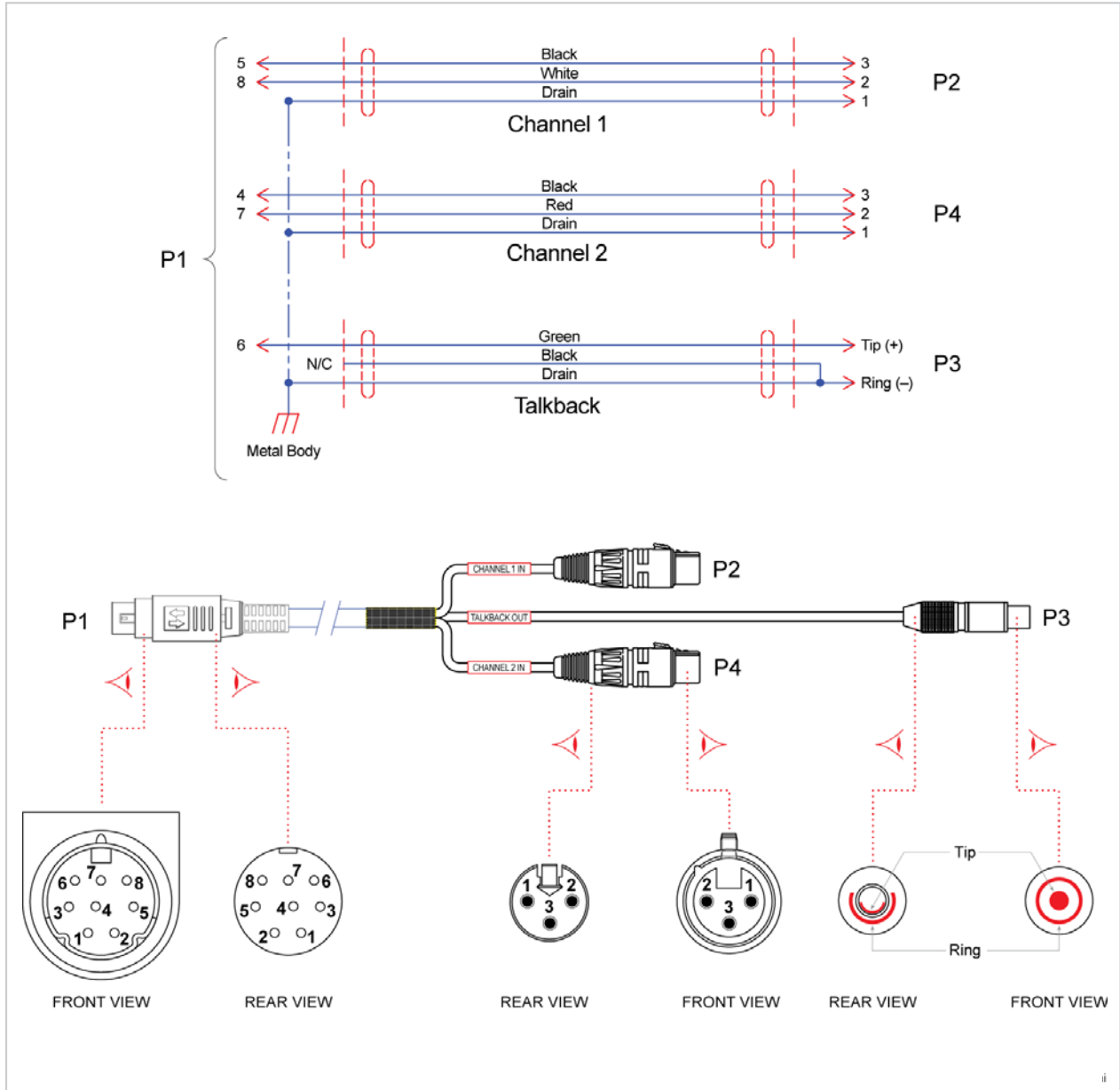


Figure 2-9 Balanced Audio Connection Details



### Related Topics

- For more information on the audio connections, see [“Audio/Video Interfaces \(Rear Panel\)”](#) on page 31.

## Audio Breakout Cables

The following table list the audio breakout cables available for the Makito X, including description and Haivision part numbers.

Table 2-3 Audio Breakout Cables for the Makito X

Cable	Description	Part Number
Makito X Series Audio Breakout Cable, Unbalanced	Unbalanced mini-DIN 8 to RCA Female <ul style="list-style-type: none"> <li>• 2 channels input</li> <li>• 1 channel output for talkback support</li> </ul> Included in the package (shown in <a href="#">Figure 2-5</a> on page 50).	CA-292-2RTB
Makito X Series Audio Breakout Cable, Balanced	Balanced mini-DIN 8 to XLR Female <ul style="list-style-type: none"> <li>• 2 channels input</li> <li>• 1 RCA female channel output for talkback support</li> </ul> May be ordered from Haivision. Please contact your sales representative or email Haivision at: <a href="mailto:sales@haivision.com">sales@haivision.com</a>	CA-292-2XFTB

## Powering Up the Unit

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

### Single-Height or Double-Height Chassis

Figure 2-10 Rear View (Single-Height Chassis #S/B-292E-HDSDI2) showing 3-pin Locking Power Connector

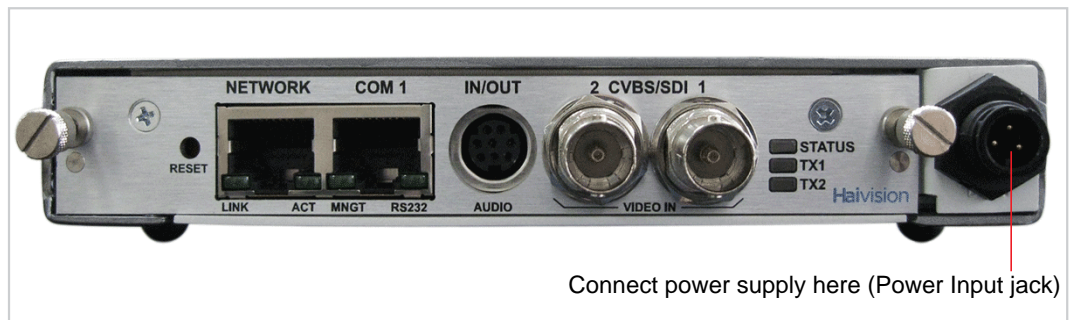
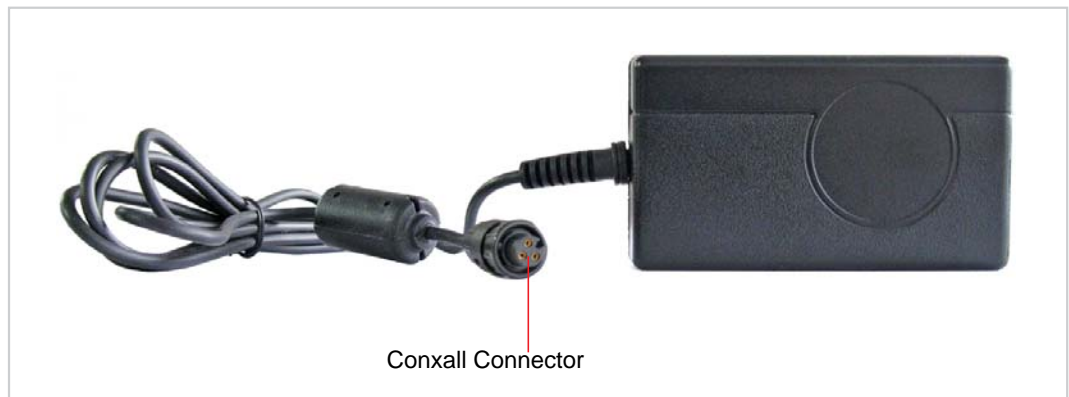


Figure 2-11 Single or Double-Height Chassis Power Adapter 12VDC with Conxall Connector



**NOTE** There is no power switch on the Makito X appliance. The power is automatically on when the unit is plugged in. The power supply cord is used as the main disconnect device.

Ensure that the AC socket outlet is located near the equipment and is easily accessible.



To power up the Single-Height or Double-Height Chassis:

1. Insert the Conxall connector on the 12V power supply into the Power input jack at the rear of the Makito X.



**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 a grounded 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.

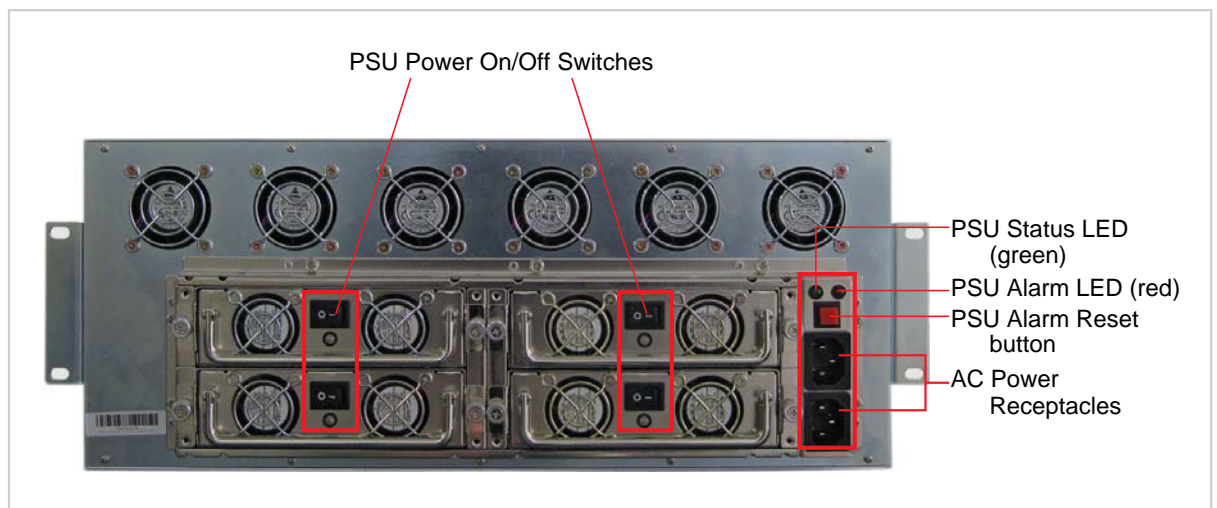
- To use the Web interface, see [“Logging In to the Web Interface”](#) on page 74.
- To enter CLI commands, see [“CLI Command Reference”](#) on page 245.

## MB21B (21-Slot) Chassis



**WARNING** To prevent electric shock, do not remove the cover of the MB21B chassis. There are no user-serviceable parts inside. The MB21B chassis is to be installed and serviced by qualified personnel only.

Figure 2-12 MB21B Chassis Rear View showing Power Connectors



Each socket on the PDU (Power Distribution Unit) powers a pair of PSUs (Power Supply Units). Two PSUs are sufficient to power a fully loaded chassis.

The MB21B chassis is designed to tolerate the following without loss of installed card functionality:

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

Since there are two power inlets on the MB21B chassis, the cards in the chassis can operate with only one powered; however, the chassis would not be fully redundant.

- The loss of one or two PSUs of the four PSUs in the MB21B chassis in any combination.

#### To power up the MB21B Chassis:

1. Turn all four PSU Power On/Off switches to the ON (1) position.
2. Connect the power cords to both power receptacles.
3. Plug both cords into earthed AC power sources.



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

---

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

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

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



**CAUTION** The power supply cords are used as the main disconnect devices on the MB21B chassis. Therefore, ensure that the socket-outlet is located/installed near the equipment and is easily accessible.

The MB21B chassis has more than one power supply cord. Be sure to disconnect both (2) power supply cords before servicing to avoid electric shock.

---

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

- To use the Web interface, see [“Logging In to the Web Interface”](#) on page 74.
- To enter CLI commands, see [“CLI Command Reference”](#) on page 245.

## MB6X (6-Slot) Chassis

The MB6X chassis is available in three power supply types:

- MB6X-RAC: Redundant AC Power supply (Dual-Input, Dual-Power supply)
- MB6X-MED: Medical Grade AC power supply, Non-Redundant (Single-Input, Single power supply)
- MB6X-DC: DC Power supply, Non-Redundant (Single-Input, Dual-Power supply)



**WARNING** To prevent electric shock, do not remove the cover of the MB6X chassis. There are no user-serviceable parts inside. The MB6X chassis is to be installed and serviced by qualified personnel only.

Figure 2-13 MB6X-RAC Chassis Rear View showing Power Connectors

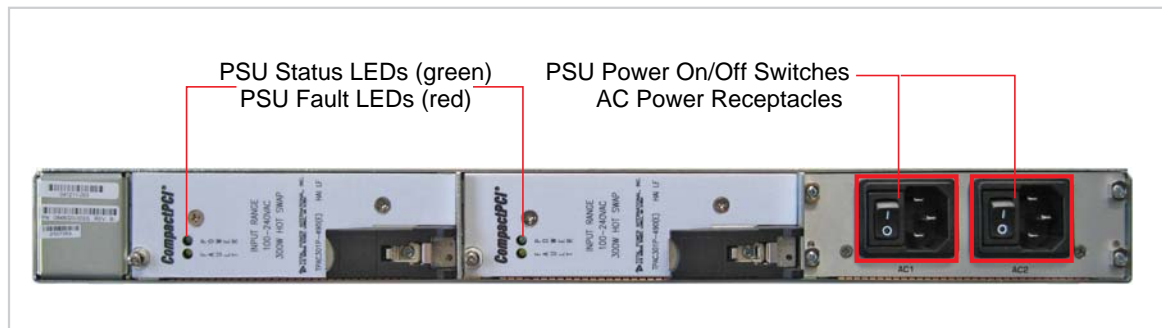


Figure 2-14 MB6X-MED Chassis Rear View showing Power Connector



To power up the MB6X-RAC or MB6X-MED Chassis:

1. Make sure the power switch(es) on the back of the chassis are in the OFF (2) position.
2. Connect the power cord(s) to one (or both) of the power receptacles.
3. Plug the cord(s) into a grounded AC power source.
4. Turn one or both PSU Power On/Off switches to the ON (1) position.

On the MB6X-RAC, the PSU Status LEDs will turn green indicating that the chassis is powered up.

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

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

To power up the MB6X-DC Chassis:

1. Make sure the power switch is in the OFF (2) position.
2. Locate DC Power IN connectors BAT and RET on the back of the chassis.
3. Connect the chassis ground wire to the ground lug on the back of the chassis.

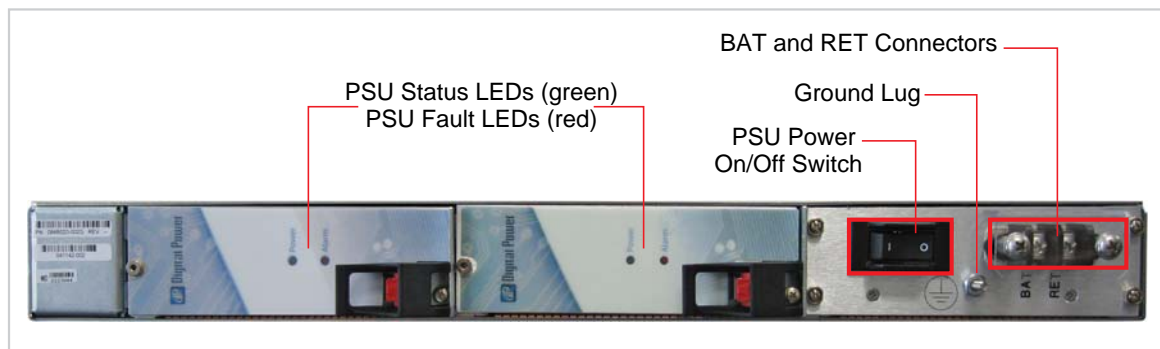
Adhere to your organization's policy on the gauge of the ground wire (12 AWG, insulated, stranded) and the number of crimps on the lug.

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



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

Figure 2-15 MB6X-DC Chassis Rear View showing Power Connectors



The PSU Status LEDs will turn green indicating that the chassis is powered up.

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

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

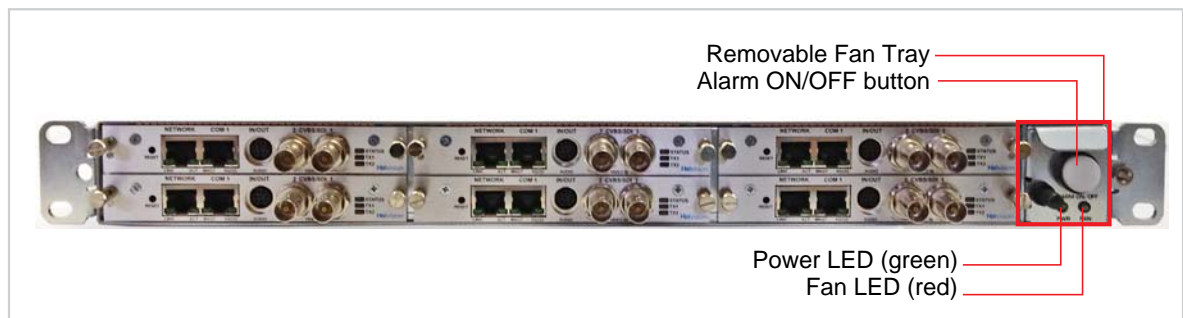
To begin configuring video streams, you can either open the Web interface, or log in to the CLI.

- To use the Web interface, see [“Logging In to the Web Interface”](#) on page 74.
- To enter CLI commands, see [“CLI Command Reference”](#) on page 245.

## MB6X Chassis Removable Fan Tray

Some MB6X chassis models have a removable fan tray located on the right side (as shown in the figure below):

Figure 2-16 MB6X Chassis Front View showing Removable Fan Tray



For descriptions of the LED indicators located on the MB6X fan-tray front panel along with the alarm behaviors, see [“MB6X Chassis Indicators and Alarms”](#) on page 38.

For the procedure to replace a fan tray, see [“Replacing the MB6X Chassis Fan Tray”](#) on page 65

## 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, MAC address, and XR personality are preserved. Everything else is wiped out (including saved presets, added user accounts, modified passwords, and encoding settings).

To reset the Makito X:

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

Figure 2-17 Reset micro switch



2. **Power Reset:** 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 five (5) seconds.

This resets the unit.

-or-

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

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

## Default Network Settings

After a factory reset, the Network settings should be:

IP Address	Subnet Mask	Gateway
10.5.1.2	255.255.0.0	10.5.0.1



## Hardware Maintenance

The following maintenance tasks are recommended for the Makito X appliance.

### Cleaning the Ventilation (Intake/Outtake) and Filter

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

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

### Monitoring of the Fan Operation

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

- If the appliance is easily accessible, turn the unit over and listen (an operational fan makes a humming noise).
- Use the CLI (temperature get command) to get information from the built-in temperature sensors (see [“temperature”](#) on page 356). If the internal temperature of the unit is rising, that is an indication that the fan may not be operating properly.

### Replacing the MB6X Chassis Fan Tray

Some MB6X chassis models have a removable fan tray, located on the far right side of the chassis. The fan tray may be removed from the front of the chassis. This procedure applies to those units supporting field swappable fan trays.

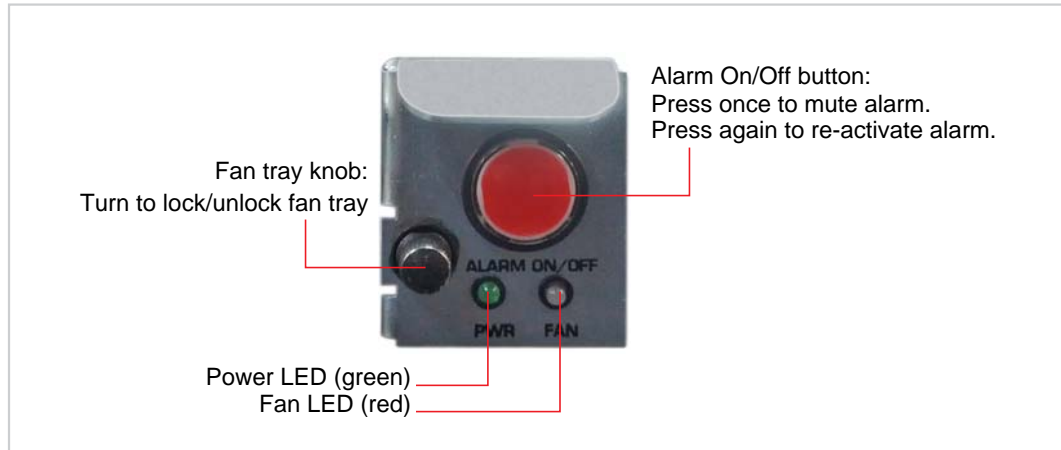


**NOTE** You can replace the fan tray without powering off the Makito X, which allows you to perform this maintenance procedure without stopping the encoder service.

However, do so only if you are able to replace the fan tray within five minutes. Otherwise, we recommend that you power off the unit before replacing a fan tray.

---

Figure 2-18 MB6X Removable Fan Tray (close-up view, Chassis Front)



#### To replace the MB6X Chassis fan tray:

1. Turn the fan tray knob clockwise to unlock the fan tray.
2. Remove the fan tray by pulling it away from the chassis.
3. Insert a new fan tray in the slot and slide it all the way into the chassis. (This will apply Power to the fan tray.)
4. Turn the fan tray knob counterclockwise to lock the fan tray into the slot.

Replacement fan trays are available from Haivision. Please contact your sales representative or email Haivision at: [sales@haivision.com](mailto:sales@haivision.com)

## Replacing the RTC Battery

The Makito X appliance contains a real-time clock (RTC) powered by the following battery:

- Varta CR2032 with 2-wire connector Mfr. Part#: 06032101030

At the end of its life (7-10 years), the battery should be replaced by the end user with the same battery or an equivalent model approved by Haivision.

The Makito XR has no battery.



**TIP** The RTC battery needs to be replaced if at a power-cycle event, the system time and date are reset to within 24 hours, depending on your time zone, of January 1, 1970 (Coordinated Universal Time, UTC).



**NOTE** The used battery should be disposed of and recycled in accordance with your national/local battery collection schemes.

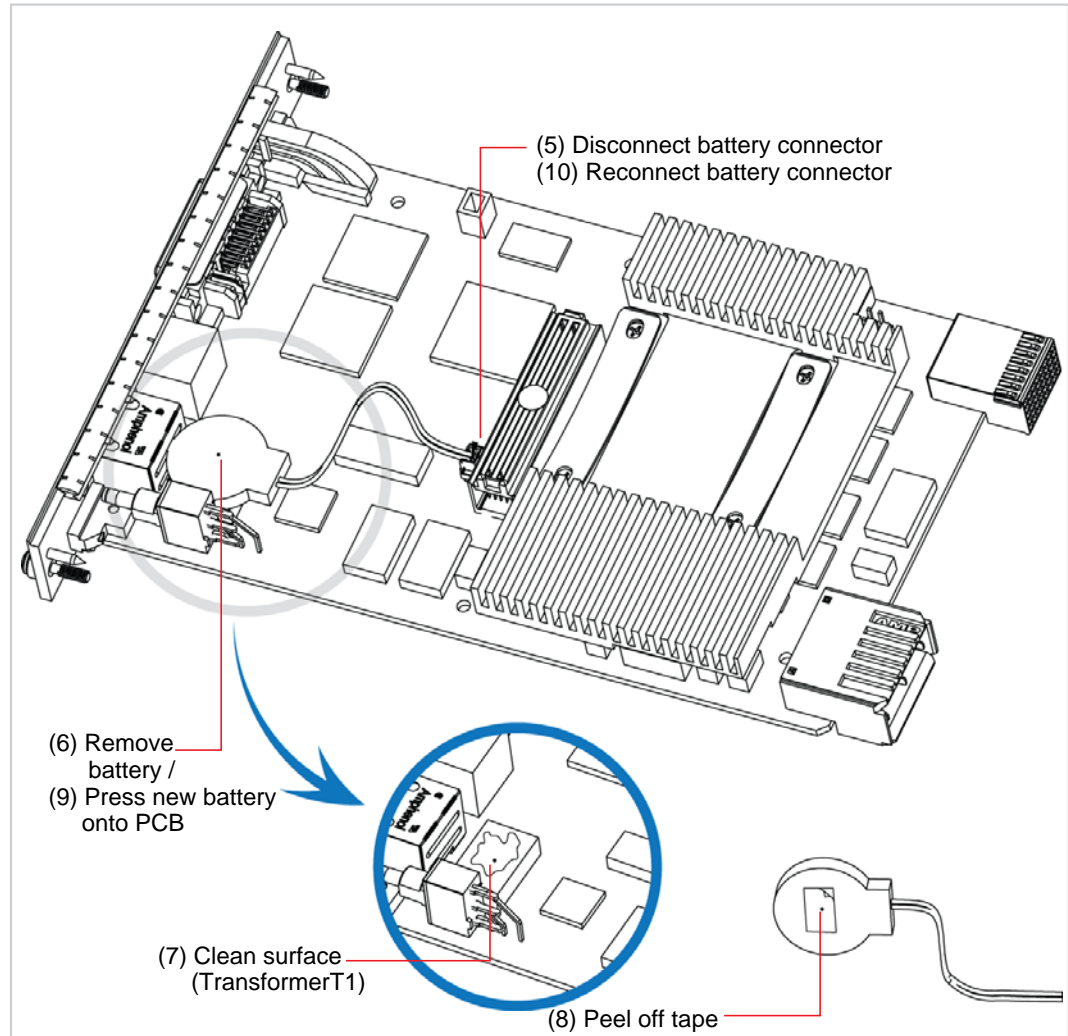
To replace the RTC battery:

1. Disconnect all external devices connected to the appliance.
2. Disconnect the power from the appliance by unplugging the power cord from the AC outlet.
3. To open the chassis, unfasten and remove the two screws on the rear of the appliance.



4. Slide the PCB board out of the chassis.
5. Disconnect the battery connector by pulling it upward from the PCB.

Figure 2-19 RTC Battery Removal and Installation



6. Remove the battery by pulling it upward from the PCB.
7. Clean the surface of transformer T1 with alcohol if there is glue residue.
8. Peel off the protective layer on the tape on the new battery.
9. Press the new battery onto the PCB (top of transformer T1) with a force of 3 pounds-force per square inch for three (3) seconds.
10. Reconnect the battery connector.
11. Reassemble the chassis, reconnect any external devices to the appliance, and reconnect the power to the appliance.

# CHAPTER 3: Getting Started with the Web Interface

This chapter begins with a management overview of the Makito X, followed by system access control information. It then provides a basic overview of 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

<a href="#">Management Overview</a> .....	70
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<a href="#">Accessing the Web Interface</a> .....	71
<a href="#">Accessing the CLI</a> .....	71
<a href="#">Default Encoder IP Address</a> .....	72
<a href="#">Role-based Authorization</a> .....	72
<a href="#">Logging In to the Web Interface</a> .....	74
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<a href="#">Selecting Items from Lists</a> .....	78
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## Management Overview

All Makito X 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 X through its Ethernet LAN port or (if applicable) the Serial Management port.

### Using the Web Interface

Managing the Makito X 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 X 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 X, 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 X through the exchange of SNMP messages.

For information on SNMP management of the Makito X, see [Chapter 7: "Configuring A/V Services Using SNMP"](#).

## Accessing the Encoder

### Accessing the Web Interface

To access the encoder configuration Web page:

1. From your computer, open a Web browser.



**NOTE** The Makito X supports the latest production versions (as of this document date) of the Firefox, Internet Explorer, Safari, and Chrome browsers. Please see the Release Notes for any limitations for specific versions of these browsers.

---

2. Type the encoder's IP Address in the browser's address bar and press Enter. (See [“Default Encoder IP Address”](#) on page 72.)
3. Log in (see [“Logging In to the Web Interface”](#) on page 74).

### Security Steps

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

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

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



**NOTE** The Makito X identity certificate and trusted root certificates are managed using the CLI certificate command or Web interface Certificates page. For details, see [“certificate”](#) on page 266 or [“Managing Certificates”](#) on page 224.

---

### Accessing the CLI

To access the encoder CLI:

1. Open a telnet session to the encoder (see [“Default Encoder IP Address”](#) on page 72).
2. At the login prompt, type the username and password (see [“Role-based Authorization”](#) on page 72).

## 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 X 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.

## Role-based Authorization

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

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

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

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

Administrators can create, delete, lock, and unlock user accounts, including changing the password, from the Accounts page (see [“Managing User Accounts”](#) on page 208).



Operators and guests can manage their password from the My Account page (see [“Changing Your Password”](#) on page 81).

You can also change your own account password CLI using the [passwd](#) command.



**NOTE** Any changes to the default passwords, created accounts, and deleted default accounts will be lost after a Factory Reset or a firmware downgrade. Factory Reset restores the default accounts and passwords.

---

#### Related Topics:

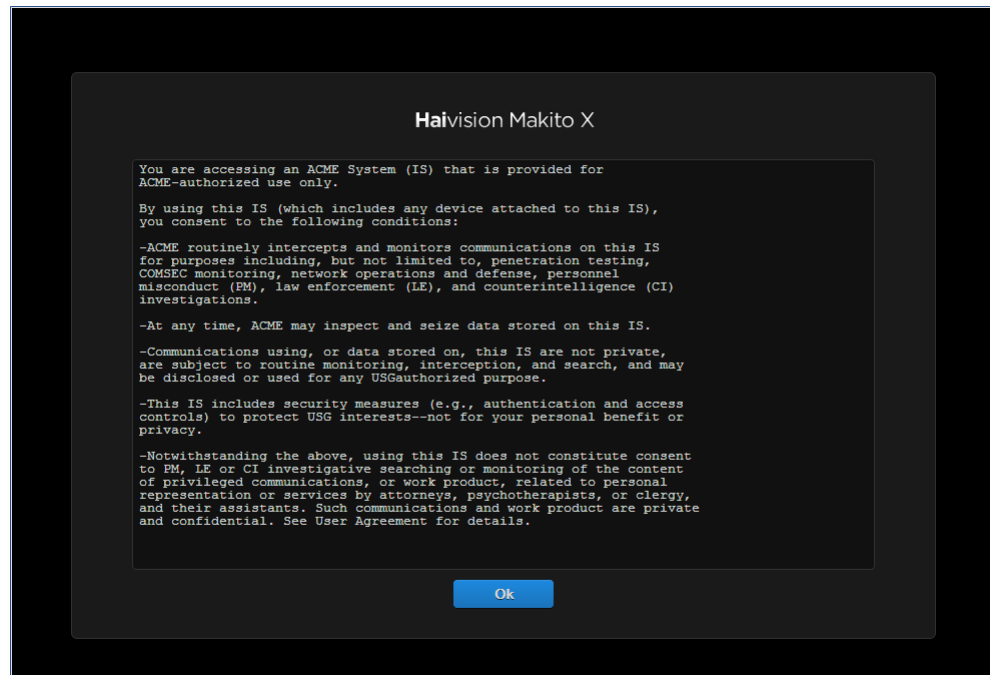
- [CLI Access Control](#)

## Logging In to the Web Interface

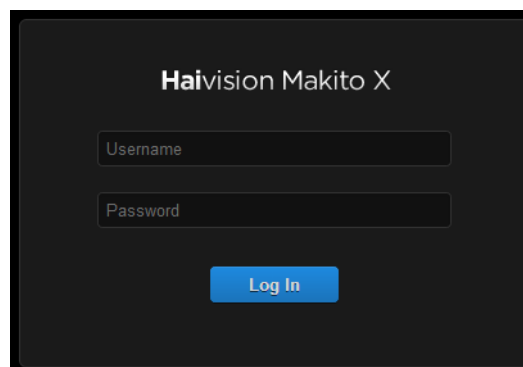
To log in to the Makito X configuration Web page:

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

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



2. Review the Advisory and Consent terms as required for your system and click [OK](#).  
The browser will now display the Login page for the Web configuration interface.
3. On the Login page, type the Username and Password and click [Log In](#) (or press Enter).




The default administrative Username and Password are:

Username: admin  
Password: manager

For other default Usernames and Passwords, see the previous section, [“Role-based Authorization”](#).

## Exploring the Web Interface



**TIP** Clicking  from the toolbar will launch the online help. For more information, see [“Online Help”](#) on page 80.


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

### Navigating the Interface

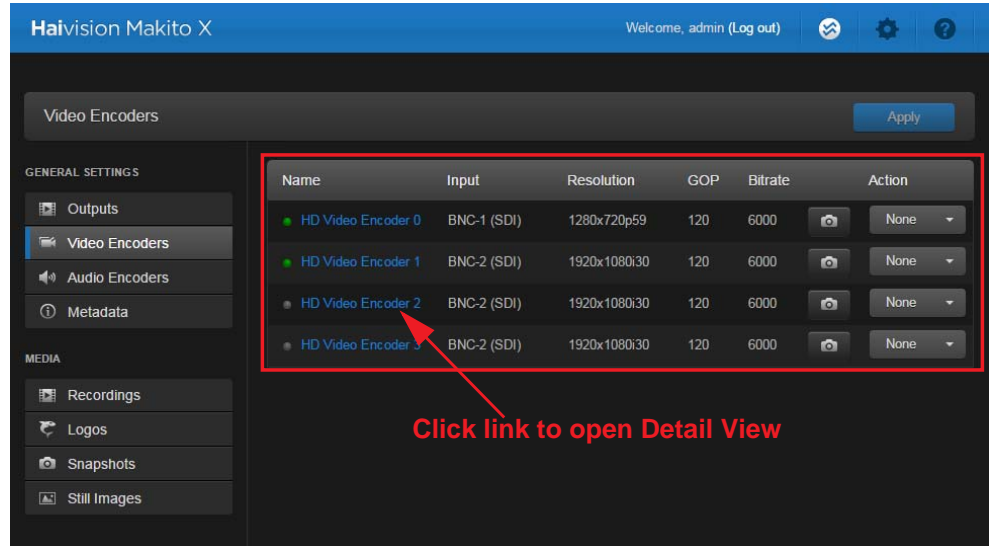
Once you have successfully logged in, the Web interface opens to the Outputs List View (as shown in the following example). Your account information is displayed on the toolbar (along the top).

The screenshot shows the Haivision Makito X web interface. At the top, a blue toolbar displays "Haivision Makito X" on the left, "Welcome, admin (Log out)" in the center, and three icons (Home, Settings, Help) on the right. A red arrow labeled "Links to Home (Outputs List View)" points to the Home icon. Another red arrow labeled "Toolbar" points to the entire top bar. Below the toolbar, the main content area is titled "Output Streams" and contains a "List View" table. On the left, a "Sidebar Menu" is visible with sections for "GENERAL SETTINGS" (Outputs, Video Encoders, Audio Encoders, Metadata) and "MEDIA" (Logos, Snapshots, Still Images). The "List View" table has the following data:

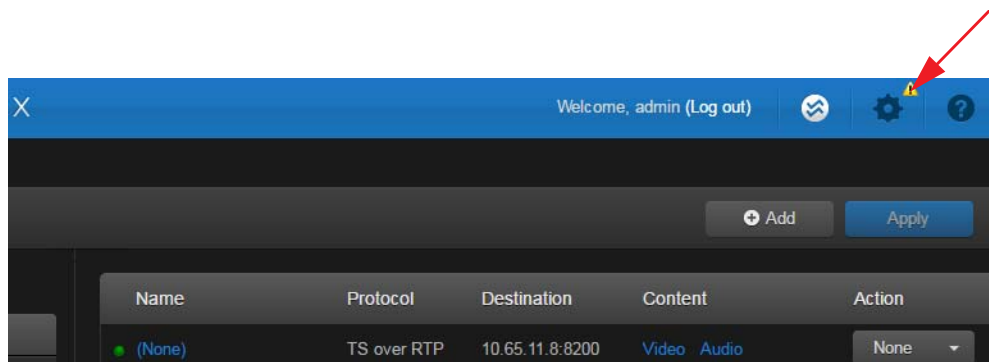
Name	Protocol	Destination	Content	Action
SRT To Decoder	TS over SRT	10.65.11.169:8888	Video Audio	None
TS-UDP to 22-30002	TS over UDP	10.65.11.22:30002	Video Audio	None
MPEG-PRO	TS over RTP	10.65.11.22:40000	Video Audio	None

- To set up video encoding, select the configuration option from the sidebar menu, for example, [VIDEO ENCODERS](#) or [AUDIO ENCODERS](#) (under [GENERAL SETTINGS](#)).
- To set up streaming or recording, select [OUTPUTS](#).
- To manage media, select the option from the sidebar menu, for example, [RECORDINGS](#) or [SNAPSHOTS](#) (under [MEDIA](#)).
- To access the encoder administration settings, click the  [ADMINISTRATION](#) icon on the toolbar, and then select the option from the sidebar menu, for example [NETWORK](#) (under [SETTINGS](#)) or [ACCOUNTS](#) (under [SECURITY](#)).

- (Where applicable) On the List View, click a link in the table to open the Detail View. For example, on the Video Encoders List View (shown below), click a link to open the Video Encoder Detail View.



**NOTE** A warning indication appears in the title bar on systems with unsaved configurations. The indication is displayed when you log in or out, or reboot a Makito X when the current configuration has not been saved in a preset. See [“Saving and Loading Presets”](#) on page 177.

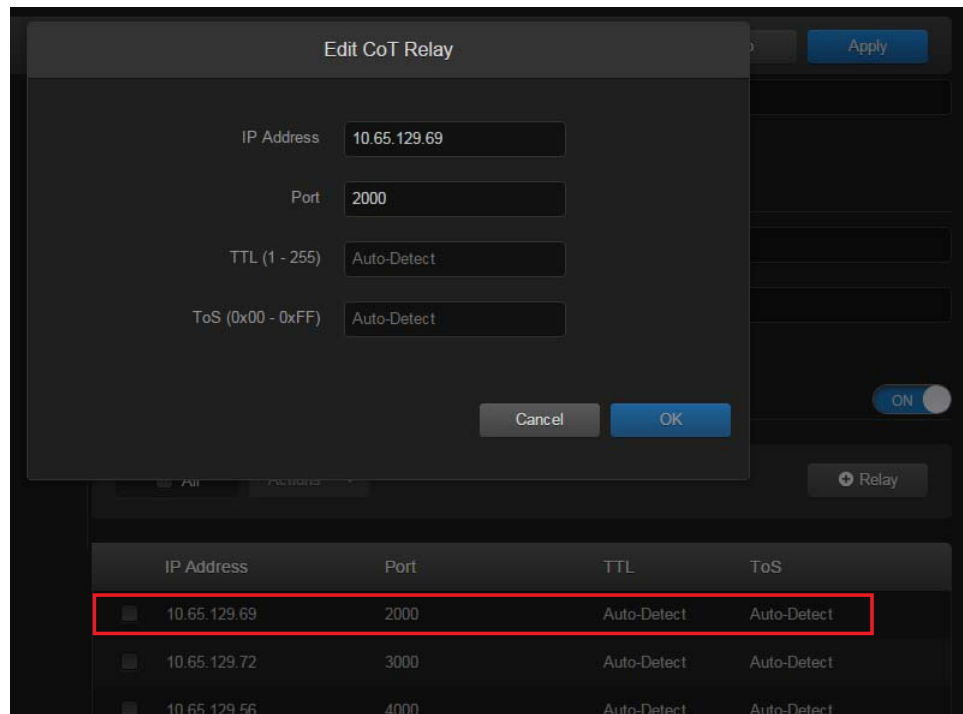


## Selecting Items from Lists

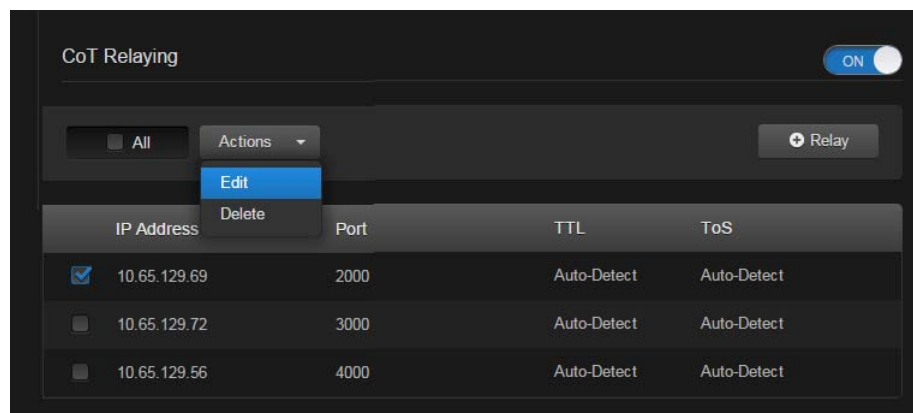
On some pages, configuration items are presented in lists. Examples include recordings on the Recordings page and CoT Relaying destinations on the Metadata Detail View. This section summarizes the different ways to select list items to perform actions such as editing, deleting, copying, moving, downloading, or exporting.

To select items:

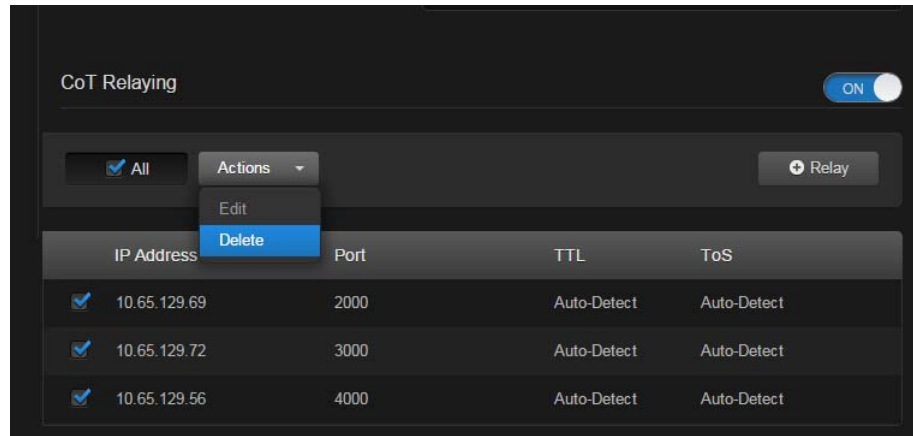
1. To edit information for a CoT metadata Relay destination, click anywhere in the row.



Or check the checkbox next to the item and select the action from the Actions drop-down menu (this menu is selectable when one or more items are checked).




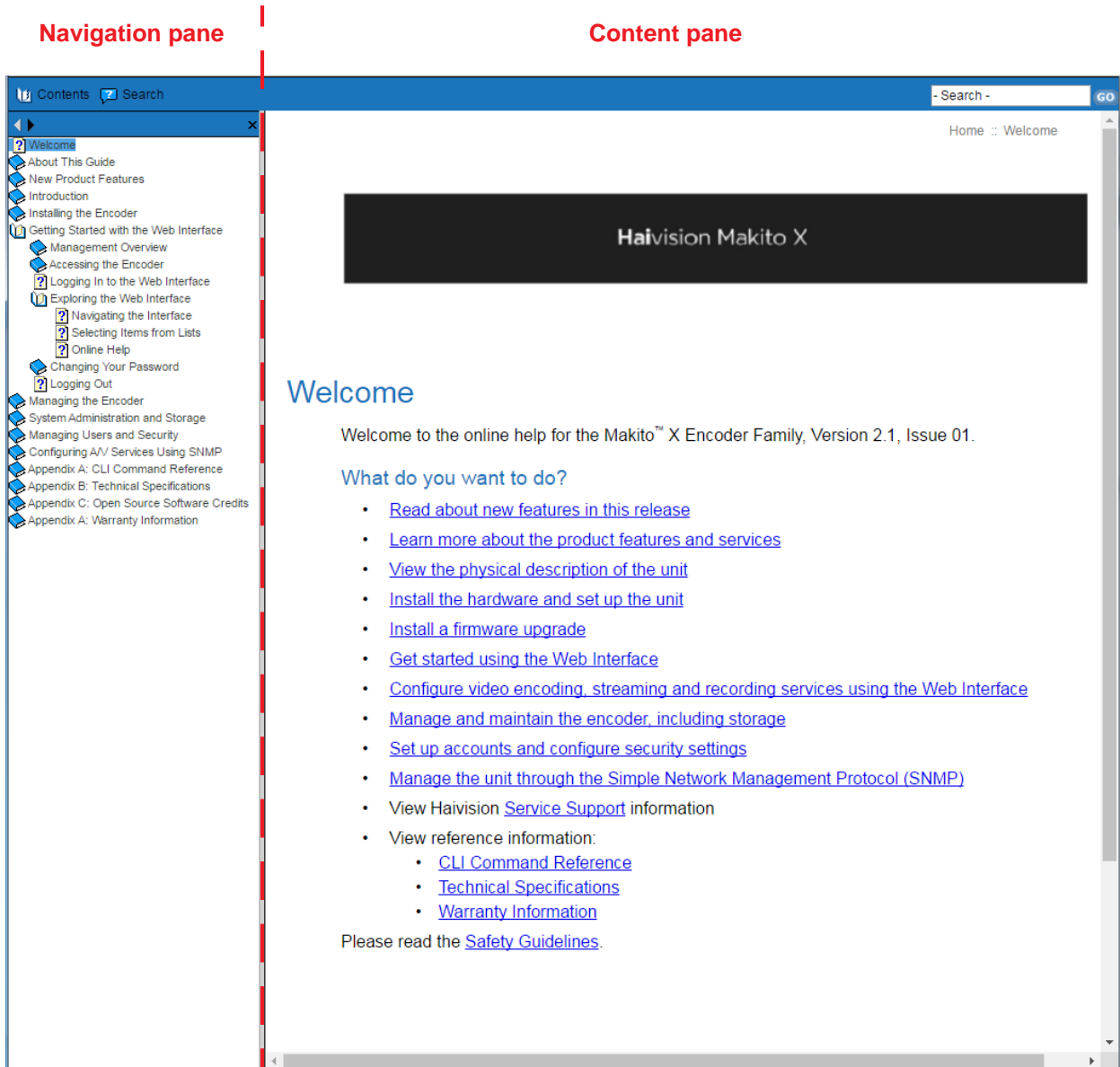
2. To perform actions (such as copy, move, delete or export) on multiple items, you can check multiple items in the list or check [All](#).



**TIP** You can also shift-click (i.e., click multiple items while holding the Shift key down) to select a range of items (checkboxes).

## Online Help

Clicking  on the toolbar will launch the online help for the Makito X. The figure below shows a sample Welcome page.





## Changing Your Password



**IMPORTANT** For security purposes, be sure to change the default password! The first time you sign into a newly created account as well as any time your password has expired, you will see a Change Password dialog (as shown in the following example).

Change Password

Name infodev

Old Password

Password

Confirmation Password

Cancel Change

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

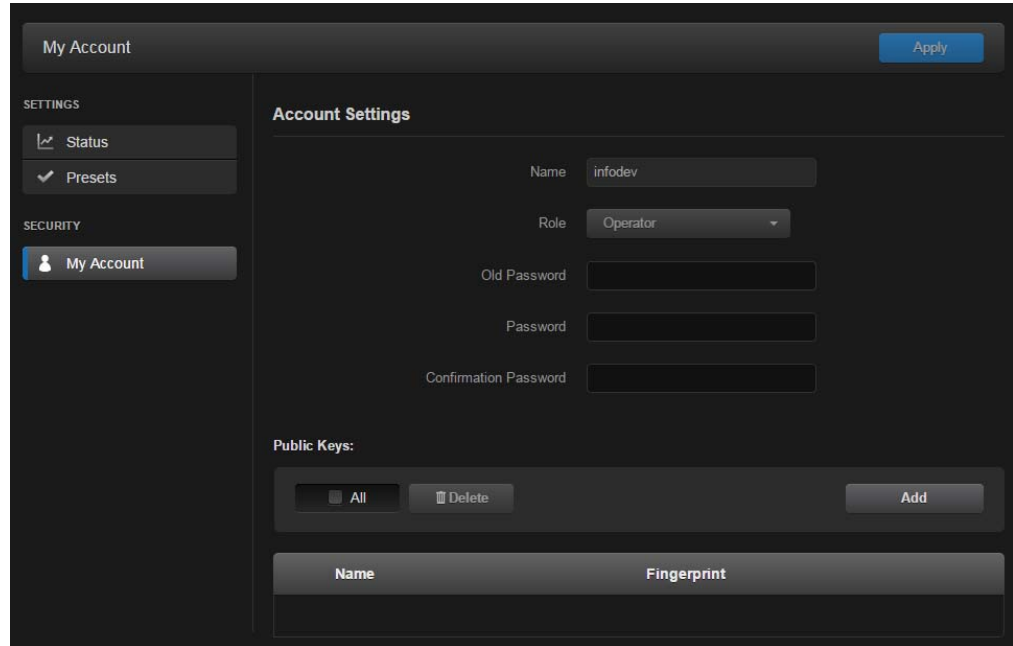


**NOTE** The My Account page is available to users assigned either **Operator** or **Guest** roles. Administrative users may change their passwords from the Accounts page.

### To change your password:

1. To navigate to the Administration page, click the  **ADMINISTRATION** icon on the toolbar, and then click **MY ACCOUNT** from the sidebar menu.

The My Account page opens as shown in the following example.



2. Type your current password in the Old Password field.
3. Type the new password in the Password field and again in the Confirmation Password field.
4. Click [Apply](#).

The new password will take effect immediately.

You can also upload and manage personal public keys for your account to enable public key authentication (instead of password-based authentication). Note that in the current release, this only applies to SSH CLI access to the encoder. For more information, see [“Managing Public Key Authentication”](#) on page 213.

## Password Requirements

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

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



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

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

## Logging Out

After you finish using the Makito X, be sure to log out. To do so, click [Log out](#) from the toolbar.

Logging out prevents misuse and unauthorized access to the encoder.

# CHAPTER 4: Managing the Encoder

This chapter explains how to set up and manage video encoding, streaming and recording, as well as recorded assets and other media using the Web interface.



**NOTE** For a management overview of the Makito X as well as a basic overview of the Web interface, see [“Getting Started with the Web Interface”](#) on page 69.

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## Configuring Video Encoders

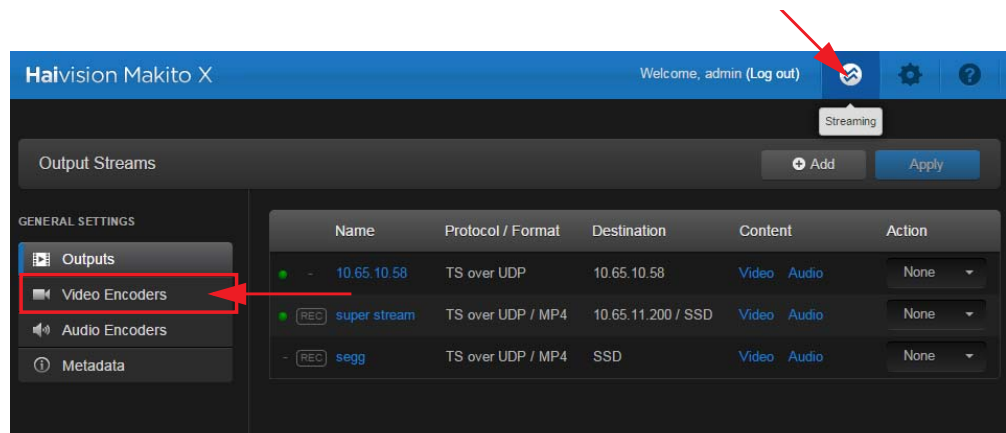
From the Video Encoders pages, you can configure four or eight (Makito X4R only) independent H.264 video encoders to apply to streams. You can start and stop each video encoder, as well as display statistics for the encoder.

With the Makito X HEVC, you can also configure two HEVC encoders. The Makito X HEVC supports concurrent AVC/H.264 and HEVC/H.265 video encoding.

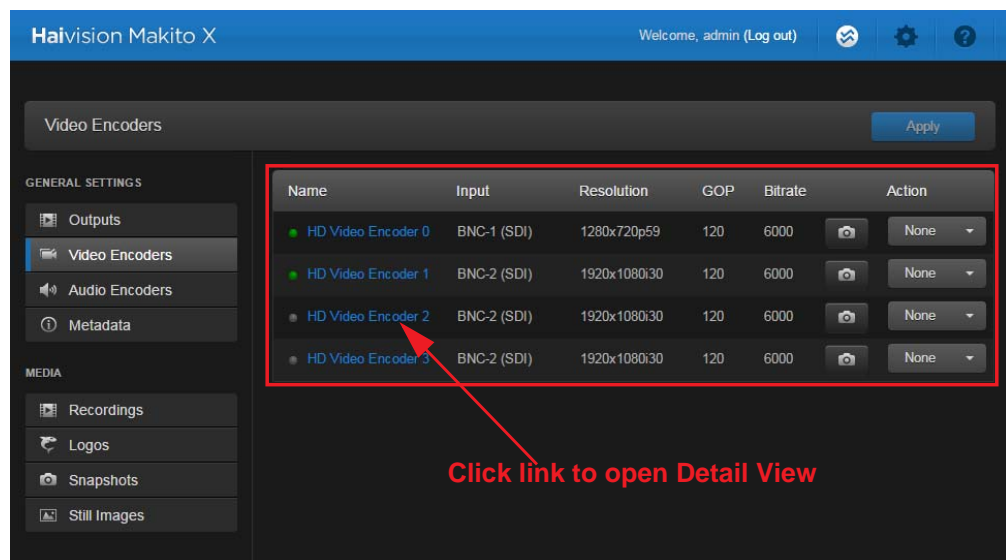
### Video Encoders List View

To open the Video Encoders List View:

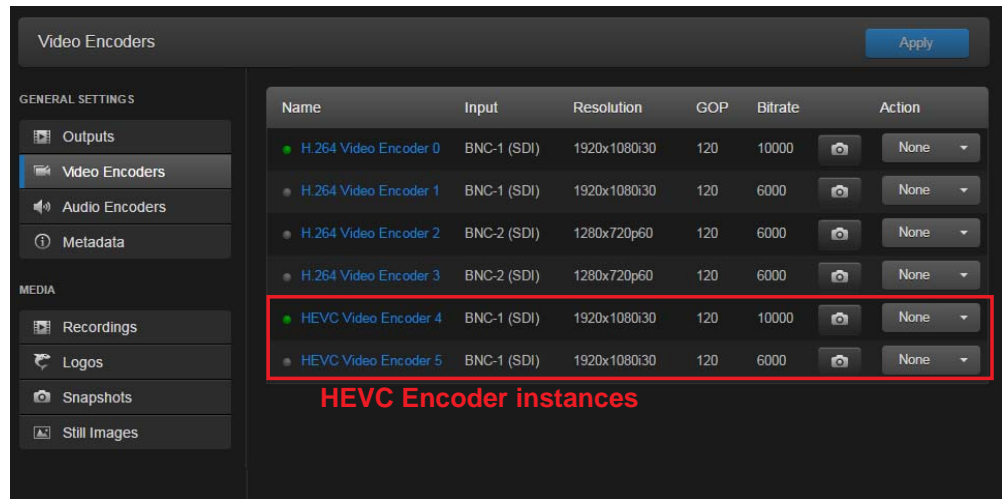
1. Click the  STREAMING icon on the toolbar, and then click VIDEO ENCODERS from the sidebar menu.




The Video Encoders List View opens, as shown in the following example.

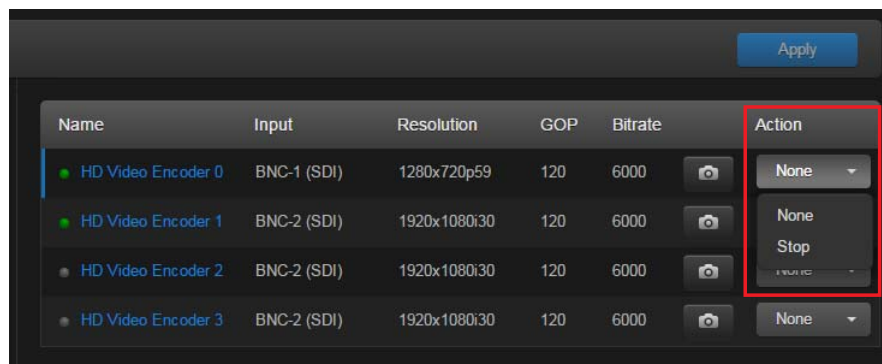


On the Makito X HEVC, the List View includes two HEVC encoder instances:



The Video Encoders List View displays the status LED, Name, Input format, Resolution, GOP Size, and Bitrate for each video encoder. It also provides an option for you to take a snapshot of an input and either start or stop an encoder.

- To view details or modify the video settings for an encoder, click a link in the table to open the Video Encoder Detail View.
- To take a snapshot of an encoder’s input, click the  Camera icon.
- To change the status for an encoder, click the drop-down list under **Action** and select either Start or Stop (as applicable).



2. To apply your changes, click **Apply**.



## Configuring Video Encoder Settings

From the Video Encoder Detail View, you can define both basic and advanced video encoding parameters for the encoder, such as the Input interface (SDI-only), Bitrate, output Resolution, Frame Rate, and GOP Size.

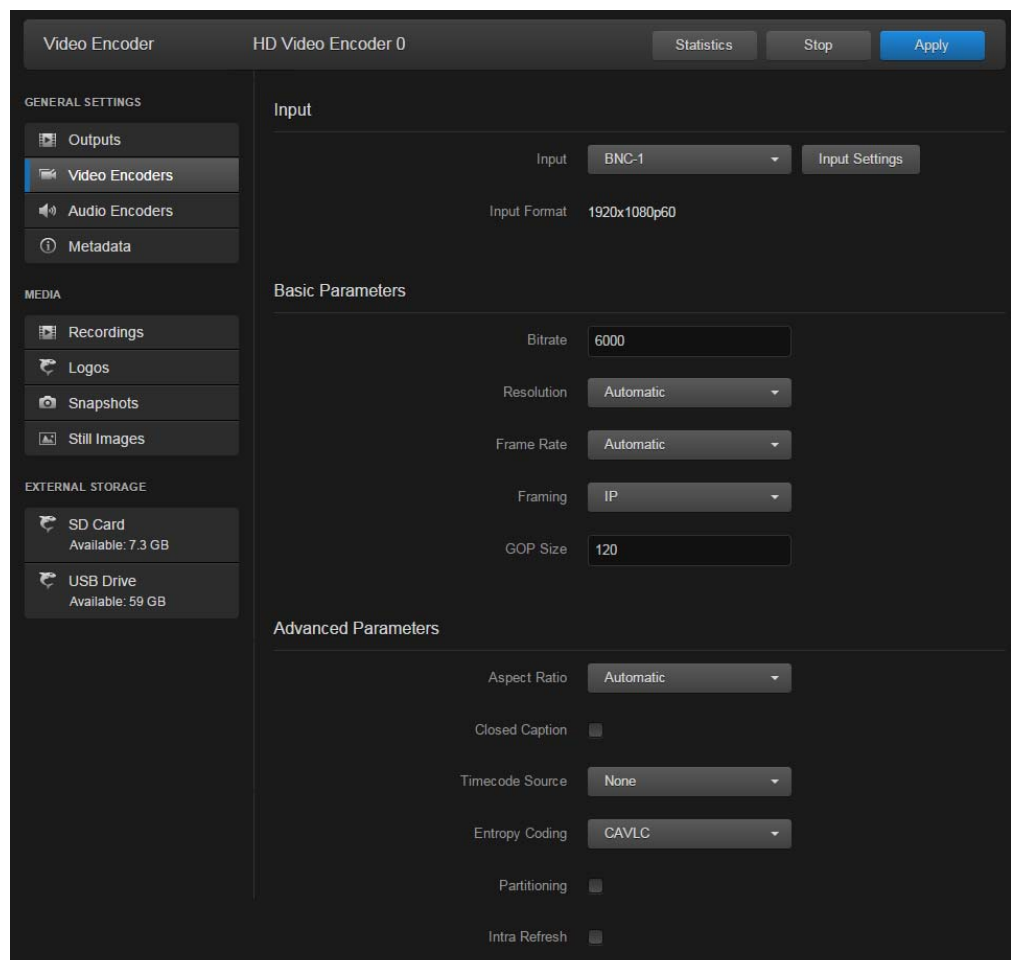
(H.264 only) You can also select a Region of Interest (ROI) to maximize the quality of video within selective portions of the video frame. Or you can enable cropping (within the input image) to enhance the view.

For supported video encoding resolutions, see [“Video Encoding”](#) on page 375.

### To configure the Video Encoding Settings:

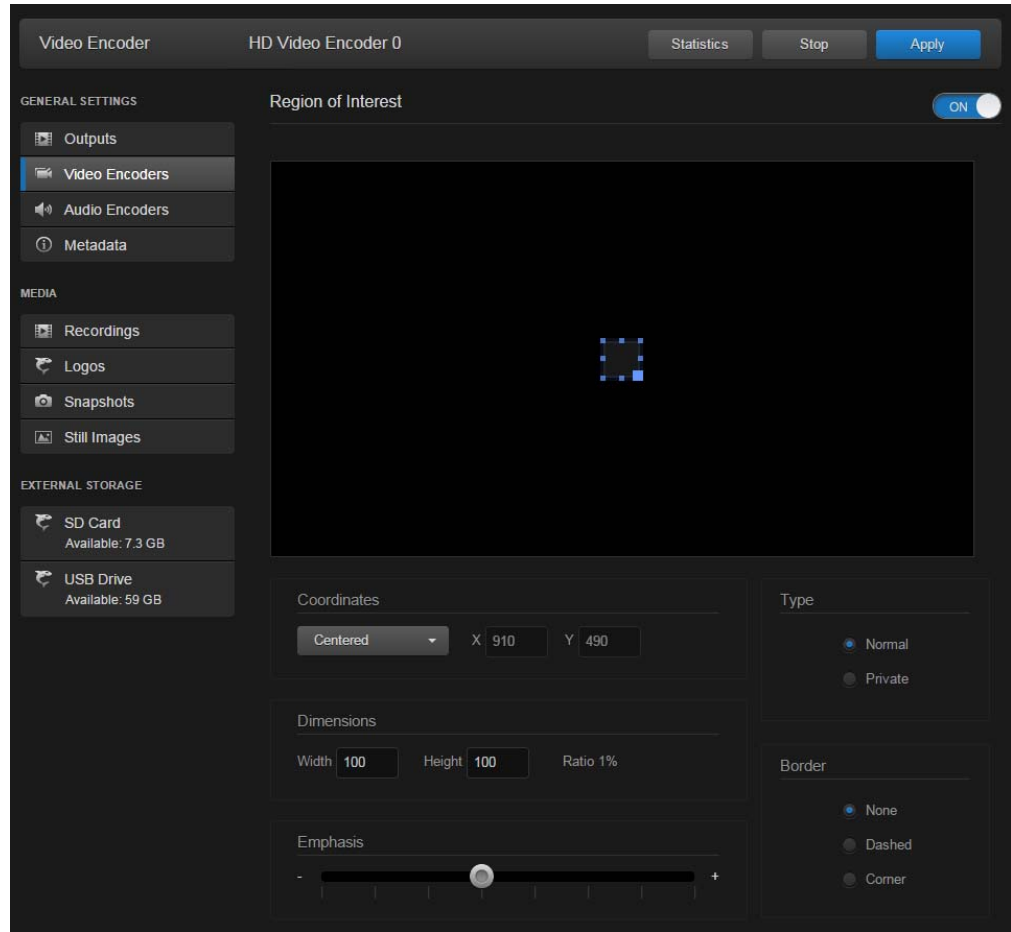
1. From the Video Encoders List View, click a link in the table to select the encoder.

The Video Encoder Detail View opens, displaying the settings for the selected video encoder (see following example).



2. Select or enter the new value(s) in the appropriate field(s). See [“Video Encoder Settings”](#) on page 92.

- (H.264 only) To set up a Region of Interest, toggle the Region of Interest button to **On** (as shown in the following example). See [“Region of Interest \(ROI\) \(H.264 only\)”](#) on page 98.



- To start or stop the encoder, click **Start** or **Stop** (as applicable).
- To view statistics for the encoder, click **Statistics**. For details, see [“Video Encoder Statistics”](#) on page 100.
- 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 > PRESETS](#) page. See [“Saving and Loading Presets”](#) on page 177.

- To return to List View, click **VIDEO ENCODERS** from the sidebar menu.

## Configuring HEVC Video Encoding

From the Video Encoders List View, you can select the HEVC encoding instance and then define the encoding parameters for the HEVC encoder. The Makito X HEVC platform supports three HEVC modes of operation:

- [Single HEVC Encoding](#) – Up to 1080p60 from an input with frame decimation / downscale support.
- [High/Low HEVC Encoding from the Same Input Source](#) – A single input signal can be up to 1080p60, but each encoding core can be set up to 1080i30/1080p30/720p60 with frame decimation / downscale support.
- [Dual HEVC Encoding from Different Inputs](#) – Each input signal can be up to 1080i30/1080p30/720p60 with frame decimation / downscale support.

The total aggregate HEVC encoding capability for all active HEVC video encoders is equivalent to one (1) 1920x1080p60 video signal.

You may select either SD/HD/3G-SDI video input as the video source for each HEVC encoding instance.

The total video encoder bitrate supported for all HEVC encoders is at least 15 Mbps.



**NOTE** The first HEVC encoder (#4) is the primary encoder and gets preferential treatment when the configuration exceeds the available resources (at least as far as HEVC encoding resources are concerned).

For example, if video encoder #4 is using all HEVC encoding resources (i.e., encoding 1080p60), video encoder #5 is blocked from taking resources from #4, so it cannot be started. But if you reverse the scenario, and video encoder #5 is using all HEVC encoding resources, video encoder #4 is able to start and take all HEVC encoding resources away from #5, and #5 fails/stops.

---

## Video Encoder Settings

The following table lists the Video Encoder controls and settings:

Video Encoder Setting	Default	Description/Values
<b>Input</b>		
Input		Select the Video Input port for the encoder:
SDI	BNC-1	<ul style="list-style-type: none"> <li>BNC-1</li> <li>BNC-2</li> <li>BNC-3*</li> <li>BNC-4*</li> </ul> <p><b>NOTE:</b> *BNC-3 and BNC-4 only available on Makito XR.</p>
DVI	DVI	<ul style="list-style-type: none"> <li>DVI (read-only)</li> </ul>
Input Format	n/a	<p>This is the input signal auto-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.</p> <p><b>NOTE:</b> If the signal cannot be detected (or is outside the supported range), the Input Format will be Unknown.</p>
Copy Protected Content DVI only	n/a	(Read-only) Indicates whether or not the video source connected to the Makito X DVI is protecting/encrypting its output. If Yes, the stream will not be encoded.
<b>Input Settings</b>		
Type		<p>Select the Video Input type for the encoder:</p> <p><b>NOTE:</b> Automatic mode will cause increased delay during an input switch event. To reduce the re-lock delay, set the Input Type to SDI or Composite as appropriate.</p>
BNC-1 or 2	Automatic	<ul style="list-style-type: none"> <li>Automatic</li> <li>SDI</li> <li>Composite</li> </ul>
BNC-3 or 4 (Makito XR only)		
DVI	Automatic	<ul style="list-style-type: none"> <li>Automatic</li> <li>Digital (HDMI/DVI)</li> <li>Analog (Component/RGB)</li> </ul>

Video Encoder Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
Colorspace Control DVI only	Automatic	<p>(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:</p> <ul style="list-style-type: none"> <li>• Automatic: The encoder determines the appropriate color space to use.</li> <li>• YCbCr: Forces the encoder to use Y,Cb,Cr</li> <li>• RGB (Full Range): Forces the encoder to use RGB Full Range [0..255]</li> <li>• RGB (Limited Range): Forces the encoder to use RGB Limited Range [16..235]</li> </ul>
Preferred Resolution DVI only	1920x1200p60	<p>Sets the DVI-D preferred input resolution so that connected devices do not scale their output resolutions to undesired resolutions. For more information, see <a href="#">“edid”</a> on page 277.</p>
HDCP DVI only	Enabled	<p>Check this checkbox to enable HDCP for the DVI interface.</p> <ul style="list-style-type: none"> <li>• When enabled, HDCP sources will detect the Makito X as a HDCP sink. The source will decide whether or not the content it sends to the Makito X needs to be protected/encrypted. The Makito X will <i>not</i> encode encrypted/protected content.</li> <li>• When disabled, the authentication phase where keys are exchanged will fail and the content source will detect the Makito X as a device that does <i>not</i> support HDCP. At this point, the source will not send any protected content to the Makito X but can still send unprotected content.</li> </ul> <p><b>NOTE:</b> Disabling HDCP will allow the Makito X to inter-work with Apple products such as the MacBook and iPad.</p>

Video Encoder Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
<b>Basic Parameters</b>		
Bitrate	6000 kbps	Enter the video bitrate for the encoder: 32 to 25,000 kbps
Resolution	Automatic	<p>Select the stream output resolution (i.e., the number of lines per frame and pixels per line to be encoded):</p> <ul style="list-style-type: none"> <li>• Automatic: Encodes at the same resolution as the incoming video.</li> <li>• Manually select the coded picture resolution from the list of available options (includes down-scaled resolutions). The options depend on the Input Format detected.</li> </ul> <p><b>NOTE:</b> See <a href="#">“Video Encoding”</a> on page 375.</p>
Cropping	Disabled	<p>This parameter crops the input and encodes to a rectangle within the input image while discarding the rest of the input image.</p> <p>By default, input is scaled to the output resolution. When Cropping is enabled, the output resolution is the portion of the input that is encoded from the center. This may be done instead of downscaling.</p> <p><b>NOTE:</b> Available only if <a href="#">Resolution</a> is not Automatic, 960, or 1440.</p>
Frame Rate	Automatic	<p>Select the coded picture frame rate per second:</p> <ul style="list-style-type: none"> <li>• Automatic: Encodes at the same frame rate as the input</li> <li>• 1..60</li> </ul> <p><b>NOTE:</b> The frame rate cannot exceed the input frame rate.</p>

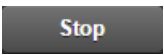

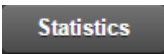
Video Encoder Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
Framing	IP	<p>Select the video compression mode for the encoded video:</p> <ul style="list-style-type: none"> <li>• I: I frames only (lowest delay; lowest quality)</li> <li>• IP: I and P frames only</li> <li>• IBP: I, B and P frames (H.264 only)</li> <li>• IBBP: I, BB (two B frames in sequence) and P frames (highest delay; highest quality) (H.264 only)</li> </ul> <p><b>NOTE:</b> B frames require a Main Profile decoder.</p> <p>B frames provide more quality as the encoding is more efficient; thus more details can be rendered in the same bandwidth/bitrate.</p>
GOP Size	120	Enter the Group of Pictures size for the encoded video.1..1000
<b>Advanced Parameters</b>		
Aspect Ratio	Automatic	<p>This specifies the aspect ratio of the video source and signals it into the MPEG stream:</p> <ul style="list-style-type: none"> <li>• Automatic: Aspect ratio is derived from the incoming video source resolution.</li> <li>• Manually force aspect ratio to either: 3:2, 4:3, 5:3, 5:4, 16:9, 16:10, or 17:9.</li> <li>• WSS/AFD: Aspect ratio is extracted from the incoming video source based on WSS (Wide Screen Signaling) or AFD (Active Format Description) if detected.</li> </ul> <p><b>NOTE:</b> WSS is only supported with analog PAL video; AFD is only supported with SD-SDI video.</p>
Closed Caption	Enabled	<p>(Optional) Check this checkbox to enable Closed Captioning on the output Stream.</p> <p><b>NOTE:</b> For more information, see <a href="#">“Closed Captioning”</a> on page 395.</p>

Video Encoder Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
TimeCode Source	None	<p>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:</p> <ul style="list-style-type: none"> <li>• None: No time code will be inserted in the video stream (saves bandwidth if not required).</li> <li>• (SDI only) Video: The timecode will be extracted from the incoming video signal.</li> <li>• System: If no timecode is included in the video feed, the encoded timecode is based on the encoder’s system clock.</li> </ul> <p>In this case, it is a good idea to enable NTP (see <a href="#">“Configuring Network Settings”</a> on page 183).</p> <p><b>NOTE:</b> See <a href="#">“TimeCode Source”</a> below for additional information.</p>
Entropy Coding	CAVLC	<p>(H.264 only) Select the compression scheme:</p> <ul style="list-style-type: none"> <li>• CAVLC: Context-adaptive Variable-length Coding is a lower-complexity alternative to CABAC. CAVLC produces lower quality, but is easier to decode.</li> <li>• CABAC: Context-adaptive Binary Arithmetic Coding is an algorithm to losslessly compress syntax elements in the video stream. CABAC compresses data more efficiently than CAVLC and should produce better quality, but requires considerably more processing to decode.</li> </ul> <p><b>NOTE:</b> The H.264 decoder must be Main Profile compliant or higher to decode a CABAC video stream.</p> <p><b>TIP:</b> CABAC provides better visual quality because it is more efficient.</p>



Video Encoder Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
Partitioning	Disabled	<p>(H.264 only) Check this checkbox to enable Intra-Picture Sub-Partitioning.</p> <p>Intra-Partitioning is a setting that allows the use of a smaller macroblock partition during the video macroblock encoding process.</p> <p><b>NOTE:</b> Intra-Partitioning requires that the H.264 decoder be High Profile compliant.</p> <p>Intra-Partitioning provides better visual quality because it gives the video encoder better coding tools.</p> <p><b>TIP:</b> Noisy Matrix completion is enabled automatically when Partitioning is enabled and video bitrate is under 800 Kbps. Noisy Matrix completion enhances video image “noise” reduction to improve video quality at lower bitrates and make blocky artifacts less visible.</p>
Intra Refresh	Disabled	<p>(H.264 only) Check this checkbox to enable Intra-refresh video encoding support.</p> <p>Intra-refresh is a video encoding mode of operation in which no distinct IDR frame is sent in the video elementary stream. Instead, the macro-blocks that make up the IDR frame are sent gradually within a certain time so that the entire video reference frame is rebuilt (at the decoder) within the number of frames specified by the <a href="#">Intra Refresh Rate</a> parameter. Intra-refresh minimizes latency, smooths the video bitrate, and minimizes GOP pulsing artifacts.</p> <p><b>TIP:</b> Intra-refresh requires that the decoder and streams be started first.</p>
Intra Refresh Rate	60	<p>(H.264 only) Specifies the number of frames over which the entire picture is refreshed. 1..5000</p> <p><b>NOTE:</b> If the refresh rate is set too low, a left-to-right wave-like artifact may result.</p>
Partial Image Skip	Disabled	<p>Allows the encoder to skip part of the image in order to respect the bitrate limit.</p>

Video Encoder Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
<b>Region of Interest (ROI) (H.264 only)</b>		
Region of Interest	Off	Use to create a static region of interest (one per video encoder) to enhance the quality of the encoded video within the region. This allows you to choose what portion of the image is important to have maximum quality. <b>TIP:</b> To get started, position the region in the center and then adjust the size.
Coordinates	Centered	Select the position for the region: <ul style="list-style-type: none"> <li>• Centered</li> <li>• Top Left</li> <li>• Top Right</li> <li>• Bottom Left</li> <li>• Bottom Right</li> <li>• Absolute</li> </ul> <b>NOTE:</b> In Absolute mode, the region is positioned at the exact X and Y coordinates specified. You can type in a value or use the Up and Down arrows on your keyboard to change the value: <ul style="list-style-type: none"> <li>• Up/Down Arrow: Increase/Decrease value by 1 unit</li> <li>• Shift-Up/Down Arrow: Increase/Decrease value by 10 units</li> </ul> If you select any other option than Absolute, the X and Y input boxes are disabled. If you drag the ROI, the Coordinates drop-down automatically switches to Absolute and the X and Y input boxes are enabled.
X, Y	Default varies with input resolution	Specifies the position of the region on the X and Y axes. (The origin is the top left corner of the display area.) <b>NOTE:</b> Only takes effect if <a href="#">Coordinates</a> is set to <a href="#">Absolute</a> .
Type	Normal	Specifies the effect of the region: <ul style="list-style-type: none"> <li>• Normal: ROI is translucent, therefore enhances the video in the region.</li> <li>• Private: ROI is opaque to block out the ROI video. Also <a href="#">Emphasis</a> is grayed out (since no longer applicable)</li> </ul>

Video Encoder Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
Dimensions	100, 100	Specifies the width and height of the region. You can type in a value or use the Up and Down arrows on your keyboard to change the value. See <a href="#">Coordinates</a> above.
Ratio	1%	(Available only if there is an active input signal with detected resolution) Displays the ratio of the ROI region to the entire screen. <b>NOTE:</b> The ratio must not exceed 30% in order to see the quality difference between the background and the ROI.
Border	None	(Optional) Applies a border to the region: <ul style="list-style-type: none"> <li>• None: No border around the ROI</li> <li>• Dashed: Thin dashed border around the ROI</li> <li>• Corner: Borders on each corner of the ROI.</li> </ul> <b>NOTE:</b> Once a region of interest with borders is enabled on a video encoder, all the video encoders using the same video input will show that border in their encoded output regardless of whether or not ROI is enabled on them.
Emphasis	4	Sets the difference in quality between the ROI and the rest of the input image. The higher the value, the better the region of interest will look at the expense of the rest of the image. An emphasis value of 4 is a compromise where the ROI looks better but the surroundings are still good. <b>TIP:</b> You can either move the slider to the desired value, click along the slider frame, or click the “-” or “+” to change the slider position.
  	n/a	Click <a href="#">Stop</a> to stop an active encoder. Click <a href="#">Start</a> to start or restart a stopped encoder.
	n/a	Click <a href="#">Statistics</a> to view statistics for the encoder. See <a href="#">“Video Encoder Statistics”</a> on page 100.

## TimeCode Source

The following table provides the list of possible TimeCode sources when “Video” is selected:

Input Type	Possible TimeCode Source(s)
CVBS Input signal	1) VITC (The timecode is extracted from the Vertical Interval TimeCode of the incoming video signal).
SD/HD/3G-SDI	1) MISB 0605 KLV micro-second timestamp (if KLV is enabled)
	2) ATC_VITC
	3) MISB 0601 KLV micro-second timestamp (if KLV is enabled)
	4) System Time clock
	<b>NOTE:</b> The one to be carried is chosen based on the time difference between the timecode STC (System Time Clock) and the coded picture.

### NOTES:


- The digitized version of VITC (referred to as D-VITC) is not supported. Only ATC\_VITC (Ancillary Timecode) is supported.
- Although LTC (Linear Timecode) and VITC timecodes may be present at the same time, the current release only supports VITC and LTC ancillary packets will be ignored.

## Video Encoder Statistics

The following table lists the Video Encoder statistics:

Video Encoder Statistic	Description/Values
State	The current operating status of the encoder, either: <ul style="list-style-type: none"> <li>• WORKING</li> <li>• STOPPED</li> </ul>
Up Time	(only available when State is WORKING) The length of time the encoder is actively encoding (e.g., 1d22h5m41s).
Input Present	Indicates whether an input signal has been detected from the video source: Yes / No

Video Encoder Statistic	Description/Values (Cont.)
Input Type	The video input for the encoder: For example, SDI, Composite, or DVI.
Input Format	The input signal detected from the video source.
Protected Content	(DVI only) Indicates whether or not the video source is protecting/encrypting its output. Yes / No
Output Resolution	The stream output resolution.
Aspect Ratio	The aspect ratio of the video source.
Encoded Frames	Number of encoded frames.
Encoded Bytes	Number of encoded bytes.
Encoded Frame Rate	The video frame rate per second.
Dropped Frames	Number of dropped frames.
Encoder Resets	Number of encoder resets.
Encoded Bitrate	The video bitrate used for the encoder (in kbps).
Encoder PTS	The current encoder Presentation Time Stamp (PTS) based on a 90 kHz clock: e.g., 0x138a56483
Encoder Load	The video encoding processor usage of the stream instance in percentage (%).
Closed Captioning	Indicates whether Closed Captioning (CC) is Enabled or Disabled on the output Stream.
Extracted CC Bytes	(CC must be enabled) Number of extracted Closed Captioning Bytes.
CC Errors	(CC must be enabled) Number of Closed Captioning errors.
Extracted CSD Bytes	(CC must be enabled) Number of extracted Caption Service Descriptor Bytes. <b>TIP:</b> CSDs define signaling and announcement of caption services.
Timecode Source	(Timecoding must be enabled) The selected timecode source. See <a href="#">“TimeCode Source”</a> on page 96.
Timecode	The timecode for the encoded video frame. Or the system time if user has chosen “system” for the <a href="#">TimeCode Source</a> displayed as (HH:MM:SS:FF) Hours, Minutes, Seconds and Frames.
H.264 Profile	The application profile class for the encoder: e.g., Main or High.

Video Encoder Statistic	Description/Values (Cont.)
H.264 Level	The required level of decoder performance to be able to process the video incoming stream: e.g., 3, 3.2, or 4
	Click to reset the Video Encoder statistics.

## Makito Decoder Interoperability

The following table lists recommended settings to optimize the Makito X encoder configuration to stream to the Makito X decoder:

Video Encoder Parameters	Recommended Settings
Entropy Coding	CAVLC or CABAC
Partitioning	On or Off
GOP Structure	I/IP/IBP/IBBP
Bitrate	32..25000

The following Video Encoder settings are *required* when configuring the Makito X encoder to interoperate with the Makito Classic (*previous generation*) decoder:

Video Encoder Parameters	Recommended Settings
Entropy Coding	CAVLC only
Partitioning	Off only
GOP Structure	I and IP only
Bitrate	150..15000

## Configuring Audio Encoders

From the Audio Encoder pages, you can configure either four or eight independent audio encoders to apply to streams (depending on whether the encoder is single or dual channel). You can also start, mute, and stop each audio encoder, as well as display statistics for the encoder.



**NOTE** The Makito X SDI and Makito X DVI blades are capable of encoding up to 16 channels of audio in channel pair groups: 16 for dual-channel SDI, 8 for single-channel SDI, 2 for DVI-D, and 2 for Analog audio in any combination.

### Audio Encoders List View

To open the Audio Encoders List View:

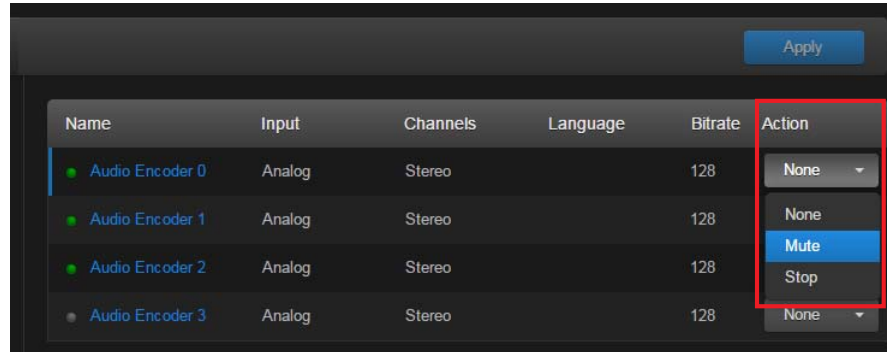
1. On the Streaming page, click **AUDIO ENCODERS** from the sidebar menu.

The Audio Encoders List View opens, as shown in the following example (#S/B-292E-DVI).

Name	Input	Channels	Language	Bitrate	Action
Audio Encoder 0	Analog	Stereo		128	None
Audio Encoder 1	Analog	Stereo		128	None
Audio Encoder 2	Analog	Stereo		128	None
Audio Encoder 3	Analog	Stereo		128	None

The Audio Encoders List View displays the status LED, Name, Input, Channel Mode, Language, and Bitrate for each audio encoder. It also provides an option for you to either start, stop, or mute each input.

- To view details or modify the audio settings for an encoder, click a link in the table to open the Audio Encoder Detail View.
- To change the status for an encoder, click the drop-down list under **Action** and select either Start or Stop (as applicable), or Mute.



Name	Input	Channels	Language	Bitrate	Action
Audio Encoder 0	Analog	Stereo		128	None
Audio Encoder 1	Analog	Stereo		128	None
Audio Encoder 2	Analog	Stereo		128	Mute
Audio Encoder 3	Analog	Stereo		128	None

- To apply your changes, click [Apply](#).

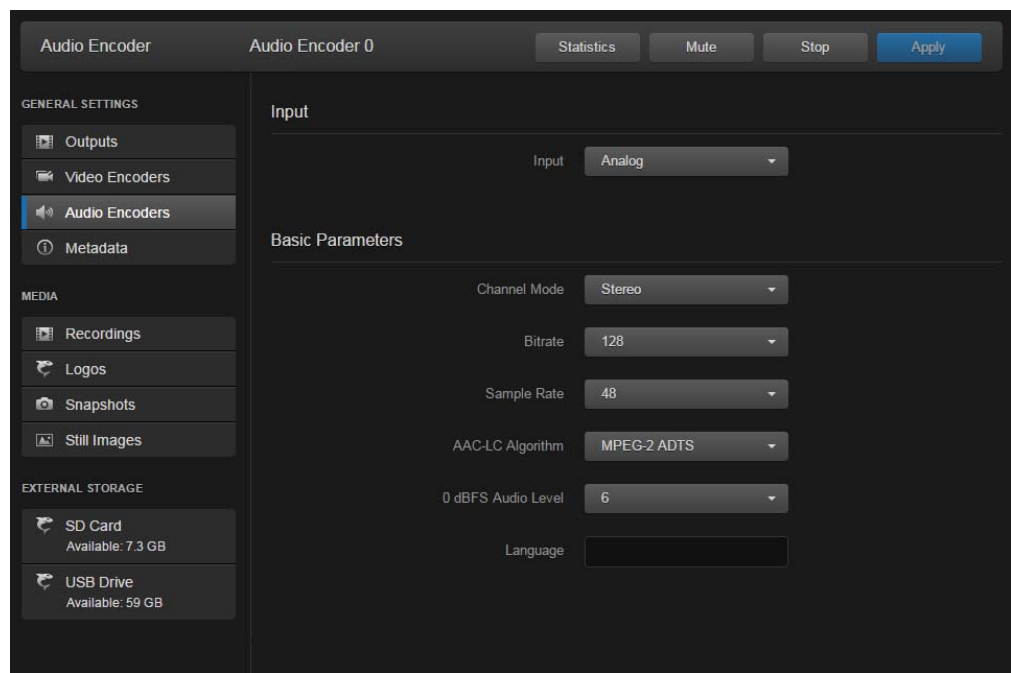
## Configuring Audio Encoder Settings

From the Audio Encoder Detail View, you can configure audio encoding properties such as the Input interface, Bitrate, Channel Mode, and Language for the encoder.

To configure the Audio Encoding Settings:

- From the Audio Encoders List View, click a link in the table.

The Audio Encoder Detail View opens, displaying the current audio settings for the selected encoder (see following example).



- Select or enter the new value(s) in the appropriate field(s). See [“Audio Encoder Settings”](#) on page 105.
- To start or stop the encoder, click [Start](#) or [Stop](#) (as applicable).



- To mute the audio (when active), click [Mute](#).



**NOTE** When an audio encoder is muted, it still generates audio data, but the audio content is silence. For more information, see [Mute on page 106](#).

- To view statistics for the encoder, click [Statistics](#). For details, see [“Audio Encoder Statistics” on page 107](#).

- 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 > PRESETS](#) page. See [“Saving and Loading Presets” on page 177](#).

- To return to List View, click [AUDIO ENCODERS](#) from the sidebar menu.

## Audio Encoder Settings


The following table lists the Audio Encoder controls and settings:

Audio Setting	Default	Description/Values
<b>Input</b>		
Input		Select the Audio Input for the encoder.
SDI	Analog	<ul style="list-style-type: none"> <li>Analog</li> <li>SDI1 (1-2). . (15-16)</li> <li>SDI2 (1-2). . (15-16)</li> </ul> <p><b>NOTE:</b> The SDI2 audio inputs are only available on dual-channel systems.</p> <p><b>TIP:</b> For Analog audio, on dual input SDI encoders, you may need to specify the video input from which to derive the audio encoder's STC source (either Auto, BNC1, or BNC2). This is done using the CLI. For details, see <a href="#">“stcif” on page 258</a>.</p>
DVI	Analog	<ul style="list-style-type: none"> <li>Analog</li> <li>DVI (1-2)</li> </ul>

Audio Setting	Default	Description/Values (Cont.)
<b>Basic Parameters</b>		
Bitrate	128 kbps	Select the Audio Bitrate for the encoder: <ul style="list-style-type: none"> <li>• Mono: 56 to 160 kbps.</li> <li>• Stereo: 80 to 320 kbps.</li> </ul>
Sample Rate (kHz)	48 kHz	The number of audio samples per second taken from the incoming signal. 48 kHz only.
Channel Mode	Stereo	Select the number and type of audio channels to encode. Stereo, Mono-Left, Mono-Right
AAC-LC Algorithm	MPEG-2 ADTS	The audio compression algorithm: <ul style="list-style-type: none"> <li>• MPEG-2 ADTS - Encodes audio using the ISO/IEC 13818-7 MPEG-2 AAC-LC algorithm with an ADTS header. (Default)</li> <li>• MPEG-4 LOAS/LATM - Encodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm with a LOAS/LATM header.</li> </ul>
0 dBFS Audio Level (dBu)	+6 dBu	(Analog Input only) Adjusts the maximum analog Audio Input level (0 dBfs) from +5dBu up to +20dBu. <b>NOTE:</b> This is useful in applications such as broadcast and streaming to allow higher audio headroom.
Language	n/a	To specify the language of the input, select a language from the list or enter a 3-character ISO639-2 code.
	n/a	Click <a href="#">Mute</a> to encode silence instead of the selected audio input. For example, this may be used when you do not wish to encode the audio but the decoder being used does not support decoding of video only streams.
 	n/a	Click <a href="#">Stop</a> to stop an active encoder. Click <a href="#">Start</a> to start or restart a stopped encoder.
	n/a	Click <a href="#">Statistics</a> to view statistics for the encoder. See <a href="#">“Audio Encoder Statistics”</a> on page 107.

## Audio Encoder Statistics

The following table lists the Audio Encoder statistics:

Audio Encoder Statistic	Description/Values
State	The current operating status of the encoder, either: <ul style="list-style-type: none"><li>• WORKING</li><li>• STOPPED</li></ul>
Encoded Frames	Number of encoded frames.
Encoded Bytes	Number of encoded bytes.
Encoded Bitrate	The audio bitrate used for the encoder (in kbps).
Encoder Errors	Number of audio encoding errors.
Encoder PTS	The current encoder Presentation Time Stamp (PTS) based on a 90 kHz clock: e.g., 0x138a56483
STC Source Interface	(only available when State is WORKING) The audio input from which the audio STC (System Time Clock) is derived: either BNC-1 or BNC-2, or DVI-D.
Maximum Sample Value	The largest sample in the last audio frame (total of 1024 samples per frame). (Duration: 21 ms)
	Click to reset the Audio Encoder statistics.

## Configuring Metadata Capture



**NOTE** Metadata Capture is an optional feature which may be installed at the factory or via a field upgrade by installing a license file.

From the Metadata pages, you can configure the Makito X 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.

You can set up multiple metadata inputs to include in Transport Streams. The Makito X supports up to three metadata input types: either from the COM1 serial port, the HD-SDI interface, or a user definable network port (up to eight UDP inputs). The first two apply on the Makito X SDI only.

- **Serial port:** The Makito X SDI extracts either KLV or CoT metadata packets from the serial port. From the Metadata Detail View, you must specify the [Data Format](#), and for CoT metadata, the [Max AirCRAFT-SPI Delta](#).
- **SDI:** The Makito X SDI 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 X can capture only 1024 bytes of KLV metadata per video frame.
- **Network:** The Makito X can receive either (a) KLV payload encapsulated in UDP or (b) CoT inside UDP that is converted to KLV and then streamed (see [“CoT/UDP with SPI Message Filtering Based on UID”](#) on page 109). You must specify the UDP port on which the Makito X will listen for incoming metadata. The [IP Address](#) is only required for reception of multicast metadata, or if you only want to accept messages coming from a specific sender.

The Makito X auto-detects the hardware setup of the encoder. If the serial port or SDI video is connected, the serial or SDI metadata source is created automatically at startup by the system. For Serial input, the COM Port Mode must also be set to Metadata (see [“Mode”](#) on page 195). UDP sources must be manually created by the user. The Makito X supports insertion of multiple metadata sources into the same KLV Elementary Stream.

The Makito X supports both synchronous and asynchronous KLV metadata stream signaling and AU (Access Unit) transport support. When configuring a stream, you can select the encapsulation type to use for the associated KLV metadata source. For technical specifications, see [“Asynchronous KLV Metadata Support”](#) on page 385.

CoT/UDP and CoT/Serial metadata sources can also be retransmitted to other IP destinations. For more information, see [“Configuring CoT Retransmission”](#) on page 115.

You can define a small set of static KLV objects (i.e., mission IDs and security classification) for KLV and CoT metadata sources. For more information, see [“Configuring KLV Metadata Insertion”](#) on page 116.

## CoT/UDP with SPI Message Filtering Based on UID

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

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

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

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

The Makito X supports multiplexing of metadata sources. The CoT SPI filtering applies to the CoT/UDP and CoT/Serial services.

## Metadata List View

To open the Metadata List View:

1. On the Streaming page, click **METADATA** from the sidebar menu.

The Metadata List View opens, displaying the list of defined Metadata sources for the encoder. The following example shows Serial, SDI and Network metadata sources.

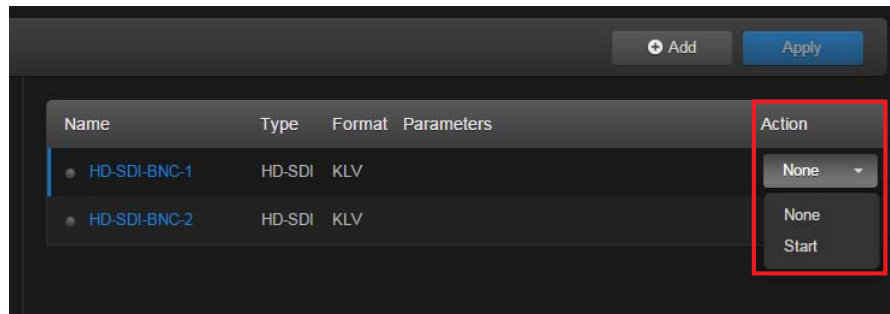
**Click to add a Network source**

Name	Type	Format	Parameters	Action
(None)	Serial	CoT	Max AirCraft-SPI Delta 0 ms	None
HD-SDI-BNC-1	HD-SDI	KLV		None
HD-SDI-BNC-2	HD-SDI	KLV	Divided By 4	None
(None)	Netw...	CoT	udp://(any):7000	None
KLV / UDP	Netw...	KLV	udp://@192.120.34.6:7000	None

**Click link to open Detail View**

The Metadata List View displays the Status LED, source Name, Type, Format, and Parameters (CoT input only) for each source. It also provides an option for you to either start, stop or delete the stream.

- To view or modify source details, click a link in the table to open the Metadata Detail View.
- To add a Network source, click [Add](#).
- To change the status for a source, click the drop-down list under [Action](#) and select either Start or Stop (as applicable). You can also delete a Network source.



2. To apply your changes, click [Apply](#).

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



**TIP** To save the current configuration, open the [ADMINISTRATION > PRESETS](#) page. See [“Saving and Loading Presets”](#) on page 177.

## Configuring Serial or HD-SDI Metadata Sources



**TIP** The Makito X auto-detects the hardware setup of the encoder and automatically creates the source if the serial port or SDI video is connected.

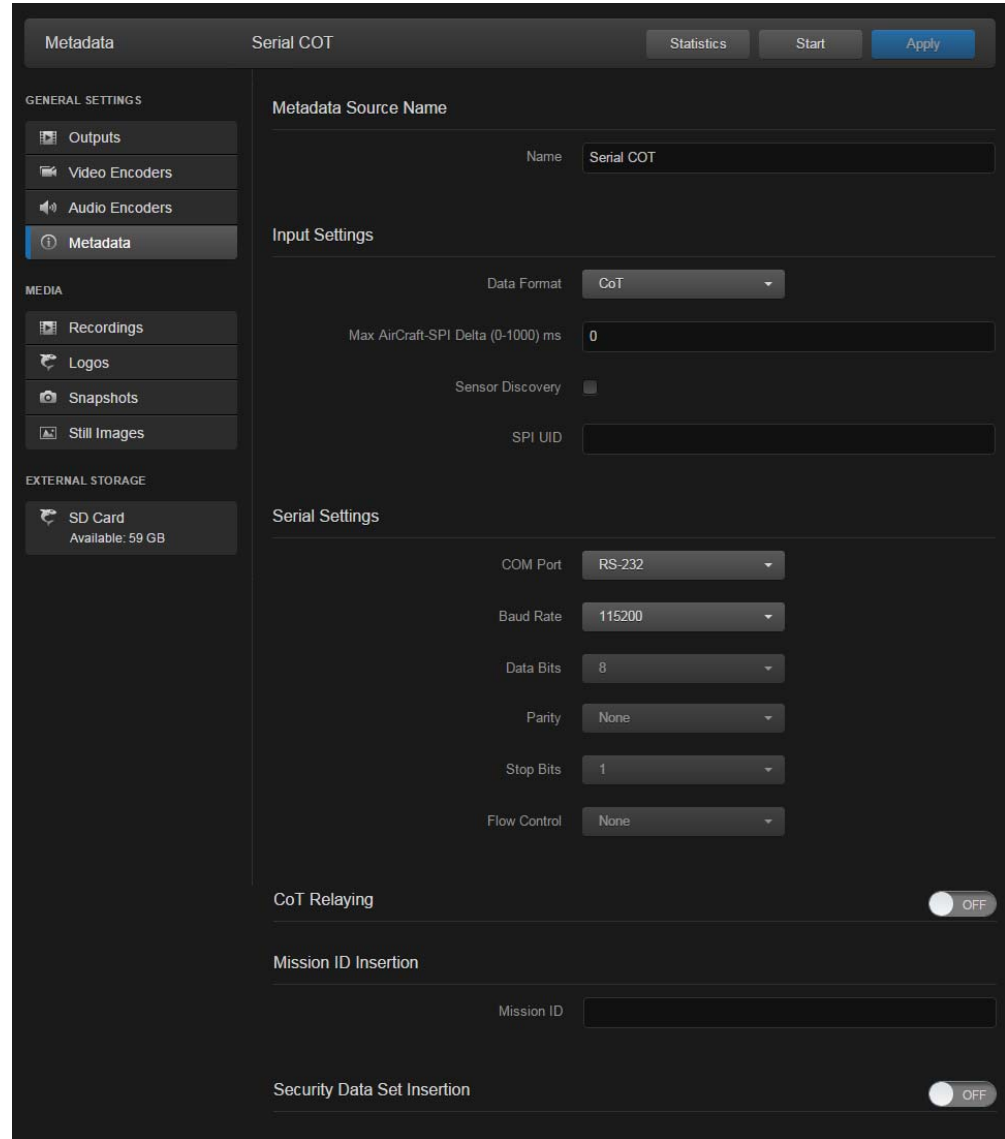
To configure Serial or HD-SDI metadata sources:

1. From the Metadata List View, click the link for the Serial or HD-SDI metadata source.

The Edit Metadata Source page opens for the selected source (as shown in the following HD-SDI source example).

The screenshot shows the 'Edit Metadata Source' interface for an HD-SDI source. The page title is 'Metadata HD-SDI-BNC-1'. On the left, there is a sidebar with 'GENERAL SETTINGS' (Outputs, Video Encoders, Audio Encoders, Metadata) and 'MEDIA' (Recordings, Logos, Snapshots, Still Images). The 'Metadata' option is selected. The main content area has three sections: 'Metadata Source Name' with 'Name' set to 'HD-SDI-BNC-1' and 'HD-SDI Input' set to 'BNC-1'; 'Decimation Settings' with 'Decimation' set to 'None'; and 'Mission ID Insertion' with an empty 'Mission ID' field. At the bottom, 'Security Data Set Insertion' is turned off.

2. (Optional) Type in the Name for the source (Serial source example shown following).



3. If CoT has been installed, select CoT for the Data Format (under Input Settings).
4. Select or enter the remaining value(s). For details on the Metadata fields, see [“Metadata Settings”](#) on page 118.
5. (Optional, CoT/UDP or CoT/Serial metadata only) To set up CoT retransmission, see [“Configuring CoT Retransmission”](#) on page 115.
6. (Optional) To configure a mission ID or security data to replace or insert, see [“Configuring KLV Metadata Insertion”](#) on page 116
7. To apply your changes and start the Metadata stream, click [Apply](#).

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





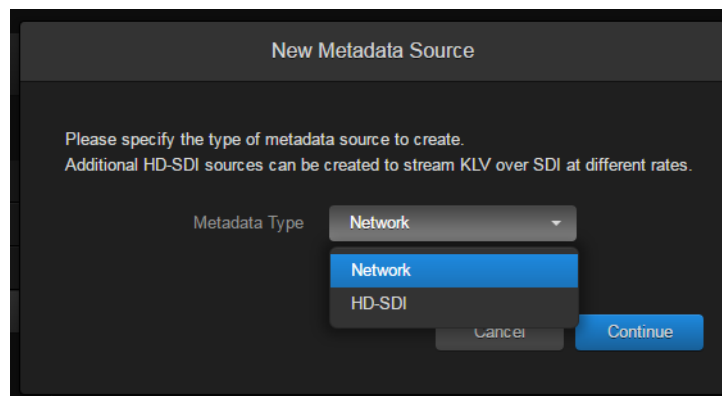
**TIP** To save the current configuration, open the [ADMINISTRATION > PRESETS](#) page. See [“Saving and Loading Presets”](#) on page 177.

8. To start or stop the stream, click [Start](#) or [Stop](#) (as applicable).
9. To view Metadata statistics, click [Statistics](#). For details, see [“Metadata Statistics”](#) on page 121.
10. To return to List View, click [METADATA](#) from the sidebar menu.

## Adding Network Metadata Sources

To add a network metadata source:

1. From the Metadata List View, click [Add](#).
2. Select Network for the Metadata Type on the New Metadata Source dialog and click [Continue](#).



The Metadata Detail View opens for you to specify a new metadata source (as shown in the following example).

Metadata Create New Metadata Source Apply

GENERAL SETTINGS

- Outputs
- Video Encoders
- Audio Encoders
- Metadata

MEDIA

- Recordings
- Logos
- Snapshots
- Still Images

Metadata Source Name

Name

Input Settings

Data Format KLV

Network Settings

IP Address

Port

Mission ID Insertion

Mission ID

Security Data Set Insertion OFF

3. Follow steps [#2](#) through [#6](#) in the previous section, “[Configuring Serial or HD-SDI Metadata Sources](#)” to select or enter the values for the source.
4. To apply your changes and start the Metadata stream, click [Apply](#).

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



**TIP** To save the current configuration, open the [ADMINISTRATION > PRESETS](#) page. See “[Saving and Loading Presets](#)” on page 177.

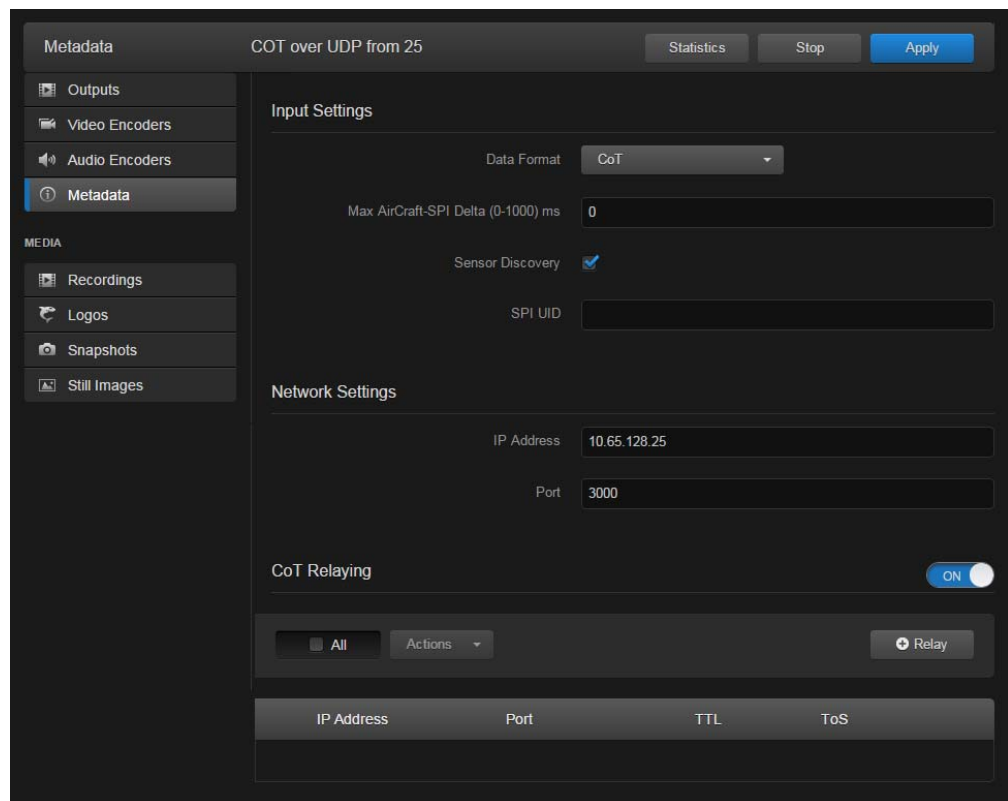
5. To start or stop the stream, click [Start](#) or [Stop](#) (as applicable).
6. To view Metadata statistics, click [Statistics](#). For details, see “[Metadata Statistics](#)” on page 121.
7. To return to List View, click [METADATA](#) from the sidebar menu.

## Configuring CoT Retransmission

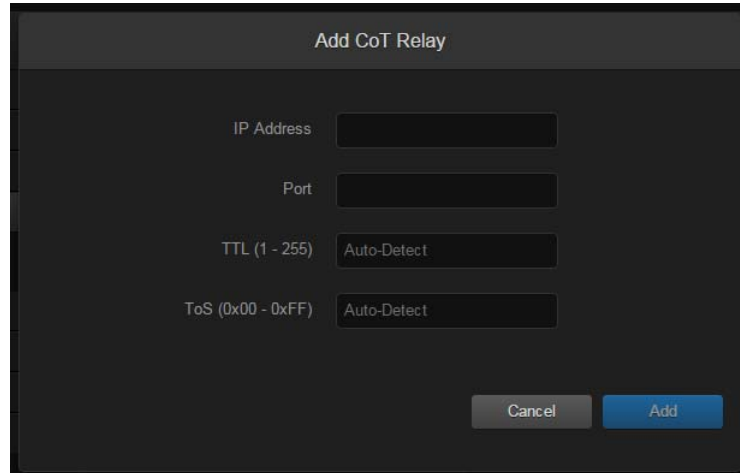
From the Metadata Detail View, you can configure CoT retransmission of COT metadata received over the Serial or UDP interface. The metadata will be retransmitted as a CoT/UDP unicast or multicast stream so that multiple CoT listeners can access the source CoT data. You can retransmit up to 8 CoT/UDP messages.

To configure CoT Retransmission:

1. From the Metadata List View, click the link for the CoT metadata source to retransmit. For details on setting up the metadata source, see [“Setting Up Streaming”](#) on page 125).
2. On the Metadata Detail View, if necessary, scroll down the page and toggle the CoT Relaying button to **On** (as shown in the following example).

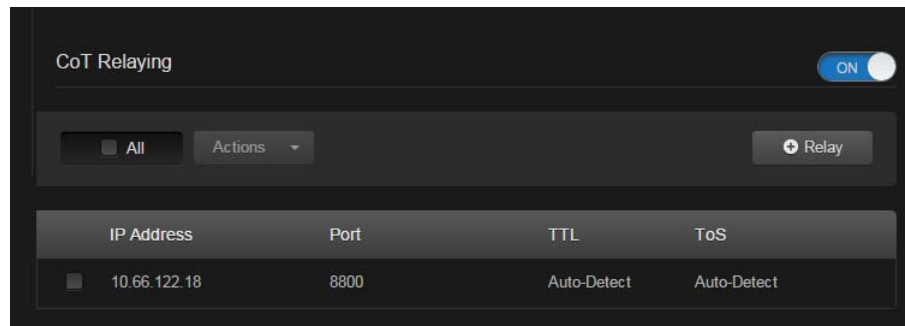


3. To add a CoT retransmission destination, click **+Relay**.
4. On the Add CoT Relay dialog, enter the IP Address and Port for the destination. Adjust the TTL and TOS values if required.



5. Click [Add](#).

The stream is added to the list:



IP Address	Port	TTL	ToS
<input type="checkbox"/> 10.66.122.18	8800	Auto-Detect	Auto-Detect

6. To edit or delete a CoT relay destination, select the relay from the list and select Edit or Delete from the Actions drop-down menu.

## Configuring KLV Metadata Insertion

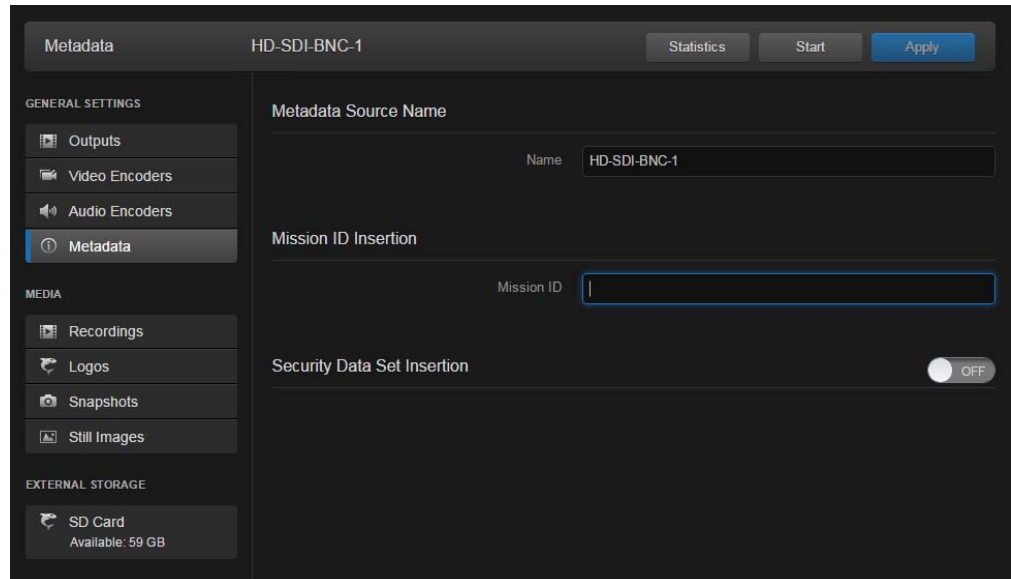
From the Metadata Detail View, you can define a small set of static KLV objects (i.e., mission IDs and security classification) for KLV and CoT metadata sources. This allows customers to modify erroneous or insert missing metadata within outbound TS steams. These options are available:

- Configure a mission ID string of up to 127 characters: When the mission ID is configured, any received UAS KLV dataset will be processed in order to modify the existing mission ID or add a mission ID element if not there with the configured value.
- Enable or disable the update/generation of the security data set in UAS messages: When this feature is enabled, you then specify the classification (Unclassified, Restricted, Confidential, Secret, or Top Secret), the classifying country, and the object country/ies (up to 6) (using the proper ISO 3-letter country code).

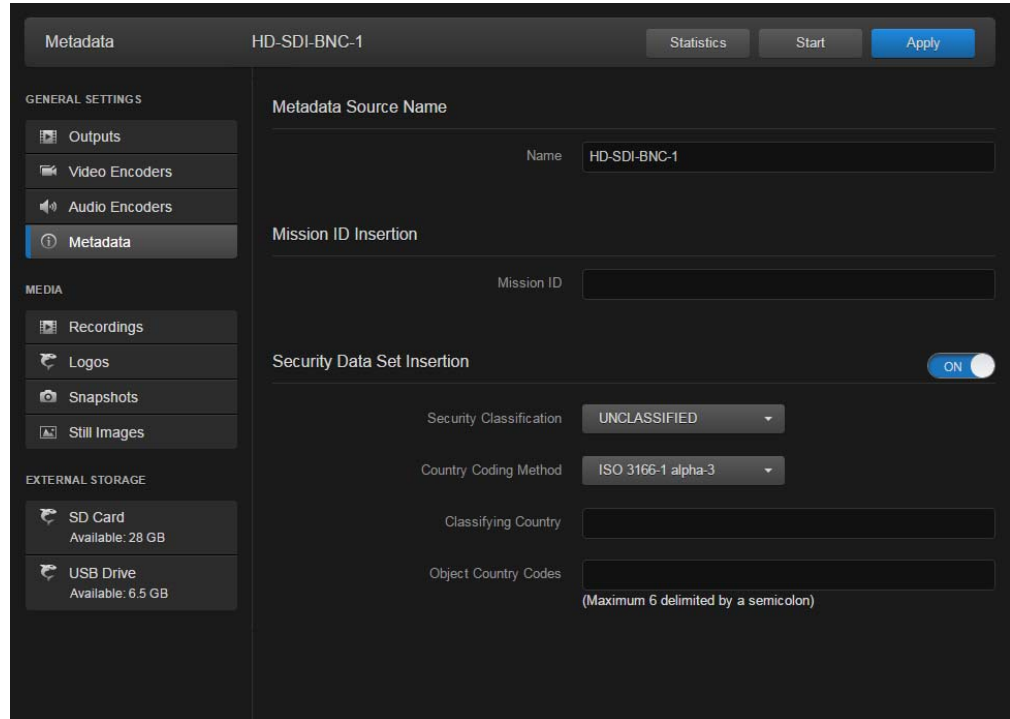
In both cases, the mission ID or security data will get replaced or inserted with the ones created by the Makito X based on the configuration.

To configure insertion of static KLV objects:

1. From the Metadata List View, click the link for the metadata source to define static KLV objects. For details on setting up the metadata source, see [“Setting Up Streaming”](#) on page 125).
2. On the Metadata Detail View, if necessary, scroll down the page and (optional) type in a mission ID string of up to 127 characters in the Mission ID text box.



3. (Optional) To enable the update/generation of the security data set in UAS messages, toggle the Security Data Set Insertion button to **On** (as shown in the following example).



4. Fill in the remaining fields and click [Apply](#).

## Metadata Settings

The following table lists the encoder Metadata controls and settings:



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

Metadata Setting	Default	Description/Values
<b>Metadata Source Name</b>		
Name	n/a	Enter a unique name for the source.
Type	Network	Select the type of metadata source to create. <ul style="list-style-type: none"> <li>• Network or</li> <li>• HD-SDI</li> </ul> <b>NOTE:</b> Additional HD-SDI sources can be created to stream KLV over SDI at different rates.

Metadata Setting	Default	Description/Values (Cont.)
HD-SDI Input	BNC-1	(HD-SDI source only) Select the Input port for the metadata source. <ul style="list-style-type: none"> <li>BNC-1</li> <li>BNC-2</li> </ul>
<b>Decimation Settings (HD-SDI only)</b>		
Decimation	None	(Optional) For KLV over SDI metadata input, the ingested KLV messages can be decimated by the factor specified here. To reduce the bandwidth used by the metadata service, select the frame decimation rate. 1/2..1/60 <b>NOTE:</b> 1 means no decimation, 2 means divide the amount by half, etc.
<b>Input Settings (Serial or Network input only)</b>		
Data Format	KLV	Select the data format for the metadata. <ul style="list-style-type: none"> <li>KLV (Key Length Value) or</li> <li>CoT (Cursor on Target).</li> </ul> <b>NOTE:</b> To configure Serial input, the COM Port <b>Mode</b> must first be set to Metadata (see <a href="#">“Mode”</a> on page 195). <b>CoT</b> must be specified upon purchase. For details, refer to the <i>MakitoX CoT Addendum</i> .
Max Aircraft-SPI Delta	0 ms	( <b>CoT</b> 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 <b>NOTE:</b> Only available if <b>CoT</b> has been installed.
Sensor Discovery	Disabled	( <b>CoT</b> input only) Check this checkbox to enable discovery of SPI UIDs that will be shown in the <a href="#">SPI UID</a> field below and can then be potentially used as the SPI UID for SPI message filtering.
SPI UID	n/a	( <b>CoT</b> input only) Double-click the text box to display the list of the SPI messages detected by the Makito X and select a string for the UID filter.
<b>Serial Settings (Makito X with SDI, Serial Input only)</b>		
COM Port	RS-232	Select the type of Serial interface: <ul style="list-style-type: none"> <li>RS-232 or</li> <li>RS-422 (only available if the Metadata Capture option is installed).</li> </ul>

Metadata Setting	Default	Description/Values (Cont.)
Baud Rate	115200	Select the bitrate for the COM Port to match the protocol for connected RS-232/422 equipment. Choose from: 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.
Data Bits	8	Select the databits for the COM Port: 8
Parity	None	Select the parity for the COM Port: None
Stop Bits	1	Select the stopbits for the COM Port: 1
Flow Control	None	Select the flow control for the COM Port: None
<b>Network Settings (UDP I Input only)</b>		
IP Address	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 can also specify the address if you only want to accept KLV messages coming from a specific sender.
Port	n/a	(Required) Specifies the local UDP port on the Makito X that is receiving the packets.
<div style="background-color: #333; color: white; padding: 5px; text-align: center; margin-bottom: 10px;">Stop</div> <div style="background-color: #333; color: white; padding: 5px; text-align: center;">Start</div>	n/a	These buttons become available to control a metadata stream once it has started streaming (after you click <a href="#">Apply</a> ).  Click <a href="#">Stop</a> to stop an active stream. Click <a href="#">Start</a> to restart a stopped stream.
<div style="background-color: #333; color: white; padding: 5px; text-align: center;">Statistics</div>	n/a	Click <a href="#">Statistics</a> to view statistics for the stream. See " <a href="#">Streaming Statistics</a> " on page 142.
<b>CoT Relaying (See "<a href="#">Configuring CoT Retransmission</a>" on page 115)</b>		
CoT Relaying	off	When set to On, the system will retransmit received CoT/UDP or CoT/Serial metadata to up to 8 other hosts over UDP. on,off
<a href="#">+Relay</a>	n/a	Use to specify the IP address and UDP port for each relayed packets. You can optionally specify the ttl and tos.
TTL	64	Time to Live. See <a href="#">TTL</a> on page 140.
ToS	0xB8	Type of Service. See <a href="#">ToS</a> on page 140.



Metadata Setting	Default	Description/Values (Cont.)
<a href="#">KLV Insertion (See “Configuring KLV Metadata Insertion” on page 116)</a>		
Mission ID Insertion	n/a	Enter a string of up to 127 characters.
Security Data Set Insertion	off	(KLV input only) When set to On, enables reclassification of received UAS KLV messages. on,off
Security Classification	unclassified	Specifies the classification of the security data set: <ul style="list-style-type: none"> <li>unclassified, restricted, confidential, secret, topsecret</li> </ul>
Country Coding Method		ISO 3166-1 alpha-3
Classcountry	n/a	The ISO 3166-1 3-letter code for the classifying country.
Objcountry	n/a	The ISO 3166-1 3-letter code(s) for up to six object countries separated by semicolons.



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

## Metadata Statistics

The following table lists the Metadata statistics:

Metadata Statistic	Description/Values
State	The current operating status of the stream, either: <ul style="list-style-type: none"> <li>WORKING</li> <li>STOPPED</li> </ul>
Rx Bytes	Number of received bytes.
Rx OK Messages	Number of successfully received messages.
Rx Corrupt Messages	Number of corrupt or failed messages.
Source Address	(UDP input only) The IP address of the Network source.
Rx SPI Messages	(CoT input only) Number of received SPI (Sensor Point of Interest) messages.

Metadata Statistic	Description/Values (Cont.)
Rx AirCraft Messages	(CoT input only) Number of received Aircraft messages.
Generated KLV Messages	(CoT input only) Number of generated KLV messages.
Generated KLV Bytes	(CoT input only) Number of generated KLV bytes.
RX Filtered SPI Messages	(CoT input only) Number of filtered SPI Messages.
<div style="border: 1px solid black; background-color: #0070c0; color: white; padding: 2px 10px; display: inline-block; margin-bottom: 5px;">Reset</div>	Click to reset the Metadata statistics.

## Configuring Streaming Outputs

From the Outputs pages, you can set up either streaming only, recording only, or both streaming with recording. This section covers setting up streaming.



**IMPORTANT** Recording is *only* available on the Makito X with Storage dual-height model (either fixed or removable SSD). The available configuration settings are specific to this model. For information on recording, see [“Configuring Recording Outputs”](#) on page 146.

Recording is *not* available on HEVC-capable appliances.

### Outputs List View

To open the Outputs List View:

1. On the Streaming page, click **OUTPUTS** from the sidebar menu.

The Outputs List View opens, displaying the list of defined streams for the encoder, as shown in the following example.

Click to add a stream

Click a link to open the Detail View

Click links to view current configuration

Name	Protocol / Format	Destination	Content	Action
(None)	TS over SRT	10.65.133.22:5000	Video Audio	None
(None)	TS over UDP	239.129.65.2:12965	Video Audio	None
(None)	TS over RTP	10.65.11.8:8350	Video Audio	None
hevc streamer	TS over UDP	10.65.11.145:8080	Video Audio	None

The Outputs List View displays the status LED, Stream Name, Protocol, Destination (IP Address and Port), and selected Content (Video/Audio Encoders and Metadata source) for each stream. It also provides an option for you to either start, stop, pause, or delete the stream.

- To create an output stream or recording session, click [Add](#).

- To view details or modify the settings for a stream or recording, click a link in the table under **Name** to open the Outputs Detail View.
- To view the video or audio encoder or metadata source for a stream, hover over a link in the table under **Content** to display the configuration information.

Name	Protocol / Format	Destination	Content	Action
(None)	TS over SRT	10.65.133.22:5000	Video Audio	None
(None)	TS over UDP	239.129.65.2:12965	Video Audio	None
(None)	TS over RTP	10.65.11.8:8350	Video Audio	None
hevc streamer	TS over UDP	10.65.11.145:8080	Video Audio	None

- To view the status of a stream or recording, hover over the status LED or **REC** link (to the left of the row).

Name	Protocol / Format	Destination	Content	Action
(None)	TS over SRT	10.65.133.22:5000	Video Audio	None
(None)	TS over UDP	239.129.65.2:12965	Video Audio	None
(None)	TS over RTP	10.65.11.8:8350	Video Audio	None

- To change the status for an existing stream, click the drop-down list under **Action** and select either Pause, Resume, Start, Stop, or Delete (as applicable).

Name	Protocol / Format	Destination	Content	Action
(None)	TS over SRT	10.65.133.22:5000	Video Audio	None
(None)	TS over UDP	239.129.65.2:12965	Video Audio	None
(None)	TS over RTP	10.65.11.8:8350	Video Audio	None
hevc streamer	TS over UDP	10.65.11.145:8080	Video Audio	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.



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**TIP** To save the current configuration, open the [ADMINISTRATION > PRESETS](#) page. See [“Saving and Loading Presets”](#) on page 177.

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## Setting Up Streaming

From the Outputs pages, you can create multiple output streams using the defined video encoders, audio encoders, and metadata (if applicable). Each output stream is configured independently. For details see:

- [“Configuring Video Encoders”](#) on page 87
- [“Configuring Audio Encoders”](#) on page 103
- [“Configuring Metadata Capture”](#) on page 108

From the Outputs pages, you can create and configure streams, start and stop streaming, and display statistics for streams. When creating a stream, you begin by selecting the content sources and then configure broadcasting, destination, link, and other streaming parameters.



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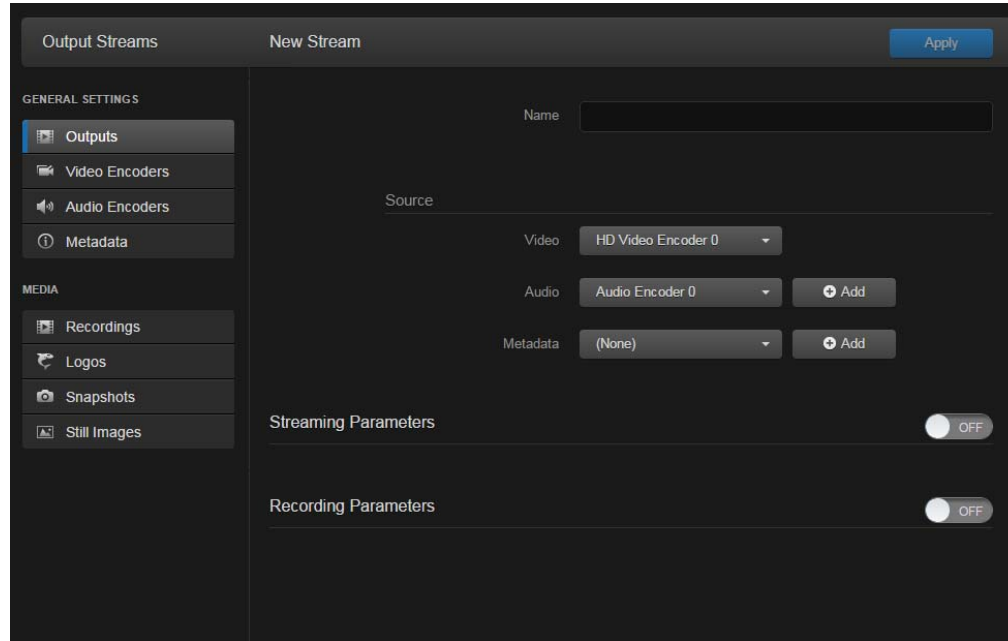
**NOTE** There is a limit of 16 streams that are exact duplicates. This refers to streams that have the exact same content sources (i.e., the same encoders and/or metadata sources).

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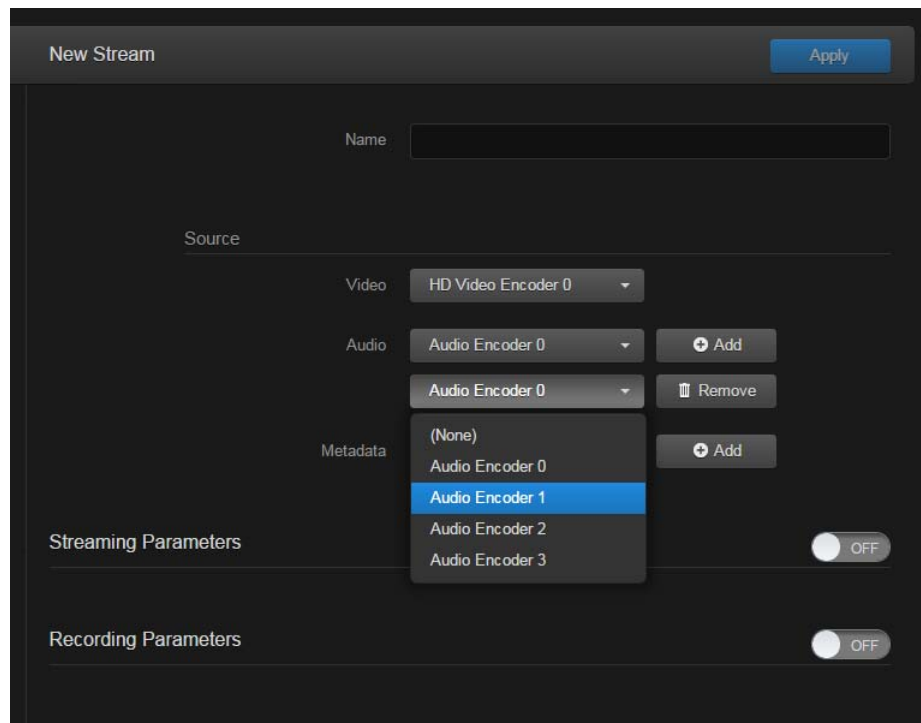
### To configure Output Steaming parameters:

1. From the Outputs List View, click a link in the table for an existing stream, or click [Add](#) to add a stream.

The Outputs Detail View opens (as shown in the following example for a new stream, Makito X with Storage).



2. Enter the stream name and select the sources (video, audio, and metadata, if applicable). See [“Streaming Settings”](#) on page 137.
3. To configure multi-track audio, click **Add** next to the Audio field and select the next Audio Encoder to add to the stream.





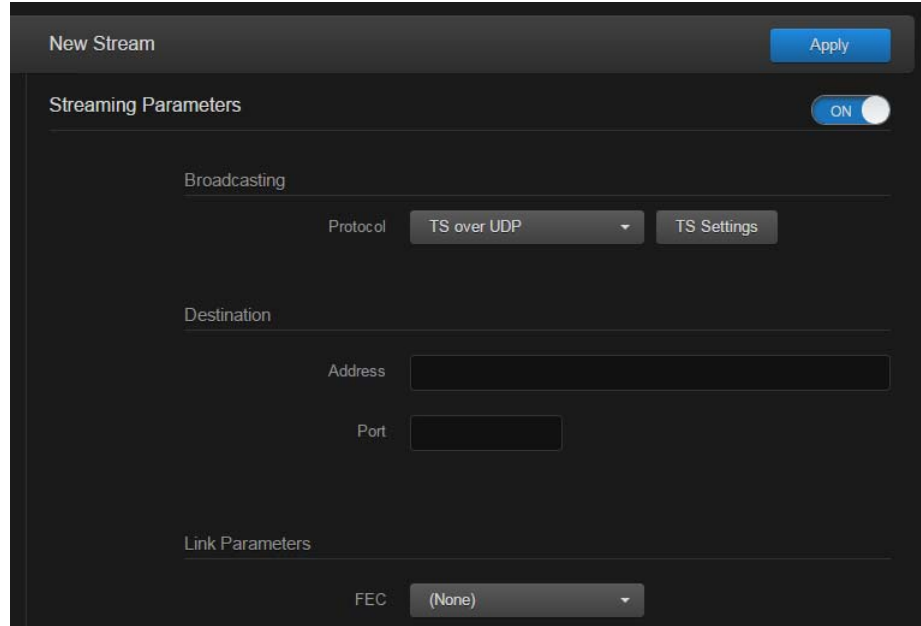
**IMPORTANT** Audio sources should always be associated with the same video interface for the dual channel SDI encoder. Selecting Analog or SDI audio sources that do not originate from the same video source is *not* recommended as audio artifacts will result at the decoder. For example, selecting video from BNC1 and audio from BNC2 will cause audio artifacts. Analog audio must be associated with a single BNC input.

4. To add metadata to the stream, select the Metadata source, and (optionally) select the encapsulation type (Data Carriage).

The screenshot shows the 'New Stream' configuration interface. It includes a title bar with 'New Stream' and an 'Apply' button. The main area is divided into several sections: 'Name' with a text input field; 'Source' section containing 'Video' (set to 'HD Video Encoder 0'), 'Audio' (set to 'Audio Encoder 0' with an 'Add' button), and 'Metadata' (set to 'HD-SDI-BNC-1' with an 'Add' button); 'Data Carriage' section with a dropdown menu showing 'Synchronous', 'Asynchronous' (highlighted), and 'Async with Sync AU'; 'Streaming Parameters' section with a toggle switch set to 'OFF'; and 'Recording Parameters' section with a toggle switch set to 'OFF'.

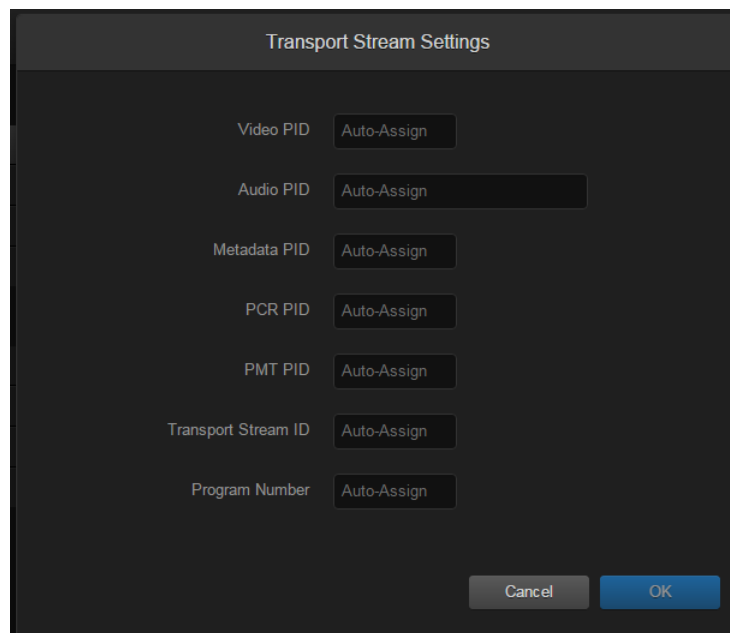
5. To stream metadata from multiple sources, click [Add](#) next to the Metadata field and select the next metadata source to add to the stream.

6. (Makito X with Storage only) To set up streaming, toggle the Streaming Parameters button to **On** (as shown in the following example). This step is *not* required if your encoder is not a Storage platform because streaming is already enabled.



The screenshot shows the 'New Stream' configuration interface. At the top right is an 'Apply' button. Below it is the 'Streaming Parameters' section with a toggle switch set to 'ON'. The 'Broadcasting' section includes a 'Protocol' dropdown menu set to 'TS over UDP' and a 'TS Settings' button. The 'Destination' section has 'Address' and 'Port' input fields. The 'Link Parameters' section has an 'FEC' dropdown menu set to '(None)'.

7. Under Broadcasting, select the Protocol. See [“Protocol”](#) on page 138.
8. To configure the Transport Stream settings (for TS over UDP, RTP, or SRT), click [TS Settings](#) and enter the values. See [“Transport Stream Settings”](#) on page 139.



The screenshot shows the 'Transport Stream Settings' dialog box. It contains several 'Auto-Assign' buttons for Video PID, Audio PID, Metadata PID, PCR PID, PMT PID, Transport Stream ID, and Program Number. 'Cancel' and 'OK' buttons are at the bottom.

9. Enter the values for the Destination and Link Parameters. See [“Broadcasting”](#) on page 138.



10. To configure a stream using the SRT (Secure Reliable Transport) streaming protocol, select TS over SRT for the Protocol and then complete the additional fields under Connection and SRT Settings. See [“Configuring Secure Reliable Transport \(SRT\)”](#) on page 133.

The screenshot displays the 'New Stream' configuration window. At the top right is an 'Apply' button. Below the title bar is the 'Streaming Parameters' section, which is currently turned 'ON'. Under 'Broadcasting', the 'Protocol' is set to 'TS over SRT', with a 'TS Settings' button next to it. A dropdown menu is open for 'Protocol', showing options: 'TS over UDP', 'TS over RTP', 'TS over SRT' (highlighted), 'Direct RTP', and 'RTMP'. Under 'Connection', the 'Mode' is set to 'Direct RTP'. The 'Address' field is empty. The 'Source Port' is set to 'Auto-Assign', and the 'Destination Port' is empty. The 'SRT Settings' section has 'Latency' set to 125 and 'Encryption' set to '(None)'. The 'Link Parameters' section has 'Bandwidth Overhead' set to 25% and 'MTU (228 - 1500)' set to 1496.

11. To configure a static image to display when the stream is paused, select a Still Image file. (Image files must have been previously uploaded for the encoder. To upload image files, see [“Configuring Still Image Streaming”](#) on page 165.)
12. To configure SAP network announcements, check the “Transmit SAP” checkbox and fill in the SAP fields. For details, see [“Session Announcement Protocol \(SAP\)”](#) on page 131.

The screenshot shows two configuration sections in a dark-themed UI. The first section, titled 'Still Image When Paused', contains a 'Still Image' text input field followed by a 'Select' button. The second section, titled 'SAP', features a 'Transmit SAP' toggle switch which is checked. Below this are several text input fields for 'Name', 'Description', 'Keywords', 'Author', and 'Copyright'. At the bottom of the SAP section are two more input fields: 'Address' with the value '224.2.127.254' and 'Port' with the value '9875'.

13. (Makito X with Storage only) To set up a recording session, toggle the Recording Parameters button to **On**. See [“Configuring Recording Outputs”](#) on page 146.

14. If you only want to create a streaming session, click **Apply** now to apply your changes and start streaming.

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 > PRESETS](#) page. See [“Saving and Loading Presets”](#) on page 177.

15. To start, pause, or stop streaming, click **Start**, **Pause**, or **Stop** (as applicable).

The screenshot shows a control panel for a streaming session named 'test-ts-srt1'. At the top, there are four buttons: 'Statistics', 'Pause', 'Stop', and 'Apply' (which is highlighted in blue). Below the buttons, there is a 'Name' field containing 'test-ts-srt1'. Underneath, there is a 'Source' section with a 'Video' dropdown menu currently set to 'HD Video Encoder 0'.

16. To view streaming statistics, click [Statistics](#). For details, see [“Streaming Statistics”](#) on page 142.



**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).

17. To return to List View, click [OUTPUTS](#) from the sidebar menu.

### Session Announcement Protocol (SAP)

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

You can also specify the address and port to transmit SAP announcements on a stream-by-stream basis. This is useful if you do not want to multicast SAP announcements on the standard IP addresses and ports (as defined in RFC 2974). See [“SAP only”](#) on page 141.

### Selective Video Mute

Pausing and then resuming a stream allows you to selectively and temporarily “mute” the video. For example, if you are streaming the same content multiple times to different audiences, you can choose to mute one or some of the streams (i.e., by pausing them). 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 [“Configuring Still Image Streaming”](#) on page 165.)

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.

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

## Bandwidth Overhead for CBR Streams with Metadata

In CBR streams with Traffic Shaping enabled, metadata may cause the stream to exceed the bandwidth overhead (video bitrate + bandwidth overhead percentage). Therefore, when configuring the bandwidth overhead 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 bandwidth overhead 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:

$$\text{bandwidth overhead} = ( \text{metadata\_bitrate} / ( \text{video\_bitrate} + \text{audio\_bitrate} ) ) * 100$$

Minimum bandwidth overhead should be no less than 5. For example:

$$\text{metadata\_bitrate} = 500 \text{ Kbps}, \text{ video\_bitrate} = 1000 \text{ Kbps}, \text{ audio\_bitrate} = 128 \text{ Kbps}$$

$$\text{bandwidth overhead} = ( 500 / ( 1000 + 128 ) ) * 100 = 44$$

## Configuring Secure Reliable Transport (SRT)

The Secure Reliable Transport (SRT) streaming protocol is designed to provide reliable and secure end-to-end transport between two SRT-enabled devices (such as Makito X Series encoders and decoders) over a link which traverses the public Internet. SRT optimizes video streaming performance across unpredictable Internet networks, recovering from packet loss, jitter, network congestion and bandwidth fluctuations that can severely affect the viewing experience.



**NOTE** For additional information required to set up and tune SRT streams from the encoder to the decoder, please see the SRT Deployment Guide (available through Haivision's Download Center at: <http://www.haivision.com/download-center/>).

The following table lists the SRT-specific parameters:

SRT Stream Setting	Description
<b>Connection</b>	
Mode	<p>Specifies the SRT Connection Mode:</p> <ul style="list-style-type: none"> <li>• <b>Caller:</b> The SRT stream acts like a client and connects to a server listening and waiting for an incoming call.</li> <li>• <b>Listener:</b> The SRT stream acts like a server, and listens and waits for clients to connect to it.</li> </ul> <p><b>NOTE:</b> The firewall must be configured to allow incoming Caller connections to reach the Listening device.</p> <ul style="list-style-type: none"> <li>• <b>Rendezvous:</b> Allows calling and listening at the same time.</li> </ul> <p><b>NOTE:</b> To simplify firewall traversal, Rendezvous Mode allows the encoder and decoder to traverse a firewall without the need for IT to open a port, but requires that the firewall not remap the UDP port for the stream.</p>
Address	<p>(Caller and Rendezvous Connection modes) Specifies the destination IP address for the SRT stream.</p> <p><b>TIP:</b> You can also enter a Fully Qualified Domain Name (FQDN).</p>
Source Port	<p>(Caller Connection mode) Specifies the UDP source port for the SRT stream. If not filled in, a (default) source port will be assigned.</p> <p><b>NOTE:</b> This simplifies firewall configuration as the firewall/NAT rules can be precisely tailored to the SRT stream.</p>

SRT Stream Setting	Description
Destination Port	(Caller and Rendezvous Connection modes) Specifies the UDP destination port for the SRT stream.
Port	(Listener Connection mode only) Specifies the UDP local port for the SRT stream.
<b>SRT Settings</b>	
(Buffering) Latency	Specifies the SRT receiver buffer that permits lost packet recovery. The size of this buffer adds up to the total latency. A minimum value must be 3 times the round-trip-time (RTT). Range = 20 - 8000 ms <b>NOTE:</b> Latency is for the SRT protocol only and does not include the capture, encoding, decoding and display processes of the end-point devices. The SRT buffer, configured as “Latency”, is the time reserved in the decoder to recover missing packets.
Encryption	Enables AES encryption and specifies the key length, either: None, AES-128, or AES-256
Passphrase	(Only required and accepted if <a href="#">Encryption</a> is enabled) Specifies a string used to generate the encryption keys to protect the stream. Range = 10-79 UTF8 characters
(Maximum) Bandwidth Overhead (%)	(Listener Connection mode only) Specifies the maximum stream bandwidth overhead that can be used for lost packets recovery. Range = 5-100% <b>NOTE:</b> SRT streams may temporarily overshoot the defined bandwidth overhead limit.

For SRT-specific statistics and graphical display, see [“Streaming Statistics”](#) on page 142.

#### To create an SRT connection:

1. Make sure the encoder and decoder are accessible from the public Internet by appropriate configuration of any firewalls.
2. Set up the SRT stream and start the stream connection (following the steps in [“Setting Up Streaming”](#) on page 125).
3. Once you establish the SRT stream, check the statistics and make adjustments to fine-tune the stream. On the Output Streams page, click the [Statistics](#) button to see how the SRT stream is performing.
4. Monitor the link statistics to see if the link is over-subscribed (and adjust the video encoder bitrate if it is).

For example, use the Max Bandwidth and (Buffering) Latency values to set the encoder bitrates appropriately.

## CDN and Flash Interoperability (RTMP)

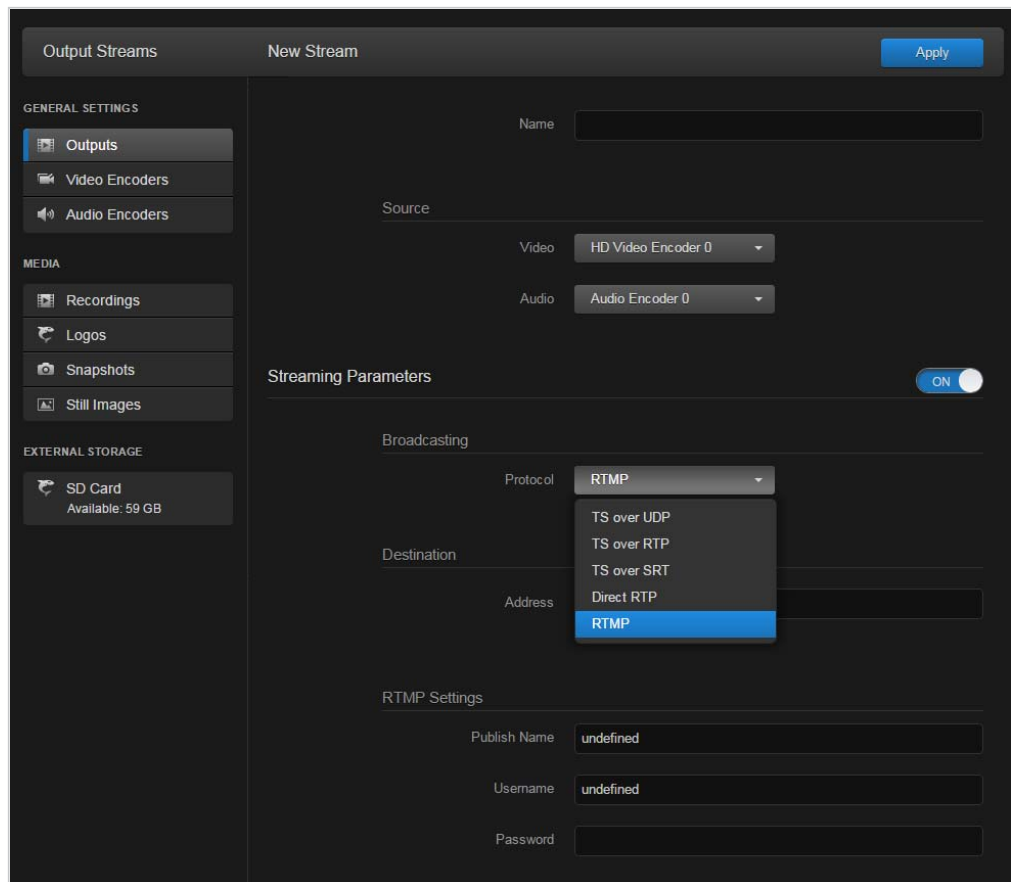
The Makito X can stream directly to a Flash Media Server (FMS) or Flash-based Content Delivery Network (CDN) using the Real Time Messaging Protocol (RTMP).

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

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

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

1. Follow the steps in [“Setting Up Streaming”](#) on page 125 to add a stream and select the sources.
2. From the Outputs Detail View, set the Stream Protocol Type to RTMP (as shown in the following example).



3. For the Destination Address, type in the URL for the application endpoint of the FMS or CDN server.



**NOTE** When interoperating with Kaltura using RTMP, add a slash “/” at the end of the URL provided by Kaltura.

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4. Type in the username and password for the CDN server. See [“RTMP only”](#) on page 142.
5. Click [Apply](#) to start the stream.
6. To return to List View, click [OUTPUTS](#) from the sidebar menu.



**NOTE** You can create and stream multiple RTMP streams with identical server destination and application name URLs in order to stream to both a primary and backup RTMP entry point.

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**TIP** When creating a stream to an Akamai HD2 CDN, to avoid dropped frames by the HD2 player, make sure that sufficient bandwidth exists between the Makito X and the HD2 node.

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## Publishing an RTMP Stream to YouTube

Following are the steps to publish an RTMP stream from the Makito X to YouTube:

1. Log in to YouTube, and go to “My Channel” and then to “Video Manager”.
2. Select “Live Events” in the navigation pane on the left and click the “New live event” button on the top-right.
3. Enter the event name, start date/time, and set Type to Custom. Click “Create Event”.
4. On the “Ingestion Settings / Main Camera” page, choose “Custom ingestion”. Create a stream, select “Other encoders” in the encoder list, and note the stream name and the server URL which will appear below.
  - When you click on “Custom ingestion”, you must choose the appropriate resolution (e.g., MXE (720p)). If you do not give the resolution you will transmit, YouTube cannot start to display your stream.
  - When you select “Other encoders”, YouTube will give you a Stream Name (e.g., makrtmp.ee8a-v8qv-cury-70mg). This name correspond to the Makito X Publish Name field.



YouTube will also give you a “Primary Server URL” (e.g., `rtmp://a.rtmp.youtube.com/live2`). This is the URL to use in Makito X Destination Address field.

5. Start the RTMP stream on the Makito X.
6. On YouTube, go to the “Live Control Room” page, and as soon as YouTube starts to receive your stream (i.e., the stream status appears as GOOD), you can go into preview mode (press the [Preview](#) button).
7. Shortly before the event start time, you should be able to press “Start Streaming” to actually start your event.



**IMPORTANT** Everything you stream to YouTube becomes public.

## Streaming Settings

The following table lists the Streaming controls and settings:

Streaming Setting	Default	Description/Values
Name	n/a	(Optional) Enter a unique name for the stream.
<b>Source</b>		
Video H.264	HD Video Encoder 0	Select the Video Encoder to assign to the stream: <ul style="list-style-type: none"> <li>• None (no content source selected)</li> <li>• HD Video Encoder 0</li> <li>• HD Video Encoder 1</li> <li>• HD Video Encoder 2</li> <li>• HD Video Encoder 3</li> </ul>
HEVC	H.264 Video Encoder 0	Select the Video Encoder to assign to the stream: <ul style="list-style-type: none"> <li>• None (no content source selected)</li> <li>• H.264 Video Encoder 0</li> <li>• H.264 Video Encoder 1</li> <li>• H.264 Video Encoder 2</li> <li>• H.264 Video Encoder 3</li> <li>• HEVC Video Encoder 4</li> <li>• HEVC Video Encoder 5</li> </ul>

Streaming Setting	Default (Cont.)	Description/Values (Cont.)
Audio	Audio Encoder 0	<p>Select the Audio Encoder to assign to the stream.</p> <ul style="list-style-type: none"> <li>• None (no content source selected)</li> <li>• Audio Encoder 0. . 3</li> <li>• Audio Encoder 4. . 7 (SDI only)</li> </ul> <p><b>NOTE:</b> To configure multi-track audio, click <a href="#">Add</a> next to the Audio field and select the next Audio Encoder to add to the stream.</p>
Metadata	None	<p>(Only available if KLV or CoT has been installed) To enable metadata, select one of the defined inputs.</p> <ul style="list-style-type: none"> <li>• (None)</li> <li>• Select from list of defined metadata sources, e.g., Serial:CoT or Serial:KLV (if connected), HD-SDI-BNC-1, or HD-SDI-BNC-2.</li> </ul> <p><b>NOTE:</b> To stream metadata from multiple sources, click <a href="#">Add</a> next to the Metadata field and select the next metadata source to add to the stream.</p> <p>For more information, see <a href="#">“Configuring Metadata Capture”</a> on page 108.</p>
Data Carriage	Asynchronous	<p>Selects the encapsulation type to use for the metadata source, either:</p> <ul style="list-style-type: none"> <li>• Synchronous</li> <li>• Asynchronous</li> <li>• Asynchronous with Sync AU</li> </ul>
<a href="#">Streaming Parameters</a>		
<a href="#">Broadcasting</a>		
Protocol	TS over UDP	<p>Select the Protocol Type for the encoded stream.</p> <ul style="list-style-type: none"> <li>• TS over UDP: MPEG2 transport stream over UDP (no RTP header)</li> <li>• TS over RTP: MPEG2 transport stream over RTP</li> <li>• TS over SRT: Secure Reliable Transport. See <a href="#">“Configuring Secure Reliable Transport (SRT)”</a> on page 133.</li> <li>• Direct-RTP: RFC3984 (H.264 only)</li> <li>• RTMP: Streams to a Flash Media Server or Content Delivery Network. See <a href="#">“CDN and Flash Interoperability (RTMP)”</a> on page 135. (H.264 only)</li> </ul>

Streaming Setting	Default (Cont.)	Description/Values (Cont.)
<b>Transport Stream Settings</b>		
Video PID	33	(Optional) Video Packet Identifier. 16..8190
Audio PID	36	(Optional) Audio Packet Identifier. 16..8190
Metadata PID	40	(Optional) Data (metadata) Packet Identifier. 16..8190
PCR PID	33	(Optional) (Program Clock Reference) Packet Identifier. Timestamp in the TS from which the decoder timing is derived. 16..8190
PMT PID	32	(Optional) (Program Map Table) Packet Identifier. 16..8190
Transport Stream ID	0	(Optional) Transport Stream ID. Identifies the transport stream in the Program Association table (PAT) of the TS stream. 0..65535
Program Number	1	(Optional) Program Identifier used in the Program Map Table (PMT) of the TS stream. 0..65535
<b>Destination</b>		
Address	n/a	Enter the destination IP address in dotted-decimal format. For multicast addresses, see <a href="#">NOTE</a> on page 131.
(RTMP only)		(If RTMP protocol is selected as the stream type) Enter a Fully Qualified Domain Name (FQDN) for the application endpoint. <a href="#">NOTE</a> : For more information, see " <a href="#">CDN and Flash Interoperability (RTMP)</a> " on page 135.
Port(s)	n/a	Enter the destination UDP port(s). Enter a number in the range 1025..65,535. Note that RTP streams use <i>even numbers only</i> within this range. <a href="#">NOTE</a> : Direct-RTP streams require different UDP ports for video and audio. You must specify the second port number.

Streaming Setting	Default (Cont.)	Description/Values (Cont.)
<b>Link Parameters</b>		
Average Bandwidth	n/a	(Read-only) The average transmit bandwidth for the unit in kbps.
FEC	None	(Optional) Enable Forward Error Correction (FEC). Select either: <ul style="list-style-type: none"> <li>• (None)</li> <li>• VF (TS over UDP only)</li> <li>• Pro-MPEG FEC (TS over RTP only)</li> </ul> <b>NOTE:</b> VF FEC is a proprietary FEC and is not interoperable with devices outside of the Haivision family.
VF Encryption	Off	(Read-only) Indicates whether Advanced Encryption Standard (AES) encryption has been enabled through the Furnace Server interface (VF Channel Editor).
MTU	1496	(Maximum Transmission Unit) Specifies the maximum allowed size of IP packets for the outgoing RTP data stream. 228..1500
TTL	64	(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 <b>NOTE:</b> 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.
<b>Traffic Shaping only</b>		
Traffic Shaping	Disabled	Check this checkbox to enable Traffic Shaping for the stream. <b>NOTE:</b> 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.


Streaming Setting	Default (Cont.)	Description/Values (Cont.)
Idle Cells	Disabled	( <a href="#">Traffic Shaping</a> must be enabled) When enabled, Idle TS cells will be inserted into a TS stream when necessary.
Delayed Audio	Disabled	( <a href="#">Traffic Shaping</a> must be enabled) When enabled, delays the transmission of audio information to prevent MPEG-2 TS HRD main buffer overflows.
Bandwidth Overhead	15%	( <a href="#">Traffic Shaping</a> must be enabled) Specifies the percentage of network bandwidth beyond the average rate that the encoder is allowed to use if needed. Range = 5..100% <b>NOTE:</b> To configure the Bandwidth Overhead for CBR streams with metadata, see " <a href="#">Bandwidth Overhead for CBR Streams with Metadata</a> " on page 132.
<b>Still Image</b>		
Still Image When Paused	n/a	Click Select to select an image from the pre-defined list. See " <a href="#">Configuring Still Image Streaming</a> " on page 165.
<b>SAP only</b>		
Transmit SAP	Off	Check this checkbox to enable SAP announcements.
Name	n/a	If SAP is enabled, enter a unique name for the 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.
Copyright	n/a	(Optional) Enter the copyright information for the session.
Address	n/a	Enter the SAP multicast advertising IP address. Default=224.2.127.254.
Port	n/a	Enter the SAP advertising UDP port. Default=9875.

Streaming Setting	Default (Cont.)	Description/Values (Cont.)
<b>RTMP only</b>		
Publish Name	n/a	(RTMP only) Enter a publish name for the stream (512 characters maximum). A stream publishing name is required for RTMP streaming. If you do not enter a publish name, the stream name will be used instead. <b>NOTE:</b> Note that stream names must be unique, while the publish name can be re-used if desired across multiple RTMP streams. See <a href="#">"CDN and Flash Interoperability (RTMP)"</a> on page 135.
Username	n/a	Enter the CDN login username.
Password	n/a	Enter the CDN login password.
<div style="text-align: center; margin-bottom: 5px;"><b>Stop</b></div> <div style="text-align: center; margin-bottom: 5px;"><b>Pause</b></div> <div style="text-align: center;"><b>Start</b></div>	n/a	These buttons become available to control a stream once it has started streaming (after you click <a href="#">Apply</a> ). <ul style="list-style-type: none"> <li>Click <a href="#">Stop</a> to stop an active stream. You can later restart it or clear it.</li> <li>Click <a href="#">Pause</a> to pause the stream. If a <a href="#">Still Image When Paused</a> has been configured, it will be displayed. You can later resume the stream or stop it.</li> <li>Click <a href="#">Start</a> to restart a stopped stream.</li> </ul>
<div style="text-align: center;"><b>Statistics</b></div>	n/a	Click <a href="#">Statistics</a> to view statistics for the stream. See <a href="#">"Streaming Statistics"</a> on page 142.

## Streaming Statistics

The following table lists the Streaming statistics:

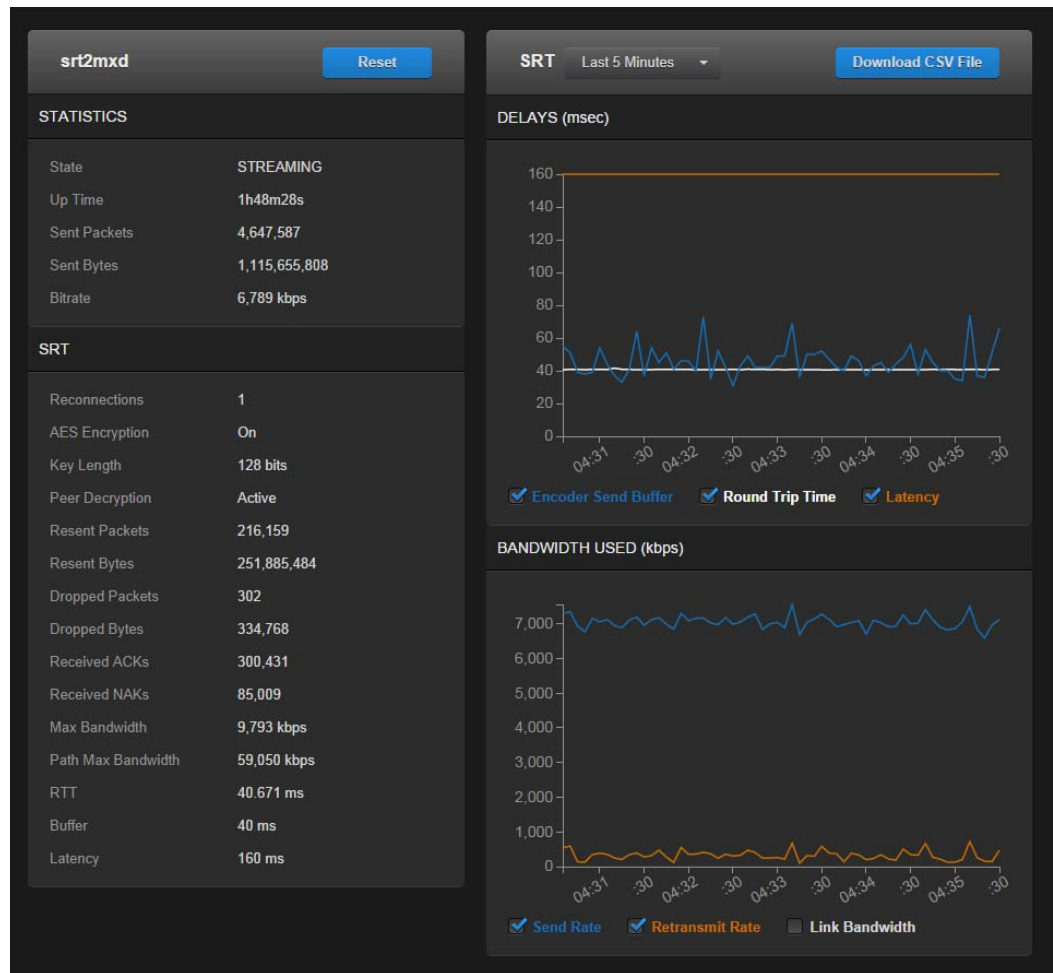
Streaming Statistic	Description/Values
State	The current operating status of the stream, either: <ul style="list-style-type: none"> <li>STREAMING</li> <li>STOPPED</li> <li>PAUSED</li> </ul>
Up Time	(only available when State is STREAMING) The length of time the stream is actively streaming (e.g., 1d22h5m41s).
SSRC	(RTP only) The synchronization source.

Streaming Statistic	Description/Values (Cont.)
Sent Packets	Number of RTP or UDP packets sent for that stream.
Sent Bytes	Number of Bytes sent for that stream.
Unsent Packets	Number of RTP or UDP packets not sent for that stream.
Unsent Bytes	Number of Bytes not sent for that stream.
Last Error	The last logged error (number and description).
Occurred	The time at which the last error was logged (i.e., how long ago).
Bitrate	The stream bitrate (in kbps).
	Click to reset the Output statistics.
<b>SRT</b>	
Reconnections	Number of reconnections since the stream started. Severe network congestion may cause the connection to drop and automatically reconnect.
AES Encryption	Indicates whether Advanced Encryption Standard (AES) encryption has been enabled.
Key Length	The key length for AES encryption, either: None, AES-128, or AES-256
Peer Decryption	Indicates whether the decoder can decrypt the stream. Either Active, Initializing, Inactive (no passphrase), or Inactive (invalid passphrase).
Resent Packets	Number of packets retransmitted following a lost report from the decoder.
Resent Bytes	Total bytes of the lost packets retransmitted.
Dropped Packets	Number of dropped packets.
Dropped Bytes	Number of dropped bytes.
Received ACKs	Transmission progress acknowledgment and feedback.
Received NAKS	Lost packet reports.
Max Bandwidth	Maximum bandwidth (input stream rate * (1 + overhead)).

Streaming Statistic	Description/Values (Cont.)
Path Max Bandwidth	Estimated link bandwidth. This can change due to cross traffic.
RTT	Measured Round Trip Time.
Buffer	Encoder buffers in milliseconds. SRT encoder buffers are unacknowledged stream packets (reception not confirmed by the receiver/decoder). The encoder buffer in absence of congestion or packet lost is around the RTT value. In presence of recoverable packets lost, the value should be between the RTT and Latency. Encoder buffers above Latency will most probably have an impact on the decoder and affect the user's experience.
Latency	<p>Maximum of the decoder and encoder configured <a href="#">(Buffering) Latency</a>. For example:</p> <ul style="list-style-type: none"> <li>Encoder Configured SRT Latency = 750</li> <li>Decoder Configured SRT Latency = 20</li> </ul> <p>The SRT Stats Latency (which is the current SRT connection applied Buffering Latency) = 750 (largest of the two).</p> <p>At startup, handshake exchanges the value configured on both sides and the largest one is selected.</p> <p>The decoder default is set to the minimum (20ms) so it can be completely controlled from the encoder side.</p>



SRT streams include a graphical statistics display as shown in the following example:



**NOTE** The Link Bandwidth is an *estimate* of the actual link bandwidth.

## Configuring Recording Outputs

From the Outputs pages, you can set up either streaming only, recording only, or both streaming with recording. This section covers setting up recording outputs.



---

**IMPORTANT** Recording is *only* available on the Makito X with Storage dual-height model (either fixed or removable SSD). For details, see [“Storage Options \(Rear Panel\)”](#) on page 29.

---

## Setting Up Recording

On the Makito X with Storage, you can create recording sessions in order to save selected encoded content (Audio/Video/Metadata) on the installed storage media (SATA or mSATA SSD).



---

**NOTE** The Makito X can record two streams simultaneously.

---

When setting up a recording session, you select the file format (either .TS or .MP4) and then can optionally configure a recording limit and segmentation.

Recording segmentation subdivides the recording into segments. Segmented file creation is useful for long duration or continuous recording. You can specify either a size limit or a time limit for segments of the content recording. As each completed segment is saved, a new segment is created and any newly created content is stored in the new segment.

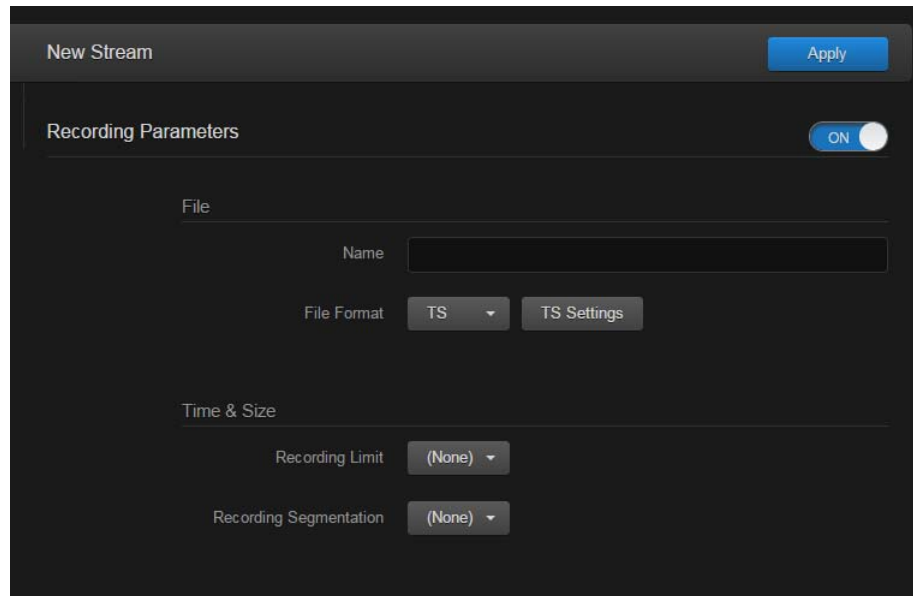
- Auto Export automatically exports completed segments to either HVC or an FTP server. Auto Export becomes available once you either set a recording limit or enable segmentation.
- Segmentation Roll-Over deletes old segments beyond the configured recording limit. As such, it is only available when a recording limit is set and segmentation is enabled.

You can play back .MP4 assets directly in the Makito X Web Interface once a segment of the recording has completed. See [“Managing Recordings”](#) on page 150.

Makito X recordings can be used by either HVC or Calypso. These videos can be downloaded from the Makito X Web Interface, exported to a USB, or sent automatically to an FTP location.

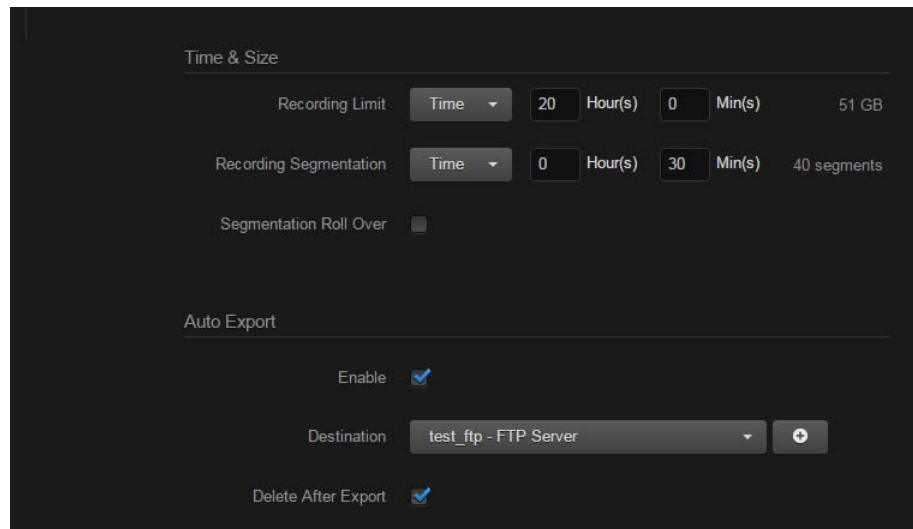
To set up a Recording session:

1. From the Outputs List View, click a link in the table for an existing stream, or click [Add](#) to add a stream.
2. On the Outputs Detail View, if necessary, scroll down the page and toggle the Recording Parameters button to **On** (as shown in the following example).



The screenshot shows the 'New Stream' configuration interface. At the top right is an 'Apply' button. Below it is the 'Recording Parameters' section, which is currently turned ON. Under the 'File' section, there is a 'Name' input field and a 'File Format' dropdown menu set to 'TS', with a 'TS Settings' button next to it. Under the 'Time & Size' section, there are two dropdown menus: 'Recording Limit' and 'Recording Segmentation', both currently set to '(None)'.

3. Under File, enter the name and select the File Format. See [“File”](#) on page 148.
4. (Optional) Under Time & Size, specify a Recording Limit and/or Recording Segmentation. See [“Time & Size”](#) on page 148.



The screenshot shows the 'Time & Size' configuration section. The 'Recording Limit' is set to 20 hours and 0 minutes, with a total size of 51 GB. The 'Recording Segmentation' is set to 0 hours and 30 minutes, resulting in 40 segments. The 'Segmentation Roll Over' checkbox is unchecked. Under the 'Auto Export' section, the 'Enable' checkbox is checked, the 'Destination' is set to 'test\_ftp - FTP Server', and the 'Delete After Export' checkbox is checked.

5. Click [Apply](#) to start recording (as well as streaming, if configured).
6. To return to List View, click [OUTPUTS](#) from the sidebar menu.

## Recording Settings

The following table lists the Recording controls and settings:

Recording Setting	Default	Description/Values
<b>File</b>		
Name	n/a	Enter a unique name for the recording. This can be any string that follows standard file naming conventions and must be defined at the recording session start time. <b>NOTE:</b> This name is merged with the recording start date/time of the asset segment to create the asset file name.
File Format	TS	Select the file format for the recording, saved directly into a file either: <ul style="list-style-type: none"> <li>• TS (Transport Stream): MPEG-2 TS/ISO 13818-1 format. Supports audio/video &amp; metadata.</li> <li>• MP4: formatted as per ISO 14496-12, 14 and 15. Only supports audio/video, no metadata.</li> </ul>
TS Settings	Auto-Assign	Available if the File Format is TS. See <a href="#">“Transport Stream Settings”</a> on page 139
Create CC File	disabled	Check this checkbox to create a serial file (.srt) containing the captured closed captions. This file can be used by some players to replay the captions with the recorded content.
<b>Time &amp; Size</b>		
Recording Limit	None	Specifies either a size limit or a time limit for the recording: <ul style="list-style-type: none"> <li>• (None)</li> <li>• Time: Specify the time limit in hours and minutes.</li> <li>• Size: Type in the size limit and select either MB, GB or TB.</li> </ul>
Recording Segmentation	None	Specifies either a size limit or a time limit for recording segments. <ul style="list-style-type: none"> <li>• (None)</li> <li>• Time: Hours and Minutes</li> <li>• Size: Type in the size limit and select either MB, GB or TB</li> </ul>

Recording Setting	Default (Cont.)	Description/Values (Cont.)
Segmentation Roll Over	Disabled	(Both <a href="#">Recording Limit</a> and <a href="#">Recording Segmentation</a> must be enabled) Check this checkbox to delete the oldest content and continue recording new content as segments are filled. See " <a href="#">Roll-Over and Uploading to HVC / Calypso / FTP</a> " on page 149.
<b>Auto Export</b>		
Enable	Disabled	(Either <a href="#">Recording Limit</a> or <a href="#">Recording Segmentation</a> must be enabled) Check this checkbox to configure the recording session to automatically export completed segments to either HVC or an FTP server.
Destination	None	Select from drop-down list of previously defined destinations (see " <a href="#">Destination</a> " on page 139). Or you can click <b>+Add</b> to add an export destination from this page and then select it.
Delete After Export	Disable	(Not available when <a href="#">Segmentation Roll Over</a> is enabled) Check this checkbox to configure the Makito X to delete these files after transfer.

## Roll-Over and Uploading to HVC / Calypso / FTP

Segmentation Roll-Over becomes available when the Time & Size are set for a recording and both Recording Limit and Recording Segmentation are enabled. Segmentation Roll-Over allows you to leave the encoder running autonomously (for example, to record a high quality stream while streaming a low quality version of the same content for surveillance purposes, such as over 24 hours).

In such applications, operators do not intend to view the recording unless some event occurs and then they can extract just the particular segment, instead of having to go through the entire 24 hour file. To do this, you simply set up the recording in Segmented Roll-Over mode and leave it alone.

The recording may also be configured to upload completed segments to the Haivision Video Cloud (HVC), Calypso (via FTP), or a NAS drive.

As of Version 1.5, you can auto-export a segment of an asset that has completed recording to a NAS drive in order to automate asset ingest from a Makito X with storage to a NAS-mounted watch folder.

## Managing Recordings



**NOTE** The Asset Browser is only available on the Makito X with Storage dual-height model. For details, see [“Storage Options \(Rear Panel\)”](#) on page 29.

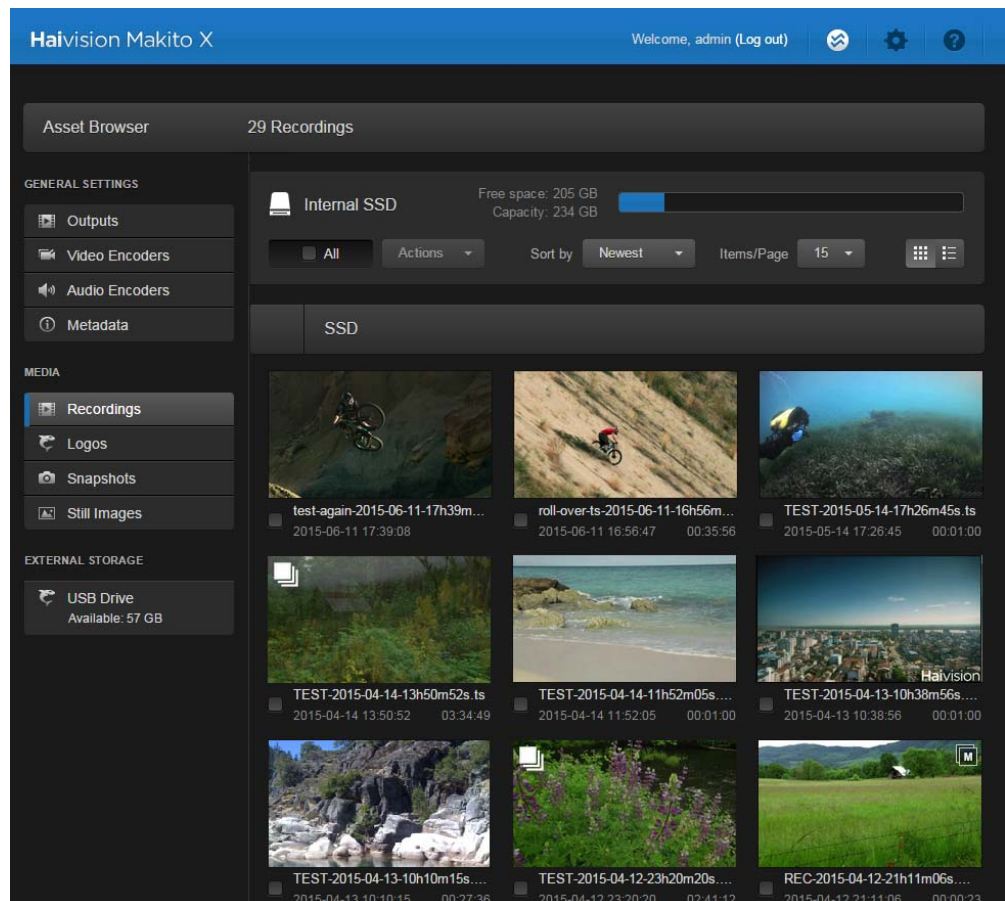
From the Recordings (Asset Browser) page, you can manage the recordings created from Makito X encoded stream content. For setup details, see [“Configuring Recording Outputs”](#) on page 146.

From here, you can copy, move, download, export, and delete recordings. You can also select and play back .MP4 recordings directly in the Makito X Web Interface once a segment of the recording has completed.

### To manage recordings:

1. On the Streaming page, click [RECORDINGS](#) from the sidebar menu.

The Recordings page opens, displaying the list of files that have been recorded by the encoder, as shown in the following example.





**TIP** If you have a Removable SSD Storage option, you can review the contents from a removable drive on a PC (Windows 7 to 10) or MAC OS. For details, see [“Viewing Recordings from a Removable Drive on a Computer”](#) on page 157.

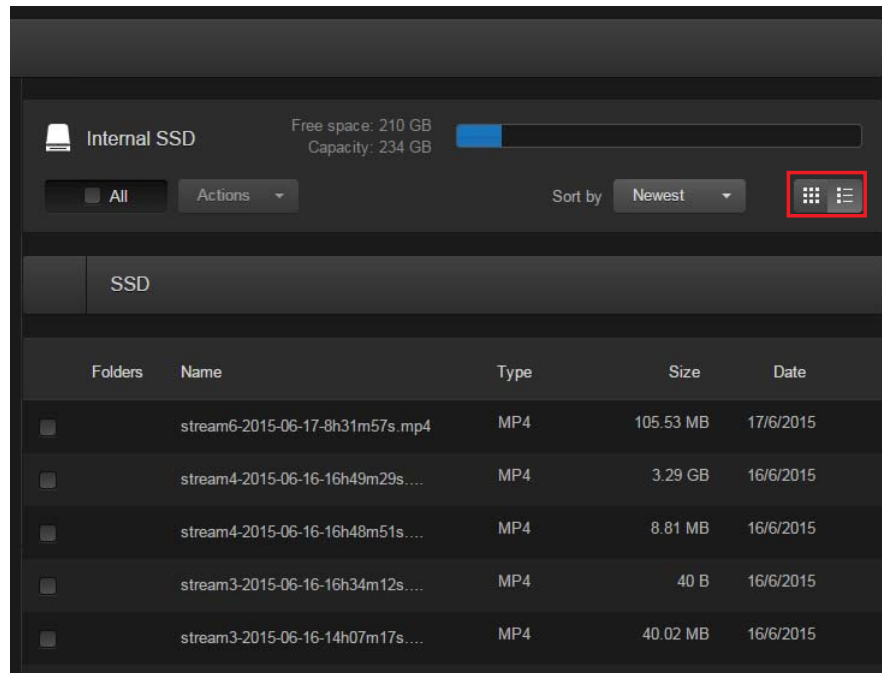
## Viewing Options

By default, the Recordings (Asset Browser) page opens with the list displayed in Thumbnail view, showing the newest assets first (as shown in the previous example). In Thumbnail view, each asset is represented with a thumbnail image.

You can adjust the display to List view, which displays the assets in horizontal rows of information (see following examples).

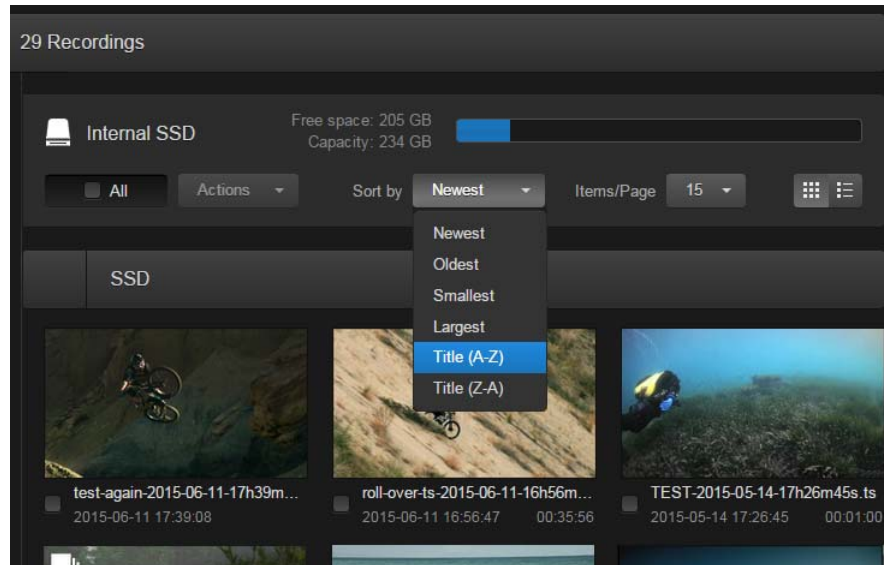
You can also change the sort order of the list and change the number of items to display per page.

1. To switch from Thumbnail view to List view, click  on the content toolbar.



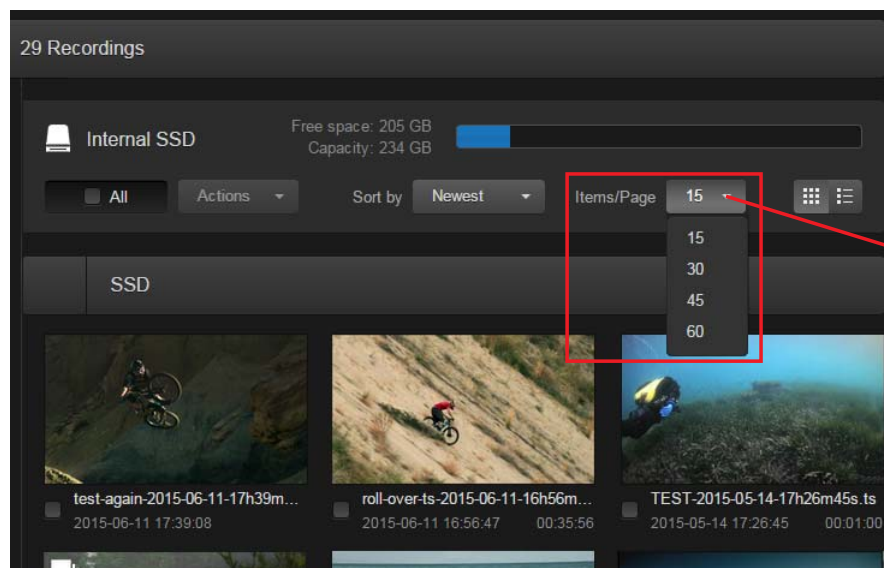
2. To sort the list by a different metadata field or change the sort order, select from the [Sort by](#) drop-down menu.





The [Sort by](#) options include title (A-Z, default, or Z-A), file size (Smallest or Largest), and creation date (Oldest or Newest).

- To change the number of items to display per page, select the number from the [Items/Page](#) drop-down menu (the default is 15).



- If the list is more than one page, you can page forward and backward through the list by clicking [Next](#) and [Previous](#) (along the bottom of the page).





## Playing Back .MP4 Recordings

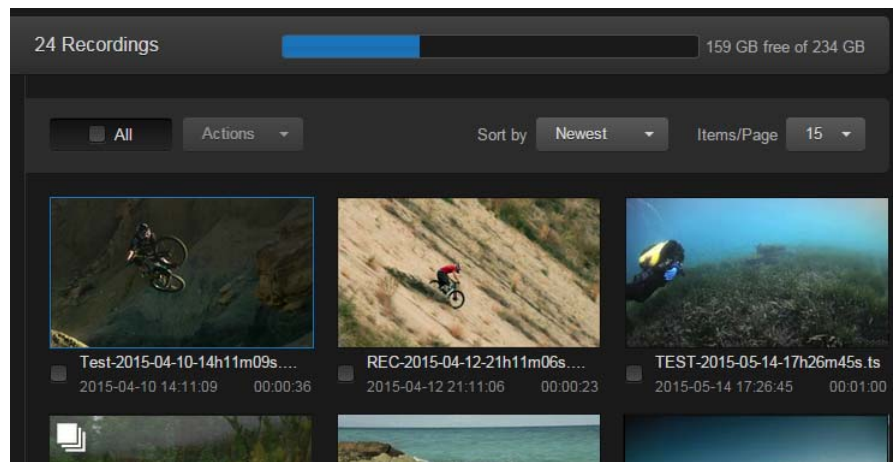
From the Recordings page, you can select and play back .MP4 recordings once a segment of the recording has completed. Clicking a thumbnail of a recording launches it in a default viewer.



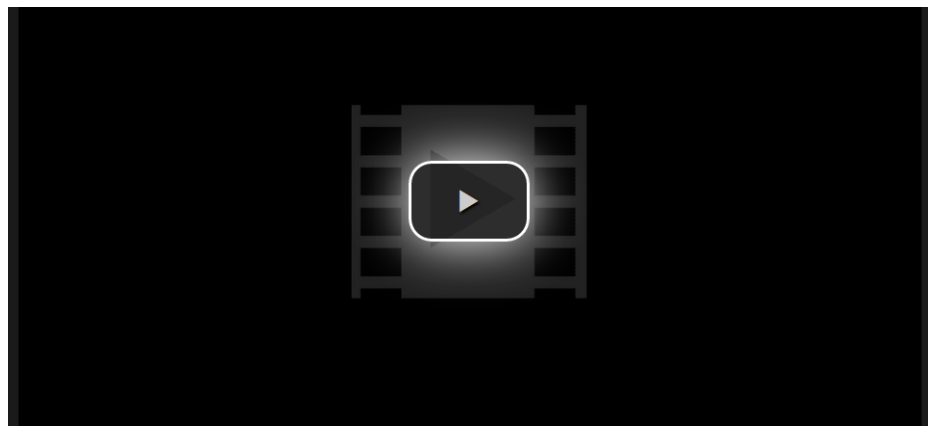
**NOTE** If you have a removable storage drive, you can play back either .MP4 or .TS files on a PC. See [“Viewing Recordings from a Removable Drive on a Computer”](#) on page 157.

To play back .MP4 recordings:

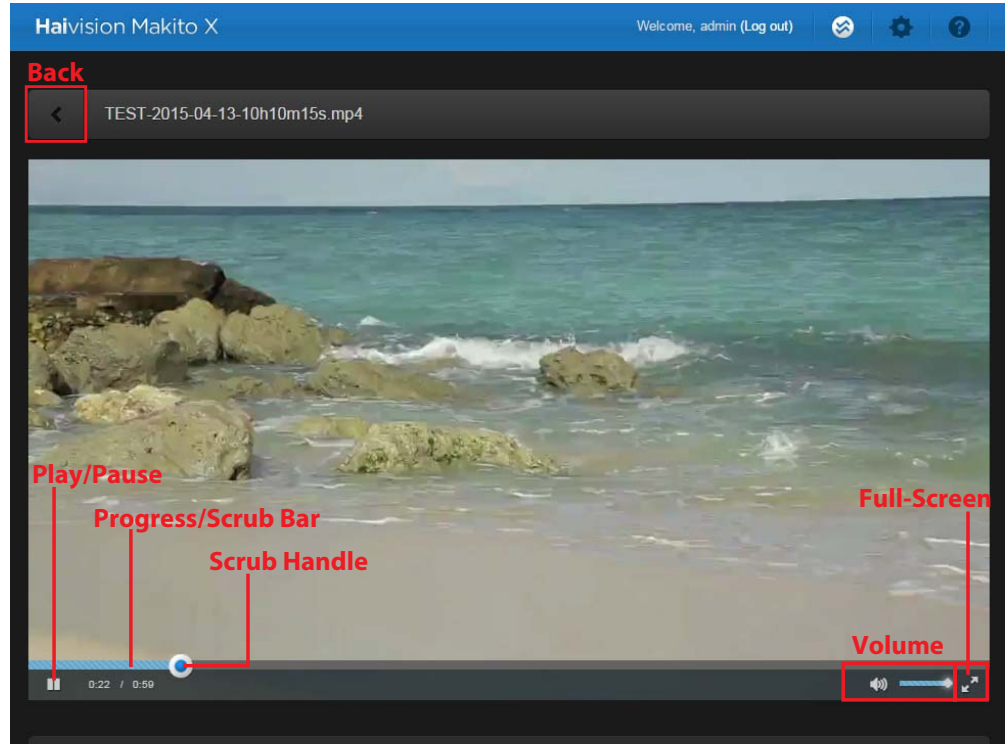
1. On the Recordings page, click the thumbnail (anywhere except the name or time) of the recording in the Recordings list.






2. Click the arrow in the viewer to start playback.



The Recording opens and starts to play in the viewer (example shown following).



3. From here you can pause and restart playback and adjust the volume.  
When you hover the cursor over the controls, the progress/scrub bar and scrub handle appear.
4. To move forward or backward through the video, drag the scrub handle along the progress/scrub bar.
5. To switch to full-screen mode (i.e., to fill your entire screen and remove the player controls), mouse over the viewer and click  (in the bottom right corner).  
To exit full-screen mode, press ESC or click  again.
6. To return to the Recordings list, click .

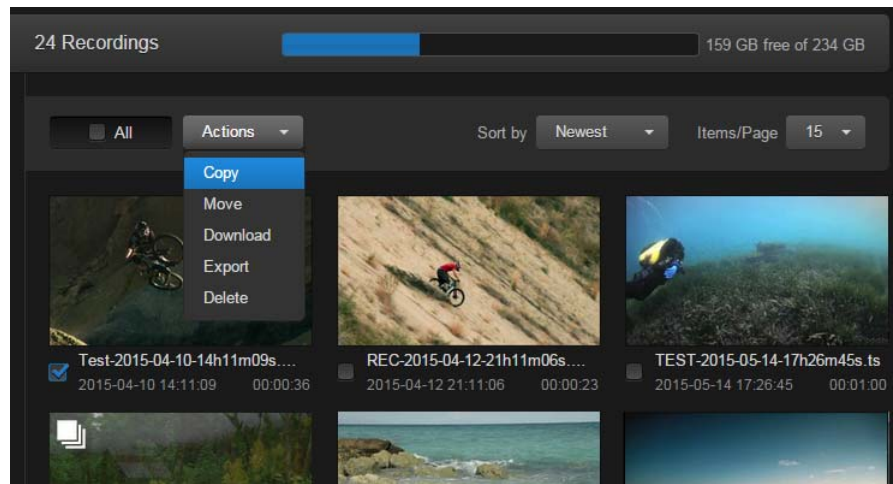
## Managing Recorded Content

From the Recordings page, you can copy or move one or multiple recordings to a storage location. The difference is that moving deletes the recordings from the Recordings page. You can also download recordings as MP4 or TS files, export files to an FTP/FTPS server or the Haivision Video Cloud (HVC), and delete recordings.

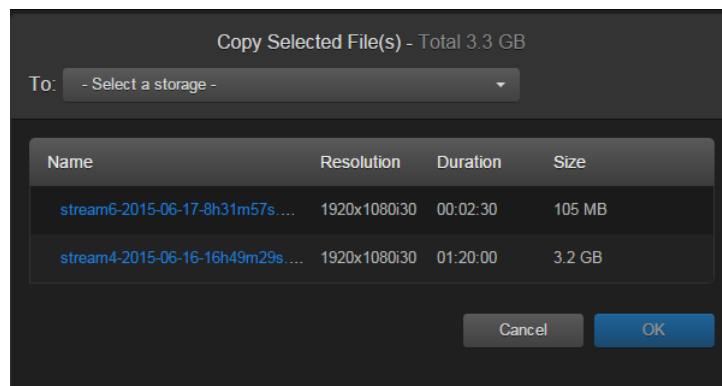
To copy or move recordings:

1. On the Recordings page, click the name or time information (*not* the thumbnail) to select the recording.

Or check the checkbox next to one or more items in the list, or check [All](#).



2. Select Copy or Move from the Actions drop-down menu (this menu is selectable when one or more items are checked).
3. On the Copy or Move Selected File(s) dialog, select the (destination) storage location from the drop-down list.



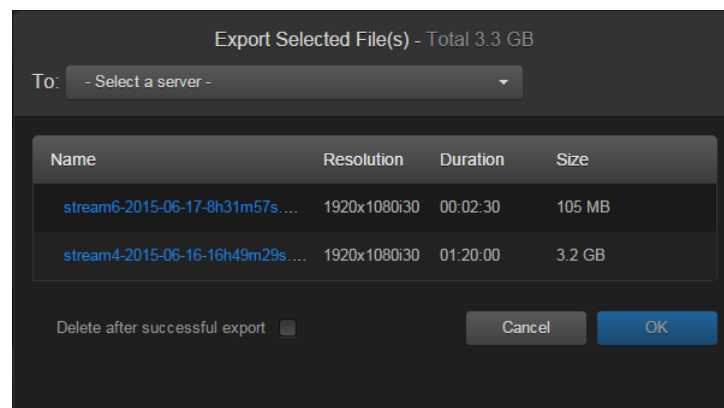
4. Click [OK](#).

#### To download recordings:

1. Select one or more recordings from the Recordings list.
2. Select Download from the Actions drop-down menu.
3. Type in the file name in the Save As window and click Save.

#### To export recordings:

1. Select one or more recordings from the Recordings list.
2. Select Export from the Actions drop-down menu.
3. On the Export Selected File(s) dialog, select the (destination) server location from the drop-down list.



4. (Optional) Check the “Delete after successful export” checkbox.
5. Click OK.

#### To delete recordings:

1. Select one or more recordings from the Recordings list.
  2. Select Delete from the Actions drop-down menu.
  3. Click [Confirm](#) (or where applicable, select [Delete](#) from the warning dialog).
- The selected recording(s) will be removed from the list.

## Viewing Recordings from a Removable Drive on a Computer

The Makito X with Removable Storage will record either .TS or .MP4 on a SATA drive formatted for EXT4. This section explains how to review the contents from a removable drive on a PC (Windows 7 to 10) or MAC OS.

### Prerequisites:

- USB2-3 uSATA dock
- ExtFS disk utility (from Paragon) installed on computer  
<http://www.paragon-software.com/home/extfs-windows-pro/eshop-business.html?affChecked=1>

### To view recordings on a MAC OS X computer:

1. Download the ExtFS for MAC OS X and install it.
2. Remove the SATA drive from the Makito X and insert it into a SATA dock on your computer.
3. You will see the EXT4 file system mounted automatically on the desktop.
4. You can view MP4s using VLC.
5. You can view TS files using VLC or another TS player such as Haivision's InStream.

### To view recordings on a PC (Windows Professional):

1. Download the ExtFS for Windows Professional and install it.
2. Remove the SATA drive from the Makito X and insert it into a SATA dock on your computer.
3. You will see the EXT4 file system.
4. You can view MP4s using VLC.
5. You can view TS files using VLC or another TS player such as Haivision's InStream.

## Configuring Logo Overlays



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

You can configure the Makito X to display a graphic file as a logo overlay in the encoded video. One logo may be configured for each physical video input interface, i.e.:

- Two logos on the Makito X SDI dual-channel #S/B-292E-HDSDI2 (BNC1 and BNC2);
- One logo on the Makito X DVI #S/B-292E-DVI or the Makito X SDI single-channel #S/B-292E-HDSDI1.

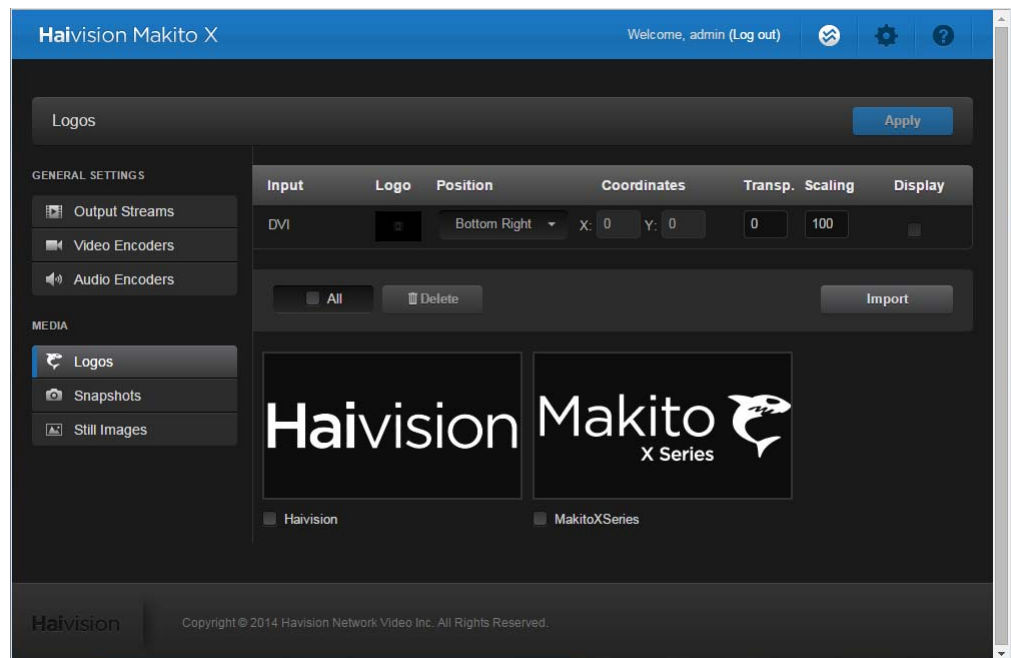
The image file can be uploaded in either BMP, JPEG, PNG, or GIF format. The image file will be converted to Haivision's image overlay (.oly) format.

The logo position can either be relative (top left, top right, centered, etc.) or absolute (positioned at the exact X and Y coordinates specified).

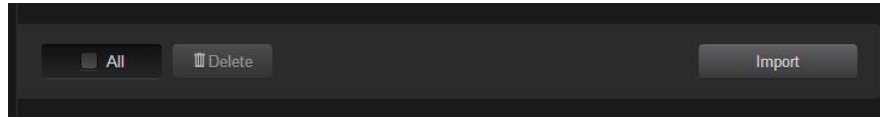
To configure a logo overlay:

1. On the Streaming page, click [LOGOS](#) from the sidebar menu.

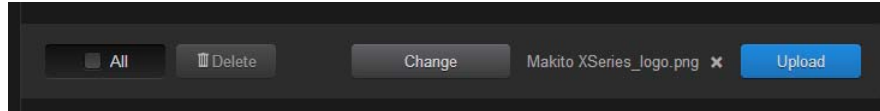
The [LOGOS](#) page opens, displaying the list of logo image files that have been uploaded for the encoder, as shown in the following example.



2. To upload a new image file in either BMP, JPEG, PNG, or GIF format, click [Import](#) and select the file in the Open File dialog box.



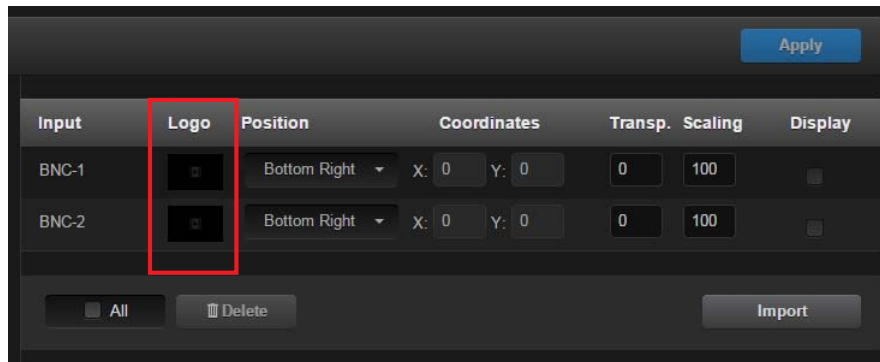
3. When you see the filename in the text box, click [Upload](#).



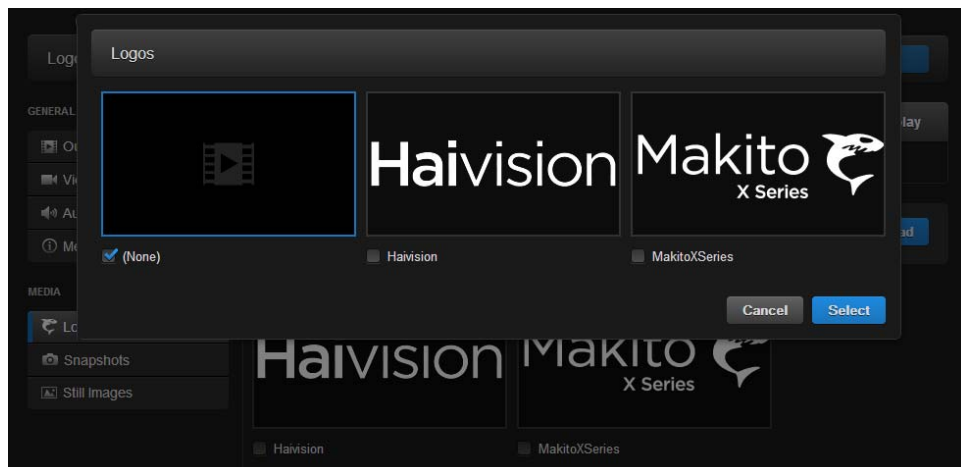
**TIP** To select a different logo file, click [Change](#). To remove the selection, click .

The image file will be converted to Haivision's image overlay (.oly) format and will be added to the Logos list.

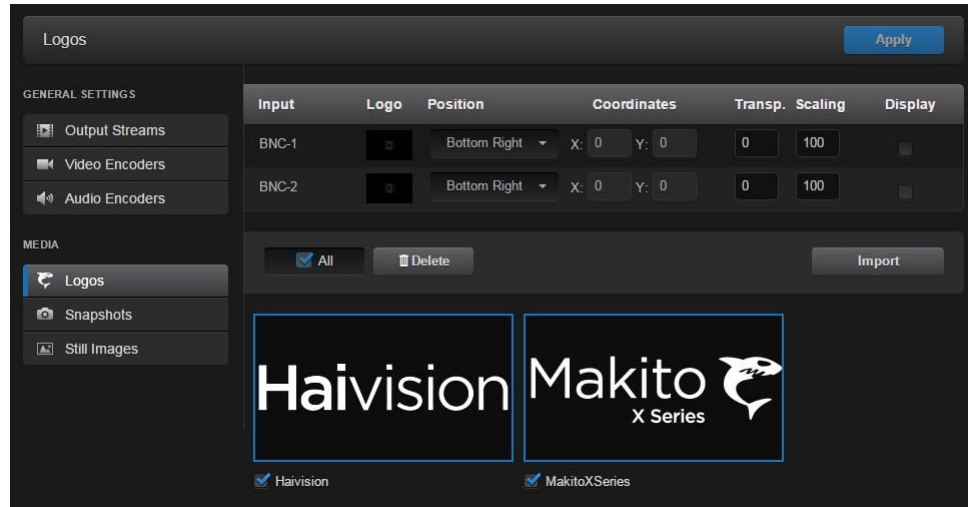
4. To select the image file to display as a logo overlay, click the area below [Logo](#).



The [LOGO SELECTION](#) pane opens, with the currently selected logo or [None](#) highlighted and checked.



5. To select the image for the logo overlay, click the image or check the checkbox next to the image filename and click [Select](#).
6. To configure the position, transparency, and scaling for the logo overlay, select or enter value(s) in the appropriate field(s). See [“Logo Settings”](#) on page 160.
7. To delete one or more image files from the Logos list, check the checkbox next to one or more filenames (or check [All](#)) and click [Delete](#) on the Content toolbar.



8. To apply your changes, click [Apply](#).



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

## Logo Settings

The following table lists the Logo controls and settings:

Logo Setting	Default	Description/Values
ID	n/a	On the Makito X SDI dual channel, ID is the video input, either 0 for BNC-1 or 1 for BNC-2. The ID is 0 on the Makito X-DVI or SDI single channel since there is only one video input.



Logo Setting	Default (Cont.)	Description/Values (Cont.)
Position	Bottom Right	<p>Select the position for the logo overlay:</p> <ul style="list-style-type: none"> <li>• Bottom Right</li> <li>• Top Right</li> <li>• Bottom Left</li> <li>• Top Left</li> <li>• Centered</li> <li>• Absolute</li> <li>• Relative</li> </ul> <p><b>NOTE:</b> In Absolute mode, the logo will be positioned at the exact X and Y coordinates specified.</p>
Coordinates	0, 0	<p>Specifies the position of the logo on the X and Y axes. (The origin is the top left corner of the display area.)</p> <p><b>NOTE:</b> Only takes effect if <a href="#">Position</a> is set to <a href="#">Absolute</a>.</p>
Transparency	0	<p>Specifies the percentage of transparency for the logo:</p> <ul style="list-style-type: none"> <li>• 0 = no transparency (i.e., a completely solid/opaque logo)</li> <li>• 100 = fully transparent (i.e., a completely transparent/invisible logo)</li> </ul>
Scaling	100	<p>Specifies the scale factor (percentage) for the logo:</p> <ul style="list-style-type: none"> <li>• 25% = 1/4 size</li> <li>• 100% = no scaling</li> <li>• 400% = 4x</li> </ul>
Display	Disabled	<p>Check this checkbox to display the selected file as a logo overlay.</p>

## Capturing Image Snapshots



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**NOTE** Snapshot Capture is an optional H.264 feature which may be disabled at the factory. The following section is only applicable if snapshots are enabled.

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From the [SNAPSHOTS](#) page, you can take a snapshot of the current video input and save it to either JPEG or YUV image format. With JPEG snapshots, you can also specify the image quality. On the Makito X SDI, you can select the video input, either BNC-1 or BNC-2.

The snapshot feature may be used to create still images, for example, to record a person's image or a scene from an event for identification purposes or for future reference.

When you take a snapshot, a unique snapshot name will be generated based on the current time.

Thumbnails of the snapshots are displayed on the [SNAPSHOTS](#) page for you to view and optionally save to an external location.

Note that the encoder must have a valid Input Format. To verify the Input Format detected by the system, see [“Configuring Video Encoders”](#) on page 87.



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

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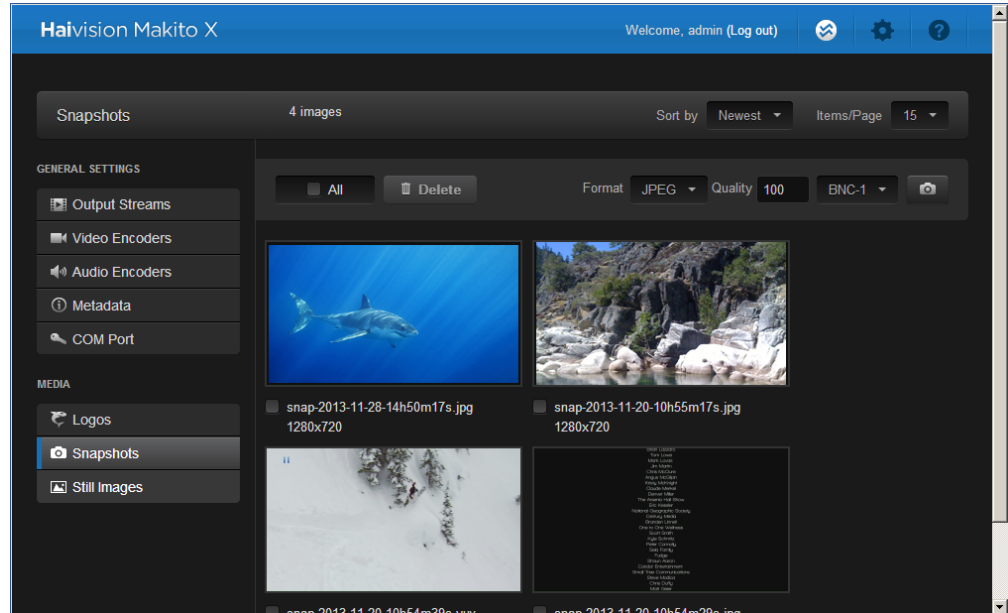
**TIP** You can also take snapshot of each video input from the [VIDEO ENCODERS LIST VIEW](#).

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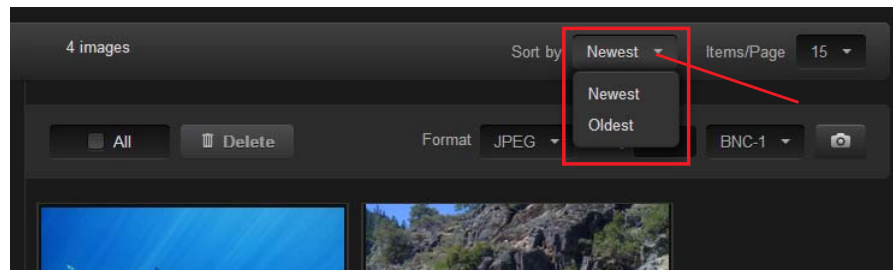
### To take an image snapshot:

1. On the Streaming page, click [SNAPSHOTS](#) from the sidebar menu.

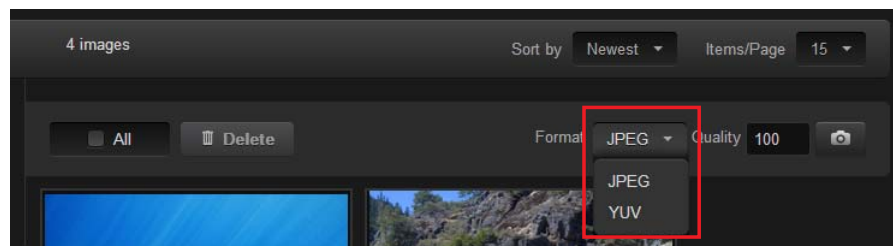
The [SNAPSHOTS](#) page opens, displaying the snapshots taken for the encoder, as shown in the following example.



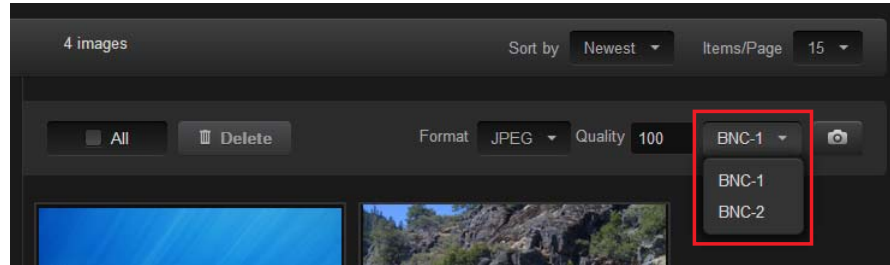
- To toggle the sort order of the list from newest to oldest, select the order from the **Sort by** drop-down list.




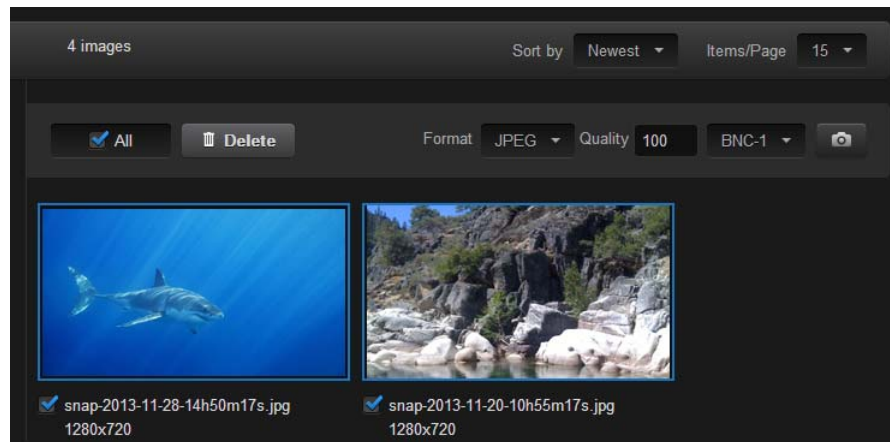
- Select the format for the new snapshot, either JPEG or YUV color space (color model).



- (JPEG only) To adjust the image quality, either type in a value between 1 and 100 in the Quality field.
- (Optional, Makito X SDI only) Select the video input, either BNC-1 or BNC-2.



6. To take the image snapshot, click .  
Once a snapshot has been taken, a new thumbnail is displayed.
7. (JPEG only) To view a full-size image of a snapshot, click the thumbnail.  
A full-size snapshot opens in a new browser window.
8. To save the snapshot to an external location, right-click either the thumbnail or the full-size image (JPEG only), and select Save image as...
9. To delete one or multiple snapshots, check the checkbox beside the snapshot (or click [Check All](#)) and click [Delete](#).



## Configuring Still Image Streaming

When creating a stream, you can specify a static image that will be used to replace the encoded video stream when the stream is paused. This feature may be used, for example, to block out sensitive content or deliver announcements and other messages. (See “[Selective Video Mute](#)” on page 131.)

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** Still Image insertion when pausing a stream is *not* supported when a HEVC/H.265 video encoder is selected as a content source.

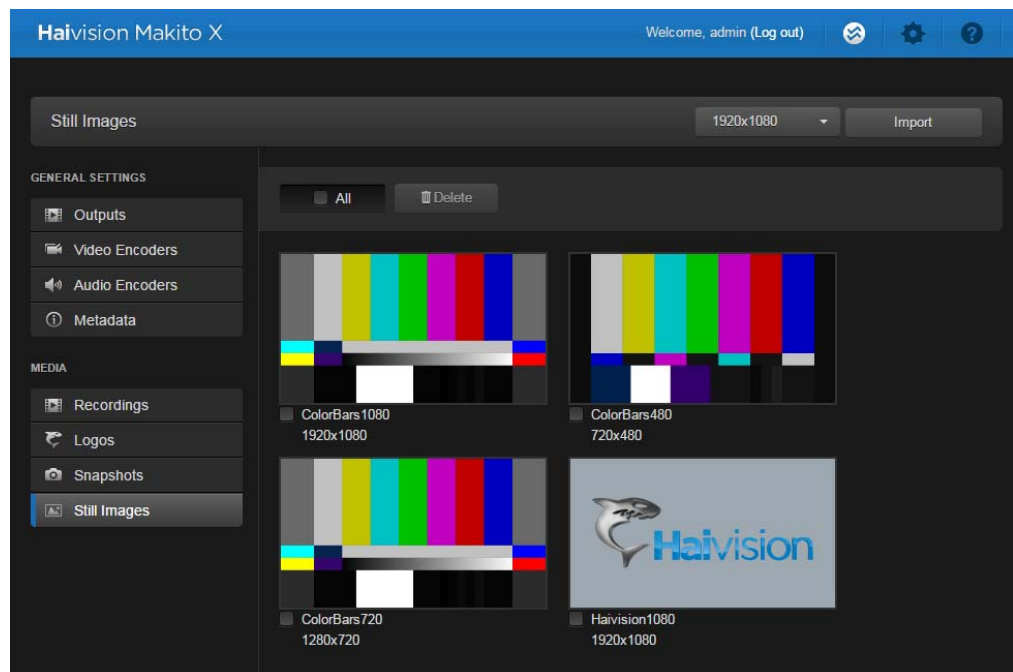


**TIP** For best results, the input file resolution must be the same or greater than the output resolution.

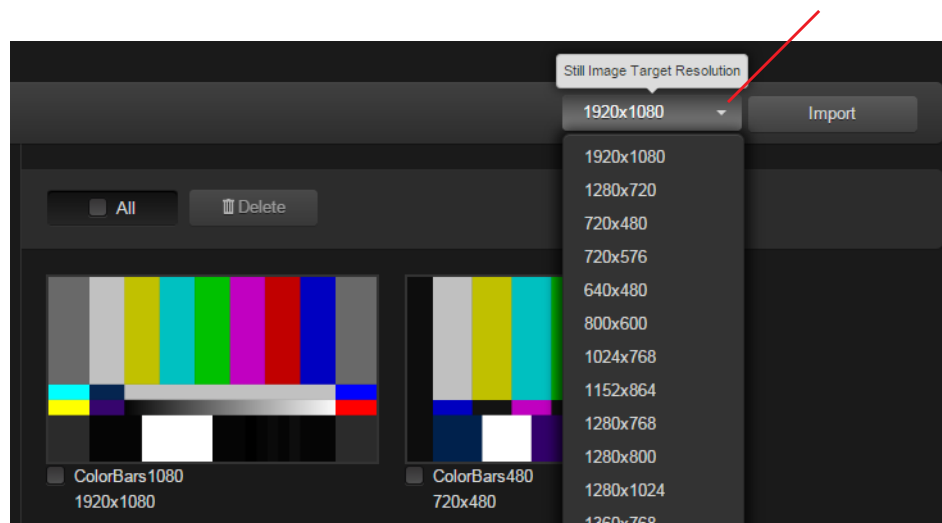
To upload a static image:

1. On the Streaming page, click [STILL IMAGES](#) from the sidebar menu.

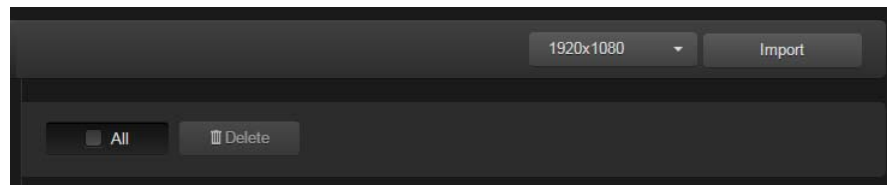
The [STILL IMAGES](#) page opens, displaying the list of still images that have been uploaded for the encoder, as shown in the following example.



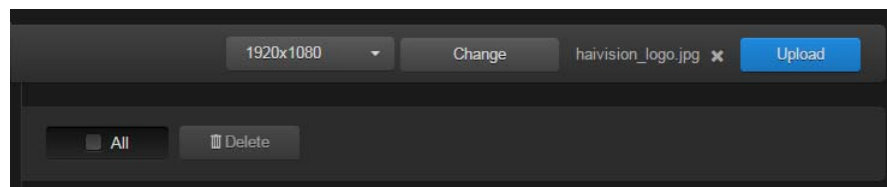
- To upload a new image file, first select the Output Resolution for the image.



- Click [Import](#) and select the file in the Open File dialog box.



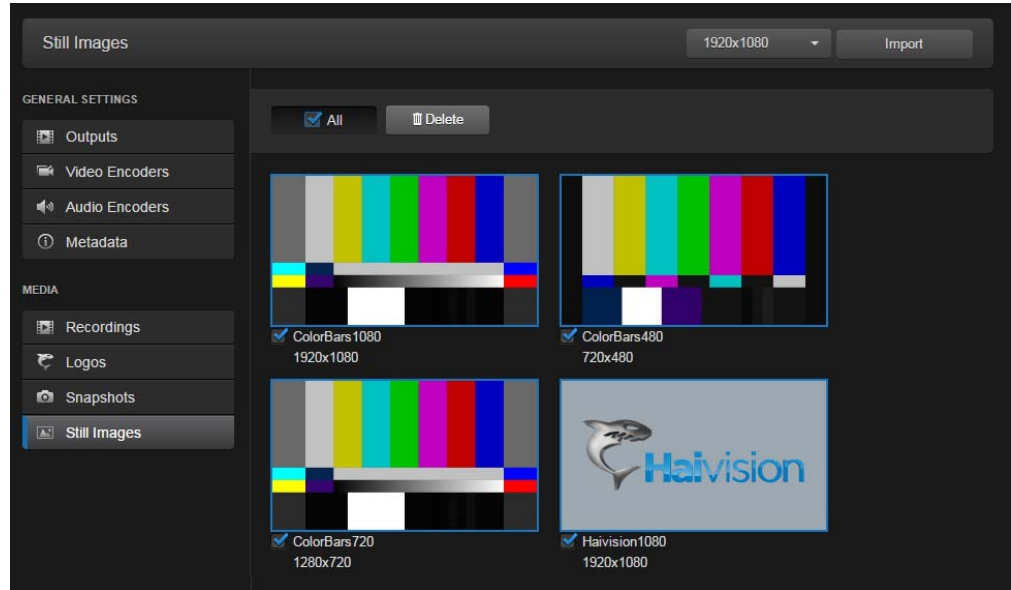
- When you see the filename in the text box, click [Upload](#).



**TIP** To select a different image file, click [Change](#). To remove the selection, click .

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

- To delete one or more image files from the Still Images list, check the checkbox next to one or more filenames (or check [All](#)) and click [Delete](#) on the Content toolbar.



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

## Managing External Storage



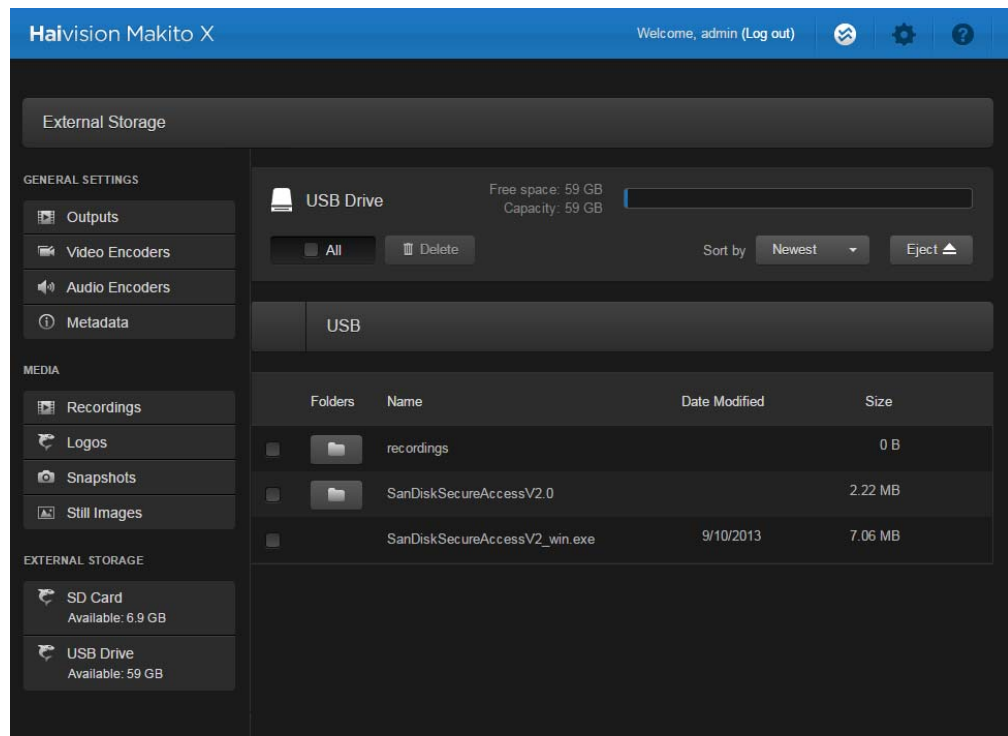
**NOTE** The External Storage page is only available on the Makito X with Storage dual-height units with face-plate accessible USB 2.0 and SD card interfaces. For details, see [“Storage Options \(Rear Panel\)”](#) on page 29.

The External Storage pages list all installed external storage devices for the encoder. There is a separate page for each device, which shows the available space and capacity. From here, you can view the list of folders (and sub-folders) on each device, as well as delete folders or files and eject devices.

To manage external storage:

1. On the Streaming page, click either [SD CARD](#) or [USB DRIVE](#) from the sidebar menu (under External Storage).

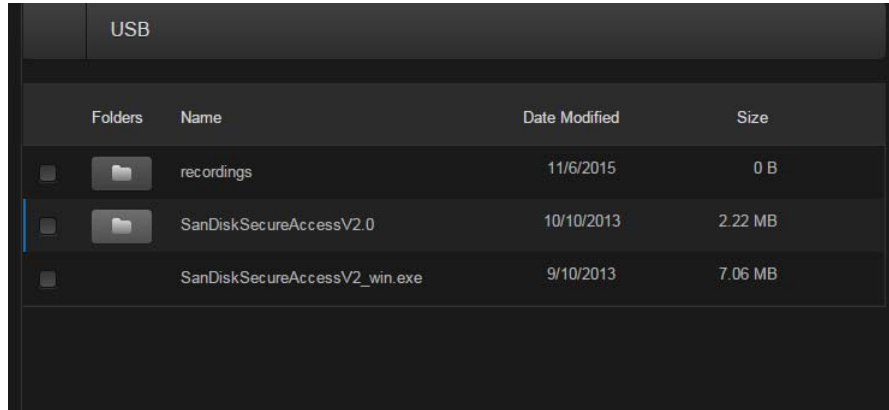
The [EXTERNAL STORAGE](#) page opens for the device, as shown in the following example.




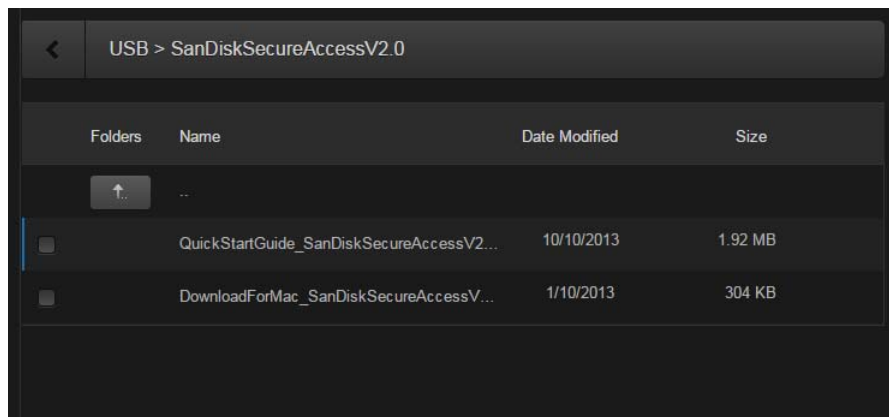
This page displays the name, date modified, and size for each folder.

2. To display the contents of a folder, click .

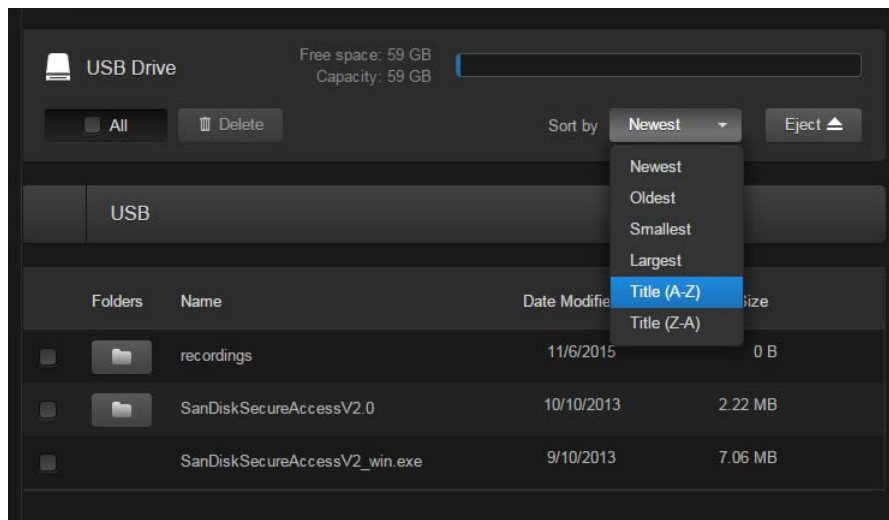




3. To close the folder and return one folder up in the hierarchy, click .



4. To change the sort order of the list of folders, select the order from the [Sort by](#) drop-down list.



5. To delete one or multiple folders or files, check the checkbox beside the folder (or check [All](#)) and click [Delete](#).

6. To unmount one or multiple removable devices (i.e., SD or USB or removable SSD), check the checkbox beside the device (or check [All](#)) and click [Eject](#).
7. Remove the device from the interface port.
8. Install the device on a computer to view the assets on the device. (See [“Viewing Recordings from a Removable Drive on a Computer”](#) on page 157.)

# CHAPTER 5: System Administration and Storage

This chapter explains how to manage and maintain the encoder, including storage components.



**NOTE** Unless otherwise indicated, the Administration Settings and Storage pages are only accessible to administrators.

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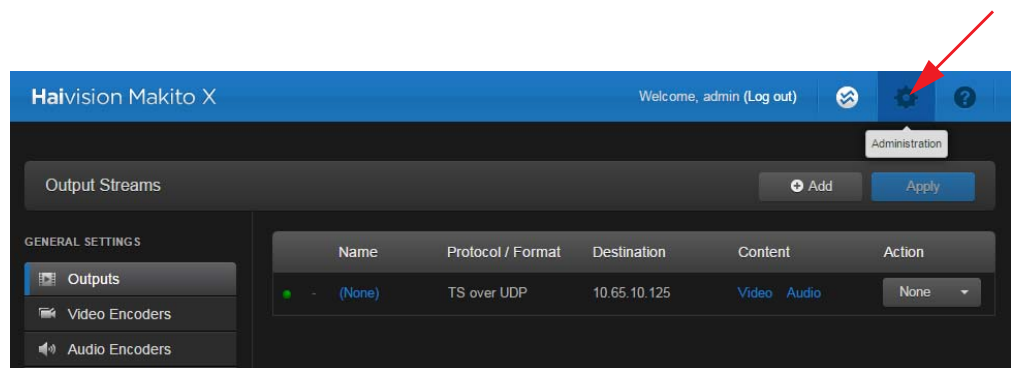
## Viewing System Status Information

From the Status page, you can view status information about the Makito X, such as the operating system up time, along with information about the hardware and software components. You can also reboot the encoder and take a system snapshot from the Status page.

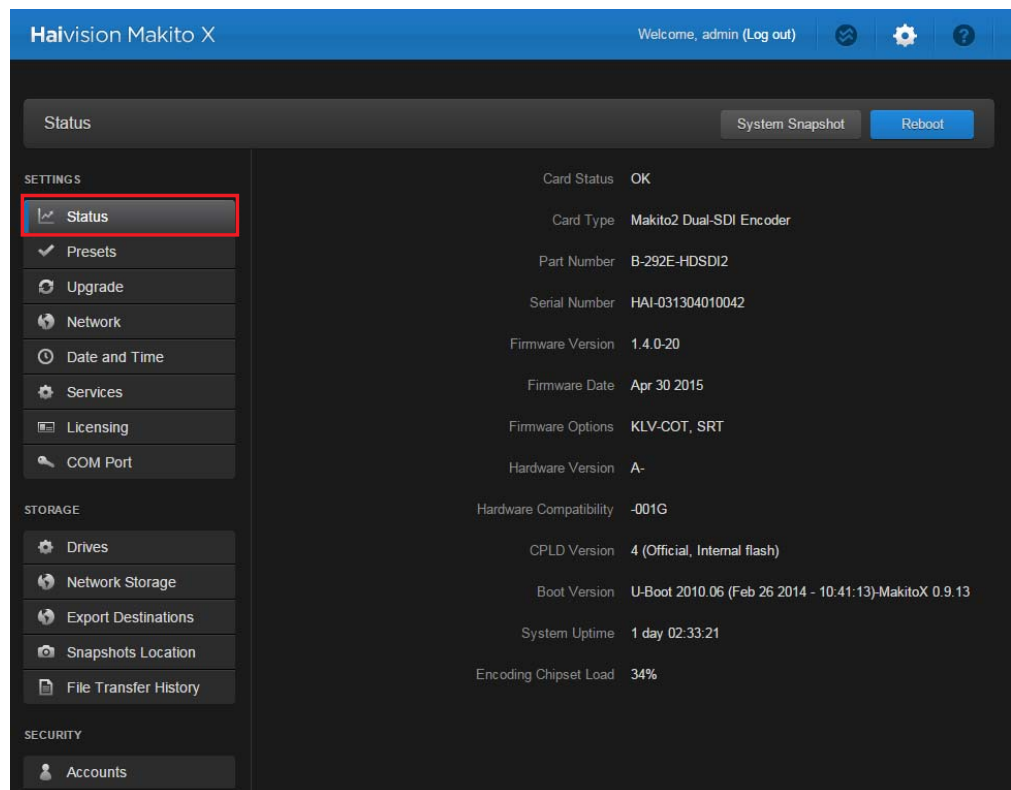
The Status page is available to Operator and Guest users as well as Administrators.

To view status information:

1. Click the  ADMINISTRATION icon on the toolbar.



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





The Status settings are read-only. For details, see the following section, [“Status Settings”](#).

2. To reboot the encoder, see [“Rebooting the Encoder”](#) on page 175.
3. To display a snapshot of system information, see [“Taking a System Snapshot”](#) on page 175.

## Status Settings

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

Status Setting	Description/Values
Card Status	OK (or error message if applicable).
Card Type	The type of encoder, e.g., Makito2 Dual-SDI Encoder.
Part Number	The Haivision part number for the encoder, e.g., B-292E-HDSI2
Serial Number	The serial number for this encoder appliance or card.
Firmware Version	The firmware version of the encoder, e.g., v2.1-47
Firmware Date	The firmware release date.
Firmware Options	(If applicable) Firmware options installed, e.g., KLV-COT (Metadata Capture KLV & COT). For more information, see <a href="#">“Configuring Metadata Capture”</a> on page 108.
Hardware Version	The hardware version of the encoder.
Hardware Compatibility	-001G (basic card assembly).
CPLD Version	The CPLD version of the encoder.
Boot Version	The Boot version of the encoder.
System Uptime	The length of time the encoder has been “up” and running (e.g., 1 day 03:42:03).
Encoding Chipset Load	The combined video encoding processor usage in percentage% (combining both Hi and Lo streams).
	Displays a snapshot of system information in a new window. See <a href="#">“Taking a System Snapshot”</a> on page 175.
	Reboots the encoder. See the following section, <a href="#">“Rebooting the Encoder”</a> .

## Rebooting the Encoder

To reboot the Encoder:

1. Click the  ADMINISTRATION icon on the toolbar.
2. On the Status page, click [Reboot](#).

The encoder will reboot and you will be returned to the Login page. If you did not save your configuration/presets, you will end up with the default configuration with no streams at all.



---

**TIP** You can also reboot the encoder from the Network Settings page. See [“Configuring Network Settings”](#) on page 183.

---

## 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 configuration 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
=====

-----
Credentials:
-----
uid=500(admin) gid=511(haiadmin) groups=510(haisecur),511(haiadmin),512(haioper)

-----
Local Time:
-----
Wed May 6 14:58:57 EDT 2015

-----
Universal Time:
-----
Wed May 6 18:58:57 UTC 2015

-----
System UP Time:
-----
14:58:57 up 1 day, 2:47, 3 users, load average: 0.00, 0.01, 0.05

-----
Manufacturing Information:
-----
MAC Address : 5c:77:57:00:32:97
Serial Number : HAI-031304010042
Boot Revision : U-Boot 2010.06 (Feb 26 2014 - 10:41:13)-MakitoX 0.9.13

-----
Card Temperature:
-----
Temperature Status:
Current Temperature : 52 Celsius measured 1s ago
Maximum Temperature : 54 Celsius measured 1d18m16s ago
Minimum Temperature : 49 Celsius measured 17h27m46s ago

-----
System Information:
-----
Card Type : "Makito2 Dual-SDI Encoder"
Part Number : B-292E-HDSDI2-FS
Serial Number : HAI-031304010042
MAC Address : 5c:77:57:00:32:97
Firmware Version : 1.4.0-20
Firmware Date : "Apr 30 2015"
Firmware Time : "12:31:02"
Firmware Options : "KLV-COT, SRT"
Hardware Version : A-
Hardware Compatibility : -001G
Storage Mezzanine : Present
Storage Type : "MSATA Fixed"
CPLD Version : 4 (Official, Internal flash)
Boot Version : "U-Boot 2010.06 (Feb 26 2014 - 10:41:13)-MakitoX 0.9.13"

-----
Installed Debian Packages:
-----
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/half-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name Version Description

```



**TIP** You can also take a system snapshot from the CLI using the [system\\_snapshot.sh](#) command.



## Saving and Loading Presets

### Preset Management

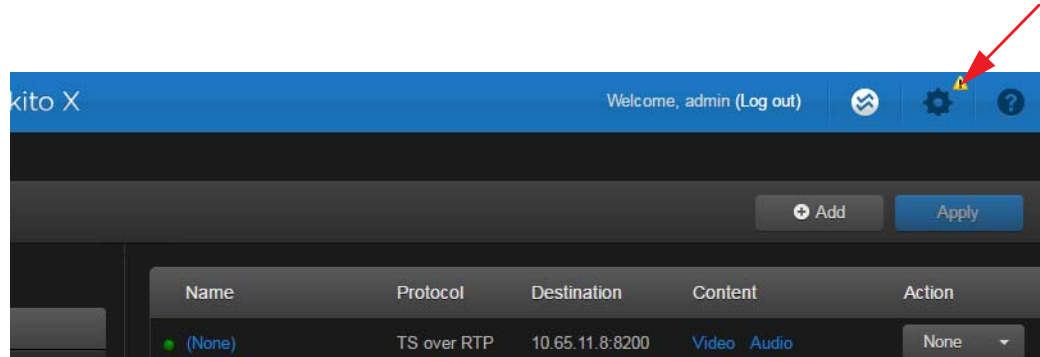
Each Makito X is configured by users' selecting and setting values of applicable system settings, such as encoder and stream settings and the stream destination. Although these configuration settings are not automatically saved, *presets* provide a way for you to save groups of settings and recall these configurations settings to apply to other streams.

Configuration settings saved as the “startup” preset will continue to be used after a reboot, or when the unit is turned off and on. You can also direct the system to apply a preset to restore settings when the system startup process performs the configuration autoload.

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



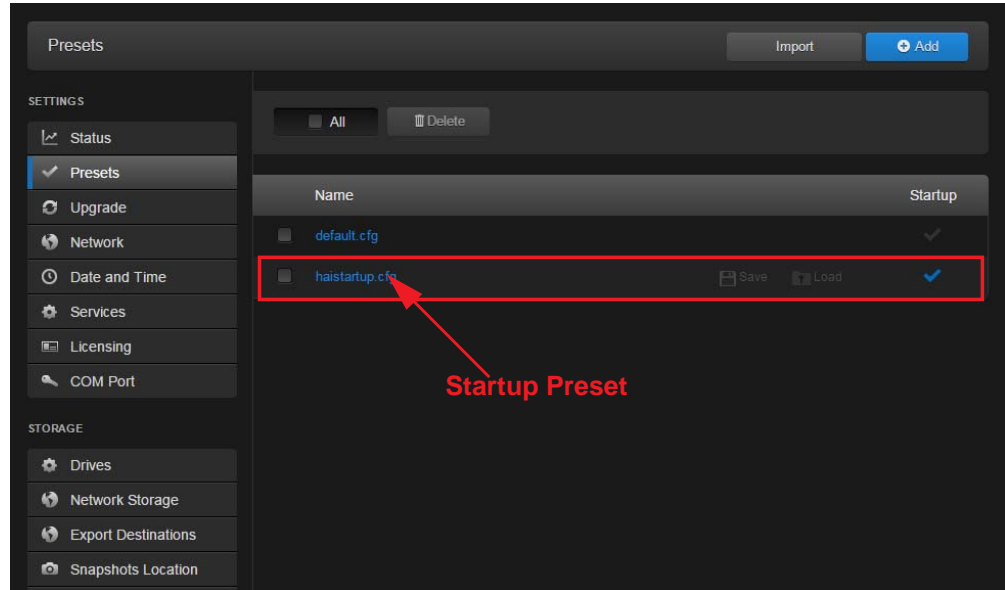
**NOTE** A warning indication appears in the title bar on systems with unsaved configurations. The indication is displayed when a user logs in or out of a Makito X when the current configuration has not been saved in a preset.



To view and manage presets:

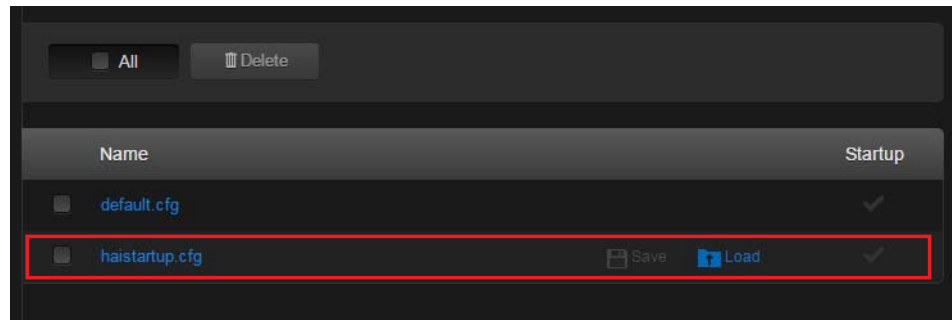
1. On the Administration page, click **PRESETS** from the sidebar menu.

The Presets List View opens displaying the list of saved presets for the encoder, as shown in the following example.

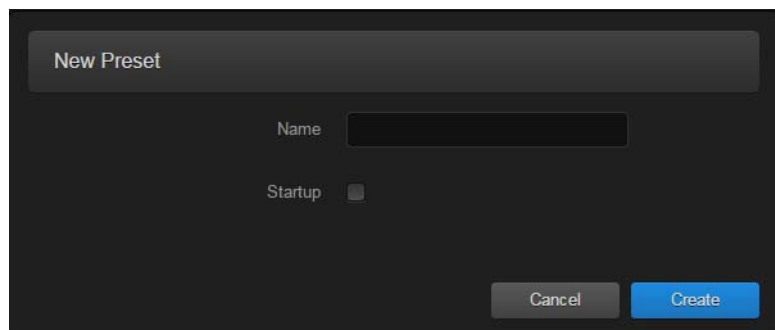


The startup preset is indicated with a blue check.

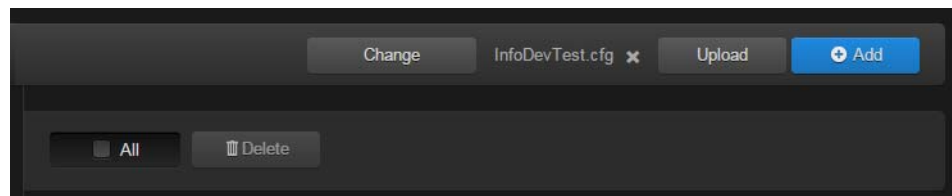
- To load an existing preset into the current session, hover over the preset name or anywhere in the row and click [Load](#).



- To select an existing preset to load at startup, hover over the preset row and click the (grayed out) checkmark under [Startup](#).
- To save the current settings as a new preset, click [Add](#).
  - In the New Preset dialog, type a new filename in the Name text box.



- b. To select this preset to load at startup, check the [Startup](#) checkbox.
  - c. Click [Create](#).
5. To save the current settings as an existing preset, hover over the preset row and click [Save](#). You can (optionally) check the [Startup](#) checkmark.
6. To save the preset as a text file to view or export to other Makito X encoders, click the preset name and save it in the Save As dialog. Note that the file is in Unix format.
7. To import a preset, for example, from another Makito X encoder, click [Import](#) and select the file in the Open File dialog box.
8. When you see the filename in the text box, click [Upload](#).



**TIP** To select a different preset file, click [Change](#). To remove the selection, click .

9. To delete one or more presets, check the checkbox next to one or more preset names (or check [All](#)) and click [Delete](#) on the Content toolbar.

## Installing Firmware Upgrades



**IMPORTANT** We recommend that upgrades to a new version occur in a stepwise fashion (i.e., 1.0.x -> 1.1.x -> 1.2.x -> 1.3.x -> 1.4.x -> 1.5.x).



**NOTE** On SDI appliances/blades (#S/B-292E-HDSDI2), prior to upgrading to Version 2.1, please verify that the CPLD is version 4 or greater (Web Interface > Status page or CLI `haiversion` command). If it is *not* at least version 4, contact Haivision Technical Support.

When you first receive the Makito X, 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.

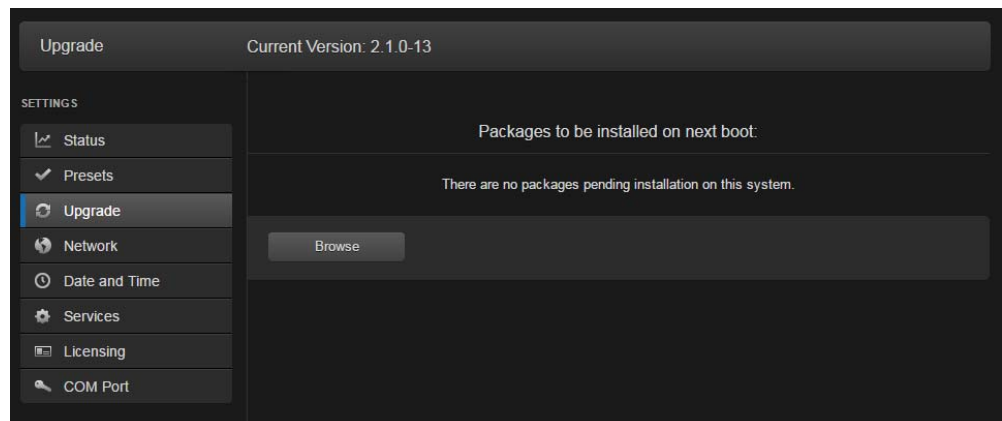
The firmware upgrade comes in the form of a file with the extension `.hai`, which when loaded will replace the application on your Makito X. The firmware upgrade components are digitally signed, and these signatures are all verified before performing the installation.

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

### To install a firmware upgrade:

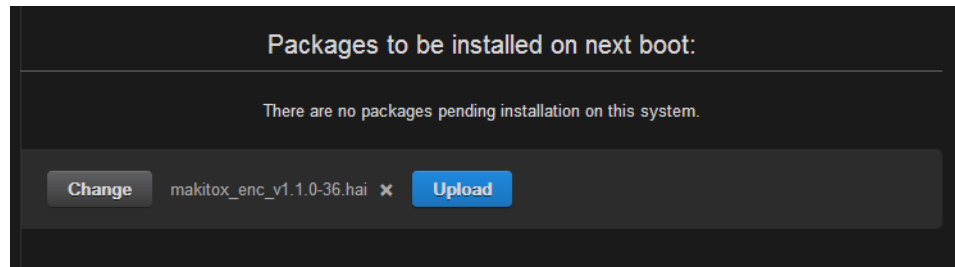
1. On the Administration page, click **UPGRADE** from the sidebar menu.

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



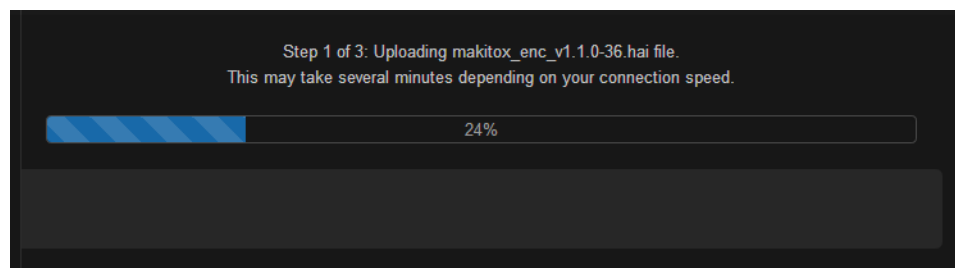
2. Click **Browse** and select the file in the Open File dialog box.

- When you see the filename in the text box, click [Upload](#).



**TIP** To select a different file, click [Change](#).

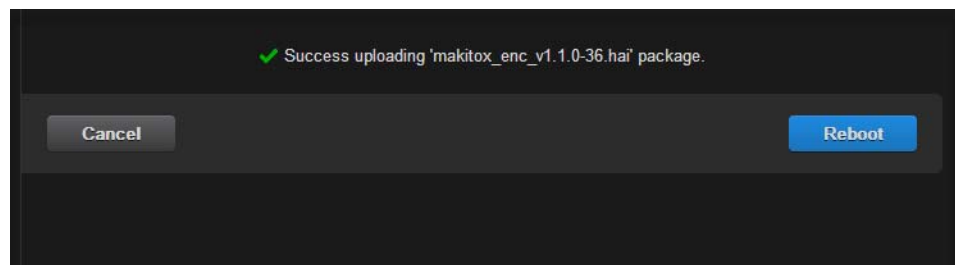
The file upload begins, as shown in the following example.



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

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

When the file is uploaded and verified successfully, you will see a confirmation page (as shown in the following example).

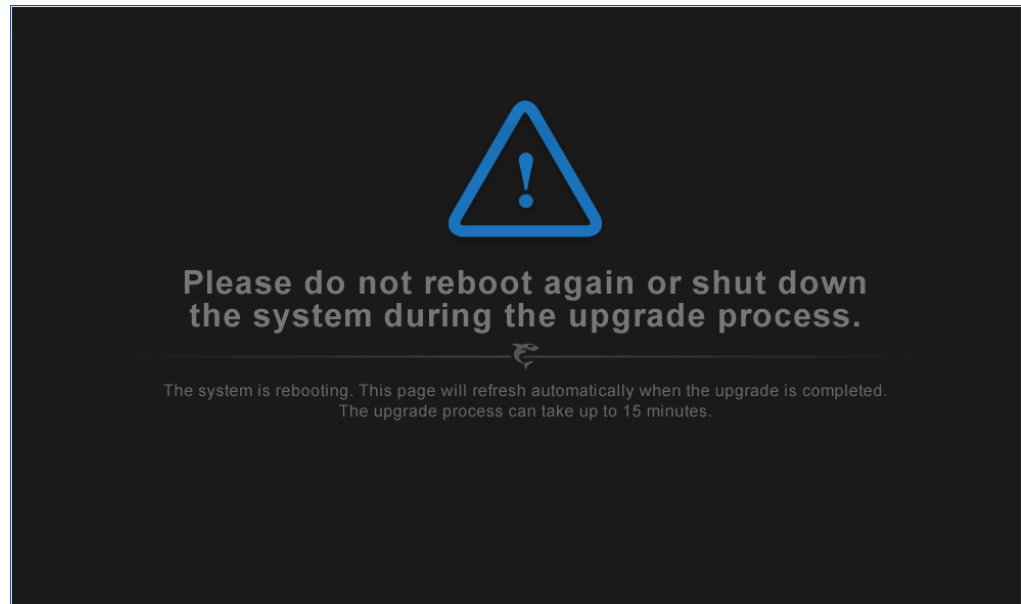


- Click [Reboot](#).

While the unit is rebooting, the Status LEDs will flash, and you will see a warning page (as shown on the following 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.

5. Clear your browser cache after the firmware upgrade.
6. Log in again in order to access the encoder. For more information, see [“Logging In to the Web Interface”](#) on page 74.



**NOTE** You can verify the result of the installation on the Messages page.

## Configuring Network Settings

From the Network Configuration page, you can modify the network interface settings for the encoder, including the unit's IP Address.



**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 apply 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. On the Administration page, click **NETWORK** from the sidebar menu.

The Network Configuration page opens, as shown in the following example.

Network Reboot Apply

**SETTINGS**

- Status
- Presets
- Upgrade
- Network**
- Date and Time
- Services
- Licensing
- COM Port

**STORAGE**

- Drives
- Network Storage
- Export Destinations
- Snapshots Location
- File Transfer History

**SECURITY**

- Accounts
- Messages
- Banner
- Policies
- Certificates
- Audit

**Ethernet**

Link

Speed

Current Speed 100 Mbps

Duplex

MAC Address 5c:77:57:00:32:97

Total TX Bandwidth  kbps

**Addressing**

DHCP

Assign Link-Local Address When DHCP Fails

IP Address

Netmask

Gateway

Hostname

**DNS Settings**

Obtain DNS Settings Automatically

Primary DNS Server Address

2. Select or enter the new value(s) in the appropriate field(s). See [“Network Settings”](#) on page 184.
3. To apply your changes, click [Apply](#).

You must reboot the system for the changes to take effect. After the encoder reboots, you will be returned to the Login page.

## Network Settings

The following table lists the Network settings:

Network Setting	Description/Values
<b>Ethernet</b>	
Link	<p>Determines whether the Ethernet parameters are set automatically or manually (i.e., enables or disables autonegotiation):</p> <ul style="list-style-type: none"> <li>• Automatic - The system will match the Ethernet Speed and Duplex Mode to the Ethernet hub to which it is connecting:</li> <li>• Manual - These values must be set manually. See following settings.</li> </ul> <p><b>NOTE:</b> Always use Auto with Gigabit Ethernet (GigE) speed (1000 Mbps).</p>
Speed	<p>Select the Ethernet Speed (in Mbps):</p> <ul style="list-style-type: none"> <li>• Any</li> <li>• 1000</li> <li>• 100</li> <li>• 10</li> </ul> <p><b>NOTE:</b> You can set the Ethernet Speed even when autonegotiation is enabled (i.e., when <a href="#">Link</a> is set to Auto).</p>
Current Speed	(Read-only) Displays the actual Ethernet Speed.
Duplex	<p>If <a href="#">Link</a> is Auto, displays the actual value for the Duplex Mode (read-only).</p> <p>-or-</p> <p>If <a href="#">Link</a> is Manual, select the Duplex Mode:</p> <ul style="list-style-type: none"> <li>• Full</li> <li>• Half</li> </ul>
MAC Address	(Read-only) The Media Access Control address assigned to the Makito X.
Total TX Bandwidth Limit	The maximum transmit bandwidth for the unit in kbps. Specifies the bandwidth “ceiling” for the Ethernet port.



Network Setting	Description/Values (Cont.)
<b>Addressing</b>	
DHCP	<p>Check or clear this checkbox to enable or disable the Dynamic Host Configuration Protocol.</p> <p><b>NOTE:</b> 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 &amp; Gateway Address.</p>
Assign Link-Local Address When DHCP Fails	<p>(<a href="#">DHCP</a> must be enabled) When this checkbox is checked, and DHCP is used but no DHCP server is present to assign an IP address to the device, the device will automatically assign itself an IP address in the 169.254.0.0/16 range.</p> <p>This allows you to use the device locally on a LAN (the address is NOT routable) in situations where DHCP is not available or failed.</p>
IP Address	<p>Displays the IP Address for the Makito X. This is a unique address that identifies the unit in the IP network.</p> <p>-or-</p> <p>If <a href="#">DHCP</a> is disabled, you may enter an IP address in dotted-decimal format.</p>
Netmask	<p>Displays the Subnet Mask for the Makito X. This is a 32-bitmask used to divide an IP address into subnets and specify the network's available hosts.</p> <p>-or-</p> <p>If <a href="#">DHCP</a> is disabled, you may enter a Netmask in dotted-decimal format.</p>
Gateway	<p>Displays the gateway address of the network (typically the address of the network router).</p> <p>-or-</p> <p>If <a href="#">DHCP</a> is disabled, you may enter a gateway address in dotted-decimal format.</p>
Hostname	You may, optionally, enter a unique name for the Makito X.
DHCP Vendor Class ID	<p>(<a href="#">DHCP</a> must be enabled) You may, optionally, specify the DHCP Vendor Class ID (option 60). This allows IT departments to identify Makito X devices on their networks. The default Device Identification value for the Makito X is "Haivision Makito X Encoder".</p>

Network Setting	Description/Values (Cont.)
<b>DNS Settings</b>	
Obtain DNS Settings Automatically	<p>(<a href="#">DHCP</a> must be enabled) Check this checkbox to obtain DNS settings from DHCP.</p> <p>DHCP servers often provide DNS information to the device on top of the IP address. When DHCP is enabled and this checkbox is enabled, the system will attempt to learn its DNS settings from the DHCP servers (which avoids unnecessary user configuration).</p>
Primary DNS Server Address	<p>(<a href="#">Obtain DNS Settings Automatically</a> must be disabled) Enter the primary DNS server address for your network.</p>
Alternate DNS Server Address	<p>(<a href="#">Obtain DNS Settings Automatically</a> must be disabled) Enter an alternate DNS server address for your network.</p> <p>The alternate DNS server is used only if the primary server is not responding.</p>
Domain Name	<p>(<a href="#">Obtain DNS Settings Automatically</a> must be disabled) Enter the domain for the Makito X.</p>
Enable mDNS	<p>Check this checkbox to enable the Multicast DNS (mDNS) protocol as a means for third party entities to discover the IP address of the Makito X.</p> <p><b>TIP:</b> Enabling mDNS allows the Safari Web browser (or other mDNS application) to automatically find the encoder. In Safari, navigate to Bookmarks and then select Bonjour to see the Makito X listed.</p>
mDNS Identifier	<p>(Optional) Enter a unique name for the encoder. By default, the system creates a unique name "MakitoXD (%HOSTNAME%)" for the device.</p>
<b>Reboot</b>	<p>Reboots the encoder. See "<a href="#">Rebooting the Encoder</a>" on page 175.</p>

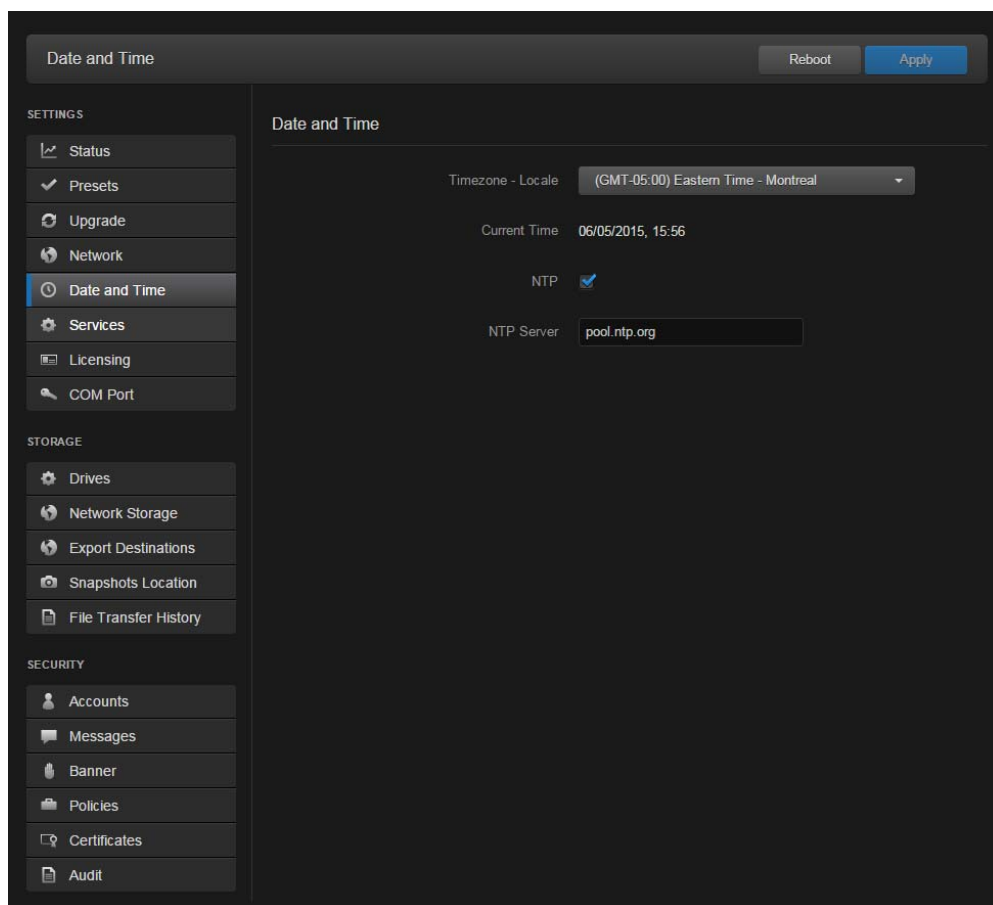
## Configuring Date and Time

From the Date and Time page, you can configure Network Time Protocol (NTP) support to synchronize the encoder clock with the selected time zone.

To view and configure the date and time:

1. On the Administration page, click [DATE AND TIME](#) from the sidebar menu.

The Date and Time page opens, as shown in the following example.



2. Select or enter the new value(s) in the appropriate field(s). See [“Date and Time Settings”](#) on page 188.
3. To apply your changes, click [Apply](#).

## Date and Time Settings

The following table lists the Date and Time settings:

Network Setting	Description/Values
Timezone-Locale	Select the desired time zone and corresponding city. <b>NOTE:</b> The times are based on hours added to or subtracted from Greenwich Mean Time (GMT).
Current Time	(Read-only) The current local date and time.
Enable NTP	Check this checkbox to connect to an NTP (Network Time Protocol) server to synchronize the encoder clock.
NTP Server	If NTP is enabled, enter the IP address of the NTP server.

## Enabling and Disabling Network Services

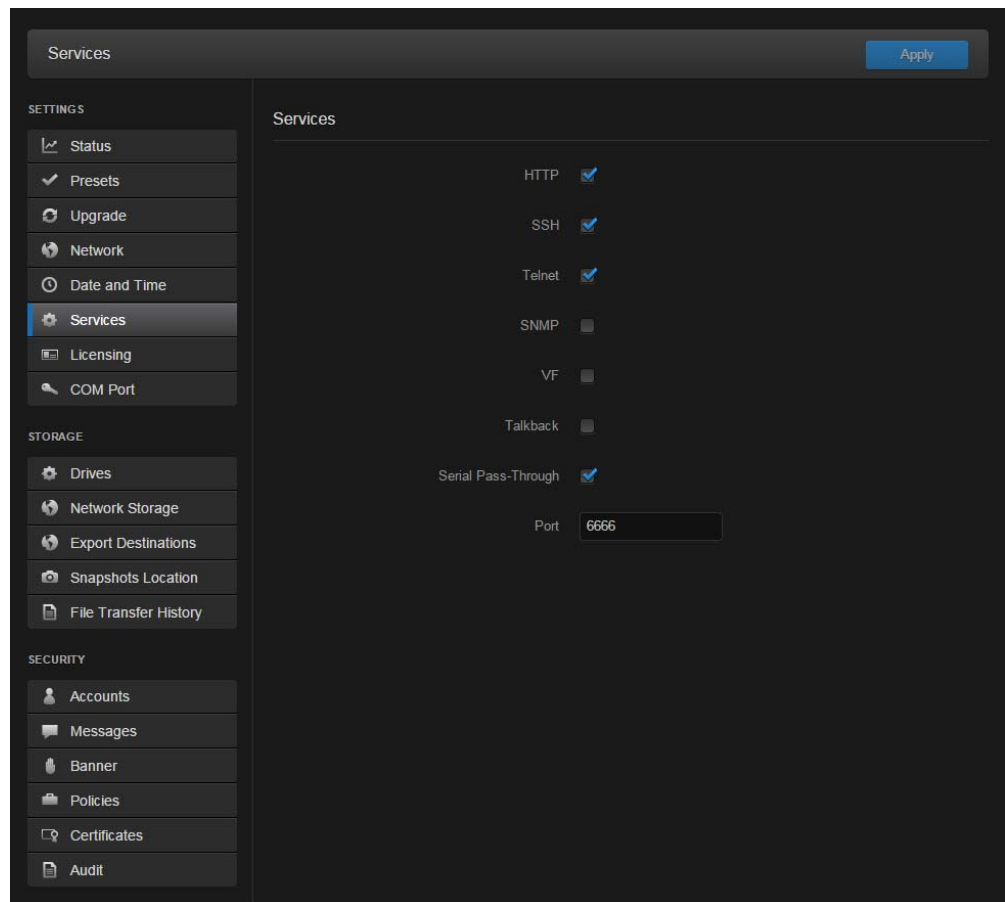
For security purposes, an administrator may need to stop one or more network services from accessing the Makito X. From the Services page, you can enable and disable the following network services: HTTP, SSH, Telnet, SNMP, VF, and Talkback.

On the Makito X with SDI, you can also enable bi-directional serial pass-through for controlling serially attached devices such as PTZ controlled cameras. Both RS-232 and RS-422 are supported.

To enable or disable network services:

1. On the Administration page, click [SERVICES](#) from the sidebar menu.

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



2. To enable or disable a service, check or clear the associated checkbox. See the following section, [“Service Settings”](#).
3. To apply your changes, click [Apply](#).

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



**IMPORTANT** If the COM1 serial port is used for metadata capture, and all remote management interfaces (HTTP, telnet, SSH, and SNMP) are disabled, the only way to re-enable these services will be by a Factory Reset. (For details, see [“Resetting the Encoder”](#) on page 63.) Once the serial port is dedicated for metadata capture, it is no longer usable for CLI management.

## Service Settings

The configurable Services are as follows:

Service	Description
HTTP	Hypertext Transfer Protocol, used for Web browsers acting as a client. <b>NOTE:</b> Only secured HTTP (HTTPS) is supported. See <a href="#">“Managing Certificates”</a> on page 224 to manage HTTP TLS certificates.
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 bidirectional communications via a virtual terminal connection.
SNMP	Simple Network Management Protocol, a network protocol used mostly in network management systems to monitor network-attached devices.
VF	Protocol used for communication between the encoder and Furnace servers. Note that VF Pilot provides access to encoder configuration settings. <b>NOTE:</b> The Makito X interoperates with Furnace v6.2.3 or later.
Talkback	Audio Talkback (a Makito X feature) allows end users monitoring a streaming session to “talk back” to individuals at the video source, via a speaker or headphones connected to the encoder. For details, see <a href="#">“Audio Talkback”</a> on page 40.
Serial Pass-Through	Bi-directional serial pass-through for controlling serially attached devices such as PTZ controlled cameras. Both RS-232 and RS-422 are supported. <b>NOTE:</b> The COM Port Mode must first be set to Pass-Through (see <a href="#">“Managing the COM Port”</a> on page 194).
Port	<a href="#">(Serial Pass-Through</a> must be enabled) Specifies the TCP port that the Makito X will listen on for remote commands.

## Managing Licenses

Feature licensing allows you to add new functionality to already deployed systems. You may add the following features to a base Makito X.

Feature	SKU
KLV	SWO-292E-KLV
KLV&CoT	SWO-292E-KLV-COT

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

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

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

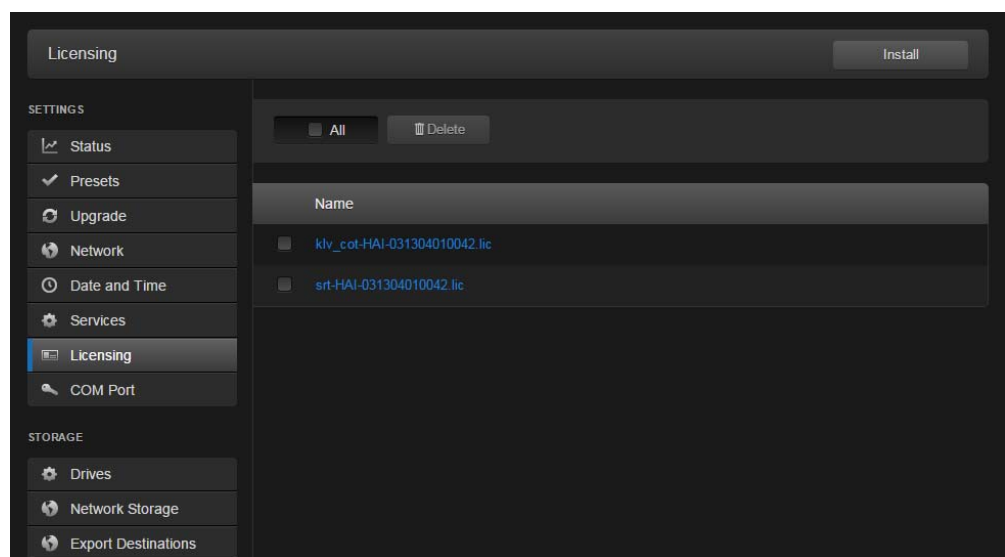
The licensing of the unit will survive a factory reset and upgrade of the firmware.

This section provides instructions to install a license from the Web interface as well as view current licenses on your system.

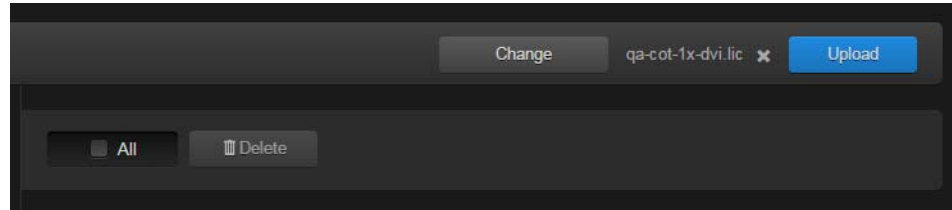
### To install a license file:

1. On the Administration page, click **LICENSING** from the sidebar menu.

The Licensing page opens, displaying the list of currently installed licenses (if applicable), as shown in the following example.



2. To select the license file, click [Install](#) and select the file in the Open File dialog box.
3. When you see the filename in the text box, click [Upload](#).



**TIP** To select a different license file, click [Change](#). To remove the selection, click .

4. To apply your changes, click [Reboot](#).  
The encoder will reboot and you will be returned to the Login page.
5. To view an installed license file, click the file in the list.  
The license file opens in a separate window.

```
#----BEGIN LICENSED FEATURE---- metadata.lcf ----
[INFO]
Feature=Metadata
Description=Metadata KLV CoT

[KLV]
Enabled=On

[CoT]
Enabled=On

#----END LICENSED FEATURE---- metadata.lcf ----
#----BEGIN LICENSING DATA-----
[LIC-SIGNATURE]
CreatedOn=2015-02-25 15:17:33
CreatedBy=infodev@haivision.com
Sequence=fw100984_metadata.lic

[LIC-DEVICES]
HAI-031304010042=Yes

#----END LICENSING DATA-----

Verifying license file klv_cot-HAI-031304010042.lic...
License verification successful.
```

6. To delete a previously installed license, select the file in the list and click [Delete](#).



## License File Errors

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

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

## Managing the COM Port



**NOTE** The COM Port page only accessible to administrators. However, operators can configure the COM port settings from the Metadata page when the COM port is in Metadata mode.

The Makito X with SDI provides a serial interface that you can use to connect to a computer for management of the encoder. The COM Port page displays the serial COM port settings and provides the option to switch from Metadata to Management mode.

On systems with the Metadata Capture option installed, you can use the serial COM port interface to capture either KLV or CoT metadata. For more information, see [“Configuring Metadata Capture”](#) on page 108.

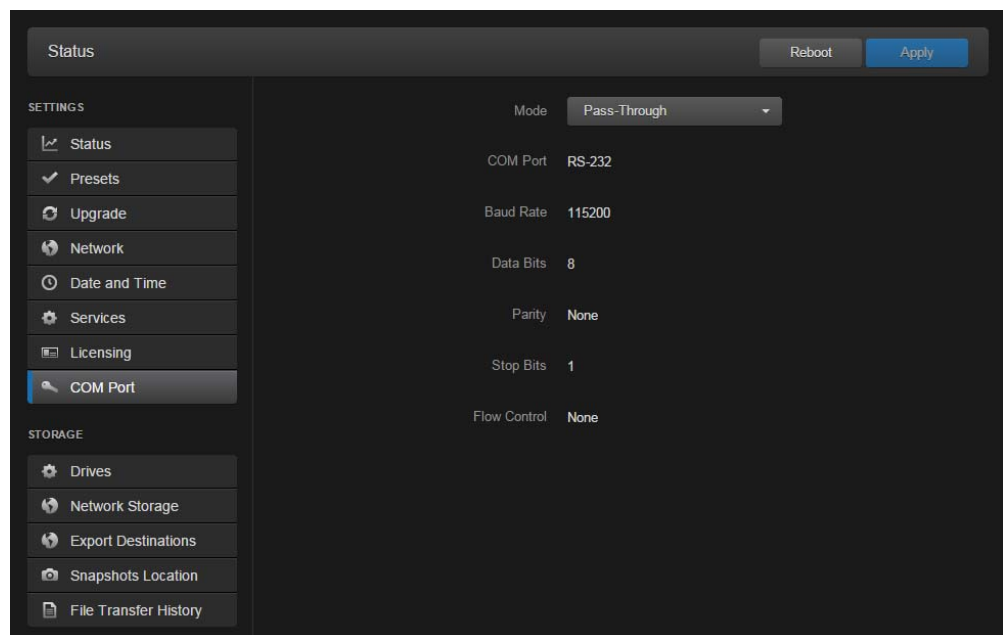
In order to configure the COM port settings to capture metadata, you need to set the COM Port Mode to Metadata and then reboot the encoder. You can then configure the COM port settings from the Metadata page (see [“Configuring Metadata Capture”](#) on page 108).

In order to configure serial pass-through to control devices such as PTZ cameras, you need to set the COM Port Mode to Pass-Through and then reboot the encoder.

### To manage the COM Port settings:

1. On the Administration page, click **COM PORT** from the sidebar menu.

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



2. (If applicable) Select **Metadata** from the COM Port **Mode** drop-down list.

3. To apply your change, click [Apply](#).
4. Click [Reboot](#).

The changes will take effect after the reboot has completed.

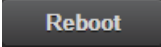
For information on connecting a computer to the COM1 port, see [“Connecting the Encoder to the Network and a Computer”](#) on page 46.

## COM Port Settings

The following table lists the COM Port settings.



**NOTE** With the exception of the COM Port Mode, the COM Port settings are read-only. For information on modifying the COM Port settings, see [“Metadata Settings”](#) on page 118.

COM Port Setting	Default	Description/Values
Mode	Management	<p>Selects the type of activity:</p> <ul style="list-style-type: none"> <li>• Management,</li> <li>• Metadata (required in order to configure the Metadata settings), or</li> <li>• Pass-Through (required to control serially attached devices such as PTZ controlled cameras).</li> </ul> <p><b>NOTE:</b> You must reboot the encoder when you change the Mode.</p>
COM Port	RS-232	<p>(Read-only) The type of Serial interface:</p> <ul style="list-style-type: none"> <li>• RS-232 or</li> <li>• RS-422</li> </ul>
Baud Rate	115200	(Read-only) The COM Port bitrate.
Data Bits	8	(Read-only) The COM Port databits: 8
Parity	None	(Read-only) The COM Port parity: None
Stop Bits	1	(Read-only) The COM Port stopbits: 1
Flow Control	None	(Read-only) The COM Port flow control: None
	n/a	Reboots the encoder. See <a href="#">“Rebooting the Encoder”</a> on page 175.

## Managing Storage Drives

From the Drives page, you can view and manage storage media for the encoder. This includes removable devices such as SD cards, USB thumb drives, or removable SSDs. From here you can format, mount or unmount storage drives.

- Formatting a drive initializes the file structure and removes all existing data.
- Mounting makes the drive available to the system (e.g., to store data).
- Ejecting unmounts the drive in order to allow it to be removed (physically) from the unit.

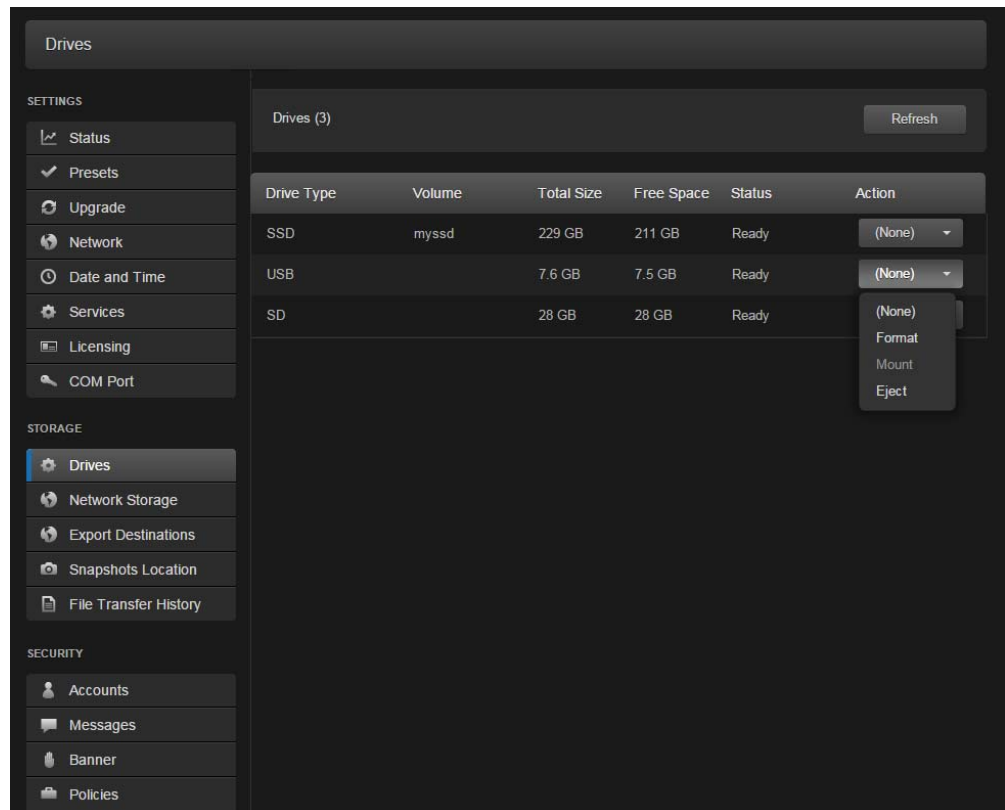


**NOTE** The Drives page is only available on the Makito X with Storage dual-height model.

To manage storage drives:

1. On the Administration page, click **DRIVES** from the sidebar menu.

The Storage Drives page opens, as shown in the following example.



2. To change the status for a storage drive, click the drop-down list under **Action** and select either Format, Mount or Eject (as applicable).



**NOTE** The Makito X does not support formatting of SD drives.

---

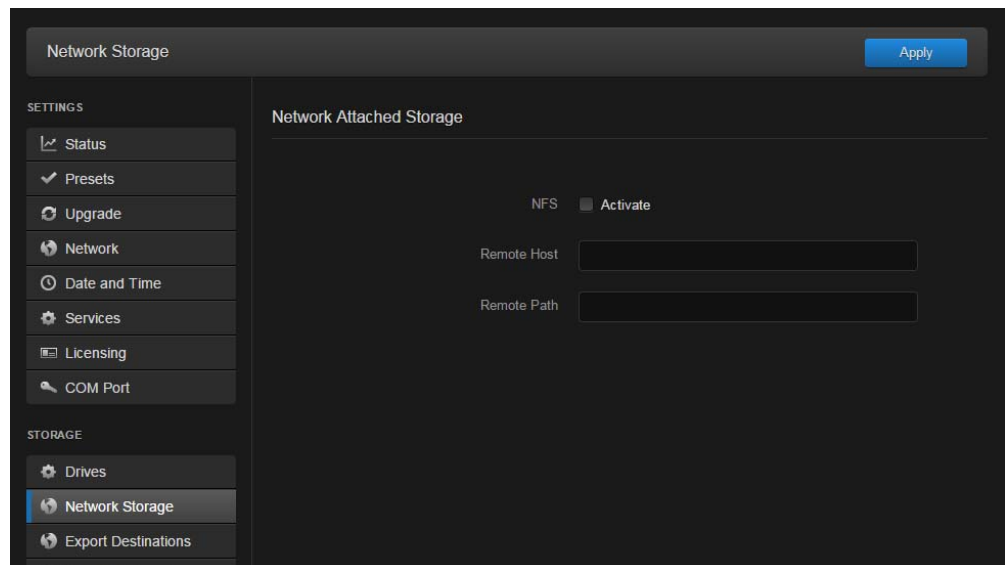
## Managing Network Storage

Network Storage enables you to move video storage from your Makito X to Network-Attached Storage through an NFS connection. This is useful for storing snapshots or (with the Makito X with Storage) for copying recordings after they are completed.

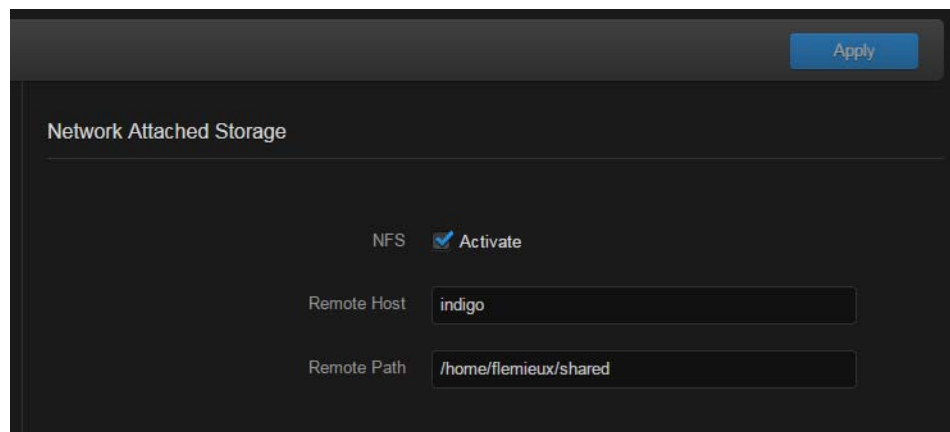
To configure network storage:

1. On the Administration page, click **NETWORK STORAGE** from the sidebar menu.

The Network Attached Storage page opens, showing the **NFS – Activate** checkbox.



2. To connect to an NFS server, check the checkbox.
3. Fill in the remote host IP address and path.
4. To apply your changes, click **Apply**.



The Network-Attached Storage is now available.

## Network Storage Settings

The configurable Network Attached Storage settings are as follows:

Network Storage Setting	Description
NFS – Activate	Check this checkbox to activate Network Attached Storage.
Remote Host	Enter the NFS server hostname or its IP address in dotted-decimal format.
Remote Path	Enter the NFS server path.

## Configuring Export Destinations

When setting up Makito X, you can add export destinations to be available to transfer video and metadata to FTP/FTPS servers and the Haivision Video Cloud (HVC) platform. From the Export Destinations page, you can add destinations, edit settings for destinations, and delete destinations.



**NOTE** Export Destinations is only available on the Makito X with Storage dual-height model.

To view and manage export destinations:

1. On the Administration page, click **EXPORT DESTINATIONS** from the sidebar menu.

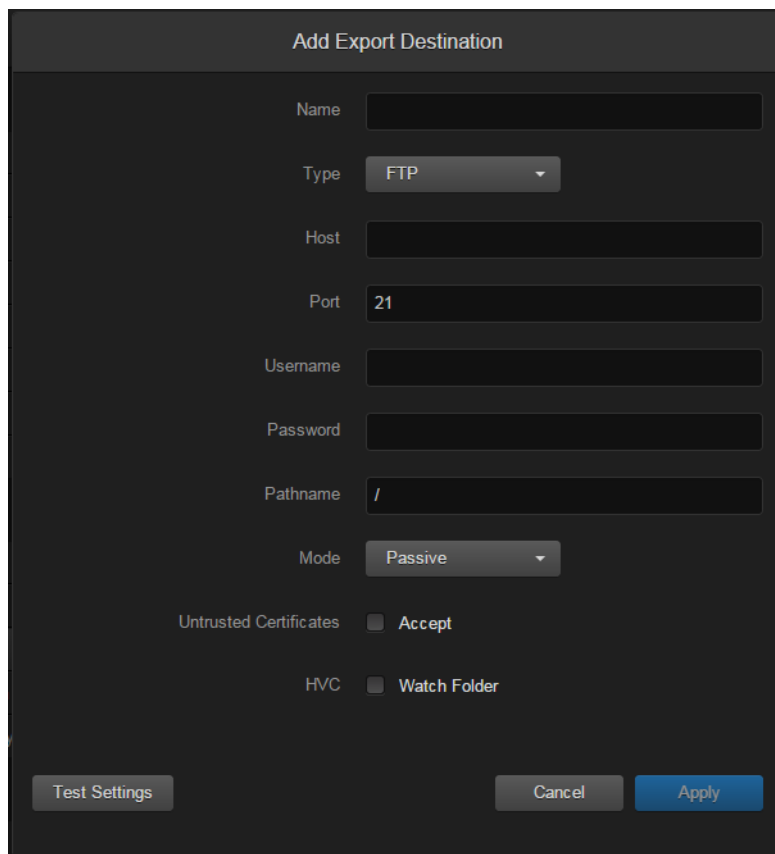
The Export Destinations page opens, displaying the list of defined destinations for your platform, if any (see following example).

Name	Type	Host	Path
noname	ftps	test.mozillaorg	/
secure	ftps	incoming.oligny.com	/
incoming.oligny.com	ftp	oligny.com	/recordings
nfs	ftp	okiii	/
good path	ftp	incoming.oligny.com	recordings

To add an export destination:

1. From the Export Destinations page, click **+ Destination**.
2. On the Add Export Destination dialog, enter or select the value(s) to define the destination. See [“Export Destination Settings”](#) on page 202.





**Add Export Destination**

Name

Type

Host

Port

Username

Password

Pathname

Mode

Untrusted Certificates  Accept

HVC  Watch Folder

3. To test the connection, click [Test Settings](#).



**NOTE** You do not need to save in order to test settings.

---

4. Click [Add Destination](#).

The new export destination will be added to the list.

## Export Destination Settings

The following table lists the Export Destination configuration settings:

Export Destination Setting	Default	Description/Values
Name	n/a	Enter a name for the destination. This name will be selectable on the Export Video list.
Type	FTP	Select the protocol type, either: <ul style="list-style-type: none"> <li>• FTP: File Transfer Protocol</li> <li>• FTPS: FTP with explicit Transport Layer Security (TLS)</li> </ul>
Host	n/a	Type in the server's DNS host name or IP address for the destination.
Port	21	Type in the port number for the destination server.
Username	n/a	Type in your login username for the site.
Password	n/a	Type in your password.
Pathname	n/a	(Optional) Type in the file path to use on the server, or leave blank for the server's default path.
Mode	Passive	Select the FTP data connection mode provided by your FTP administrator, either: <ul style="list-style-type: none"> <li>• Active: The client tells the server what port it is listening on, and the data connection is established by the server with the client via the specified port. For this to work, there either needs to be no firewalls or the firewalls defined must understand the FTP protocol.</li> <li>• Passive: The client opens two random ports. One port issues a PASV command to inform the server that it is in Passive mode. The server opens a random port and responds to the client. The client uses the second port to establish the data connection with the server via the port specified by the server.</li> </ul>

Export Destination Setting (Cont.)	Default (Cont.)	Description/Values (Cont.)
Untrusted Certificates	Do not Accept	Check this checkbox to allow Makito X to connect to an FTPS server that is using an untrusted SSL certificate.
HVC - Watch Folder	Disabled	<p>Check this checkbox to create an HVC-compatible mRSS (Media RSS) metadata file.</p> <p><b>NOTE:</b> This file contains information about recording used by platforms to process files. When files show up here, HVC starts processing.</p>

## Managing Snapshot Storage Locations

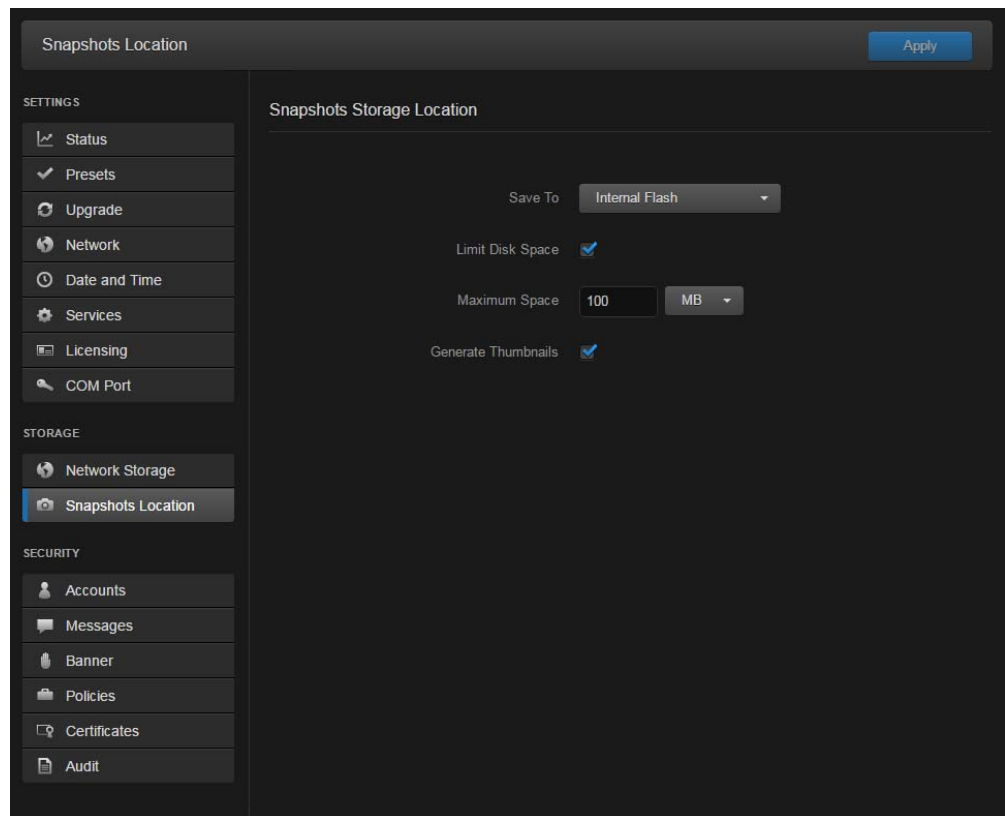
From the Snapshots Storage Location page, you can specify the location where image snapshots are stored. You may choose to store snapshots on removable storage media (if available) as well as define the number and size of snapshots recorded in order to limit or increase the space allocated for snapshot storage.

Snapshots may be stored on the internal NAND storage, or on mSATA/SATA SSD, SD, USB, or NAS-configured storage devices. The snapshot storage destination control is a global parameter.

To view and manage snapshot storage locations:

1. On the Administration page, click [SNAPSHOTS LOCATION](#) from the sidebar menu.

The Snapshots Storage Location page opens, as shown in the following example.



2. Enter or select the value(s) to define the location. See [“Snapshots Location Settings”](#) on page 205.
3. To apply your changes, click [Apply](#).

## Snapshots Location Settings

The configurable Snapshots Storage Locations settings are as follows:

Snapshots Location Setting	Description
Save to	Select the location for snapshot storage: <ul style="list-style-type: none"><li>• Internal Flash</li><li>• Internal SSD (if installed)</li><li>• USB Drive (if installed)</li><li>• Network Storage</li></ul>
Limit Disk Space	Check this checkbox to limit the disk space for snapshot storage.
Maximum Space	( <a href="#">Limit Disk Space</a> must be enabled) Type in the maximum disk space allowed and select either MB or GB. <b>NOTE:</b> For USB or SD cards, you cannot configure a space limit; instead the space available on these devices will be the effective limit.
Generate Thumbnails	Check this checkbox to disable thumbnail generation to speed up snapshot acquisition and storage time.

## Managing File Transfer History

From the File Transfer History page, you can view a list of the files that have been transferred to an external storage location. You can also clear the list from here.



**NOTE** File Transfer History is only available on the Makito X with Storage dual-height model.

To view and manage file transfer history:

1. On the Administration page, click [FILE TRANSFER HISTORY](#) from the sidebar menu.

The Snapshots Location page opens, as shown in the following example.

The screenshot displays the 'File Transfer History' page. The top right corner shows 'Total: 3'. Below the title bar, there is a 'Clear All' button and an 'Items/Page' dropdown set to 15. The main content area contains a table with the following data:

File	Date	Destination	Type	Status
roll-over-ts-2015-06-12-17h24m16s/ro...	16/06/2015 13h50	USB	TS	Success
roll-over-ts-2015-06-17-14h30m57s/ro...	17/06/2015 14h58	USB	TS	Success
roll-over-ts-2015-06-17-14h30m57s/ro...	17/06/2015 15h00	USB	TS	Success

2. To clear the list, click [Clear All](#).

---

# CHAPTER 6: Managing Users and Security

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



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**NOTE** Unless otherwise indicated, the Administration Security pages are only accessible to administrators.

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## Topics In This Chapter

### Security

<a href="#">Managing User Accounts</a> .....	208
<a href="#">Account Management</a> .....	210
<a href="#">Account Settings</a> .....	212
<a href="#">Managing Public Key Authentication</a> .....	213
<a href="#">Managing Messages</a> .....	215
<a href="#">Managing Banners</a> .....	217
<a href="#">Managing Security Policies</a> .....	220
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<a href="#">Managing Audits</a> .....	231
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## Managing User Accounts



**NOTE** The Accounts pages are available to administrators only (i.e., users assigned Administrator role). From here, administrators can create and manage user accounts for the Makito X (including their own accounts).

The My Account page is available to users assigned either Operator or Guest roles to change their own account passwords. For information, see [“Changing Your Password”](#) on page 81.

From the Accounts pages, administrators can create, delete and modify user accounts for the Makito X.

An account can be allocated to each user of the system so that the identity of the user can be uniquely determined. The Makito X provides three defined account roles to assign privileges to users: Administrator, Operator and Guest. For details, see [“Role-based Authorization”](#) on page 72.

Using system-wide parameters, administrators can configure the allowable password strength and composition (i.e., to force the selection of strong passwords), as well as the periodic change of passwords. For details, see [“Managing Security Policies”](#) on page 220.

The Makito X can also be configured for Web interface and CLI account sessions to log out after an idle session timeout period. The session timeout period is selectable via a system-wide parameter. For details, see [“Managing Security Policies”](#) on page 220.

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

### To open the Accounts List View:

1. On the Administration page, click **ACCOUNTS** from the sidebar menu.

The Accounts List View opens, displaying the list of defined user accounts for the encoder, as shown in the following example.



Name	Role	State	Password Expiry	Action
admin	Administrator	Enabled	Never	
operator	Operator	Enabled	Never	None
user	Guest	Enabled	Never	None

The Accounts List View displays the Name, Role, State (Enabled or Locked), and Password Expiry status for each account. It also provides an option to lock/unlock or delete an account.

2. To view or modify user account details, click the account link in the table to open the Account Settings page. For details, see [“Account Management”](#) on page 210.
3. To add a new account, click [Add](#). For details, [“Account Management”](#) on page 210.
4. To lock or unlock an account, click the drop-down list under [Actions](#) and select either:
  - Lock (if the current State is Enabled) or
  - Unlock (if the current State is Locked).
5. To delete an account, click the drop-down menu under [Actions](#) and select Delete.
6. 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 > PRESETS](#) page. See [“Saving and Loading Presets”](#) on page 177.

## Account Management



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

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

To add a new account:

1. From the Accounts List View, click [Add](#).
2. In the Add New Account dialog, type a unique user name in the Name text box.



**TIP** The user name must comply with Unix restrictions (lower case letters a-z, hyphen and underscore).

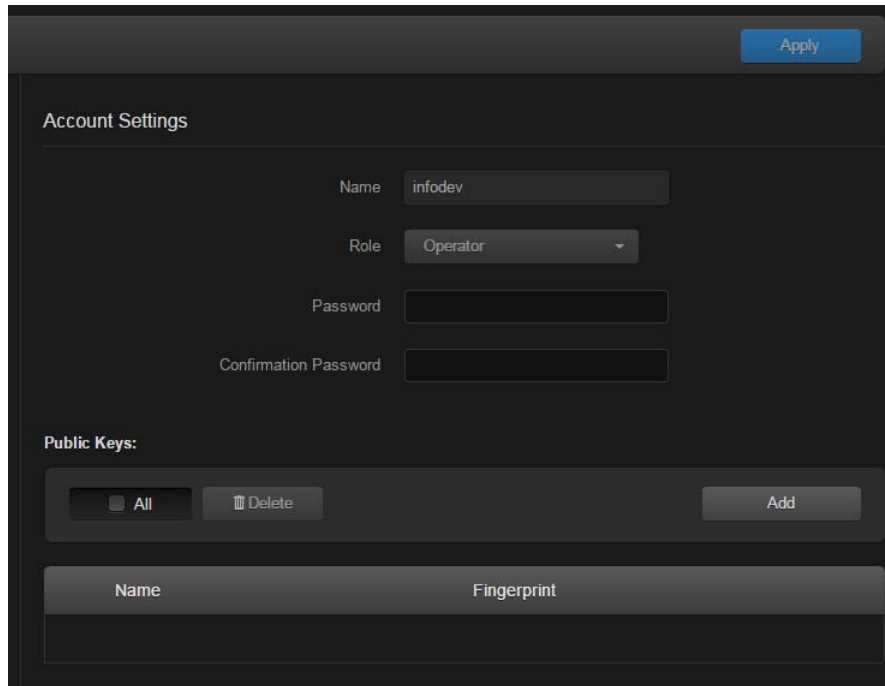
The screenshot shows a dark-themed dialog box titled "Add a New Account". Under the "Account Settings" section, there are four input fields: "Name", "Role" (a dropdown menu with "Administrator" selected), "Password", and "Confirmation Password". At the bottom right, there are two buttons: "Cancel" and "Add".

3. Select the Role for the user. See [“Role”](#) on page 212.
4. Type the initial password in the Password field and again in the Confirmation Password field. For the allowed characters, see [“Password Requirements”](#) on page 82.
5. Click [Add](#).

To manage existing accounts:

1. From the Accounts List View, click a link in the table for an existing account.

The Account Settings page opens for the selected account (as shown in the following example).



The screenshot shows the 'Account Settings' page for an account named 'infodev'. The page has a dark theme. At the top right, there is a blue 'Apply' button. Below the title, there are four input fields: 'Name' (containing 'infodev'), 'Role' (a dropdown menu set to 'Operator'), 'Password', and 'Confirmation Password'. Below these fields is a section titled 'Public Keys:' which contains three buttons: 'All', 'Delete', and 'Add'. At the bottom, there is a table with two columns: 'Name' and 'Fingerprint'. The table is currently empty.

For security purposes, you cannot modify the Name or Role for an existing account.

2. To reset the password of an existing account, type the password in the Password field and again in the Confirmation Password field. For the allowed characters, see [“Password Requirements”](#) on page 82.
3. To change your own password, type the current password in the Old Password field, type the new password in the Password field and again in the Confirmation Password field.



**NOTE** New users must change their passwords the first time they log in as well as when the administrator resets the password of an existing account.

When you change your password, the new password will take effect immediately.

4. To upload a public key for the account, follow the steps in [“Managing Public Key Authentication”](#) on page 213.
5. To get the fingerprint for a public key, select the public key in the list.

For more information, see [“Account Settings”](#) on page 212.

6. To apply your changes, click [Apply](#).

## Account Settings

The following table lists the Accounts controls and settings:

Account Setting	Default	Description/Values
Name	n/a	<p>(Read-only for existing accounts) The user name for the account.</p> <p>(New account) Type in a unique name for the account, meeting the following requirements:</p> <ul style="list-style-type: none"> <li>• Maximum length = 20 characters.</li> <li>• All characters must be lowercase.</li> <li>• The first character cannot be a number.               <ul style="list-style-type: none"> <li>- Can start with [a-z]</li> <li>- After the first character, can contain [a-z 0-9]</li> </ul> </li> </ul>
Role	n/a	<p>(Read-only for existing accounts) The Role assigned to the account.</p> <p>(New account) Select the Role for the user account, either:</p> <ul style="list-style-type: none"> <li>• Administrator</li> <li>• Operator</li> <li>• Guest</li> </ul> <p>For details on roles, see <a href="#">“Role-based Authorization”</a> on page 72.</p>
Old Password	n/a	<p>(Your own account only) Type in your current password.</p> <p><b>NOTE:</b> This is not required for other accounts since an administrator is frequently asked to change the password by users who have forgotten their passwords.</p>
Password	n/a	<p>Type in the new password.</p> <p>For the allowed characters, see <a href="#">“Password Requirements”</a> on page 82.</p>
Confirmation password	n/a	<p>Re-type the new password.</p>

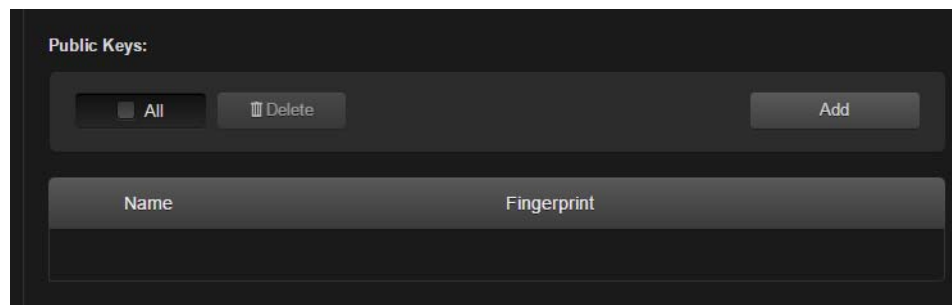
Account Setting	Default (Cont.)	Description/Values (Cont.)
Public Keys	n/a	Lists any public key files that have been uploaded for this account. <ul style="list-style-type: none"> <li>To add a public key, click <a href="#">Upload</a>.</li> <li>To delete a public key, select it from the list and click <a href="#">Delete</a>. See <a href="#">“Managing Public Key Authentication”</a> on page 213.</li> </ul>
Fingerprint	n/a	Displays the fingerprint for the selected public key (when you click a filename in the <a href="#">Public Keys</a> list). <b>TIP:</b> A public key fingerprint is a short sequence of bytes which you can copy and use to identify or look for a public key.

## Managing Public Key Authentication

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

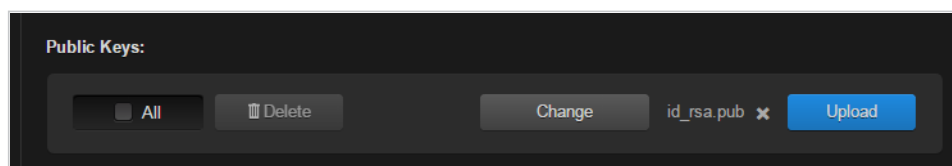
To upload a public key file for an account:

1. From the Accounts List View, click a link in the table for an existing account.
2. On the Account Settings page, click [Add](#) and select the file in the Open File dialog box.



The public key file must have a .pub extension.

3. When you see the filename in the text box, click [Upload](#).



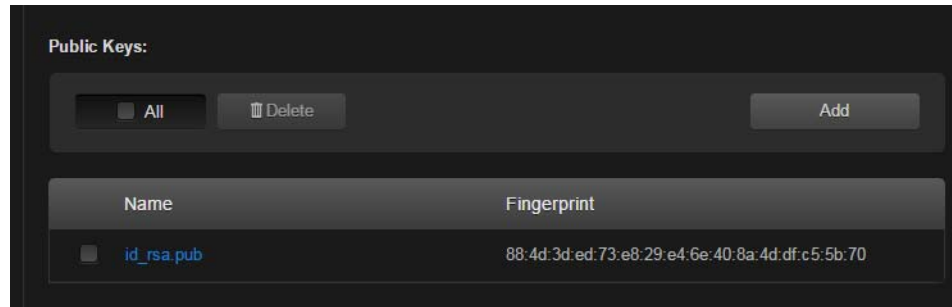


---

**TIP** To select a different public key file, click [Change](#). To remove the selection, click .

---

The file is then added to the list of public keys along with the fingerprint for the key (e.g., for identification purposes, as shown in the following example).



4. To delete one or more previously uploaded public key file from the list, check the checkbox next to one or more filenames (or check [All](#)) and click [Delete](#) on the Content toolbar.



---

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

---

## Managing Messages

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

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

The log of the actions recorded includes the following:

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



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

To view the messages:

1. On the Administration page, click **MESSAGES** from the sidebar menu.

The Messages page opens displaying the log as shown in the following example.

The screenshot shows the 'Messages' page with a 'Delete All' button in the top right corner. The left sidebar is divided into three sections: 'SETTINGS', 'STORAGE', and 'SECURITY'. Under 'SETTINGS', there are options for Status, Presets, Upgrade, Network, Date and Time, Services, Licensing, and COM Port. Under 'STORAGE', there are options for Network Storage and Snapshots Location. Under 'SECURITY', there are options for Accounts, Messages (which is highlighted), Banner, Policies, and Certificates. The main content area displays a log of messages, including software package installations and connectivity issues with an audit server.

2. To delete the messages, click [Delete All](#).

The messages will be deleted immediately.



## Managing Banners

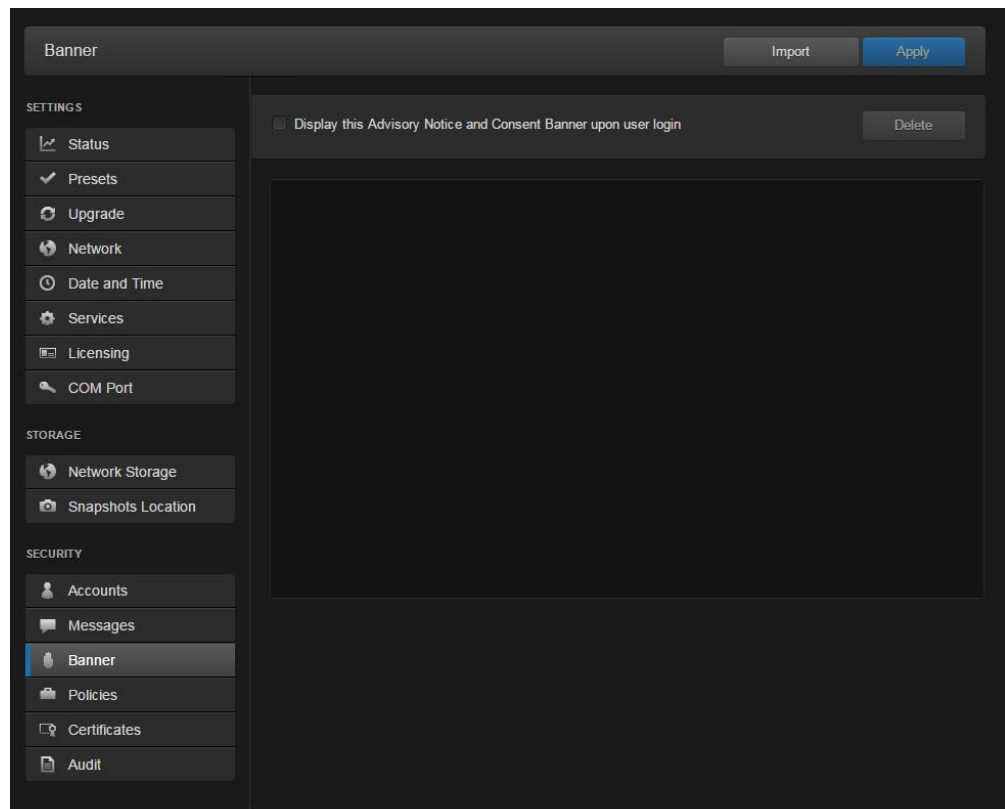
From the Banner page, administrators can upload a text file for the Advisory and Consent Banner page. The banner is typically an advisory/warning notice to be displayed before the Login page.

Only ASCII file format is supported for the banner file; the banner is a single text file with a maximum file size of 4KB.

To upload a text file for the Banner page:

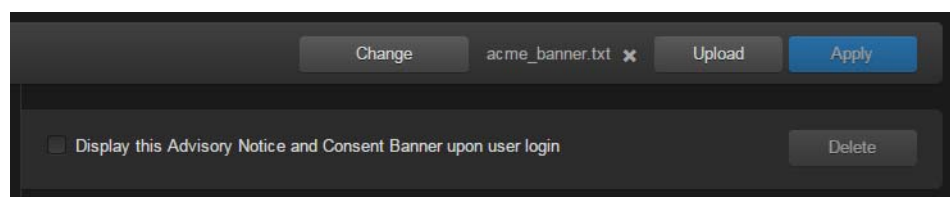
1. On the Administration page, click **BANNER** from the sidebar menu.

The Banner page opens, as shown in the following example. If banner text has been imported, it will be displayed here.



2. Click **Import** and select the file in the Open File dialog box.

The banner filename is now displayed on the Upload Banner task bar.

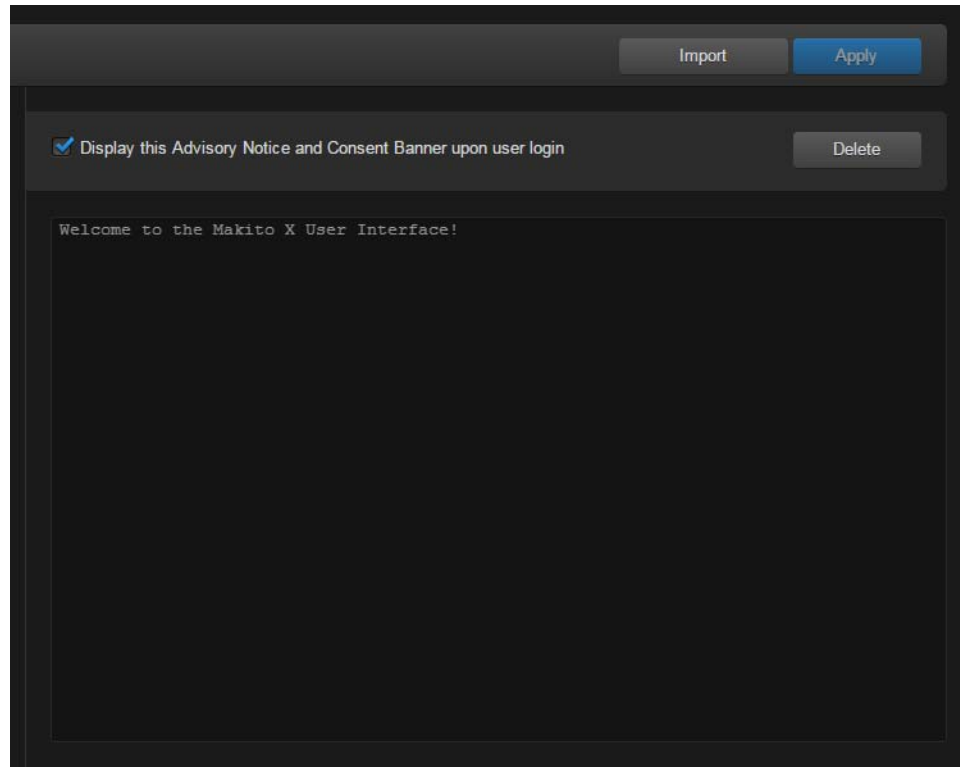




**TIP** To select a different banner file, click [Change](#). To remove the selection, click .

3. Click [Upload](#).

The banner text is now displayed in the pane.



4. To display the Advisory Notice and Consent Banner upon user login, check the checkbox.



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

5. To apply your changes, click [Apply](#).

6. To delete the current banner, click [Delete](#).

The banner will be deleted immediately.



---

**TIP** You can also install and manage banner files from the CLI using the [banner](#) command. The Makito X supports FTP and TFTP client, as well as SCP client and server.

---

## Managing Security Policies



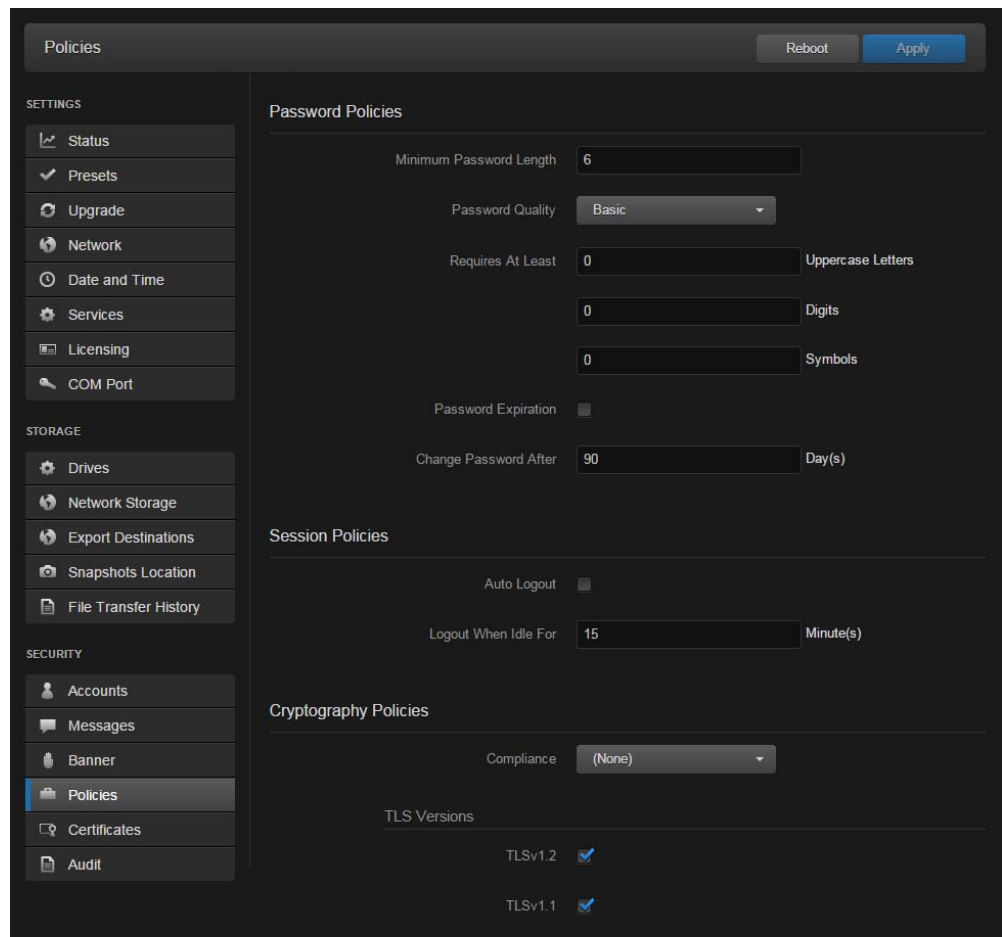
**NOTE** The Policies page provides the options to configure Makito X encoders to be “hardened”. For more information, see [“Hardening”](#) on page 42.

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

To view and manage the Security policies for the encoder:

1. On the Administration page, click **POLICIES** from the sidebar menu.

The Policies page opens as shown in the following example.



2. Select or enter the new value(s) in the appropriate field(s). See [“Policy Settings”](#) on page 221.

3. To apply your changes, click [Apply](#).

## Policy Settings

The following table lists the Policy settings for the encoder:

Policy Setting	Default	Description/Values
<b>Password Policies</b>		
Minimum password length	6 characters	Type in the minimum password length (from 6-40 characters). <b>NOTE:</b> Passwords can be up to 80 characters.
Password quality	Basic	Select the required password quality; this works in conjunction with <a href="#">Password requires at least</a> below: <ul style="list-style-type: none"> <li>• Basic: Makes the minimum password length the only requirement for creating a new password.</li> <li>• Strong: Adds stricter requirements for password creation (checks for minimum length, minimum number of required upper case characters, digits, and symbols, etc.). Also prevents the use of dictionary words in passwords, and enforces a minimum number of 4 characters that must be different from the previous password.</li> </ul>
Password requires at least	n/a if Basic 0 characters if Strong	( <a href="#">Password quality</a> must be Strong) Specify the minimum required number of: <ul style="list-style-type: none"> <li>• Uppercase Letters</li> <li>• Digits</li> <li>• Symbols</li> </ul> The range is from 0 to 40 for all 3.
Password expiration	Disabled	To enable Password expiration, check the checkbox.
Change password after	n/a if Disabled 90 days if Enabled	( <a href="#">Password expiration</a> must be enabled) Type in the number of days after which users must change their passwords (from 1-180 days).

Policy Setting	Default (Cont.)	Description/Values (Cont.)
<b>Session Policies</b>		
Auto Logout	Disabled	To enable Auto Logout, check the checkbox. This configures the Makito X to automatically log the user out after a specified period of idle time. Systems that are left logged on may represent a security risk for an organization. If the user has been inactive for longer than this period of time, he/she will be automatically logged out and redirected to the Login page.
Logout when idle for	n/a if Disabled 15 minutes if Enabled	( <a href="#">Auto Logout</a> must be enabled) Type in the maximum length of time the system may be idle before the user will be logged out (from 1 - 1440 minutes).
<b>Cryptography Policies</b>		
Compliance	None	Specifies the required cryptographic compliance, either: <ul style="list-style-type: none"> <li>• None</li> <li>• FIPS 140-2: Applies cryptographic modules accredited under the Federal Information Processing Standard (FIPS) Publication 140-2.</li> <li>• NDPP v1.1: Applies cryptographic modules accredited under National Information Assurance Partnership (NIAP) Network Device Protection Profile, Revision 1.1.</li> <li>• SP800-52 Revision 1: Applies cryptographic modules accredited under the National Institute of Standards and Technology (NIST) Special Publication 800-53, Revision 1.</li> </ul> <p><b>NOTE:</b> Either selection reinforces security for all management functions of the encoder in terms of cryptography. This setting takes effect upon the next reboot.</p>

Policy Setting	Default (Cont.)	Description/Values (Cont.)
TLS Versions	TLSv1.2, TLSv1.1, TLSv1.0	<p>Specifies which TLS (Transport Layer Security) versions are accepted from the HTTPS client.</p> <ul style="list-style-type: none"> <li>• TLSv1.2</li> <li>• TLSv1.1</li> <li>• TLSv1.0</li> <li>• SSLv3</li> </ul> <p><b>NOTE:</b> SSLv3 can be enabled only if <a href="#">Compliance</a> is set to None. At least one TLS version must be enabled.</p>

## Managing Certificates

The Certificates page shows the list of Identity and CA Certificates installed on the Makito X.

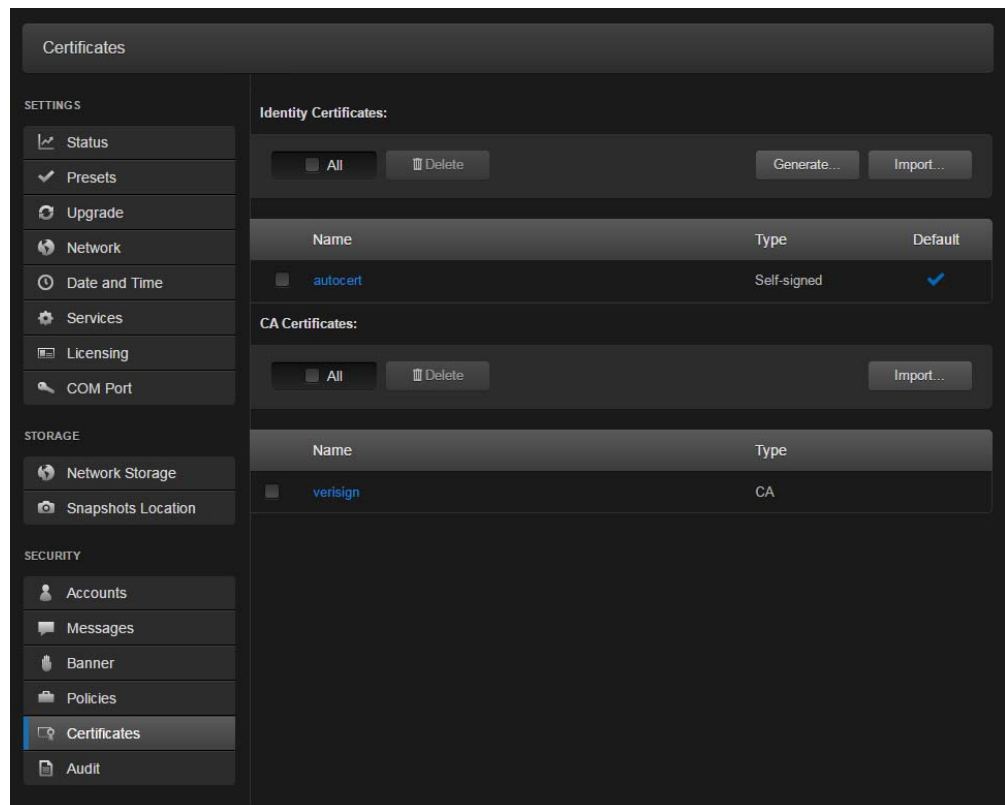
- **Identity Certificates:** An Identity Certificate identifies the Makito X during the authentication process when trying to establish a TLS connection in Audit or HTTPS session startup. Its Common Name or Alternate Subject Names must match the encoder's IP address and/or its FQDN (Fully Qualified Domain Name) if DNS is used.
- **CA Certificates:** A CA Certificate is normally a root certificate from a certificate authority that is generally widely known and trusted. CA Certificates are stored on the encoder so they can be used to authenticate CA-signed certificates from audit servers. You will need to import the root certificate from the CA that signed the certificate of the configured remote audit server. It is also recommended to import the root certificate of the CA that signed your Makito X identity certificate (if you have one).

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

To open the Certificates page:

1. On the Administration page, click **CERTIFICATES** from the sidebar menu.

The Certificates page opens as shown in the following example.

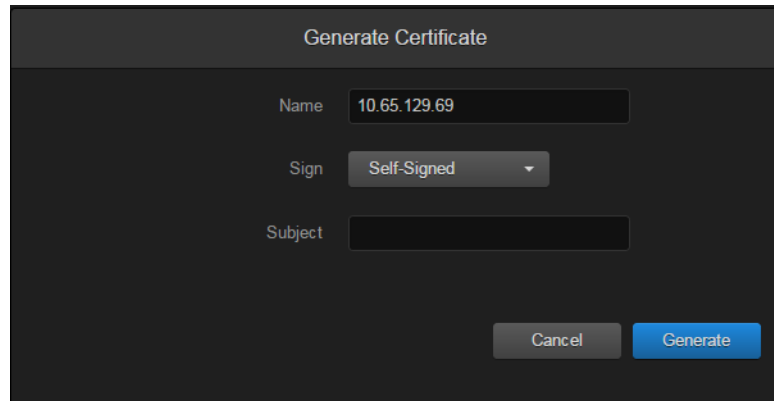




The default Identity Certificate is indicated with a blue check.

To generate a [Self-signed Certificate](#) or a [Certificate Signing Request \(CSR\)](#):

1. On the Certificates page, click [Generate](#).
2. (Optional) Type a name for the certificate in the Generate Certificate dialog.



3. Select either Self-signed or Certificate Signing Request from the drop-down list. For more information, see [“Sign”](#) on page 228.
4. For the subject, type in information about the device that the Identity Certificate represents. For more information, see [“Subject”](#) on page 229.
5. Click [Generate](#).

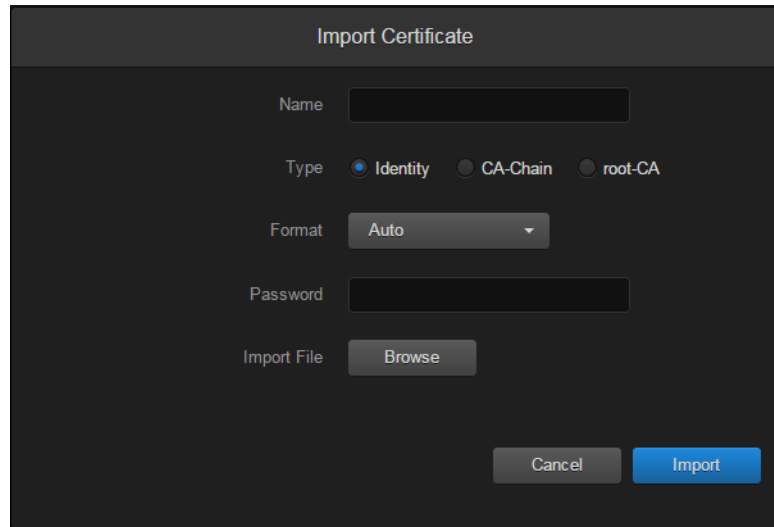
If the Certificate Signing Request (CSR) was selected, the generated CSR file needs to be sent to a Certificate Authority to be signed. A copy of it is saved in the current administrator’s home directory, or it can be copied and pasted from the CSR view. You can import the signed certificate back later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



**TIP** Keep in mind that there is a difference between importing a new certificate (that was generated externally) and importing a newly signed certificate whose request was previously generated on the Makito X and exported for signing. For details, see [“Certificate Name”](#) on page 229.

To manage Certificates:

1. To import a Certificate, click [Import](#) next to either the Identity Certificates or CA Certificates section.



- a. Type in the Certificate Name.
  - b. Select or enter the new value(s) in the remaining field(s). See [“Import Identity or CA Certificate dialog”](#) on page 229.
  - c. Click [Import](#).
2. To view the details of a certificate, click the certificate name from either the list of Identity Certificates or CA Certificates. (See [“Viewing Certificate Details”](#).)
  3. To delete a certificate file, select the certificate name from the list of Identity or CA Certificates and click [Delete](#).
  4. To set the default Identity Certificate (i.e., the Identity Certificate that will be used to represent the device during Audit and HTTPS authentication), hover over the certificate row and click the (grayed out) checkmark under [Default](#).

The selected certificate will be set as the default certificate. It will be immediately applied to communications with the Audit server, but will not apply to HTTP communications until the next service restart or system reboot.

## Viewing Certificate Details

1. To view the details of a certificate file, click the certificate name from the list of Identity or CA Certificates. (See following example.)

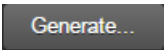
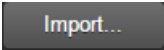
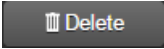
```

Certificate Fingerprints:
MD5: 28:60:78:F6:E0:51:D6:9A:0E:42:A5:20:85:F1:7E:DE
SHA1: CE:2C:0D:08:40:13:66:81:A3:D8:0D:CB:EF:46:32:C0:77:32:88:68
Certificate:
Data:
Version: 3 (0x2)
Serial Number:
8d:20:f0:57:1c:22:cb:0b
Signature Algorithm: sha1WithRSAEncryption
Issuer: CN=tk_mxe_62.haivision.com
Validity
Not Before: Oct 31 18:13:16 2014 GMT
Not After : Oct 30 18:13:16 2024 GMT
Subject: CN=tk_mxe_62.haivision.com
Subject Public Key Info:
Public Key Algorithm: rsaEncryption
Public-Key: (2048 bit)
Modulus:
00:a5:64:88:e6:8c:65:a8:a4:56:82:5b:89:e7:96:
97:c8:82:88:13:7a:9f:72:17:9c:d6:bb:13:66:9b:
72:63:31:6a:87:70:09:12:4b:ea:e1:26:1c:e6:58:
5b:c1:9a:64:1d:46:6e:e4:ab:16:e0:28:9a:46:c0:
e9:20:5e:3c:06:d4:82:ae:a9:f5:89:b8:c3:7a:12:
84:80:d2:b1:2f:98:23:f5:5b:1d:54:d4:6c:76:bb:
01:68:57:e1:99:41:2e:84:20:26:67:b2:20:e3:cb:
8c:93:a1:67:3b:ae:c3:28:8c:66:90:28:61:39:6e:
4e:ec:76:48:72:5d:8d:5f:f8:1e:a2:09:04:1d:69:
49:17:13:45:3f:4e:25:35:64:ee:02:27:fb:70:02:
34:6c:a1:51:a5:bb:83:c2:bd:2d:fe:d1:29:b2:ba:
74:ae:1d:b2:75:8e:97:e5:2a:53:0f:34:5c:c4:61:
01:94:ad:d7:3c:02:c1:1e:0f:fb:21:38:6d:47:2f:
c7:fc:7e:d6:02:29:9f:38:95:a0:92:05:8c:b3:91:
18:d0:34:29:aa:d7:ae:2c:ea:32:8d:f3:09:c9:ee:
97:a8:3e:1d:c2:e8:47:f7:76:62:72:7b:6d:ca:b1:
f2:51:08:e1:80:17:03:b7:ad:d0:1b:a7:b0:92:81:
94:31
Exponent: 65537 (0x10001)
X509v3 extensions:
X509v3 Subject Key Identifier:
D9:12:59:18:33:7C:6F:E6:C6:16:84:F9:E8:67:08:9C:63:8B:C5:7C
X509v3 Authority Key Identifier:
keyid:D9:12:59:18:33:7C:6F:E6:C6:16:84:F9:E8:67:08:9C:63:8B:C5:7C

X509v3 Basic Constraints:
CA:TRUE
X509v3 Subject Alternative Name:
DNS:tk_mxe_62.haivision.com, DNS:tk_mxe_62, IP Address:10.65.137.62
Signature Algorithm: sha1WithRSAEncryption
60:7e:60:12:8c:5a:1c:8f:99:66:73:e0:a9:54:1c:98:72:0e:
08:07:bd:08:4a:0b:13:0b:e6:15:64:73:fd:13:c1:0c:8e:ff:
f1:f7:8e:7c:08:e6:a6:1d:a8:58:24:18:3a:a1:1b:65:7d:f8:
6a:36:17:fb:55:97:ce:b7:04:f9:3d:66:a1:ef:4f:0b:7b:a8:
60:a4:63:d7:00:21:17:e5:04:ed:31:4b:49:28:52:53:2a:1e:
ba:3f:3b:e4:08:b5:02:7e:c1:ab:4c:ca:f4:e1:08:d9:3e:4f:
2d:c2:a5:f1:f6:da:9e:05:13:5b:74:86:21:dc:46:8d:aa:96:
d7:88:e4:42:76:db:e5:ae:42:1c:22:3e:48:4e:0c:99:29:00:
7b:59:9d:5f:24:0e:39:b1:7f:fe:20:61:be:81:d6:5b:50:3d:
81:90:e8:dc:7b:2a:02:2a:ac:77:0f:89:44:4f:b4:93:55:4f:
95:4e:ad:ba:ab:0c:28:a2:3f:42:70:51:db:67:2e:a4:f0:de:
42:a8:ef:4a:28:bf:87:58:34:3a:71:1c:69:0b:b2:f2:89:d2:
db:1b:0c:24:7c:b4:13:61:6c:64:57:2b:98:17:9a:4f:7e:7a:
68:63:c5:6b:cd:e2:0f:4f:72:5b:ab:8f:af:a5:77:fc:7c:3d:
f7:8d:35:62
-----BEGIN CERTIFICATE-----
MIIDTjCCAjagAwIBAgIJAi0g8FccIssLMA0GCSqGSIb3DQEBBQUAMCIxIDAeBgNV
BAMHFR3R-X214ZV82Hi5oYw12aXNpb24uY29tMBA4XDTE0MTAzMTE4MThxNl0XDTI0
MTAzMDE4MThxNl0wIjEgMB4GA1UEAwgtdGtFbXh1XzYyLmhhhaXZpc2lvb15jb20w
ggEiMA0GCSqGSIb3DQEBAQUAA4IBDwAwggEKAoIBAQC1ZiJmJGwopFaCw4nnlpFI
gogTep9yF5zWuxNmm3JjMwqHcAkSs+rhJhzmifVBmmQdRm7kqxbgKjPw60kXjwG
1IKuqfWJwM6EoSARrEvmCP1Wx1U1Gx2uwFov+GZQ56EICZnsIdjy4yToWc7rslo
jGaQKGE5bk7sdKhyXY1f+B6iCQ0daUkE0U/TiU1Z04CJ/twAJRsoVGLu4PCV53+
0SmyunSuHb11jpf1K1MPNFzEYQGUrdc8AsEeD/shOG1HL8f8fYCKZ841aCSBvYz
kRjQNCmq164s6jKN8wnJ7poePh3C6E3dmJye23KsfJRCOGAFW03rdAbp7C5GZQx
AgHBAAGjYyYwYHwYDVR0RBQBBEYFNkSWrszfg/mxhaE+ehnCjxj18V8M86GA1Ud
IwQYMBaFNFkSWrszfg/mxhaE+ehnCjxj18V8M86GA1UdEwQFMAMBAF8wYwYDVR0R
BCwwK0IXdGtFbXh1XzYyLmhhhaXZpc2lvb15jb22CCXRrX214ZV82MocEckG3PJAN
BgkqhkiG9w0BAQUFAAOCAQEAHYH5gEoxaHI+ZznPggVQcmHIOCAe9CEoLEwvWfWRZ
/RPBDI7/8fe0fAjmph2oWCQV0EqEbZX34ajYX+1WkZrcE+T1moe9P8HuoYKRj1wAh
F+UE77FLSShSuyoeuJ875Ai1An7Bq0zK90Ei2T5PLcK18fbangUTW3SGIdGjJaQW
14tkOnbb5aSCHCI+SE4MmSkAe1mdXy000bF//iBhvoHwI9AGZD03HsqAiqsdw+J
    
```

## Certificate Settings

The following table lists the Certificates controls and settings:

Certificate Setting	Default	Description/Values
	n/a	Click to generate a Certificate Signing Request. See <a href="#">“To generate a Self-signed Certificate or a Certificate Signing Request (CSR):”</a> on page 225.
	n/a	Click to import an Identity or CA Certificate. See <a href="#">“To manage Certificates:”</a> on page 226.
	n/a	Click to delete the selected Identity or CA Certificate. See <a href="#">“To manage Certificates:”</a> on page 226.
<a href="#">Generate Identity Certificate dialog</a>		
Certificate Name	n/a	Type in a unique name under which the certificate will be stored on the Makito X as well as listed on the Certificate page.
Sign	Self-signed	<p>Select the Signature Type:</p> <ul style="list-style-type: none"> <li>• Self-signed: The certificate will be generated and signed by the system, and the name will be added to the list of Identity Certificates.</li> <li>• Certificate Signing Request: A request will be generated, and its name will be added to the list of Identity Certificates. The request will be located in your home directory (accessible through the CLI), or you may export it by clicking on the <a href="#">View</a> button and copying the content into a new file in a text editor.</li> </ul> <p>In its generated form, this certificate is still a request and cannot be used as an Identity Certificate before it is signed by a CA, and imported back.</p>

Certificate Setting	Default (Cont.)	Description/Values (Cont.)
Subject		<p>The Subject identifies the device being secured, in this case, the Makito X.</p> <p>The special value “auto” used with <a href="#">Generate</a> sets the Subject Common Name to the device’s FQDN if DNS is set, or the IP address otherwise. Also, for self-signed certificates, the Subject Alternative Name extension is also set to FQDN, hostname, and IP Address of the device (there is no other method to set the Subject Alternative Name).</p> <p>Type in the subject in the form: "/C=US/ST=Maine..."</p> <p>where the most common attributes are:</p> <ul style="list-style-type: none"> <li>• /C Two Letter Country Name</li> <li>• /ST State or Province Name</li> <li>• /L Locality Name</li> <li>• /O Organization Name</li> <li>• /OU Organizational Unit Name</li> <li>• /CN Common Name</li> </ul> <p><b>TIP:</b> For successful authentication, the Common Name in the certificate should be the IP address (by default) or domain name of the device.</p>
<a href="#">Import Identity or CA Certificate dialog</a>		
Certificate Name	n/a	<p>The Certificate Name is the name under which the certificate will be stored on the device.</p> <ul style="list-style-type: none"> <li>• If the certificate is a new certificate generated outside of the Makito X, the file should also contain the certificate Private Key, and its chosen name should be one that isn't already installed on the device.</li> <li>• If the certificate is a newly signed one that was sent as a certificate signing request and is returned by the CA, the certificate name should be the same as its CSR (Certificate Signing Request) counterpart in the list.</li> </ul>

Certificate Setting	Default (Cont.)	Description/Values (Cont.)
Type	Identity (Identity Certificates)  root-CA (CA Certificates)	Select the type of the imported certificate: <ul style="list-style-type: none"> <li>• Identity: If you are importing an identity certificate.</li> <li>• CA-Chain: If the import is a chain of certificate authorities leading to the root certificate authority. The imported CA-chain can contain one or more certificates linking its associated identity certificate to the root-CA and may or may not include the root-CA itself (that will only be trusted if imported as a root-CA).</li> <li>• root-CA: If you are importing a root CA certificate. These certificates are the anchor of trust of the certificate authorities you decide to trust and are generally publicly available from the CA Web sites. They are used by the device when validating the chain of trust of an identity certificate and its CA-chain.</li> </ul> <p><b>NOTE:</b> Even though you can see the <a href="#">Type</a> buttons, clicking <a href="#">Import</a> in either the ID or CA sections may cause error messages to be displayed, i.e.:</p> <ul style="list-style-type: none"> <li>• If you select CA-root in the import from the ID.</li> <li>• If you select Identity or CA-chain in the import from the ca-root.</li> </ul>
Format	Auto	Select the file format for the Certificate (the formats differ in the way the file is encrypted): <ul style="list-style-type: none"> <li>• Auto: detected from the file extension</li> <li>• pem: Privacy Enhanced Mail Base64 encoded DER certificate</li> <li>• der: Distinguish Encoding Rules</li> <li>• pkcs #7</li> <li>• pkcs #12</li> <li>• pfx</li> </ul>
Password	n/a	If the imported certificate contains a password protected private key, type its password in this field.  Leave this field empty if the file is not password-protected.
Import File	n/a	Click <a href="#">Choose File</a> to select the file.

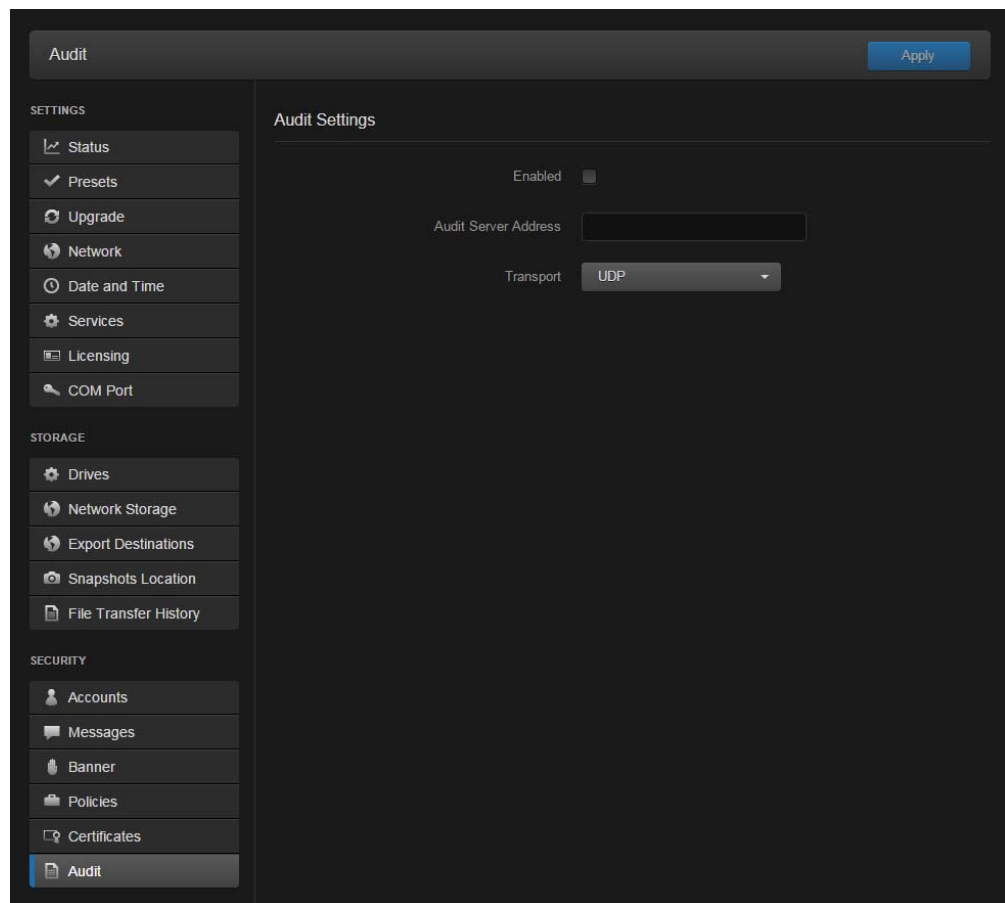
## Managing Audits

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

To configure an Audit server:

1. On the Administration page, click **AUDIT** from the sidebar menu.

The Audit page opens as shown in the following example.



2. Check the **Enable Audit** checkbox to start logging to the audit server.
3. Type the audit server address and port in the Audit Server Address field. See [“Audit Settings”](#) on page 232 for more details.

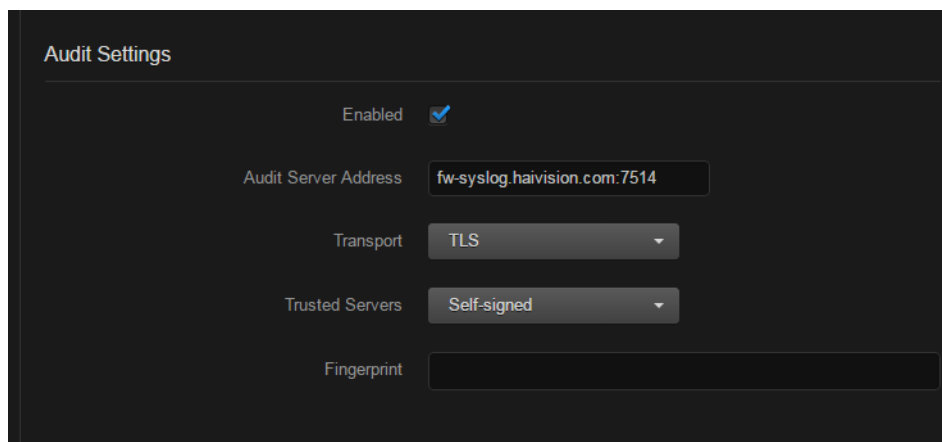
The server address must be the Common Name or one of the Subject Alternative Names in the server’s certificate for successful authentication if Transport is set to TLS and Trusted Server is set to CA-Signed.

4. Set the type of transport protocol that will be used to send the logs to the audit server. See details in [“Audit Settings”](#) on page 232.

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

If Trusted Servers is set to CA-signed, the root-CA certificate of the audit server certificate chain must be imported in the encoder (see [“Managing Certificates”](#) on page 224) for the TLS connection to succeed.

- If Trusted Servers is set to Self-signed, copy the Fingerprint string from the Audit server’s certificate and paste it in the Fingerprint field under Audit Settings to identify the certificate trusted for this TLS connection.



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

- To apply your changes, click [Apply](#).

## Audit Settings

The following table lists the Audit controls and settings:

Audit Setting	Default	Description/Values
Enable Audit	disabled	Check or clear this checkbox to enable or disable audits for the system.
Audit Server Address	n/a	Type in the address and port of the remote server, in one of the following formats: <ul style="list-style-type: none"> <li>fqdn[:port]</li> <li>ipaddr[:port]</li> <li>hostname[:port]</li> </ul> If the port is not provided, the default port for the chosen <a href="#">Transport</a> will be used:



Audit Setting	Default (Cont.)	Description/Values (Cont.)
Transport	UDP	<p>Select the Transport Type from the drop-down list:</p> <ul style="list-style-type: none"> <li>• UDP (default port: 514)</li> <li>• TLS (Transport Layer Security, default port: 6514)</li> </ul>
Trusted Servers	ALL	<p>(TLS must be selected for <a href="#">Transport</a>). Select the type of certificate exchange:</p> <ul style="list-style-type: none"> <li>• All: Server authentication is disabled. Any server that is set in the <a href="#">Audit Server Address</a> field will be accepted as a trusted server, and the authentication step is skipped.</li> <li>• CA-signed: Enables server authentication during the startup of an audit. The encoder will only accept a connection with the specified audit server if the certificate it presents is signed by a trusted Certificate Authority (i.e., The certificate of that certificate authority is present in the Makito X's CA Certificates list).</li> <li>• Self-signed: Enables server authentication. A connection with the specified audit server will be accepted if its certificate is self-signed, and its fingerprint matches the one configured on the Makito X.</li> </ul>
Fingerprint	n/a	<p>(Only appears if Self-signed is selected for Trusted Servers) Enter the fingerprint of the audit server's self-signed certificate. The fingerprint should be the SHA-1 or MD5 fingerprint of the certificate that belongs to the audit server which was set in <a href="#">Audit Server Address</a>.</p>

# CHAPTER 7: Configuring A/V Services Using SNMP

This chapter provides information required to manage the Makito X 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.



**IMPORTANT** 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 X.



**TIP** To develop new SNMP applications, see the list of [“Supported MIBs”](#) on page 236.

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## Overview

To support management of the Makito X by third party Network Management Stations (NMSs), the system includes an SNMP agent that may be used to configure and control the system's Audio/Video services and streams.



**NOTE** The Makito X uses Net-SNMP and supports SNMP v1, v2c, and v3.

---

The Makito X 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 242.

## Supported MIBs

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

Supported MIBs	Standard	Description
<ul style="list-style-type: none"> <li>• RFC1213-MIB.txt</li> <li>• SNMPv2-MIB.txt</li> <li>• IP-MIB.txt</li> <li>• IF-MIB.txt</li> <li>• TCP-MIB.txt</li> <li>• UDP-MIB.txt</li> </ul>	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.
<ul style="list-style-type: none"> <li>• SNMP-USER-BASED-SM-MIB.txt</li> <li>• SNMP-USM-AES-MIB.txt</li> <li>• SNMP-VIEW-BASED-ACM-MIB.txt</li> </ul>	SNMPv3	Supports SNMPv3 User-based Security Model (USM) and View-based Access Control (VACM).
<ul style="list-style-type: none"> <li>• HAI-VISION-MIB.txt</li> <li>• HAI-AVT-STREAM-MIB.txt</li> <li>• HAI-HDC-MIB.txt</li> </ul>	Haivision Enterprise	Supports configuration, status, and statistics.
<ul style="list-style-type: none"> <li>• HAI-MAKITO-X-ENC-CAPS.txt</li> </ul>	Haivision Enterprise	This MIB formally specifies the capabilities of the Makito X Series (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 X.

### 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.

When you start an SNMP agent on a Makito X using the `service snmp start` command, it loads the management database with the MIB files in the directory `/usr/share/snmp/mibs` and configures the agent with the files in `/usr/share/snmp`.

### snmpd.conf

snmpd.conf is the configuration file that defines how the SNMP agent works. You may need to edit this file to specify the location of the Network Management System (NMS). However, for most settings, it is preferable to use the `nmcfg` configuration script. On the Makito X, the `snmpd.conf` file includes:

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

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

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

### snmpd.local.conf

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

This file cannot be modified. 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 X MIBs.

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

## nmcfg

nmcfg is the configuration script that helps the configuration of the SNMP agent. It is particularly useful for the creation and management of SNMPv3 users of the User-based Security Model (USM) and the assignment of VACM (View-based Access Control Model) access rights to communities and users. The script interacts with the `/var/net-snmp/snmpd.conf` persistent data file, which maintains the USM user database and other SNMP agent persistent information. The script also performs `snmpget` commands to display the list of USM users, which is not available in a human readable form in any configuration file.

The script also reads and modifies the `snmpd.conf` configuration file to manage system parameters (contact, location), community-based (v1/v2c) security, and user access control. Used without parameters, it displays a summary of the SNMP agent configuration: system parameters, access control, and SNMPv3 USM users.

Following is an example of the nmcfg configuration script output:

```
# nmcfg
system parameter          value
-----
engineid                  0x80001f88030050c2c611ad
contact                   "john doe <jdoe@example.net>"
location                  "QA lab"

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

auth protocol    priv protocol    user
-----
MD5              DES              admin
MD5              nopriv           guest
SHA              AES              johndoe

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

## Related Topics

- [“nmcfg”](#) on page 307

## SNMPv3

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

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

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

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

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

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

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

### Examples

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

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

```
# snmpget -v3 -u johndoe -a MD5 -A "password" -l authNoPriv localhost  
sysName.0  
SNMPv2-MIB::sysName.0 = STRING: razor  
#
```

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

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

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

```
# snmpset -v3 -u johndoe -a MD5 -A "password" -x DES -X "pass phrase" -l  
authPriv localhost haiAvtStreamEncapsulation.1 i directRtp  
  
HAI-AVT-STREAM-MIB::haiAvtStreamEncapsulation.1 = INTEGER:  
directRtp(1)  
#
```



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 retrieve the values of <i>all</i> 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. <b>NOTE:</b> 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 following example, using netsnmp CLI commands on the Makito X, 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 ( $\geq 1$ ) 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
```

---

# Appendix A: CLI Command Reference

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

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## Syntax Conventions

The following syntax conventions are used in this appendix:

Convention	Description
MS Sans Serif font	Indicates command names and options, filenames and code samples.
italic font	Indicates variables or placeholders that you replace with a user-defined value or name.
< >	Same as italics. Variables are enclosed in angle brackets in contexts that do not allow italics.
[ ]	Square brackets indicate optional items or parameters.
x   y	A vertical bar separates items in a list of options from which you must select one. If options are not separated by  , you may use combinations.
{ x   y   z }	Items separated by vertical bars and enclosed in braces indicate a choice of required elements.
[ x { y   z } ]	Vertical bars and braces within square brackets indicate a required choice within an optional element.



**TIP** Parameter names and enumerated values are case-insensitive and can be abbreviated.

## Command Summary and Usage Information

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

- [Operation Commands](#) are used to manage the Audio/Video data path, processing, and features, including audio/video/metadata content selection, logo, audio/video encoding, H.264 streaming, and image snapshots. Operation command effects are immediate but not persistent (i.e., between reboots) unless the current operating configuration is explicitly saved (using the `config` command).
- [Administration Commands](#) address the security and network configuration. Their effects are persistent but not always immediate; some require system reboot to take effect.



**NOTE** A warning appears when you log in or out of a Makito X, or reboot, when the current configuration has not been saved in a preset. See [“config”](#) on page 269.

A screenshot of a PuTTY terminal window titled "10.65.129.65 - PuTTY". The terminal shows a login sequence. It starts with "Password:" followed by "Last login: Fri Nov 18 10:21:20 EST 2016 from 10.65.11.179 on wci/X". Below this, there are several lines of system messages: "Wed Nov 16 10:24:05 EST 2016: There was 1 failed login attempt on the admin account since the last successful login.", "Wed Nov 16 16:58:00 EST 2016: There was 1 failed login attempt on the admin account since the last successful login.", "Thu Nov 17 00:00:12 EST 2016: Admin password has not been changed from factory default! This system is not secure and could easily be compromised.", "Thu Nov 17 12:48:35 EST 2016: There was 1 failed login attempt on the admin account since the last successful login.", Finally, a "WARNING: The current running configuration is not saved." message is displayed, followed by another "WARNING: There was 1 failed login attempt on this account since the last successful login." The prompt "admin@MXE-129-65:~\$" is visible at the bottom with a green cursor.



## Operation Commands

Table A-1 Operation Commands

Command	Description
<a href="#"><u>videnc</u></a>	Use to manage video encoding parameters, including starting and stopping encoding of the video input.
<a href="#"><u>vidin</u></a>	Use to view and manage video input settings.
<a href="#"><u>audenc</u></a>	Use to manage encoder audio acquisition settings, including starting and stopping encoding of the audio input.
<a href="#"><u>stream</u></a>	Use to create and manage audio/video streams.
<a href="#"><u>metadata</u></a>	Use to manage metadata sources to capture metadata (either KLV or CoT) and then incorporate data information within the MPEG Transport Stream.
<a href="#"><u>logo</u></a>	Use to manage logo overlays (i.e., a graphic file to display as a logo overlay in the encoded video).
<a href="#"><u>mklogo</u></a>	Use to convert a graphic file to Haivision's overlay image format (.oly) in order to display the image as a logo overlay.
<a href="#"><u>mkstill</u></a>	Use to convert a static picture into a file containing an encoded single H.264 GOP sequence. This is required in order to configure a Makito X stream with a static image that will replace the "real" video stream when streaming is paused.
<a href="#"><u>passthrough</u></a>	Use to enable bi-directional serial passthrough for controlling serially attached devices such as PTZ controlled cameras.
<a href="#"><u>snapshot</u></a>	Use to take and manage snapshots from the video input.
<a href="#"><u>still</u></a>	Use to manage still image files on the Makito X file system. Static images are used to replace the "real" video stream when streaming is paused.
<a href="#"><u>talkback</u></a>	Use to manage audio talkback settings to allow two-way audio communication using the encoder's Audio Output.
<a href="#"><u>date</u></a>	Use to display the current date.
<a href="#"><u>temperature</u></a>	Use to display the current temperature of the unit.
<a href="#"><u>record</u></a>	Use to manage recording of streams, including starting and stopping recording.
<a href="#"><u>roi</u></a>	Use to enhance the quality of the encoded video for a region within the video frame (i.e., a region of interest).

## Administration Commands

Table A-2 Administration Commands

Command	Description
Network and Management	
<a href="#">bist</a>	Use to perform Built-in self-tests (BIST) and Power-ON Self-tests (POST).
<a href="#">haiversion</a>	Use to display the Firmware Build ID, Build Time, and serial number for the Makito X.
<a href="#">package</a>	Use to view and manage software packages, including firmware upgrades.
<a href="#">storage</a>	Use to manage storage devices on the Makito X with Storage dual-height model.
<a href="#">nas</a>	Use to set an NFS mount point on the Makito X.
<a href="#">dest</a>	Use to manage recording export destinations.
<a href="#">transfer</a>	Use to manage the export of files from the encoder.
<a href="#">config</a>	Use to manage configurations on the Makito X.
<a href="#">ethercfg</a>	Use to view, manually control, and save the Ethernet configuration parameters.
<a href="#">hdcp</a>	Use to manage HDCP settings on Makito X DVI systems.
<a href="#">ipconfig</a>	Use to set and view the parameters that specify the networking context for the Makito X, including the IP settings, hostname, and DNS.
<a href="#">license</a>	Use to manage licensed features.
<a href="#">nmcfg</a>	Used by system administrators or GUI/Web interface applications in the configuration of SNMP for the Makito X.
<a href="#">personality</a>	(Makito XR only) Use to set the personality to either the two or four-port variant (X2R or X4R).
<a href="#">service</a>	Use to enable and disable network services, including HTTP, passthrough, snmp, ssh, talkback, telnet, and vf.
<a href="#">system_snapshot.sh</a>	Use to take a system snapshot for the purpose of troubleshooting, which may be forwarded to Haivision Technical Support if you are requesting technical support.
<a href="#">dtconfig</a>	Use to set the date and time on the encoder.
<a href="#">tzconfig</a>	Use to configure the timezone on the encoder.
<a href="#">passwd</a>	Use to change the password for a user account.

Table A-2 Administration Commands

Command (Cont.)	Description (Cont.)
<a href="#">pubkey</a>	Use to manage the user's own authorized SSH public keys.
<a href="#">reboot</a>	Use to halt and restart the Makito X
Security	
<a href="#">account</a>	Use to manage user accounts for the encoder.
<a href="#">audit</a>	Use to enable remote logging of security and administrative events and configure the remote audit ( <i>syslog</i> ) server connection.
<a href="#">banner</a>	Use to manage the Advisory Notice and Consent Banner.
<a href="#">certificate</a>	Use to manage the TLS certificates for the Web interface HTTPS server and the secured TLS connection to the remote audit server.
<a href="#">messages</a>	Use to view and manage administrative login messages.
<a href="#">policy</a>	Use to manage security policy settings.

## CLI Access Control

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

Command	Role		
	Administrator	Operator	Guest
Web access	Yes	Yes	Yes
Telnet to/from encoder	Yes	Yes	Yes
Serial access to encoder	Yes	Yes	Yes
Operation - GENERAL			
<a href="#">videnc</a>	Yes	Yes	“get” only
<a href="#">vidin</a>	Yes	Yes	“get” only
<a href="#">audenc</a>	Yes	Yes	“get” only
<a href="#">roi</a>	Yes	Yes	“get” only
<a href="#">record</a>	Yes	Yes	“get” only
<a href="#">stream</a>	Yes	Yes	“get” only
<a href="#">talkback</a>	Yes	Yes	“get” only
<a href="#">date</a>	Yes	Yes	Yes
<a href="#">temperature</a>	Yes	Yes	Yes
<a href="#">metadata</a>	Yes	Yes	“get” only
<a href="#">passthrough</a>	Yes	Yes	“get” only
Operation - MEDIA			
<a href="#">logo</a>	Yes	Yes	“get” and “list” only
<a href="#">mklogo</a>	Yes	Yes	No
<a href="#">mkstill</a>	Yes	Yes	No
<a href="#">snapshot</a>	Yes	Yes	“get” and “list” only
<a href="#">still</a>	Yes	Yes	“list” only
Network and Management			
<a href="#">bist</a>	Yes	No	No
<a href="#">haiversion</a>	Yes	Yes	Yes
<a href="#">package</a> (for upgrade)	Yes	No	No
<a href="#">config</a>	Yes	Yes	“list” only
<a href="#">ethercfg</a>	Yes	No	No

Command (Cont.)	Role		
	Administrator	Operator	Guest
<a href="#">ipconfig</a>	Yes	No	No
<a href="#">license</a>	Yes	No	No
<a href="#">nmcfg</a>	Yes	No	No
<a href="#">personality</a>	Yes	No	No
<a href="#">service</a>	Yes	No	No
<a href="#">system_snapshot.sh</a>	Yes	Yes	Yes
<a href="#">dtconfig</a>	Yes	No	No
<a href="#">tzconfig</a>	Yes	No	No
<a href="#">passwd</a>	Yes	“operator” password only	“user” password only
<a href="#">reboot</a>	Yes	No	No
<b>Storage Commands</b>			
<a href="#">nas</a>	Yes	Yes	No
<a href="#">storage</a>	Yes	Yes	No
<a href="#">transfer</a>	Yes	Yes	No
<b>Security Commands</b>			
<a href="#">account</a>	Yes	No	No
<a href="#">audit</a>	Yes	No	No
<a href="#">banner</a>	Yes	No	No
<a href="#">certificate</a>	Yes	No	No
<a href="#">messages</a>	Yes	No	No
<a href="#">policy</a>	Yes	No	No
<a href="#">pubkey</a>	Yes	Yes	Yes
<b>Other / Utilities</b>			
iperf	Yes	Yes	Yes
ping	Yes	Yes	Yes
tcpdump	Yes	No	No
tracert	Yes	Yes	Yes

For an overview of system access control on the Makito X, see [“Role-based Authorization”](#) on page 72.

## account

### SYNOPSIS

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

### DESCRIPTION

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



**NOTE** The `account` command can only be used by an administrator.

### ACTIONS

create	Creates a new user account. See <a href="#">account Parameters</a> below for roles. You will be prompted to enter and confirm the initial password.
get	Displays the account information for the user or the Makito X, including account name, role, state, password expiry status, and public key(s).
list	Lists the account information for the user or the Makito X in table format.
passwd	Modifies the user account password. You will be prompted to enter and confirm the password (which the user will have to change upon first login). For the allowed characters, see <a href="#">"Password Requirements"</a> on page 82.
pubkey add remove keyfile	Adds or removes a public key to the user account. See <a href="#">"Managing Public Key Authentication"</a> on page 213 for more information.

pubkey list	Lists any public key files that have been uploaded for this account.
lock	Locks the user account (if Enabled).
unlock	Unlocks the user account (if Locked).
delete	Deletes the user account.

## ACCOUNT PARAMETERS

Parameter	Default	Description/Values
role		Use with <code>account create</code> command to specify the role for the user account, either: <ul style="list-style-type: none"> <li>• Admin</li> <li>• Operator</li> <li>• Guest</li> </ul> For details on roles, see <a href="#">“Role-based Authorization”</a> on page 72.

## ACCOUNT EXAMPLES

```
# account all list
Returns the list of all accounts, for example:
name          role          state      pwd expiry  pubk
-----
admin         Administrator Enabled     never       No
fdfdf         Guest         Enabled     never       No
mrmichel      Operator      Enabled     by admin    No
operator      Operator      Locked      never       No
user          Guest         Enabled     never       No
```

## Related Topics

- [“Managing User Accounts”](#) on page 208

## audenc

### SYNOPSIS

```
audenc ID start
audenc ID stop
audenc ID mute
audenc ID unmute
audenc ID set parameter=value [parameter=value ...]
audenc ID get [config, stats, all]
audenc ID clear
```

### 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 or all.

- On the Makito X-DVI, the encoder ID is 0, 1, 2, or 3.
- On the Makito X-SDI, the encoder ID is 0, 1, 2, 3, 4, 5, 6, or 7.

For details, see [“Configuring Audio Encoders”](#) on page 103.

### ACTIONS

start	Activates encoding of the audio input.
stop	Stops encoding of the audio input.
mute	Mutes encoding of the audio input (i.e., causes the encoder to encode silence instead of the selected audio input.) <b>TIP:</b> This may be used when you do not wish to encode the audio but the decoder being used does not support decoding of video-only streams.
unmute	Resumes encoding of the audio input (when muted).
set	Configures encoder audio parameter(s). A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">audenc Parameters</a> below.
get	Displays encoder audio status information. You can specify configuration, stats, or all audio information. <b>TIP:</b> To display a summary of all the encoders in a table format, you can use <code>audenc all get table</code> .
clear	Clears the encoder's statistics.
help	Displays usage information for the <code>audenc</code> command.



## AUDENC PARAMETERS

Parameter	Default	Description/Values
input	Analog	The Audio Input for the encoder:
DVI		<ul style="list-style-type: none"> <li>• Analog</li> <li>• DVICH12</li> </ul>
SDI		<ul style="list-style-type: none"> <li>• Analog</li> <li>• SDI1CH1+2</li> <li>• SDI1CH3+4</li> <li>• SDI1CH5+6</li> <li>• SDI1CH7+8</li> <li>• SDI1CH9+10</li> <li>• SDI1CH11+12</li> <li>• SDI1CH13+14</li> <li>• SDI1CH15+16</li> <li>• SDI2CH1+2</li> <li>• SDI2CH3+4</li> <li>• SDI2CH5+6</li> <li>• SDI2CH7+8</li> <li>• SDI2CH9+10</li> <li>• SDI2CH11+12</li> <li>• SDI2CH13+14</li> <li>• SDI2CH15+16</li> </ul> <p><b>NOTE:</b> The SDI2 audio inputs are only available on dual-BNC systems.</p>
language		<p>The language used for the input. Enter a 3-character long ISO639-2 code or none.</p> <p>If you don't know the code for a language, you can directly enter one of the languages below in full or abbreviated form:</p> <ul style="list-style-type: none"> <li>• Albanian, Arabic, Armenian, Bulgarian, Chinese, Croatian, Czech, Danish,</li> <li>• Dutch, English, Estonian, Finnish, French, German, Greek, Hebrew, Hindi</li> <li>• Hungarian, Indonesian, Irish, Icelandic, Italian, Japanese, Khmer, Korean,</li> <li>• Latvian, Lithuanian, Malay, Maltese, Mongolian, Norwegian, Punjabi, Persian,</li> <li>• Polish, Portuguese, Romanian, Russian, Slovak, Slovenian, Spanish, Swahili,</li> <li>• Swedish, Turkish, Ukrainian, Vietnamese.</li> </ul>

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
level	6	The maximum analog Audio Input level from +5dBu up to +20dBu. <b>NOTE:</b> Only applies to Analog Audio Input.
mode	stereo	The number and type of audio channels to encode. <ul style="list-style-type: none"> <li>• mono (left)</li> <li>• monoright</li> <li>• stereo</li> </ul>
algorithm	[mpeg2]adts	The audio compression algorithm: <ul style="list-style-type: none"> <li>• [mpeg2]adts - Encodes audio using the ISO/IEC 13818-7 MPEG-2 AAC-LC algorithm with an ADTS header. (Default)</li> <li>• loas - Encodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm with a LOAS/LATM header.</li> </ul>
bitrate	128 kbps	The Audio Bitrate for the encoder. 56..320 kbps. <b>NOTE:</b> The available bitrate range depends on the current <a href="#">mode</a> . <ul style="list-style-type: none"> <li>• For mono, the bitrate can be set from 56 to 160 kbps.</li> <li>• For stereo, the bitrate can be set from 80 to 320 kbps.</li> </ul>
stcif	Auto	Selects the video input from which the audio STC (System Time Clock) will be derived. <b>NOTE:</b> When configuring the audio, in some cases, it may be necessary to specify the video input from which to derive the audio clock. An example would be if both SDI and Analog audio inputs are connected and you create two streams that share video input but each stream uses a different audio input. For more information, see <a href="#">“System Time Clock Interface (Video Input Selection)”</a> on page 259.
DVI		<ul style="list-style-type: none"> <li>• Auto</li> <li>• digital</li> <li>• analog</li> </ul>

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
SDI		<ul style="list-style-type: none"> <li>• Auto</li> <li>• BNC1</li> <li>• BNC2</li> </ul>

### System Time Clock Interface (Video Input Selection)

When configuring the audio, you have to specify the video input from which to derive the audio clock so that it “runs” in lockstep with the with the video input and its STC (System Time Clock) moves forward at the same rate. This helps decoders with the playback and lip sync.

When audio encoders are configured to use an SDI input (SDI1ch12 or SDI2ch12), it is expected and recommended that the source of the video for that encoder is the exact same SDI input.

However, when audio encoders are configured to use an Analog input, the encoder has no way to know from which video input this particular audio encoder should derive its clock and STC.

When you set `stcif` to Auto selection of the STC source, when a new stream is created or started, if the stream contains Audio and is using Analog for an input, the encoder will check if the stream *also* has Video. If it does, it will check the currently configured input for that video encoder and set the STC source of the audio encoder to match it.

#### AUDENC EXAMPLES

```
# audenc 0 set input=SDI1CH12
(#S/B-292E-HDSDI2) Sets the Audio Input to SDI1CH12

# audenc 0 set input=DVICH12
(#S/B-292E-DVI) Sets the Audio Input to DVICH12

# audenc 0 set bitrate=128
Sets the Audio Bitrate to 128. You will receive the following confirmation:
Audio encoder configured successfully
```

```
# 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 : 881,906
  Encoded Bytes  : 301,024,128
  Encoded Bitrate : 128 kbps
  Encoder Errors : 0
  Encoder PTS    : 0x06503e698
  STC Source Interface : BNC-1
```

### Related Topics

- [Configuring Audio Encoders](#) on page 103

## audit

### SYNOPSIS

```
audit start
audit stop
audit set parameter=value [parameter=value ... ]
audit get [config|stats|all]
audit verify [debug]
```

### DESCRIPTION

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



**NOTE** The audit command can only be used by an administrator.

### ACTIONS

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

### AUDIT PARAMETERS

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

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
transport	UDP	The transport protocol, either:
		<ul style="list-style-type: none"> <li>• UDP (User Datagram Protocol): Default UDP port = 514</li> </ul>
		<ul style="list-style-type: none"> <li>• TLS (Transport Layer Security): Default TLS port = 6514</li> </ul>
trusted	All	If transport is TLS, the type of server authentication:
		<ul style="list-style-type: none"> <li>• All: No server authentication</li> </ul>
		<ul style="list-style-type: none"> <li>• CA-signed: Root-CA certificate imported</li> </ul>
		<ul style="list-style-type: none"> <li>• Self-signed: Fingerprint</li> </ul>
fingerprint	n/a	If trusted is self-signed, specify the audit server certificate fingerprint (md5 or sha1):
		<ul style="list-style-type: none"> <li>• md5-fingerprint:</li> </ul>
		<ul style="list-style-type: none"> <li>• sha1-fingerprint:</li> </ul>

#### AUDIT EXAMPLE

```
# audit get
Returns audit server configuration information, such as:
Configuration:
  Audit server address : syslog.example.com:10533
  Transport           : TLS
  Trusted servers     : CA-signed
```

#### Related Topics

- [Managing Audits](#) on page 231

## banner

### SYNOPSIS

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

### DESCRIPTION

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



**NOTE** The banner command can only be used by an administrator.

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

---

### ACTIONS

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

## BANNER PARAMETERS

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

## BANNER EXAMPLES

```
# banner get
The Advisory Notice and Consent Banner is disabled.
Unable to display banner: No banner file.

If enabled, the following banner is displayed upon user login:
-----
*****
*                                     *
*                               WARNING                               *
*                                     *
*****

THIS IS A PRIVATE COMPUTER SYSTEM.
This computer system including all related equipment and network devices
are provided only for authorized use. All computer systems may be
monitored for all lawful purposes, including to ensure that their use is
authorized, for management of the system, to facilitate protection against
unauthorized access, and to verify security procedures, survivability and
operational security.

*****
*                               Haivision Systems - Makito X SDI #4                               *
*                               *                               *
*****
```

## Related Topics

- [Managing Banners](#) on page 217



## bist

### SYNOPSIS

bist

### DESCRIPTION

The `bist` command provides information about the current status of the device and the results of any BIST (built-in self-test) or POST (power-on self test) operations executed by the device or the administrator. The purpose is to provide confidence that the Makito X hardware and software are operating reliably and correctly. Some tests are performed immediately, while others are the most recently recorded results of POST operations.



**NOTE** The `bist` command can only be used by an administrator.

### BIST EXAMPLE

```
# bist
bist displays the list of built-in self-tests for you to select.

Built-in Self-tests:
1) Show Ethernet status
2) Show video inputs status
3) Show video encoders status
4) Show CPU usage
5) Show memory usage
6) Show temperature
7) Show FIPS1 POST results
Q) Quit
Enter test number or q to exit:
```

1. Federal Information Processing Standard (FIPS) Publication 140-2, (FIPS PUB 140-2), entitled "Security Requirements for Cryptographic Modules," documents a U.S. government computer security standard used to accredit cryptographic modules.

## certificate

### SYNOPSIS

```
certificate name/all get
certificate name/all list
certificate name view
certificate name create [sign=self] [subject=query]
certificate name delete [type=id]
certificate name import infile=<certfile> [type=id] [fmt=auto]
certificate name select
certificate name verify
```

### DESCRIPTION

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



**NOTE** The `certificate` command can only be used by an administrator.

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

### ACTIONS

get	Displays the information for the specified certificate or all certificates, including certificate name, type, signature, subject, issuer, expiration, and fingerprint.
list	Lists the specified certificate or all certificates installed on the encoder, including the type and name.
view	Displays the content of the named certificate file.
create	Generates a Self-signed certificate or a Certificate Signing Request. The <code>sign</code> and <code>subject</code> can be specified. See <a href="#">certificate Parameters</a> below.
delete	Deletes the selected certificate. The <code>type</code> can be specified. See <a href="#">certificate Parameters</a> below. <b>NOTE:</b> The <code>type</code> specification may be added to specify the deletion of the Identity certificate, the chain associated with it, or the CA certificate with the given name.

import	Imports a certificate to be installed on the device. The infile, i.e., the file to import the certificate from, must be provided. The file's type and format can also be specified. See <a href="#">certificate Parameters</a> below.
select	Selects the certificate used when establishing a TLS connection with the audit server or starting an HTTPS session.n.
verify	Verifies the validity of the specified certificate.

## CERTIFICATE PARAMETERS

Parameter	Default	Description/Values
sign	self	The signature type for the certificate: <ul style="list-style-type: none"> <li>• self: Creates a self-signed identity certificate.</li> <li>• Request: Creates an identity Certificate Signing Request (CSR)</li> </ul>
subject	query	Sets the certificate's distinguished name parameters: <ul style="list-style-type: none"> <li>• auto: Automatically gets the subject Common Name which is HOSTNAME.DOMAIN if DNS is configured, or IPADDR otherwise. The subject Alt Name is set to DNS:HOSTNAME.DOMAIN, DNS:HOSTNAME,IPAddress:IPADDR</li> <li>• query: Prompts the user for Distinguished Name (DN) attributes</li> <li>• DN: Distinguished Name in the form: "/C=US/ST=Maine..." where the most common attributes are: /C Two Letter Country Name /ST State or Province Name /L Locality Name /O Organization Name /OU Organizational Unit Name /CN Common Name</li> </ul>

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
type	id	<p>The type of certificate to either import or generate:</p> <p><b>NOTE:</b> Only ID certificates can be generated. Chain and CA certificates can only be imported.</p> <ul style="list-style-type: none"> <li>• id: Identity certificate (for HTTPS service and audit)</li> <li>• chain: Identity certificate CA chain (Import only)</li> <li>• ca: Certificate Authority Certificate (for peer certificate validation, Import only)</li> </ul>
fmt	auto	<p>The format in which the certificate is encrypted:</p> <ul style="list-style-type: none"> <li>• auto: Detects the certificate format based on file extension when importing.</li> <li>• pem: Privacy Enhanced Mail Base64 encoded DER certificate</li> <li>• p7: PKCS#7</li> <li>• p12: PKCS#12</li> <li>• pfx: PKCS#12</li> <li>• der: Distinguish Encoding Rules</li> </ul>
infile	n/a	<p>The name of the file to import.</p> <p><b>NOTE:</b> The administrator has previously downloaded/uploaded the certificate file to import in its home directory (using SCP, for example).</p>

## Related Topics

- [Managing Certificates](#) on page 224

## config

### SYNOPSIS

```
config save [cfgname] [startup=yes,no]
config load [cfgname]
config delete [cfgname, all]
config list
```

### DESCRIPTION

The config command is used to manage configurations on the Makito X. This includes saving the current configuration, loading a saved configuration, and specifying the configuration file to load at startup.



**NOTE** This is equivalent to saving and loading Presets in the Web interface. See [Saving and Loading Presets](#) on page 177.

### 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. See <a href="#">NOTE</a> regarding cfgname.
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).



**NOTE** The following special characters are *not* supported for use in the configuration name (cfgname) unless they are escaped using the backward slash (\) character before being used:

Single Quote `

Ampersand &

Parentheses ( )

Semicolon ;

Apostrophe ’

Double Quote ”

Left and Right Angle Brackets < >

## Related Topics

- [Saving and Loading Presets](#) on page 177

## date

### SYNOPSIS

date

### DESCRIPTION

The date command is used to display the current date and time.

### DATE EXAMPLE

```
# date
Displays the current date, e.g.:
Tue Oct 22 11:23:56 EDT 2013
```

### Related Topics

- [dtconfig](#) on page 276
- [tzconfig](#) on page 359
- [Configuring Date and Time](#) on page 187

## dest

### SYNOPSIS

```
dest create host=addr name=destname [type=ftp,ftps] [path=rpath]
  [username=uname] [password=pwd] [port=ftpport] [passive=yes, no]
  [untrust=yes, no] [watchfolder=yes, no]
dest id/name/all delete
dest id/name/all get
dest id set
dest id/name test
```

### DESCRIPTION

The `dest` command is used to manage recording export destinations (i.e., add destinations, edit settings for destinations, and delete destinations).



---

**TIP** First create the destination, then use the [transfer](#) command.

---

### ACTIONS

create	Creates an export destination to be available to transfer video and metadata. A series of one or more <code>parameter=value</code> pairs can be specified at once.
delete	Removes the destination.
get	Displays information about the destination. See <a href="#">dest Parameters</a> below. You can specify a destination or all destinations. <b>TIP:</b> To display a summary of all the destinations in a table format, you can use <code>dest all get table</code> .
set	Changes the information on the destination if it is not used by any transfer.
test	Tests the ftp connection of this destination.



## DEST PARAMETERS

Parameter	Default	Description/Values
name	n/a	Specify a name for the destination. 1 to 32 characters
type	ftp	Select the protocol type, either: <ul style="list-style-type: none"> <li>• FTP: File Transfer Protocol</li> <li>• FTPS: FTP with explicit Transport Layer Security (TLS)</li> </ul>
host	n/a	The server's DNS host name or IP address for the destination.
path	n/a	The directory on the host.
username	n/a	A valid user name to access the ftp server.
password	n/a	The password to access that ftp server with the provided user name.
port	21	The port number for the destination server.
passive	yes	The FTP data connection mode for the transfer, either yes for passive mode, or no for active mode: <ul style="list-style-type: none"> <li>• Active: The client tells the server what port it is listening on, and the data connection is established by the server with the client via the specified port. For this to work, there either needs to be no firewalls or the firewalls defined must understand the FTP protocol.</li> <li>• Passive: The client opens two random ports. One port issues a PASV command to inform the server that it is in Passive mode. The server opens a random port and responds to the client. The client uses the second port to establish the data connection with the server via the port specified by the server.</li> </ul>
untrust	no	This parameter can allow the Makito X to connect to an FTPS server that is using an untrusted SSL certificate. <b>NOTE:</b> Type <code>yes</code> to accept untrusted certificates if <code>type</code> is <code>ftps</code> .

Parameter	Default (Cont.)	Description/Values (Cont.)
watchfolder	no	Type yes to create an HVC-compatible mRSS (Media RSS) metadata file. <b>NOTE:</b> This file contains information about recording used by platforms to process files. When files show up here, HVC starts processing.

## DEST EXAMPLE

```
# dest all get
Displays information about the export destinations, such as:
Destination ID      : 1
Name                : "Dest1"
Configuration:
  Type              : FTP
  FTP Server        : 10.65.10.57
  Path              :
  FTP Port          : 21
  Passive Mode      : Off
  HVC Watch Folder : Off

Destination ID      : 2
Name                : "Active_dest"
Configuration:
  Type              : FTP
  FTP Server        : dfs.haivision.com-1
  Path              : /
  FTP Port          : 21
  Passive Mode      : Off
  HVC Watch Folder : Off

Destination ID      : 3
Name                : "s1_HVC"
Configuration:
  Type              : FTP
  FTP Server        : 240844.upload.akamai.com
  Path              : /240844/HAIVISION-RD/watch
  FTP Port          : 21
  Passive Mode      : On
  HVC Watch Folder : On

3 dests displayed.
```

## Related Topics

- [Configuring Export Destinations](#) on page 200

## dtconfig

### SYNOPSIS

dtconfig YYYYMMDDhhmm[.ss]

### DESCRIPTION

The dtconfig command is used to set the date and time on the encoder.



**NOTE** Setting the encoder to a date in the past (compared to the current date) may cause the encoder to reboot.

---

### DTCONFIG EXAMPLE

```
# dtconfig 201310211100  
Sets the encoder clock to Monday October 21 11:00:00 EDT 2013
```

### Related Topics

- [date](#) on page 271
- [tzconfig](#) on page 359

## edid

### SYNOPSIS

```
edid set preferred=res  
edid get  
edid reset
```

### DESCRIPTION

The `edid` command is used on the Makito X DVI to set the DVI-D preferred resolution advertised as part of the HDMI EDID (Extended Display Identification Data) so that connected devices do not scale their output resolutions to match the current Makito X DVI default (1080p). The current default may cause image distortion issues when computer graphics resolutions are encoded for some third party equipment.



**TIP** This is useful because some computer video cards do not allow users to specify a resolution other than the advertised preferred one. If you have trouble getting your computer to send the proper graphic resolution to the Makito X, forcing the EDID to advertise that resolution as its preferred input format is likely to remedy that situation.



**NOTE** EDID (Extended Display Identification Data) is a data structure provided by a digital display to communicate its capabilities to a video source device.

### ACTIONS

<code>set</code>	Selects the DVI-D preferred resolution.
<code>get</code>	Displays the current EDID settings.
<code>reset</code>	Resets the preferred resolution to the driver internal default EDID.

## EDID PARAMETERS

Parameter	Default	Description/Values
preferred	1920x1200p60 0	Following are the available values for the DVI-D preferred resolution: 1920x1200p60 (default) 1920x1080p60 1680x1050p60 1600x1200p60 1600x900p60
		1440x900p60, 1440x900p75 1400x1050p60, 1400x1050p75 1360x768p60 1280x1024p60, 1280x1024p75 1280x800p60, 1280x800p75, 1280x800p85 1280x768p60, 1280x768p75, 1280x768p85 1152x864p75 1024x768p60, 1024x768p75, 1024x768p85, 800x600p60, 800x600p75, 800x600p85, 640x480p60, 640x480p75, 640x480p85

## EDID EXAMPLES

<pre># edid get Returns EDID configuration information for the encoder, such as: Configuration:   EDID File           : (Using driver internal data)   Preferred Resolution : 1920x1200p60</pre>
<pre># edid set preferred= 1280x1024p60 Sets the DVI-D preferred resolution to 1280x1024p60.</pre>

## Related Topics

- [Video Encoder Settings](#) on page 92

## 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 X 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 manually force settings such as the Ethernet interface line rate and duplex mode.

- You can change the Ethernet interface line rate while autonegotiation is enabled.
- However, in order to change the duplex mode, you must first disable autonegotiation.

If no options are specified, the system displays the current settings, as shown in the following example.

```
admin@fugu2:~$ ethercfg
Speed                : 1000mbps
Duplex                : Full
Auto-Negotiation     : On
Advertised Mode      : All
Link Detected        : Yes
Ceiling              : 100000kbps
```

### OPTIONS

-a	--autoneg	Enables or disables autonegotiation.
-s	--speed	If autonegotiation is disabled, sets the speed. If autonegotiation is enabled, this is the advertised supported speed which will be available for the peer Ethernet switch to use.
-d	--duplex	If autonegotiation is disabled, sets the duplex mode. If autonegotiation is enabled, this will be the advertised 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** When the entire set of parameters is not specified, the system will try to combine the current Ethernet settings with the newly supplied ones. Therefore, you should carefully review the outputted configuration when the command completes to make sure it matches the desired Ethernet settings.

Always enable autonegotiation with Gigabit Ethernet (GigE) speed (1000 Mbps).

#### ETHERCFG EXAMPLE

```
# ethercfg -s 100
Sets the line speed to 100 Mbps (which also modifies the advertised mode, see
example below).

admin@fugu2:~$ ethercfg -s 100
Speed           : 100mbps
Duplex          : Full
Auto-Negotiation : On
Advertised Mode : 100mbps Full-Duplex
Link Detected   : Yes
Ceiling         : 100000kbps

Do you wish to save these settings ? (y,n): y
Settings saved successfully.
```

#### Related Topics

- [Configuring Network Settings](#) on page 183



## haiversion

### SYNOPSIS

haiversion

### DESCRIPTION

The haiversion command is used to display status information about the Makito X. Status information can be useful for troubleshooting and may be forwarded to Haivision Technical Support if you are requesting technical support.

### HAIVERSION EXAMPLE

```
$ haiversion
Displays information about the hardware and software components.
Card Type           : "Makito2 DVI Encoder"
Part Number         : B-292E-DVI
Serial Number       : HAI-031339010049
MAC Address         : 5c:77:57:00:48:71
Firmware Version    : 1.1.0-42
Firmware Date       : "Dec 2 2013"
Firmware Options    : "KLV"
Hardware Version    : --
Hardware Compatibility : -001G
CPLD Version        : 2 (Official, Internal flash)
Boot Version        : "U-Boot 2010.06 (Mar 14 2013 - 13:04:35)-
MakitoX 0.9.10"

$
```

### Related Topics

- [Viewing System Status Information](#) on page 173

## hdcp

### SYNOPSIS

hdcp enable  
hdcp disable  
hdcp get

### DESCRIPTION

The `hdcp` command is used to manage HDCP settings on Makito X DVI systems.

### ACTIONS

enable	Enables HDCP support on the DVI input interface.
disable	Disables HDCP support on the DVI input interface.
get	Displays the current status of HDCP support.

### HDCP EXAMPLES

```
# hdcp get
Returns hdcp status for the encoder:
Configuration:
  HDCP Enabled    : On
```

## ipconfig

### SYNOPSIS

ipconfig display  
ipconfig configure  
ipconfig renew  
ipconfig release

### DESCRIPTION

The `ipconfig` command is used to set and view the parameters that specify the networking context for the Makito X, 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 examples that follow, 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.

When DHCP is enabled, you can configure the DHCP Vendor Class ID (option 60), which is set by default to “Haivision Makito X Encoder”. This allows IT departments to identify Makito X devices on their networks.



**NOTE** Enabling the Multicast DNS (mDNS) protocol allows the Safari Web browser (or other mDNS application) to automatically find the encoder. In Safari, navigate to Bookmarks and then select Bonjour to see the Makito X listed.

---

You must reboot for any changes to take effect.

### ACTIONS

display	Displays the current IP configuration.
configure	Configures IP settings.
renew	Renews DHCP address lease.
release	Releases current DHCP address lease.

## IPCONFIG EXAMPLES

```
# ipconfig display
Returns current IP settings for encoder configured to use DHCP:
Current IP Settings (Obtained via DHCP):
  IP Address           : 10.65.11.188
  Network Mask        : 255.255.254.0
  Gateway             : 10.65.10.1
  Link-Local Address  : (Disabled)
  Hostname            : STORAGE-2
  DHCP Vendor Class ID : "Haivision Makito X Encoder"
Current DNS Settings (Obtained via DHCP):
  Domain              : haivision.com
  Primary Server      : 10.65.0.10
  Alternate Server    : 10.65.0.11
Current Multicast DNS (mDNS) Settings:
  Responder           : Enabled
  Identifier          : "MakitoX STORAGE-2"
Current NTP Settings:
  Server              : pool.ntp.org
  Timezone            : "America/Montreal"
```

```
# ipconfig display
Returns current IP settings for encoder that does not use DHCP:
Current IP Settings:
  IP Address           : 10.65.129.67
  Network Mask        : 255.255.255.0
  Gateway             : 10.65.129.1
  Hostname            : MXE-129-67
Current DNS Settings:
  Domain              : haivision.com
  Primary Server      : 10.65.0.10
  Alternate Server    : (None)
Current Multicast DNS (mDNS) Settings:
  Responder           : Disabled
Current NTP Settings:
  Server              : 0.ca.pool.ntp.org
  Timezone            : "America/Montreal"
```

```
#ipconfig configure
Prompts you as follows to modify current settings (using DHCP):
Current IP Settings (Obtained via DHCP):
  IP Address           : 10.65.11.188
  Network Mask        : 255.255.254.0
  Gateway             : 10.65.10.1
  Link-Local Address  : (Disabled)
  DHCP Vendor Class ID : "Haivision Makito X Encoder"

Change IP settings? (y,N): y
Use DHCP to obtain IP address automatically? (Y,n): y
Auto-assign link-local address when DHCP is unavailable? (y,N):
Enter DHCP Vendor Class Identifier ("Haivision Makito X Encoder"):

Current Hostname      : STORAGE-2
Change hostname? (y,N):

Current DNS Settings (Obtained via DHCP):
  Domain              : haivision.com
  Primary Server      : 10.65.0.10
  Alternate Server     : 10.65.0.11
Change DNS settings? (y,N):

Current Multicast DNS (mDNS) Settings:
  Responder           : Enabled
  Identifier           : "MakitoX STORAGE-2"
Change Multicast DNS Settings? (y,N):

Current NTP Settings:
  Server              : pool.ntp.org
  Timezone            : "America/Montreal"
Change NTP server? (y,N):n
Change Timezone? (y,N): n

Network settings updated successfully.
You must REBOOT for any changes to take effect!
```

```
#ipconfig configure
Prompts you as follows to modify current settings (does not use DHCP):
Current IP Settings:
  IP Address           : 10.5.1.2
  Network Mask        : 255.255.0.0
  Gateway             : 10.5.0.1
  Hostname            : Makito2

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      : Makito2
Change hostname? (Y,N): y

Current DNS settings:
  Domain              : haivision.com
  Primary Server      : 10.65.0.10
  Alternate Server    : (None)
Change DNS settings? (Y,N): n

Current Multicast DNS (mDNS) Settings:
  Responder           : Enabled
  Identifier           : "MakitoX (MXE-DVI John)"
Change Multicast DNS Settings? (y,N): n

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

Network settings updated successfully.
You must REBOOT for any changes to take effect!
```

### Related Topics

- [Configuring Network Settings](#) on page 183

## license

### SYNOPSIS

```
license list
license view <features.lic>
license install <features.lic>
license verify <features.lic>
license delete <features.lic>
```

### DESCRIPTION

The license command is used to manage licensed features.

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

For more information, see [“Managing Licenses”](#) on page 191.



**NOTE** Multiple licenses may be installed on the same device at the same time.

### ACTIONS

list	Displays a list of installed licenses. Licenses are stored on the Makito X file system in the folder <code>/usr/share/haivision/licenses</code> .
view	Displays the content of the specified license file.
install	Installs the specified (uploaded) license. <b>IMPORTANT:</b> The license file must be uploaded to the encoder and locally stored in the current (administrative) user's folder before it can be installed. The Makito X supports FTP and TFTP client, as well as SCP client and server for downloading and uploading files.
verify	Verifies the specified license (either installed or uploaded).
delete	Deletes a previously installed license file from the system.

### LICENSE EXAMPLES

```
$ license list
Displays a list of licenses currently installed on the system:
License Files (in /usr/share/haivision/licenses):
  metadata-PO123456.lic
```

```
$ license view metadata-PO123456.lic
Displays the contents of the specified license:
#-----BEGIN LICENSED FEATURE----- metadata.lcf -----
[INFO]
Feature=Metadata
Description=Metadata KLV CoT

[KLV]
Enabled=On

[CoT]
Enabled=On

#-----END LICENSED FEATURE----- metadata.lcf -----

#-----BEGIN LICENSING DATA-----
[LIC-SIGNATURE]
CreatedOn=2013-06-13 09:27:06
CreatedBy=support@haivision.com
Sequence=fw100001_metadata.lic

[LIC-DEVICES]
HAI-031233010018=Yes
HAI-090022300016=Yes
HAI-100022230061=Yes
HAI-100009820054=Yes

#-----END LICENSING DATA-----
```

```
$ license verify metadata-PO123456.lic
Verifies the specified license:
Verifying license /usr/share/haivision/licenses/metadata-PO123456.lic...
License verification successful.
NOTE: This command first checks to see if the specified license is in the current
working directory.
If Yes, it will verify that one.
If No, it will look for it in the installed licenses directory (/usr/share/...)
This allows the verification of licenses before they are installed.
```

### Related Topics

- [Managing Licenses](#) on page 191



## logo

### SYNOPSIS

logo ID enable  
logo ID disable  
logo ID set parameter=value [parameter=value ...]  
logo ID get  
logo list  
logo delete name  
logo delete all

### DESCRIPTION

The `logo` command is used to manage logo overlays. You can configure the Makito X to display a graphic file as a logo overlay in the encoded video. One logo may be configured for each physical video input interface, i.e.:

- Two logos on dual channel encoders (Makito X SDI #S/B-292E-HDSDI2);
- One logo on single input encoders (Makito X DVI #S/B-292E-DVI or Makito X SDI #S/B-292E-HDSDI1).

ID is used to select the video input on dual channel encoders (either 0 for BNC-1 or 1 for BNC-2 on #S/B-292E-HDSDI2).

ID is optional on single input encoders such as the #S/B-292E-HDSDI1 and the #S/B-292E-DVI. If entered, only 0 will be accepted.

The logo position can either be relative (top left, top right, centered, etc.) or absolute (positioned at the exact X and Y coordinates specified). You can also specify the scaling and transparency display settings.

The graphic file can be uploaded in either BMP, JPEG, PNG, or GIF format.



**NOTE** You can upload the graphic file either using the [mklogo](#) command, or from the Web interface ([LOGOS](#) page, see [“Configuring Logo Overlays”](#) on page 158).

---

### ACTIONS

enable	Displays the logo when configured properly.
disable	Hides the logo.
set	Configures logo settings. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">logo Parameters</a> below.

get	Displays information on the logo.
list	Lists the available logo files. Logos are stored on the Makito X file system in the folder /usr/share/haivision/logos.
delete name	Deletes a logo file from the list.
delete all	Deletes all logo files from the list.

## LOGO PARAMETERS

Parameter	Default	Description/Values
filename	n/a	The name of the .oly file to display as a logo overlay. <b>NOTE:</b> The file must be in Haivision's overlay image (.oly) format. See <a href="#">mklogo</a> on page 302.
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% <b>NOTE:</b> 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% <b>NOTE:</b> 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: <ul style="list-style-type: none"> <li>• 25 = logo is 1/4 its original size</li> <li>• 100 = no scaling</li> <li>• 400 = logo is 4 times its original size</li> </ul>
relative	Off	If enabled, keeps the logo in proportion to the display area regardless of the input resolution. On,Off <b>NOTE:</b> The original scaling is vis-à-vis a 1920x1080 grid.

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
positioning	BottomRight	Specifies the position for the logo: <ul style="list-style-type: none"> <li>• BottomRight</li> <li>• TopRight</li> <li>• BottomLeft</li> <li>• TopLeft</li> <li>• Centered</li> <li>• Absolute: Uses the exact X and Y coordinates.</li> <li>• Relative: Uses the X, Y coordinates in relation to a 1920x1080 display area.</li> </ul>
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.

## Related Topics

- [mklogo](#) on page 302
- [Configuring Logo Overlays](#) on page 158

## messages

### SYNOPSIS

```
messages add <msgtext>
messages get
messages delete
```

### DESCRIPTION

The `messages` command is used to manage administrative login messages. This is a log of a limited number of important events recorded such as installation of a software package, failure to establish or maintain connectivity with a remote audit server, Power-On Self Test (POST) errors, and other noteworthy events that require the administrator's attention.

These events will result in a message being sent directly to all logged-in administrators and will appear on their terminals. The message will also be displayed at the next administrative Web interface or CLI login.



**NOTE** The `messages` command can only be used by an administrator.

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

---

### ACTIONS

<code>add &lt;msgtext&gt;</code>	Adds the message text to the log. This could be used to send messages to other administrators.
<code>get</code>	Displays messages.
<code>delete</code>	Deletes the messages.

### Related Topics

- [“Managing Messages”](#) on page 215

## metadata



**IMPORTANT** Metadata capture is an optional feature and must be installed at the factory.

### SYNOPSIS

```
metadata ID start
metadata ID stop
metadata create type=network port=udpport [addr=ipaddr] [name=text]
    -or-
metadata create type=hdsdi [input=bnc1] [decimation=factor] [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 X 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 X supports three metadata input types: either from the COM1 serial port, the HD-SDI interface, or a user definable UDP network port. The first two apply on the Makito X-SDI only. UDP is always available.

Multiple metadata sources can be multiplexed into the same Transport Stream. To do so, you must specify the metadata source ES IDs in the [stream](#) command ([datasrc](#)), using multiple comma-separated metadata source id/names.

CoT/UDP and CoT/Serial metadata sources can also be retransmitted to other IP destinations for follow-up analysis by third party systems. For more information, see [“CoT Retransmission”](#) on page 300.

You can define a small set of static KLV objects for KLV and CoT metadata sources. This can be used to modify erroneous or insert missing mission IDs and security classification within outbound TS steams. For more information, see [“KLV Metadata Insertion”](#) on page 300.

## ACTIONS

start	Starts the metadata source.
stop	Stops the metadata source.
create	Creates a new network (UDP) or HD-SDI metadata source. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">metadata Parameters</a> below.
delete	Deletes a UDP metadata source.
set	Configures metadata source settings. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">metadata Parameters</a> below.
get	Displays information on the metadata source. You can specify configuration, stats, or all metadata information. <b>TIP:</b> To display a summary of all the encoders in a table format, you can use <code>metadata all get table</code> .
clear	Clears the metadata source's statistics.
<code>enable_metadata_on_serial_port</code>	Enables metadata capture from the serial port.
<code>enable_console_on_serial_port</code>	Enables console management from the serial port. (default)

## METADATA PARAMETERS

Parameter	Default	Description/Values
<b>General parameters:</b>		
type	network	Specifies the type of metadata source to create, either <code>network</code> or <code>hdsdi</code> . <b>NOTE:</b> Additional HD-SDI sources can be created to stream KLV over SDI at different rates.
name	n/a	(optional) A name of up to 63 characters.

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
Network Source-specific parameters:		
port	n/a	Specifies the UDP port for a network metadata source (i.e., the port on which to listen for KLV messages). 1025..65,535
address	n/a	(optional) Specifies the IP address for a network metadata source. The address is only required to: <ul style="list-style-type: none"> <li>• receive messages from a source that is multicasting. In this case, you need to provide the multicast IP address to which the data is being sent. -OR-</li> <li>• accept KLV messages coming from a specific sender.</li> </ul>
HD-SDI Source-specific parameters:		
input	bnc1	(optional, HD-SDI source only) Specifies the Input port for the metadata source: <ul style="list-style-type: none"> <li>• bnc1</li> <li>• bnc2</li> </ul>
decimation	none	(optional) For KLV over SDI metadata input, the ingested KLV messages can be decimated by the factor specified here. To reduce the bandwidth used by the metadata service, select the frame decimation rate. 1/2..1/60 <b>NOTE:</b> 1 means no decimation, 2 means divide the amount by half, etc.
Static KLV Insertion parameters (See <a href="#">"KLV Metadata Insertion"</a> on page 300)		
missionid	n/a	A string of up to 127 characters.
reclassify	off	(KLV input only) When set to On, enables reclassification of received UAS KLV messages. on,off
classification	unclassified	Specifies the classification of the security data set: <ul style="list-style-type: none"> <li>• unclassified, restricted, confidential, secret, topsecret</li> </ul>
classcountry	n/a	The ISO 3166-1 3-letter code for the classifying country.
objcountry	n/a	The ISO 3166-1 3-letter code(s) for up to six object countries separated by semicolons.

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
<b>CoT Retransmission parameters</b> (See <a href="#">“CoT Retransmission”</a> on page 300)		
retransmit	off	When set to On, the system will retransmit received CoT/UDP or CoT/Serial metadata to up to 8 other hosts over UDP. <i>on,off</i>
relays	n/a	(Mandatory) Specifies the IP address and UDP port of the relayed packets. You can optionally specify the ttl and tos. <code>ipaddr1:port1[:ttl1[:tos1]],ipaddr2:port2[:ttl2[:tos2]]..</code>
ttl	64	Time to Live. See <a href="#">ttl</a> on page 344.
tos	0xB8	Type of Service. See <a href="#">tos</a> on page 344.
<b>Serial and UDP Source-specific parameters:</b>		
format	KLV	Selects the data format for the metadata. <ul style="list-style-type: none"> <li>• KLV</li> <li>• CoT</li> </ul> <b>NOTE:</b> CoT is only available from the serial port. For details on setting up CoT, refer to the <i>MakitoX CoT Addendum</i> .
spiuid	n/a	(CoT input only) Specifies the UID of SPI (Sensor Point of Interest) messages to ingest.
discovery	Off	(CoT input only) When set to On, enables the discovery of SPI UIDs (User Identifiers) that will be shown in the stats output and can then be potentially used as the <a href="#">spiuid</a> for SPI message filtering.
delta	0	(CoT input only) Specifies the maximum delta between SPI and Air Craft message timestamps for them to be considered a valid pair that can be converted to KLV.
<b>Serial Source-specific parameters:</b>		
standard	RS232	Specifies the transceiver mode for the metadata capture: <ul style="list-style-type: none"> <li>• RS232</li> <li>• RS422</li> </ul> <b>NOTE:</b> Only valid for the serial port.



Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
baudrate	115200	Specifies the baud rate for the serial port: <ul style="list-style-type: none"> <li>• 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200</li> </ul> <b>NOTE:</b> 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 (showing multiple metadata stream):

```
# stream create addr=10.64.1.124 port=1234
encap=ts-udp videosrc=1 audiosrc=1 datasrc=1,3
```

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
```

#### EXAMPLE #4: CONFIGURATION INFORMATION FOR MULTIPLE METADATA SOURCES

1. Get the metadata configuration information for the encoder using the following command:

```
# metadata get all
```

Returns configuration information for three metadata sources: (1) serial port source configured for CoT, (2) HD-SDI source configured for KLV, and (3) network source configured for KLV:

```
Metadata ID      : 0
Name             : (None)
Configuration:
  Type           : Serial
  Format         : CoT
  Status        : STOPPED
  Device        : "/dev/ttyO0"
  Standard      : RS-232
  Baud Rate     : 115200
  SPI Sensor Discovery : Off
  SPI UID       : (Any)
  Max AirCraft-SPI Delta: 0 ms
  CoT Relaying  : Off
  Number Of Relays : 0
  Reclassification : Off
  Classification : UNCLASSIFIED
  Classifying Country: (None)
  Object Country : (None)
Metadata ID      : 1
Name             : "HD-SDI-BNC-1"
Configuration:
  Type           : HD-SDI
  Format         : KLV
  Status        : STARTED
  Reclassification : Off
  Classification : UNCLASSIFIED
  Classifying Country: (None)
  Object Country : (None)
Metadata ID      : 2
Name             : "KLV/UDP"
Configuration:
  Type           : Network
  Format         : KLV
  Status        : STARTED
  Address       : 10.65.11.169
  UDP Port     : 20000
  Reclassification : Off
  Classification : UNCLASSIFIED
```

Classifying Country: (None)  
Object Country : (None)

## CoT Retransmission

You can configure the Makito X to ingest CoT Messages captured over Serial or UDP and re-transmit up to 8 CoT/UDP messages to unicast or multicast destinations so that multiple CoT listeners can access the source CoT data. To do so, you specify the Destination Address (which can be a FQDN), UDP Port, TTL, and ToS.

### EXAMPLE #5: CoT RETRANSMISSION

To define CoT Retransmission:

```
metadata 3 set retransmit=on relays=10.65.129.65:2000:1:2,  
10.65.129.63:3000:3:4
```

The above example uses TTL and TOS values of 1 and 2, and 3 and 4, respectively. And ports 2000 and 3000, respectively.

## KLV Metadata Insertion

These options are available to define a set of static KLV objects for KLV and CoT metadata sources:

- Configure a mission ID string of up to 127 characters: When the mission ID is configured, any received UAS KLV dataset will be processed in order to modify the existing mission ID or add a mission ID element if not there with the configured value.
- Enable or disable the update/generation of the security data set in UAS messages: When this feature is enabled, you then specify the classification (Unclassified, Restricted, Confidential, Secret, or Top Secret), the classifying country, and the object country/ies (up to 6) (using the proper ISO 3-letter country code).

In both cases, the mission ID or security data will get replaced or inserted with the ones created by the Makito X based on the configuration.

### EXAMPLE #6: STATIC KLV METADATA INSERTION

To define a mission ID (up to 127 character string):

```
metadata 1 set missionid="XYZ"
```

To unconfigure the insertion/modification of the mission ID element:

```
metadata 1 set missionid=none
```

To enable security modification/insertion:

```
metadata 1 set reclassify=on classification=confidential objcountry=afg  
classcountry=usa
```

To disable the insertion and modification of the security data set:

```
metadata 1 set reclassify=off
```

## Related Topics

- [Configuring Metadata Capture](#) on page 108
- [stream](#) on page 341

## mklogo

### SYNOPSIS

```
mklogo <infile>
```

where:

`infile` is the name of the image file to convert into a logo.

### DESCRIPTION

In order to display an image as a logo overlay on the Makito X, you need to copy a still image file to the Makito X file system and then convert the file to Haivision's overlay image format (.oly). The image file can be in either BMP, JPEG, PNG, or GIF format.

The `mklogo` command is used to convert the graphic file to .oly format.

The Makito X 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 X 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 X.

### MKLOGO EXAMPLE

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

### Related Topics

- [logo](#) on page 289
- [Configuring Logo Overlays](#) on page 158

## mkstill

### SYNOPSIS

mkstill <infile> resolution

where:

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

### DESCRIPTION

The `mkstill` command is used to convert a static picture into a file containing an encoded single H.264 GOP sequence. This is required in order to configure a Makito X 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 X file system under `/usr/share/haivision/still_images`.

### MKSTILL PARAMETER

Parameter	Default	Description/Values
resolution	n/a	Specifies the desired resolution of the still image. Supported values include: <ul style="list-style-type: none"> <li>• 1080 for 1920x1080</li> <li>• 720 for 1280x720</li> <li>• 480, NTSC for 720x480</li> <li>• 576, PAL for 720x576</li> <li>• VGA for 640x480</li> <li>• SVGA for 800x600</li> <li>• XGA for 1024x768</li> <li>• XGA+ for 1152x864</li> <li>• WXGA for 1280x768</li> <li>• WXGA2 for 1280x800</li> <li>• SXGA for 1280x1024</li> </ul>

Parameter	Default	Description/Values (Cont.)
resolution	n/a	<ul style="list-style-type: none"><li>• WXGA3 for 1360x768</li><li>• WXGA4 for 1366x768</li><li>• WXGA+ for 1440x900</li><li>• SXGA+ for 1400x1050</li><li>• HD+ for 1600x900</li><li>• UXGA for 1600x1200</li><li>• WSXGA+ for 1680x1050</li><li>• WUXGA for 1920x1200</li></ul>

#### MKSTILL EXAMPLE

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

#### Related Topics

- [still](#) on page 338
- [Configuring Still Image Streaming](#) on page 165



## nas

### SYNOPSIS

```
nas enable
nas get
nas disable
```

### DESCRIPTION

The `nas` command is used to manage Network Assisted Storage settings. This is useful to set an NFS mount point on the Makito X for storing snapshots or (with the Makito X with Storage) for copying recordings after they are completed.

### ACTIONS

<code>enable</code>	Configures and enables NAS. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">nas Parameters</a> below.
<code>get</code>	Displays NAS configuration and status information.
<code>disable</code>	Disables NAS.

### NAS PARAMETERS

Parameter	Default	Description/Values
<code>location</code>	n/a	Specifies remote host IP address and path: = <code>remotehost:remotedir</code>

### NAS EXAMPLE

```
# nas enable location=indigo:/home/flemieux/shared
Activates Network Assisted Storage and specifies the remote host IP address and path.

# nas get
Returns NAS configuration information for the encoder, such as:
Configuration:
Status           : Enabled
Remote Host      : "tserver.haivision.com"
Remote Dir       : "/NFS"
```

```
# nas get all
Returns NAS configuration information and statistics for the encoder, such as:
Configuration:
  Status           : Enabled
  Remote Host      : "tserver.haivision.com"
  Remote Dir       : "/NFS"
Statistics:
  Capacity         : 49.08GB
  Used             : 79.96MB (0%)
  Available        : 40.94GB (83%)
```

### Related Topics

- [Managing Network Storage](#) on page 198

## 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 X. 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 X user groups (administrator, operator, and guest).

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 238 (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 X.
system	Defines contact and location system parameters.
user	Defines user-based (v3) security configuration for the Makito X.

## 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 <code>delete</code> 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. <b>NOTE:</b> 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 X settings which are lost when the unit is rebooted unless saved as a configuration.

---

## EXAMPLE #1: INITIALIZING A COMMUNITY-BASED (V1/V2C) SYSTEM

In the example below, a system with default settings is configured to add a distant host access (198.51.100.122) to the existing localhost and localnet accesses of the `admin` community. Note that the `localnet` source is a special keyword that translates at runtime to the network settings of the LAN interface. System parameters are also defined.

```
# nmcfg
parameter value
-----
contact<undefined>
location<undefined>

perm/group  community      source
-----
rw          admin         localhost
rw          admin         localnet
ro          public        localnet
# nmcfg system define contact "myname <myname@example.org>"
# nmcfg system define location "Media Lab"
# nmcfg community permit admin rw 198.51.100.122
#
```

## EXAMPLE #2: CREATING AN SNMPV3 USER

Two commands are required to create a USM (v3) user and define its access:

```
# nmcfg user define johnsmith SHA "arfds23dsjs" AES "2394urscxkvn"
# nmcfg access usm permit johnsmith operator
```

## EXAMPLE #3: INITIALIZING A USM-ONLY (SNMPV3) SYSTEM

In the example below, system security is enforced by completely disabling SNMPv1/v2c access, and by requiring v3 USM authentication only for users group-based access, and encryption for admins and operators group-based access.

```
# nmcfg
system parameter value
-----
contact<undefined>
location<undefined>

perm/group  community      source
-----
rw          admin          localhost
rw          admin          localnet
ro          public         localnet

# nmcfg agent stop
# nmcfg system define contact "joe net <jnet@example.org>"
# nmcfg system define location "Media Lab"
# nmcfg community delete admin
# nmcfg community delete public
# nmcfg user define joenet SHA "arfds23dsjs" AES "2394urscxkvn"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg user define johnsmith SHA "89ss5dkj" AES "jfdsf78998sd"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg user define guest MD5 "nososecret"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg access usm permit joenet administrator priv
# nmcfg access usm permit johnsmith operator priv
# nmcfg access usm permit guest guest
# nmcfg agent start
# nmcfg

system parameter  value
-----
engineid          0x80001f88802054a68b4b75388e
contact           "joe net <jnet@example.org>"
location          "Media Lab"

model             perm/group  level  user/community  source
-----
usm               guest       auth   guest            -
usm               administratorpriv  johnet          -
usm               operator   priv   johnsmith        -
```

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

## Related Topics

- [“nmcfg”](#) on page 238 (in [“SNMP Agent Components”](#))

## package

### SYNOPSIS

```
package list
package info [<pkgfile>.hai]
package verify <pkgfile>.hai
package install <pkgfile>.hai
package download <pkgfile>.hai <tftppipaddr>
package delete <pkgfile>.hai | all
package cancel <pkgfile>.hai
```

### DESCRIPTION

The package command is used to view and manage software packages.



**NOTE** The package command can only be used by an administrator.

---

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

Package files are digitally signed to ensure integrity and authenticity. Package component signatures and their certificate validity are verified when downloading, manually with the verify action, and when actually performing the installation upon reboot.

If the verification fails after downloading, an error message is reported by the download command and the downloaded package is discarded. If verification fails while actually installing upon reboot, installation is canceled and a package install failure notice is added to the messages displayed to administrators (see [messages](#) CLI command). A successful package installation notice is added to the messages upon successful installation.



**EXAMPLE #1: PACKAGE DOWNLOAD AND INSTALLATION**

```
$ package download makitox_enc_v1.0.0-39.hai mytftp.example.com
1/5) Temporarily pausing encoder(s)...
2/5) Downloading package makitox_enc_v1.0.0-39.hai from
    mytftp.example.com...
3/5) Verifying integrity of downloaded package... Package verified
    successfully.
4/5) Synching file system...
5/5) Resuming encoder(s)...
Package downloaded successfully.
$ package install makitox_enc_v1.0.0-39.hai
Package makitox_enc_v1.0.0-39.hai will be installed on next boot sequence.
You must REBOOT to complete the update process!
$
```

**EXAMPLE #2: PACKAGE DOWNLOAD VERIFICATION FAILURE**

```
$ package download makitox_enc_v1.0.0-39.hai mytftp.example.com
1/5) Temporarily pausing encoder(s)...
2/5) Downloading package makitox_enc_v1.0.0-39.hai from
    mytftp.example.com...
3/5) Verifying integrity of downloaded package... Package verification failed!
Try downloading the package again.
$
```

**ACTIONS**

list	Displays a list of downloaded packages.
info	Displays information about the currently installed package. If a filename is specified, displays information about the package.
verify	Verifies the authenticity and integrity of the specified package.
install	Installs the specified package. The package will be automatically verified before installation.
download	Downloads the specified package file using TFTP and then verifies it.
delete	Deletes a previously downloaded package file. You can specify the package file or all.
cancel	Cancels installation of a package scheduled for the next reboot.

## PACKAGE EXAMPLES

```
# package list
```

Displays the list of downloaded packages:

Package Files (in /usr/share/haivision/packages/):

```
makitox_enc_v1.1.0-19.hai
```

```
makitox_enc_v1.1.0-20.hai
```

```
makitox_enc_v1.1.0-4.hai
```

```
makitox_enc_v1.1.0-8.hai
```

```
# package info makitox_enc_v1_2_0.hai
```

Displays information about the package.

```
# package install makitox_enc_v1_2_0.hai
```

Installs the package.

## passthrough

### SYNOPSIS

```
passthrough start
passthrough stop
passthrough set parameter=value [parameter=value ...]
passthrough get [config, stats, all]
passthrough clear
```

### DESCRIPTION

On the Makito X with SDI, you can enable bi-directional serial passthrough for controlling serially attached devices such as PTZ controlled cameras. Both RS-232 and RS-422 are supported. The `passthrough` command is used to manage passthrough settings.

### ACTIONS

start	Starts listening for passthrough clients.
stop	Stops passthrough and disconnects any clients that were connected.
set	Configures passthrough settings. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">passthrough Parameters</a> below.
get	Displays passthrough information. You can specify configuration, stats, or all information. <b>TIP:</b> To display a summary of all the encoders in a table format, you can use <code>passthrough all get table</code> .
clear	Clears passthrough statistics.
help	Displays usage information for the <code>passthrough</code> command.

### PASSTHROUGH PARAMETERS

Parameter	Default	Description/Values
standard	RS232	Specifies the transceiver mode for the passthrough: <ul style="list-style-type: none"> <li>• RS232</li> <li>• RS422</li> </ul> <b>NOTE:</b> Only valid for the serial port.

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
baudrate	9600	Specifies the baud rate for the passthrough: <ul style="list-style-type: none"> <li>• 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200</li> </ul>
databits	8	Specifies the number of data bits in each character. <ul style="list-style-type: none"> <li>• 8, 7</li> </ul>
stopbits	1	Specifies the number of stop bits sent at the end of every character. <ul style="list-style-type: none"> <li>• 1, 2</li> </ul>
flowctrl	none	The flow control for the serial port: <ul style="list-style-type: none"> <li>• none, xonxoff</li> </ul> <p>Xon/Xoff is a protocol for controlling the flow of data between devices on an asynchronous serial connection.</p> <p><b>TIP:</b> Flow control is useful in atypical cases such as when the remote controlling device's serial port is set to a much higher baud rate than the encoder's serial port.</p>
port	7777	The TCP port on which to listen for passthrough clients.
timeout	0 (no timeout)	Specifies the amount of time in seconds a TCP connection will be kept open when no data is being received from the remote client. The timeout can be up to 10 minutes (0..600 seconds).  The idle timeout is important when you have more than one remote end point controlling the serial port: if a remote application is left running with the TCP connection active, no one else will be able to control the COM port. <b>TIP:</b> You can use 0 for an infinite timeout to keep the connection open until the client closes it.

## PASSTHROUGH EXAMPLE

This example shows how to use TCP port 8888 to listen for passthrough clients. The camera has an RS232 COM port running at 9600 bps:

```
#passthrough set port=8888 baudrate=9600 standard=rs232
```

Passthrough configured successfully.

```
#passthrough get
Configuration:
TCP Port      : 8888
Standard      : RS-232
Baud Rate     : 9600
Flow Control  : None
Disconnect Timeout : None
```

If passthrough is not started, you will have to start it:

```
# passthrough get stats
Statistics:
State        : DISABLED
```

```
# passthrough start
Passthrough started successfully.
```

```
# passthrough get stats
Statistics:
State          : LISTENING
Caller Address : 0.0.0.0
Network:
Rx Bytes       : 0
Tx Bytes       : 0
Serial:
Rx Bytes       : 0
Tx Bytes       : 0
```

## PASSTHROUGH STATISTICS

When a remote client is connected, the state will show up as **CONNECTED** and the IP address of the client will be displayed.

The statistics are divided in two sections: network and serial.

- The network stats show what is going in terms of the TCP connection with the remote controller, i.e., how many bytes were received from and sent to the remote controller.

- The serial stats show how many bytes were sent to the serial device connected to the encoder and how many were received from it.

In normal operation the number of bytes received on the TCP connection would match the number of bytes sent on the serial port and the number of bytes received on the serial port would match the number sent on TCP. However, if the device connected to the Makito X sends serial data when no client is connected, these numbers won't match.

Additional stats can show up under special conditions, as explained below:

Statistic	Description
Network dropped bytes	This counter shows the number of bytes received on the encoder's serial port that could not be sent over the TCP link. The network connection will always be orders of magnitude faster than the serial port connection so this statistic is seldom seen.
Serial Dropped bytes	This counter shows the number of bytes received on the network connection that could not be sent on the serial link. Again if the controlling remote device and the encoder are set to the same baud rate, it is unlikely that the encoder would receive data at a rate that can't be accommodated. If, however, the baud rates don't match and the remote device is set to a higher value, this could occur. In that case, it is a good idea to reconfigure the remote device or use flow control.
Flow Control Stats	When flow control is used, the network section of the stats will display the number of XON and XOFF control bytes sent to the remote device over TCP. This indicates whether or not data from the controlling device was sent too fast to be forwarded to the encoder's serial port. When flow control is used, the Makito X will queue up to 2 seconds of serial data at 115,200 bps locally from the remote device. If the remote device also supports XON XOFF (otherwise, do <i>not</i> use flow control), this ensures that no data is ever lost from it.

### Related Topics

- [Enabling and Disabling Network Services](#) on page 189
- [service](#) on page 332

## passwd

### SYNOPSIS

passwd

### DESCRIPTION

The passwd command is used to change the user's own password.



**NOTE** To modify the password for other users' accounts, see the [account](#) command on [page 254](#).

### PASSWD EXAMPLES

# passwd	Changes the password for the current user account. The system prompts you to enter the old password and then the new password. <b>NOTE:</b> Passwords can be up to 80 characters long. See <a href="#">"Password Requirements"</a> on page 82 for the supported character set. Password policies set by the administrator may enforce the selection of strong passwords.
----------	---

### Related Topics

- [Role-based Authorization](#) on page 72
- [Managing User Accounts](#) on page 208

## personality

### SYNOPSIS

```
personality set <TYPE>
personality get
```

### DESCRIPTION

The `personality` command is used to manage the Makito XR (Ruggedized) encoder “personality” by providing a means to set the XR personality to either the two-port variant (#S-292E-X2R) or the four-port variant (#S-292E-X4R).

For details on the Makito XR encoder, please refer to the Makito XR (Ruggedized) Installation Guide available through Haivision’s Download Center.

The change of personality takes effect after the next reboot of the unit.



**NOTE** This command may only be used on a Makito XR encoder by an administrator. XR personalities do not change due to a factory reset.

### ACTIONS

```
set          Sets the Makito XR (Ruggedized) encoder personality
get          Displays the current Makito XR encoder personality.
```

### PERSONALITY PARAMETERS

Parameter	Default	Description/Values
TYPE	n/a	Sets the personality that will take effect on the next boot, either X2R or X4R.

### PERSONALITY EXAMPLES

```
# personality get
Current Personality   : X4R

# personality set X4R
Sets the personality to X4R.
```



## policy

### SYNOPSIS

```
policy password set [quality=basic] [minlen=6] [minuppers=0] [mindigits=0]
  [minsymbols=0] [expiry=yes] [lifetime=90]
policy session set [autologout=yes] [idletimeout=15]
policy crypto set [compliance=None] [tlsv1.{0|1|2}=yes] [sslv3=no]
policy crypto set [compliance=None]
policy pname/all get
```

### DESCRIPTION

The policy command is used to configure and manage security policy settings. Policies are needed to define security criteria such as the required quality, length and composition of passwords. The security policies are: Password, Session, and Cryptographic Strength.

Security policies may be applied to bring the encoder to its CC evaluated configuration. During the hardening procedure, it is important for the administrator to set the policies before creating accounts.



---

**NOTE** The policy command can only be used by an administrator.

---

### ACTIONS

policy password set	Modifies the password policy parameters. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">password</a> under <a href="#">policy Parameters</a> below.
policy session set	Modifies the session policy parameters. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">session</a> under <a href="#">policy Parameters</a> below.
policy crypto set	Specifies the cryptographic policy. The <code>compliance</code> parameter can be specified. See <a href="#">crypto</a> under <a href="#">policy Parameters</a> below.
policy pname/all get	Displays the policy information for either the policy (i.e., password, session, or crypto) or the encoder.

## POLICY PARAMETERS

Parameter	Default	Description/Values
<b>crypto</b>		
compliance	None	<p>Specifies the required cryptographic compliance, either:</p> <ul style="list-style-type: none"> <li>• None</li> <li>• NDPP11: Activates cryptographic security to a level compliant with the Network Device Protection Profile v1.1.</li> <li>• FIPS140: All management cryptography is operated in the FIPS 140-2 mode.</li> <li>• Sp800-52r1: All management cryptography follows the guidelines of NIST Special Publication 800-52 Rev 1.</li> </ul> <p><b>NOTE:</b> Either selection reinforces security for all management functions of the encoder in terms of cryptography. This setting takes effect upon the next reboot.</p>
ssl3	See <a href="#">NOTE:</a>	<p>Enables or disables SSLv3 as a supported TLS version: Yes, No</p> <p><b>NOTE:</b> SSLv3 is disabled on factory new systems. On upgraded systems, SSLv3 is enabled only if upgrading a system where no (None) cryptographic compliance is configured. SSLv3 can be enabled only if <a href="#">compliance</a> is set to None.</p>
Specifies which TLS (Transport Layer Security) versions are accepted from the HTTPS client. At least one TLS version must be enabled.		
tlsv1.0	Yes	Enables or disables TLSv1.0 as a supported TLS version: Yes, No
tlsv1.1	Yes	Enables or disables TLSv1.1 as a supported TLS version: Yes, No
tlsv1.2	Yes	Enables or disables TLSv1.2 as a supported TLS version: Yes, No
<b>password</b>		
quality	Basic	<p>Specifies the required password strength, either:</p> <ul style="list-style-type: none"> <li>• Basic</li> <li>• Strong</li> </ul>

Parameter (Cont.)	Default (Cont.)	Description/Values (Cont.)
minlen	6	Specifies the minimum password length: <ul style="list-style-type: none"> <li>• 6..40</li> </ul>
minuppers	n/a if Basic 0 if Strong	(Password <a href="#">quality</a> must be Strong) Specifies the minimum number of uppercase letters: <ul style="list-style-type: none"> <li>• 0..40</li> </ul>
mindigits	n/a if Basic 0 if Strong	(Password <a href="#">quality</a> must be Strong) Specifies the minimum number of digits: <ul style="list-style-type: none"> <li>• 0..40</li> </ul>
minsymbols	n/a if Basic 0 if Strong	(Password <a href="#">quality</a> must be Strong) Specifies the minimum number of symbols: <ul style="list-style-type: none"> <li>• 0..40</li> </ul>
expiry	No	Enables or disables password expiration: <ul style="list-style-type: none"> <li>• Yes, No</li> </ul>
lifetime	90 days	(Password <a href="#">expiry</a> must be Yes) Type in the number of days after which users must change their passwords: <ul style="list-style-type: none"> <li>• 1..180 days (password expiration)</li> </ul>
<a href="#">session</a>		
autologout	No	Enables or disables Auto Logout: <ul style="list-style-type: none"> <li>• Yes, No</li> </ul>
idletimeout	15 minutes	( <a href="#">autologout</a> must be Yes) Specifies the maximum length of time the system may be idle before the user will be logged out: <ul style="list-style-type: none"> <li>• 1..1440 minutes (inactivity timeout)</li> </ul>

## POLICY EXAMPLES

<pre># policy crypto set compliance=NDPP11 Sets the required cryptographic compliance to Network Device Protection Profile v1.1.</pre>
<pre># policy password set quality=strong minlen=10 minuppers=1   minsymbols=1 expiry=yes lifetime=30 Sets the password policy for the encoder to be Strong, requiring passwords to be at least 10 characters in length, with one uppercase letter, one symbol. Passwords will expire in 30 days.</pre>

```
# policy all get
Returns policy information for the encoder such as:
Crypto:
  Compliance      : (None)
  SSLv3           : Yes
  TLSv1.0         : Yes
  TLSv1.1         : Yes
  TLSv1.2         : Yes
Password:
  Quality         : Basic
  MinLen          : 6
  Expiry          : No
Session:
  Autologout      : No
```

### Related Topics

- [Managing Security Policies](#) on page 220

## pubkey

### SYNOPSIS

```
pubkey add <KEYFILE.pub>
pubkey remove <KEYFILE.pub>
pubkey list
```

### DESCRIPTION

The `pubkey` command is used to manage your account's authorized SSH public keys.

You must first get the public key of your SSH client. Note that in the current release, this only applies to SSH CLI access to the encoder.



---

**NOTE** The `pubkey` command can only be used by an administrator.

---

### ACTIONS

<code>pubkey add</code>	Uploads a new public key file (.pub extension) to the encoder.
<code>pubkey remove</code>	Removes the specified public key file from the encoder.
<code>pubkey list</code>	Lists the public key files currently loaded on the encoder.

### PUBKEY EXAMPLES

```
# pubkey add makito.pub
Uploads the public key file makito.pub to the encoder.
```

```
# pubkey list
Lists all public key files currently loaded on the encoder along with their fingerprints. In
this example, there is one public key file:
makito.pub      : rsa[2048]
b7:ae:79:92:0d:86:f9:8d:2d:ee:99:fc:ff:24:95:87:ee:78:1d:fd
```

### Related Topics

- [Managing User Accounts](#) on page 208

## reboot

### SYNOPSIS

reboot

### DESCRIPTION

The reboot command is used to turn off and restart the Makito X. Any unsaved configurations will be lost. The encoder will restart with the saved startup configuration.



**NOTE** The reboot command can only be used by an administrator.

---

### EXAMPLE

```
# reboot
```

Reboots the Makito X.

**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.

### Related Topics

- [Rebooting the Encoder](#) on page 175

## record

### SYNOPSIS

```
record create stream=id  
record ID start  
record ID stop  
record ID close  
record ID get  
record list  
record delete [filename, all]  
record copy filename usb  
record move filename usb
```

### DESCRIPTION

The `record` command is used to create and manage video recordings. For more information, see [“Configuring Recording Outputs”](#) on page 146 and [“Managing Recordings”](#) on page 150.

### ACTIONS

create	Creates a recording for a stream A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">record Parameters</a> below.
start	Starts recording a stream.
stop	Stops recording a stream.
close	Closes a recording of a stream.
get	Displays information on the recording. You can specify configuration, stats, or all recording information. <b>TIP:</b> To display a summary of all the streams in a table format, you can use <code>record all get table</code> .
list	Lists the available recordings on the system.
delete	Deletes either the recording specified by <code>&lt;filename&gt;</code> or all recordings.
copy	Copies the recording specified by <code>&lt;filename&gt;</code> to a USB device
move	Moves the recording specified by <code>&lt;filename&gt;</code> to a USB device and deletes the recording from the encoder.

## RECORD PARAMETERS

Parameter	Default	Description/Values
name	n/a	The identifying prefix for recorded files. If not specified, the stream name or ID will be used.
format	ts	The file format for recordings, either:
		<ul style="list-style-type: none"> <li>• mp4</li> </ul>
		<ul style="list-style-type: none"> <li>• ts</li> </ul>
limit		The recording duration or size, ex 1h30m, 500M
segment		Enables segmented recording by specifying the duration or size of each segment.
recycle	off	When segmented recording is enabled and the recording is limited in space or time, this enables the overwriting of older segments when that limit is reached. On,Off
subtitles	off	When recording in mp4 format, this enables the generation of SubRip files to save any closed caption present in the stream being recorded. On,Off
start	off	Starts recording directly at recording creation time. On,Off The IDs of recordings always match the ID of the stream associated with it.
export	off	Exports recordings and segments automatically when they are complete. On,Off
destination	n/a	The destination of recording transfers when export is enabled. <ul style="list-style-type: none"> <li>• id or name</li> </ul>
delete	off	Deletes recordings when they are successfully transferred. On,Off The IDs of recordings always match the ID of the associated stream.



## RECORD EXAMPLES

```
# record all get
Returns information for the recording, for example:
Recording ID : 1
Recording Name: "continuous"
Configuration:
  Format      : TS
  Recording Limit : 5d5h
  Segmented   : On
  Segment Limit : 10m
  Segment Recycling: Off
  Auto-Export : Off
```

```
# record list
Lists the available recordings, for example:
Recordings (in /mnt/storage1/recordings/):
Test-2015-04-10-14h11m09s.mp4    (1920x1080p29, 36s, 25.66MB,
root)
REC-2015-04-12-21h11m06s.mp4    (1920x1080p29, 23s, 16.55MB,
root)
TEST-2015-04-12-23h20m20s.mp4   (1280x720p60, 2h41m12s,
43.50MB, root)
TEST-2015-04-13-10h10m15s.mp4   (1280x720p60, 27m36s, 35.70MB,
root)
TEST-2015-04-13-10h38m56s.mp4   (1280x720p60, 1m, 35.59MB,
root)
TEST-2015-04-14-11h52m05s.mp4   (1280x720p60, 1m, 41.51MB,
root)
TEST-2015-04-14-13h50m52s.ts   (1280x720p60, 3h34m49s, 44.77MB,
root)
TEST-2015-04-14-17h26m45s.ts   (1920x1080i29, 1m, 44.24MB, root)
continuous-2015-05-19-12h16m12s (Segmented, 1920x1080p30,
20h34m49s, 222.34GB, root)

9 recordings are available.
222.81GB (100%) of 222.81GB recording disk storage space used.
```

## Related Topics

- [Managing Recordings](#) on page 150

## roi

### SYNOPSIS

roi create  
roi ID set  
roi ID delete  
roi ID get  
roi ID enable  
roi ID disable

### DESCRIPTION

The roi command is used to create a static region of interest (one per video encoder) to enhance the quality of the encoded video within the region. This allows you to choose what portion of the image is important to have maximum quality.

The region 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.

### ACTIONS

create	Creates a region of interest on an encoder
set	Configures ROI parameters. A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">roi Parameters</a> below.
delete	Removes the region of interest
get	Displays information on the region of interest.
enable	Enables a created but disabled region of interest
disable	Disables a created region of interest.

## ROI PARAMETERS

Parameter	Default	Description/Values
name	n/a	Optional name for this region of interest.
encoder	n/a	Specifies the ID of the video encoder.
type	normal	Specifies the effect of the region: <ul style="list-style-type: none"> <li>normal: ROI is translucent, therefore enhances the video in the region.</li> <li>privacy: ROI is opaque to block out the ROI video.</li> </ul>
emphasis	4	Sets the difference in quality between the background and the ROI. 1 to 8
positioning	Centered	Specifies where the region should appear: <ul style="list-style-type: none"> <li>BottomRight</li> <li>TopRight</li> <li>BottomLeft</li> <li>TopLeft</li> <li>Centered</li> <li>Absolute: Uses the exact X and Y coordinates.</li> </ul>
x		Horizontal coordinate of the top left point of the region in Absolute mode.
y		Vertical coordinate of the top left point of the region in absolute mode.
width	100	Width in pixels of the region of interest.
height	100	Height in pixels of the region of interest.
border	none	Applies a border to the region: <ul style="list-style-type: none"> <li>none, corners, box</li> </ul>
enable	on	Enables the region of interest. on,off.

## ROI EXAMPLE

```
# roi 0 set type=privacy
Sets the region of interest type to privacy, i.e., opaque to block out the ROI video.
```

- [Region of Interest \(ROI\) \(H.264 only\)](#) on page 98

## service

### SYNOPSIS

service name action

where:

name        can be: all, http, passthrough, snmp, ssh, talkback,  
telnet, vf

### DESCRIPTION

For security purposes, you may need to stop one or more network services from accessing the Makito X. The `service` command is used to enable and disable the following network services: all, or HTTP, Pass-through, SNMP, SSH, Talkback, Telnet, and VF.

On the Makito X with SDI, `pass-through` allows the serial port to be used as a pass-through interface to control serially attached devices such as PTZ controlled cameras.



**IMPORTANT** If the COM1 port is not configured for CLI Management, and all remote management interfaces (HTTP, telnet, SSH, and SNMP) are disabled, the only way to re-enable these services is by a Factory Reset. (For details, see [“Resetting the Encoder”](#) on page 63.) Once the serial port is configured for metadata or passthrough use, 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.
restart	Restarts the service and configures the unit so that the service will be started automatically when the unit is rebooted.
status	Displays the current status of the service, i.e., if it has been started or stopped. Also displays the startup status of the service.

### EXAMPLES

```
# service telnet stop
Stops telnet connection to the Makito X.
```

```
# service all stop
Stops all network connections to the Makito X.
```

## Related Topics

- [Enabling and Disabling Network Services](#) on page 189

## 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.

### SYNOPSIS

```
snapshot ID take [format=value] [filename=<filename>] [quality=value]
snapshot set [format=value] [quality=value] [maxsize=value] [location=
value] [thumbnail=on,off]
snapshot get
snapshot list
snapshot delete [<filename>, all]
```

### DESCRIPTION

The `snapshot` command is used to take and manage snapshots from the video received on any input port. You can save the snapshots in JPEG or YUV format. Also, when saving in JPEG format, you can specify the compression ratio to preserve the image quality.

You can also specify the location where the snapshot is stored. Snapshots can be stored on a mounted SSD, SD, USB or NFS media, or within the on-board NAND flash.

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.



**TIP** Thumbnail generation can be disabled to speed up snapshot acquisition and storage time.

ID is used to select the video input on dual channel encoders (either 0 for BNC-1 or 1 for BNC-2 on #S/B-292E-HDSDI2).

ID is optional on single input encoders such as the #S/B-292E-HDSDI1 and the #S/B-292E-DVI. If entered, only 0 will be accepted.

Configuring a limit on the storage space available for snapshots is only valid for flash, SSD or NFS locations. For USB and SD locations, any available space will be used without constraint.

## ACTIONS

take	<p>Takes a snapshot from either:</p> <ul style="list-style-type: none"> <li>the current active video (Makito X DVI, S/B-292E-DVI or Makito X SDI single-BNC, S/B-292E-HDSDI1)</li> <li>the video received on any input port, where ID is the video input (Makito X SDI dual-BNC, S/B-292E-HDSDI2). ID is either 0 for BNC-1 or 1 for BNC-2.</li> </ul> <p>You can optionally specify the format and image quality per snapshot, as well as the filename.</p>
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	<p>Displays the available snapshots on the system along with the resolution.</p> <p>Snapshot files are stored under <code>/usr/share/haivision/snapshots</code>.</p>
delete	Deletes either the snapshot specified by <code>&lt;filename&gt;</code> or all snapshots stored under <code>/usr/share/haivision/snapshots</code> .

## SNAPSHOT PARAMETER

Parameter	Default	Description/Values
format	jpeg	<p>Specifies the image format: yuv, jpg</p> <p>When saving in jpg format, you can specify the desired image quality.</p> <p><b>NOTE:</b> YUV snapshots always have the best possible quality but take the most amount of space.</p>
quality	100	<p>Specifies the desired image quality from 1 (lowest) to 100 (highest). 1..100</p> <p><b>NOTE:</b> This setting only applies for jpg snapshots.</p>
location	Internal Flash	<p>Specifies the storage location, either:</p> <ul style="list-style-type: none"> <li>flash - Internal on-board NAND flash</li> <li>ssd - SATA Solid State Drive</li> <li>sd - Secure Digital card</li> <li>usb - Universal Serial Bus Mounted media</li> <li>nfs - Network file system</li> </ul>

Parameter	Default	Description/Values (Cont.)
maxsize	100 MB	(Users must be assigned Administrator role) Specifies the amount of storage in MB available to snapshots. -1, 0..4096 <ul style="list-style-type: none"> <li>• 0 disables the snapshot feature.</li> <li>• -1 is used for unlimited storage and is only available on NFS.</li> </ul>
thumbnails	on	When set to On, enables thumbnail generation for snapshots. on,off

## SNAPSHOT EXAMPLES

```
# snapshot 0 take format=jpg filename=mysnapshot.jpg quality=80
Takes a single image snapshot (immediately) in JPEG 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 location=ssd
Sets the snapshot storage location to an SSD.
```

```
# snapshot set thumbnail=off
Disables thumbnail generation for snapshots.
```

```
# snapshot get
Returns the current system-wide settings for the snapshot format, for example:
Current Defaults:
Format           : JPEG
Quality          : 100
Thumbnails       : On
Storage Device   : Internal Flash
Max Storage      : 100MB
```



```
# snapshot list
Lists the contents of the snapshot folder:
Snapshot Files (in /usr/share/haivision/snapshots/):
  snap-2015-05-01-11h58m15s.jpg  (BUSY)
  snap-2015-05-01-11h58m39s.jpg  (BUSY)
  snap-2015-05-01-12h00m25s.jpg  (BUSY)
  snap-2015-05-01-12h03m19s.jpg  (BUSY)

4 snapshot files are available.
5.90MB (5%) of snapshot disk storage space used.
```

### Related Topics

- [Capturing Image Snapshots](#) on page 162
- [Managing Snapshot Storage Locations](#) on page 204

## still

### SYNOPSIS

still list  
still delete <filename>

### DESCRIPTION

The still command is used to manage available still image files on the Makito X 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 X file system.

Static images may be used to replace the “real” video stream when streaming is paused. You can then configure a Makito X stream with a static image using the `stream set` command with the parameter `[stillimage=fname]`.



**NOTE** You can convert the image file either using the [mkstill](#) command, or from the Web interface ([STILL IMAGES](#) page, see [“Configuring Still Image Streaming”](#) on page 165).

### ACTIONS

list	Lists the available still image files in <code>/usr/share/haivision/still_images</code>
delete	Deletes a still image file

### STILL EXAMPLE

```
# still delete myimage.mp4  
Deletes the image file myimage.mp4
```

### Related Topics

- [mkstill](#) on page 303
- [stillimage](#) on page 347

## storage

### SYNOPSIS

```
storage device command [options] [parameters]
device = ssd, usb, sd
command = format, mount, eject, restart
```

### DESCRIPTION

The storage command is used to manage storage devices on the Makito X with Storage dual-height model. This includes formatting and ejecting storage drives.

To display available storage devices use storage list.

### OPTIONS

```
-f      --force      Never prompt for confirmation.
-v      --verbose    Display output from low level commands.
```

### ACTIONS

```
list          Displays available storage devices for the encoder.
```

### STORAGE PARAMETERS

Parameter	Default	Description/Values
device	n/a	Specifies the device type, either: ssd, usb, sd
command	n/a	Specifies the command, either: format, mount, eject, restart Available format command parameter qualifiers are: <ul style="list-style-type: none"> <li>fs = ext4, ntfs, fat32, exfat</li> <li>label = volumename</li> </ul> The SSD drive can only be formatted as ext4. The USB drive will be formatted as ntfs by default. <b>NOTE:</b> The Makito X does not support formatting of SD drives.

## STORAGE EXAMPLES

```
# storage usb eject  
Ejects the installed USB storage device.
```

```
# storage usb format  
Formats the USB drive as ntfs by default.
```

```
# storage list  
Displays a list of available storage devices, for example:  
Device      Size      Used      Available  Use%  Type  Volume  
ssd         229.2G   14.0G    203.5G    6%   ext4  
usb         --       --       --        --   --  
sd          59.9G   104.1M   59.8G    0%   exfat
```

## Related Topics

- [Managing External Storage](#) on page 168
- [Managing Storage Drives](#) on page 196

## stream

### SYNOPSIS

```
stream create [type=tx] [name=text] [id=number]
  [addr=ipaddr] [port=udpport]
  [encapsulation=ts-rtp | ts-udp | direct-rtp | rtmp] [start=yes,no]
  [ttl=64] [tos=0xB8] [mtu=1496]
  [videosrc=id/name] [audiosrc=id/name[,id/name,id/name]]
  [datasrc=id/name[,id/name,id/name]]
  [stillimage=fname]
  [shaping=yes,no [ceiling=percentage] [idlecells=yes,no] [delayaudio=
  yes,no]]
  [datacarriage=sync]
```

Possible encapsulation formats and their specific options:

```
ts-rtp: MPEG2 transport stream over RTP
  [rtcp=on [rtcpport=udpport]]
  [fec=yes,no] [rows=10] [columns=10] [level=A, B] [alignment =yes, no]
ts-udp: MPEG2 transport stream over UDP (no RTP header)
  [fec=yes,no]
direct-rtp: RFC3984
  [rtcp=on [rtcpport=udpport]]
rtmp: Real-time messaging protocol
  [publish=streampubname] [username=uname] [password=pwd]
ts-srt: MPEG2 transport stream over SRT
  [mode=caller, listener, rendezvous] [sourceport=udpport]
  [encryption=none, AES128, AES256] [passphrase="My PassPhrase"]
  [latency=125] [overhead=percentage]
```

Parameters available for all ts-based streams:

```
[videopid=pid] [audiopid=pid[,pid,pid]] [datapid=pid]
[pcrpid=pid] [pmtpid=pid]
[program=num] [tsid=id]
```

Possible methods of KLV data carriage:

```
sync: synchronous metadata AU (ISO/IEC 13818-1)
async: asynchronous private data (SMPTE RP 217)
async-syncau: asynchronous private data carrying sync metadata AU
```

```
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.

The `type` parameter only needs to be specified when creating a stream that will be used solely for recording and not sent on any network. For that specific use, use `type=recorder` and simply specify the content sources.

(Makito X HEVC only) To create an HEVC stream, specify 4 or 5 instead of 0 to 3 for the `videosrc` id.

When creating a stream you can specify a unique id to assign to it or let the system assign one for you. You can also specify a name for the stream if needed. Most commands will accept the stream id or name in order select the proper stream to manage.

When a stream has started, you may either pause or stop it. The main difference between pausing and stopping a stream is that when a stream is paused, the configured still image will be streamed instead of the configured video source. For more information, see [“Configuring Still Image Streaming”](#) on page 165.

## ACTIONS

create	Creates a streaming session from the encoder. A series of one or more <code>parameter=value</code> pairs can be specified at once.
start	Starts the specified stream ID or name. <b>NOTE:</b> By default, a stream will start immediately since <code>start=yes</code> by default. To delay the start of a stream, include the parameter <code>start=no</code> .
stop	Stops the specified stream ID or name.
pause	Pauses the specified stream ID or name. <b>NOTE:</b> If configured, a still image will be streamed instead of the configured video source. See <a href="#">“stillimage”</a> on page 347.
resume	Resumes the specified stream ID or name.
delete	Deletes the specified stream ID or name.
get	Gets stream status information. See <a href="#">stream Parameters</a> below. You can specify a stream or all streams. <b>TIP:</b> To display a summary of all the streams in a table format, you can use <code>stream all get table</code> .

clear            Clears all active sessions on the encoder.  
help             Displays usage information for the stream command.

## STREAM PARAMETERS

Parameter	Default	Description/Values
type	tx	The stream type, either transport stream or recorder. <b>NOTE:</b> type only needs to be specified when creating a stream that will be used solely for recording and not sent on any network. For that specific use, use <code>type=recorder</code> and simply specify the content sources.
addr	n/a	The destination IP address. Enter an IP address in dotted-decimal format. For multicast addresses, see <a href="#">IMPORTANT</a> on page 349.
port	n/a	The destination UDP port. Enter a number in the range 1025..65,535. Note that RTP streams use <i>even numbers only</i> within this range.
<b>Optional stream Parameters</b>		
id	n/a	A unique number assigned to the stream. <b>NOTE:</b> 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 <code>rtcp</code> 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, <code>rtcp</code> must be On) The destination UDP port for the RTCP session.

Parameter	Default (Cont.)	Description/Values (Cont.)
ttl	64	(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 is 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.
		<ul style="list-style-type: none"> <li>ts-rtp - MPEG2 transport stream over RTP</li> </ul>
		<ul style="list-style-type: none"> <li>ts-udp - MPEG2 transport stream over UDP (no RTP header)</li> </ul>
		<ul style="list-style-type: none"> <li>ts-srt - MPEG2 transport stream over SRT (see <a href="#">“Configuring Secure Reliable Transport (SRT)”</a> on page 133)</li> </ul>
		<ul style="list-style-type: none"> <li>direct-rtp - (H.264 only) RFC3984</li> </ul>
		<ul style="list-style-type: none"> <li>rtmp - (H.264 only) Streams to a Flash Media Server or Content Delivery Network (see <a href="#">“CDN and Flash Interoperability (RTMP)”</a> on page 135).</li> </ul>
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*	<p>(Optional) The video source. id/name For H.264, the id is either 0, 1, 2, or 3 (corresponding to the encoder instance number in the Web interface). For HEVC encoders, two additional ids of 4 and 5 are available and should be used to stream HEVC-encoded video.</p> <p><b>NOTE:</b> *By default, if you don't specify the source, the stream uses video encoder 0 and audio encoder 0 for a TS stream (UDP or RTP), and video encoder 0 for DirectRTP and other encapsulations.</p> <p>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 automatically uses 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.</p> <p><b>TIP:</b> Combined <a href="#">videosrc/audiosrc/datasrc</a> status shown under Contents in return output.</p>
audiosrc	0*	<p>(Optional) The audio source. id/name The id is either 0, 1, 2, 3, 4, 5, 6, or 7. See also <b>NOTE:</b> and <b>TIP:</b> above (for <a href="#">videosrc</a>).</p> <p><b>NOTE:</b> To configure multi-track audio TS streams (TS over UDP or RTP), you can put more than one <code>audiosrc</code> (audio encoder) in the stream. See "<a href="#">stream Examples</a>" on page 349.</p> <p><b>IMPORTANT:</b> Audio sources should always be associated with the same video interface for the dual channel SDI encoder. (See <a href="#">page 127</a> in "<a href="#">Setting Up Streaming</a>".)</p>
datasrc	n/a	<p>(Optional) The metadata source. id/name (0=serial, 1 or 2=SDI; all others are UDP) See "<a href="#">metadata</a>" on page 293 to determine the ID mappings.</p> <p><b>NOTE:</b> To stream metadata from multiple sources into the same KLV Elementary Stream, use multiple comma separated metadata source id/names to indicate the metadata source ES IDs to be multiplexed in the stream. e.g.: stream create .... data=1,2</p>

Parameter	Default (Cont.)	Description/Values (Cont.)
videopid	33	(Optional) Video Packet Identifier. 16..8190
audiopid	36	(Optional) Audio Packet Identifier. 16..8190 For MPEG-2 TS streams, the audio PIDs for each audio source can be assigned explicitly. The order of PID assignment is the same as the audiosrc parameters. e.g.: audiosrc=0,1,3 audiopid=64,65,66 will result in the audio elementary stream from audio source 0 being assigned an elementary PID of 64, etc.
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
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. <b>NOTE:</b> 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 <a href="#">mkstill</a> command, or the Web interface <a href="#">STILL IMAGES</a> page (see “ <a href="#">Configuring Still Image Streaming</a> ” on page 165). Still Image insertion when pausing a stream is <i>not</i> supported when a HEVC/H.265 video encoder is selected as a content source.

Parameter	Default (Cont.)	Description/Values (Cont.)
shaping	no	<p>(Optional) To enable Traffic Shaping for the stream, specify <code>shaping=yes</code>.</p> <p>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.</p> <p><b>NOTE:</b> Using Traffic Shaping on streams above 7Mbps will create audio/video artifacts.</p>
ceiling	n/a	<p>(Optional, <a href="#">shaping</a> must be <code>yes</code>) The percentage of network bandwidth beyond the average rate that the encoder is allowed to use if needed. This is used to set the ceiling bandwidth range. 5..100%, default = 15</p> <p><b>NOTE:</b> To configure the ceiling percentage for CBR streams with metadata, see <a href="#">“Bandwidth Overhead for CBR Streams with Metadata”</a> on page 132.</p>
idlecells	no	<p>(Optional, <a href="#">shaping</a> must be <code>yes</code>) When enabled, Idle TS cells will be inserted into a TS stream when necessary. <code>yes,no</code></p>
delayaudio	no	<p>(<a href="#">shaping</a> and <a href="#">idlecells</a> must be <code>yes</code>) When enabled, delays the transmission of audio information to prevent MPEG-2 TS HRD main buffer overflows. Per reference decoder main audio buffer defined in IEC/ISO 13818-1/H.222.0. <code>yes,no</code></p>
datacarriage	sync	<p>Specifies the method of KLV data carriage:</p> <ul style="list-style-type: none"> <li><code>sync</code>: synchronous metadata AU (ISO/IEC 13818-1)</li> <li><code>async</code>: asynchronous private data (SMPTE RP 217)</li> <li><code>async-syncau</code>: asynchronous private data carrying sync metadata AU</li> </ul> <p>See <a href="#">“Data Carriage”</a> on page 138.</p>

Parameter	Default (Cont.)	Description/Values (Cont.)
publish	n/a	<p>(Optional when streaming to a Flash-based Content Delivery Network (CDN) using RTMP) Enter a Publish Name (512 characters maximum).</p> <p><b>NOTE:</b> A single Publish Name may be assigned to multiple streams, configured on separate servers or content distribution services, to provide redundancy and fail-over capability. The encoder will send multiple RTMP streams to different FMS servers using the same published name. If an FMS fails, the players will have the option of fail-over to the redundant FMS server.</p> <p><b>IMPORTANT:</b> When interoperating with Kaltura using RTMP, add a slash "/" at the end of the URL provided by Kaltura.</p> <p>See "<a href="#">CDN and Flash Interoperability (RTMP)</a>" on page 135.</p>
username	n/a	(Required when streaming to a CDN using RTMP) Enter the CDN login username.
password	n/a	(Required when streaming to a CDN using RTMP) Enter the CDN login password.
fec	no	<p>Enables Forward Error Correction (FEC). yes,no</p> <ul style="list-style-type: none"> <li>• Pro-MPEG FEC if <a href="#">encapsulation</a> is ts-rtp</li> <li>• VF FEC if <a href="#">encapsulation</a> is ts-udp</li> </ul> <p><b>NOTE:</b> VF FEC is a proprietary FEC and is not interoperable with devices outside of the Haivision family.</p>
<b>SRT</b> (see " <a href="#">Configuring Secure Reliable Transport (SRT)</a> " on page 133)		
latency	125	<p>Specifies the SRT receiver buffer that permits lost packet recovery. The size of this buffer adds up to the total latency. A minimum value must be 3 times the round-trip-time (RTT). Range = 20 - 8000 ms</p> <p><b>NOTE:</b> Latency is for the SRT protocol only and does not include the capture, encoding, decoding and display processes of the end-point devices.</p>
overhead	25%	<p>Specifies the maximum stream bandwidth overhead that can be used for lost packets recovery. Range = 5-100%</p>

Parameter	Default (Cont.)	Description/Values (Cont.)
encryption	none	Enables AES encryption and specifies the key length, either: none, AES-128, or AES-256
passphrase	n/a	(Only required and accepted if encryption is enabled) Specifies a string used to generate the encryption keys to protect the stream. Range = 10-79 UTF8 characters



**IMPORTANT** 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.

Returns the following confirmation and stream ID:

```
Stream created successfully - ID : 3
```

```
# stream create addr=192.0.2.235 port=1234 stillimage=haivision.mp4
```

Creates and starts a streaming session. Specifies a static image to replace the “real” video stream when streaming is paused.

```
# stream create addr=10.64.1.124 port=1234 encap=ts-udp videosrc=1
  audiosrc=1 datasrc=1,3
```

Creates and starts a multiple metadata streaming session.

```
# stream create addr=10.64.1.124 port=1234 encap=ts-udp videosrc=1
  audiosrc=0,2,4 audiopid=36,37,38
```

Creates a TS stream with multi-track audio using audio encoders 0, 2 and 4. The corresponding audio PIDs are 36, 37 and 38.

```
# stream 3 pause
```

Pauses the stream created above (stream ID 3), which activates the still image.

```
# stream 3 resume
```

Resumes the stream created above.

```
# stream create addr=192.0.2.235
  port=1234 vid=0 aud=0
# videnc 1 start
# audenc 1 start
# stream create addr=198.51.100.106
  port=1234 vid=1 aud=1
```

Creates two streams, the first using Video and Audio encoder 0, and the 2nd using Video and Audio encoder 1.

```
stream create addr=192.0.2.235 port=1234 videosrc=4 audiosrc=0
```

Creates an HEVC stream using video encoder 4.

```
# 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.
```

#### Related Topics

- [“Configuring Streaming Outputs”](#) on page 123
- [“Setting Up Streaming”](#) on page 125

## 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 to 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.

### Related Topics

- [Taking a System Snapshot](#) on page 175



## 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 X encoder's audio output to function like an audio decoder. See [“Audio Talkback”](#) on page 40.

The talkback is sent by a software player application (such as Haivision's InStream) to the Makito X, where it is played out of the encoder's 8-pin Mini-DIN connector. See [“Talkback Audio Format Specifications”](#) on page 355.

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 X 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 X, so the encoder handles the talkback sessions on a first-come first-serve basis. To prevent a single user from monopolizing the talkback, the InStream software player provides “push-to-talk” functionality, which requires that the talkback user physically push and hold a button to transmit audio. When the button is released, the talkback application stops sending audio. The Makito X 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 X is then ready to accept the session (talkback packets) from another device.

The Talkback network service may be stopped or started from the Web interface (Services page) or using the [service](#) command.

Talkback is not configurable through SNMP in the current release.



**TIP** It's a good idea to save your configuration if you are running Talkback in order to avoid having to restart Talkback after a reboot.

---

## 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

<pre># talkback start Starts reception of audio talkback on the Makito X.</pre>
<pre># talkback set volume=6 Sets the volume of the audio talkback to 6.</pre>
<pre># talkback get Returns audio talkback configuration, such as: Volume           : 10 UDP Port         : 9177</pre>
<pre># talkback get all Returns talkback configuration and statistics, such as: Configuration: Volume           : 10 UDP Port         : 9177 Statistics: State            : LISTENING Source Address   : 10.65.134.102 Received Packets : 1,087 Received Bytes   : 960,908 Last Received    : 2s ago</pre>

## Related Topics

- [Audio Talkback](#) on page 40

## Talkback Audio Format Specifications

Haivision's InStream software player provides a talkback audio stream to the encoder. The InStream player is available either with the Furnace IP Video System v6.x or as a mobile application. For more information, see the InStream User's Guide or the InStream Mobile (iOS or Android) Quick Start Guide available through Haivision's Download Center.

The following specifications are provided for customers or system integrators who choose to develop their own applications to send talkback audio to Haivision encoders:

1. Audio data in each payload is uncompressed PCM digitized audio. There is no encoding/decoding involved.
2. Transmitted over unicast UDP (right now only port # 9177) to the Makito X.
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 minimum. (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. The talkback service locks out all other talkback sources for 500 ms period during which time only a single identified source may be played.
10. Once an end-point has acquired the talkback interface, it maintains control of the talkback interface until audio is no longer streamed to the Makito X for 500 ms.
11. If the audio input is disconnected, the application does not need to send filler zero (silence) bytes, because talkback on the Makito X inserts zeros (silence) to maintain the output audio clock.
12. Talkback audio is output over the mono analog "Audio Out" connector on the Makito X encoder.

## temperature

### SYNOPSIS

temperature get

### DESCRIPTION

The temperature command is used to display the current temperature of the unit. If the internal temperature of the unit is rising, that is an indication that the fan may not be operating properly.

### 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   : 47 Celsius measured 0s ago
Maximum Temperature  : 48 Celsius measured
                       1d5h8m48s ago
Minimum Temperature  : 45 Celsius measured
                       1d5h37m7s ago
```

## transfer

### SYNOPSIS

```
transfer create [source=ssd] [dest=text] [file=txt][remove=yes,no]
transfer id/name/all start
transfer id/name/all delete
transfer id/name/all stop
transfer id/name/all get [config/stats/all]
```

### DESCRIPTION

The transfer command is used to manage exporting of files to an external storage location.

### ACTIONS

create	Creates a file transfer from the encoder. A series of one or more parameter=value pairs can be specified at once.
start	Starts the transfer.
delete	Removes the transfer.
stop	Stops the transfer.
get	Displays information about the transfer. See <a href="#">transfer Parameters</a> below. You can specify the config, status, or all.

### TRANSFER PARAMETERS

Parameter	Default	Description/Values
source	ssd	The source device: ssd only in the current release
dest	n/a	The destination ID or name from the pre-configured destination list, or usb, sd, or nfs
file	n/a	The name of the file to transfer.
remove	no	If yes, removes the source file if the transfer is successful.

## TRANSFER EXAMPLE

```
# transfer create dest=usb file=NewOne-2015-06-23-18
Transfer to copy small recording to USB (completed right away). Returns information
such as:
Transfer created successfully - ID: 1.
admin@X-STORAGE-2:~$ transfer 1 get all
Transfer ID      : 1
Name            : (None)
Configuration:
  Source         : SSD
  Destination Device : USB
  File           : NewOne-2015-06-23-18h18m00s.mp4
  Remove Source File: No
Status:
  Status         : SUCCESS
  Transfer Type  : COPY
  Transferred    : 100%
  Start Time     : 2015-6-23 18:29:37
  End Time       : 2015-6-23 18:29:39
```

```
# transfer create dest=1 file=Stream#1-2015-06-22-18h02m56s.mp4
Transfer using a preconfigured FTP destination (ID=1) to export a larger file. Returns
information such as:
Transfer created successfully - ID: 2.
admin@X-STORAGE-2:~$ transfer 2 get all
Transfer ID      : 2
Name            : (None)
Configuration:
  Source         : SSD
  Destination ID  : 1
  File           : Stream#1-2015-06-22-18h02m56s.mp4
  Remove Source File: No
Status:
  Status         : IN PROGRESS
  Transfer Type  : FTP
  Transferring File : /mnt/storage1/recordings/Stream#1-2015-06-22-
18h02m56s.mp4
  Start Time     : 2015-6-23 18:31:7
```

## Related Topics

- [Managing File Transfer History](#) on page 206

## tzconfig

### SYNOPSIS

tzconfig

### DESCRIPTION

The `tzconfig` command is used to configure the timezone on the encoder. `tzconfig` displays the current timezone and prompts you to change the timezone (Y,N).

To change the timezone, type Y and follow the prompts for information about the current location. When you have completed your selections, the encoder saves the newly configured time zone information

### TZCONFIG EXAMPLE

```
# tzconfig
Please identify a location so that time zone rules can be set correctly.

Please select a continent or ocean.

1) Africa
2) Americas
3) Antarctica
...
$? 2

Please select a country.

1) Antigua & Barbuda 2) Anguilla 3) Netherlands Antilles 4) Argentina 5)
  Aruba 6) Barbados
7) Bolivia 8) Brazil 9) Bahamas
10) Belize 11) Canada 12) Chile
...
$? 11

Please select one of the following time zone regions

1) St_Johns 2) Halifax 3) Glace_Bay
4) Goose_Bay 5) Montreal 6) Toronto
...
$? 5
```

## Related Topics

- [date](#) on page 271
- [dtconfig](#) on page 276



## 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, 1, 2, or 3) or all.

(Makito X HEVC only) The HEVC encoder uses ID 4 and 5.

### ACTIONS

start	Activates encoding of the video input.
stop	Stops (mutes) encoding of the video input.
set	Configures encoder video parameter(s). A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">videnc Parameters</a> below.
get	Displays encoder video status information. You can specify to display the configuration (config), stats, or all. <b>TIP:</b> To display a summary of all the encoders in a table format, you can use <code>videnc all get table</code> .
clear	Clears the encoder's statistics.
reset	Resets the encoder.
help	Displays usage information for the <code>videnc</code> command.

## VIDENC PARAMETERS

Parameter	Default	Description/Values
input		(SDI Dual-BNC only) The Video Input port for the encoder:
SDI		<ul style="list-style-type: none"> <li>• BNC1</li> <li>• BNC2</li> </ul>
timecode	None	<p>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:</p> <ul style="list-style-type: none"> <li>• <b>None:</b> No time code will be inserted in the video stream (saves bandwidth if not required).</li> <li>• <b>Video:</b> The timecode will be extracted from the incoming video signal.</li> <li>• <b>System:</b> If no timecode is included in the video feed, the encoded timecode is based on the encoder’s system clock.</li> </ul> <p>In this case, it is a good idea to enable NTP (see <a href="#">“Configuring Network Settings”</a> on page 183).</p> <p><b>NOTE:</b> See <a href="#">“TimeCode Source”</a> on page 100 for currently supported TimeCode features.</p>
aspectratio	Auto	<p>Specifies the aspect ratio of the video source and signals it into the MPEG stream:</p> <ul style="list-style-type: none"> <li>• <b>Auto:</b> Aspect ratio is derived from the incoming video source resolution.</li> <li>• <b>3:2, 4:3, 5:3, 5:4, 16:9, 16:10, 17:9:</b> Forces aspect ratio to specified value.</li> <li>• <b>WSS/AFD:</b> Extracts aspect ratio from incoming video source based on WSS (Wide Screen Signaling) or AFD (Active Format Description) if detected.</li> </ul> <p><b>NOTE:</b> WSS is only supported with analog PAL video; AFD is only supported with SD-SDI video.</p>
bitrate	6000 kbps	<p>The Video Raw Elementary Stream bitrate (kbps):</p> <ul style="list-style-type: none"> <li>• 32..25000</li> </ul>

Parameter	Default (Cont.)	Description/Values (Cont.)
resizemode	Scale	<p>By default, input is scaled to the output resolution.</p> <ul style="list-style-type: none"> <li>• Scale: Input is scaled to output resolution.</li> <li>• Crop: This setting crops the input and encodes to a rectangle within the input image (at the center of the image) while discarding the rest of the input image. The output resolution is the portion of the input that is encoded from the center. This may be done instead of downscaling.</li> </ul> <p><b>NOTE:</b> Available only if <a href="#">resolution</a> is not Auto 960, or 1440.</p> <p>For more information, see <a href="#">“Cropping”</a> on page 94.</p>
gopsize	120	<p>The Group of Pictures size for the encoded video. 1..1000</p> <p><b>NOTE:</b> For intra-refresh mode, the GOP size is the number of frames between the sequence and picture parameter set NAL transmission.</p>
gopstructure	IP	<p>The GOP structure for the encoded video: (See <a href="#">“Framing”</a> on page 95)</p> <ul style="list-style-type: none"> <li>• I: I frames only (lowest delay; lowest quality)</li> <li>• IP: I and P frames only</li> <li>• IBP: I, B and P frames (H.264 only)</li> <li>• IBBP: I, BB (two B frames in sequence) and P frames (highest delay; highest quality) (H.264 only)</li> </ul> <p><b>NOTE:</b> B frames require a Main Profile decoder.</p> <p>B frames provide more quality as the encoding is more efficient; thus more details can be rendered in the same bandwidth/bitrate.</p>

Parameter	Default (Cont.)	Description/Values (Cont.)
entropycoding	CAVLC	<p>Select the compression scheme:</p> <ul style="list-style-type: none"> <li>• <b>CAVLC:</b> Context-adaptive Variable-length Coding is a lower-complexity alternative to CABAC. CAVLC produces lower quality, but is easier to decode.</li> <li>• <b>CABAC:</b> Context-adaptive Binary Arithmetic Coding is an algorithm to losslessly compress syntax elements in the video stream. CABAC compresses data more efficiently than CAVLC and should produce better quality, but requires considerably more processing to decode.</li> </ul> <p><b>NOTE:</b> The H.264 decoder must be Main Profile compliant or higher to decode a CABAC video stream.</p> <p><b>TIP:</b> Generally, you get better visual quality if you are using CABAC because it is more efficient.</p>
partitioning	Off	<p>Enables or disables Intra-Picture Sub-Partitioning. <i>On,Off</i></p> <p>Intra-Partitioning is a setting that allows the use of a sub-macroblock partition called the “Intra8x8 block” with all the intra-prediction modes associated with it.</p> <p><b>NOTE:</b> Intra-Partitioning requires that the H.264 decoder be High Profile compliant. Generally, you get better visual quality if you enable Intra-Partitioning because it gives the video encoder better coding tools.</p> <p><b>TIP:</b> Noisy Matrix completion is enabled automatically when Partitioning is enabled and video bitrate is under 800 Kbps. Noisy Matrix completion enhances video image “noise” reduction to improve video quality at lower bitrates and make blocky artifacts less visible.</p>

Parameter	Default (Cont.)	Description/Values (Cont.)
intrarefresh	Off	<p>Enables or disables Intra-refresh video encoding support. On,Off</p> <p>Intra-refresh is a video encoding mode of operation in which no distinct IDR frame is sent in the video elementary stream. Instead, the macro-blocks that make up the IDR frame are sent gradually within a certain time so that the entire video reference frame is re-built (at the decoder) within the number of frames specified by the <a href="#">refreshrate</a> parameter. Intra-refresh minimizes latency, smooths the video bitrate, and minimizes GOP pulsing artifacts.</p> <p><b>TIP:</b> Intra-refresh requires that the decoder and streams be started first.</p>
refreshrate	60	<p>Specifies the number of frames over which the entire picture is refreshed. 1..5000</p> <p><b>NOTE:</b> If the refresh rate is set too low, a left-to-right wave-like artifact may result.</p>
skipframes	Off	<p>This parameter permits the dropping of frames to improve video quality at lower bitrates. Off, On</p> <p>For more information, see <a href="#">“Partial Image Skip”</a> on page 97.</p>
picrate	Auto	<p>The video frame rate per second:</p> <ul style="list-style-type: none"> <li>• Auto: Encodes at the same frame rate as the input</li> <li>• 1..60</li> </ul>
closedcaption	Off	<p>This parameter enables Closed Captioning on the encoder stream. Off, On</p> <p><b>NOTE:</b> For more information, see <a href="#">“Closed Captioning”</a> on page 395.</p>
ptsoffset	50 ms.	<p>Offset video timestamps by this value in ms. -1000..1000</p>

Parameter	Default (Cont.)	Description/Values (Cont.)
resolution	Auto	<p>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.</p> <ul style="list-style-type: none"> <li>• Auto (output resolution is the same as the input)</li> </ul>
		<ul style="list-style-type: none"> <li>• 1080p, 1920x1080p</li> <li>• 1080i, 1920x1080i</li> <li>• 1440x1080p</li> <li>• 1440x1080i</li> <li>• 960x1080p</li> <li>• 960x1080i</li> <li>• 720p, 1280x720</li> <li>• 960x720</li> <li>• 640x720</li> </ul>
	n/a	<ul style="list-style-type: none"> <li>• 480p, 720x480p</li> <li>• 480i, 720x480i</li> <li>• 576p, 720x576p</li> <li>• 576i, 720x576i</li> <li>• 540x480p</li> <li>• 540x480i</li> <li>• 704x576p</li> <li>• 704x576i</li> <li>• 540x576p</li> <li>• 540x576i</li> <li>• 352x480p</li> <li>• 352x480i</li> <li>• 352x576p</li> <li>• 352x576i</li> <li>• 352x288p</li> <li>• 352x288i</li> </ul>

Parameter	Default (Cont.)	Description/Values (Cont.)
RGB	n/a	<ul style="list-style-type: none"> <li>• WUXGA, 1900x1200</li> <li>• UXGA, 1600x1200</li> <li>• WSXGA, 1680x1050</li> <li>• HD+, 1600x900</li> <li>• SXGA+, 1400x1050</li> <li>• WXGA+, 1440x900 1360x768</li> <li>• SXGA, 1280x1024</li> <li>• WXGA, 1280x768</li> <li>• XGA, 1024x768</li> <li>• SVGA, 800x600</li> <li>• VGA, 640x480</li> </ul>
		<b>NOTE:</b> See <a href="#">"Video Encoding"</a> on page 375.

## 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=
BNC-1
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          : BNC-1
Video Format          : Auto-Detect
Aspect Ratio         : Auto-Detect
Time Code            : VIDEO
Video Bitrate        : 6000 kbps
Video GOP Size       : 120
Encoded Picture Rate : Input/Auto
Output Resolution    : Input/Auto
Closed Captioning    : Off
Video GOP Structure  : IP
Video Entropy Coding : CAVLC
Picture Partitioning : Off
Intra Refresh        : On
Refresh Rate         : 60
```

```
# videnc 0 get stats
```

Returns encoder statistics:

```
Encoder ID           : 0
Name                 : "HD Video Encoder 0"
Statistics:
State                : WORKING
Uptime               : 21h8m28s
Input Present        : Yes
Input Type           : SDI
Input Format          : 1280x720p59
Output Resolution    : 1280x720p
Input Aspect Ratio   : 16:9
```



```
Encoded Frames           : 2,148,020
Encoded Bytes           : 2,326,715,604
Encoded Frame Rate      : 30
Dropped Frames          : 2
Encoded Bitrate         : 5,994 kbps
Encoder Resets          : 2
Encoder PTS             : 0x1708c8ce8
Encoder Load            : 14%
Closed Captioning       : Disabled
Timecode Source         : SYSTEM
Timecode                : 20:18:48:07
Source Switches         : 5
UTC                     : 1386188328244254 (2013-Dec-4-
                        20h18m48s244254us)
H.264 Profile           : Main
H.264 Level             : 4
```

#### Related Topics

- [Configuring Video Encoders](#) on page 87

## vidin

### SYNOPSIS

vidin ID get  
vidin ID set  
vidin ID clear

### DESCRIPTION

The vidin command is used to view and manage video input parameters.

ID is used to select the video input on dual channel encoders (either 0 for BNC-1 or 1 for BNC-2 on #S/B-292E-HDSDI2).

ID is optional on single input encoders such as the #S/B-292E-HDSDI1 and the #S/B-292E-DVI. If entered, only 0 will be accepted.

### ACTIONS

get	Displays information on the video input.
set	Configures video input parameter(s). See <a href="#">vidin Parameters</a> below.
clear	Clears the video input's statistics.
help	Displays usage information for the vidin command.

### VIDIN PARAMETERS

Parameter	Default	Description/Values
interface	Auto	The type of Video Input for the encoder:
DVI		<ul style="list-style-type: none"> <li>• Auto</li> <li>• Digital</li> <li>• Component</li> </ul>
SDI		<ul style="list-style-type: none"> <li>• Auto: auto-detect from the video source</li> <li>• SDI</li> <li>• Composite</li> </ul>

## VIDIN EXAMPLE

```
# vidin 0 get
Returns video input information for the encoder:
Input ID           : 0
Name               : "BNC-1"
State              : ACTIVE
Configured Type    : Auto-Detect
Input Type         : SDI
Input Format       : 1280x720p59
Frame Rate        : 60
Output Buffers     : 9
Captured Frames   : 961,721
Dropped Frames     : 776
Last Dropped Frame : 49m51s ago
Lock Status Changes : 33
Last Status Change : 49m50s ago
```

```
# vidin 0 set interface=SDI
Sets the video input to SDI.
```

## Related Topics

- [Video Encoder Settings](#) on page 92

# Appendix B: Technical Specifications

This appendix lists the technical specifications for the Makito X encoder.



**NOTE** References to the “Makito X” can be taken to include all Makito X SDI and Makito X DVI interfaces unless specifically stated otherwise. For the list of available interfaces, see [“Introduction”](#) on page 19.

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## Audio/Video Interfaces

Video Inputs		
Makito X DVI (#S/B-292E-DVI)		
Y,Pb,Pr / RGBHV		Component Analog video. Also supporting: <ul style="list-style-type: none"> <li>• RGB with external SYNC (HSYNC &amp; VSYNC)</li> <li>• RGB with SYNC on Green (RsGB)</li> </ul>
Y,Cb,Cr / DVI		Component Digital video
Makito X SDI (#S/B-292E-HDSDI2 or #S/B-292E-HDSDI1) Makito X HEVC (#S/B-292E-SDI2-HEVC or #S/B-292E-SDI1-HEVC) Makito X Harsh Environment SDI (#S-292E-X2H or #S-292E-X1H) Makito XR (Ruggedized) SDI (#S-292E-X2R or #S-292E-X4R)		
Composite NTSC/PAL/PAL-M		RS-170 RS-170A CCIR
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 <sup>1</sup>	SMPTE-424M (Level A only)	3 Gbps interface
	SMPTE-425M	1080p60 video format
Impedance		
DVI-I		100 Ohms
DVI-A		75 Ohms
SDI		75 Ohms

1. 3G-SDI is not supported on the Makito X4R (#S-292E-X4R).

Audio Inputs
Makito X DVI (#S/B-292E-DVI)
<ul style="list-style-type: none"> <li>• Two analog audio channels per blade.</li> <li>• The DVI interface supports two channels of embedded audio (channels 1 &amp; 2).</li> </ul>
Makito X SDI (#S/B-292E-HDSDI2 or #S/B-292E-HDSDI1) Makito X HEVC (#S/B-292E-SDI2-HEVC or #S/B-292E-SDI1-HEVC) Makito X Harsh Environment SDI (#S-292E-X2H or #S-292E-X1H) <sup>1</sup>
<ul style="list-style-type: none"> <li>• Two analog audio channels per blade.</li> <li>• Up to 16 channels of embedded audio per blade, in channel pair groups. The channel pair sources are:                sdi1ch1&amp;2, sdi1ch3&amp;4, sdi1ch5&amp;6 ... sdi1ch15&amp;16                sdi2ch1&amp;2, sdi2ch3&amp;4, sdi2ch5&amp;6 ... sdi2ch15&amp;16  <b>NOTE:</b> SDI2 audio inputs are only available on dual-BNC systems (#S/B-292E-HDSDI2).</li> </ul>
Available through mini-DIN-8 locking connector: <ul style="list-style-type: none"> <li>• Balanced stereo analog audio</li> <li>• Unbalanced stereo analog audio (Line Level)</li> <li>• Audio Talkback</li> </ul>
Digital Embedded Audio <ul style="list-style-type: none"> <li>• SD-SDI: SMPTE-272M</li> <li>• HD/3G-SDI: SMPTE 299M</li> </ul>
Stereo Analog Audio Inputs <ul style="list-style-type: none"> <li>• Level: Adjustable from 6 to 20dBu</li> <li>• Impedance: 24 KOhms Single Ended (Unbalanced) / 48 KOhms Differential (Balanced)</li> </ul>
Analog Audio Output (Talkback) <ul style="list-style-type: none"> <li>• Level: 2.2 dBu (1Vrms)</li> <li>• Impedance: 100 Ohms</li> </ul>

1. Support for analog and embedded audio capture or encoding is not currently provided for the Makito X Ruggedized (#S-292E-X2R or #S-292E-X4R)

## Video Encoding

Video Encoding – H.264 AVC/H.265 HEVC (MPEG-4 Part 10)																																	
DVI Input Resolutions / Scan Rates	<table> <tr><td>1920x1200</td><td>60 Hz</td></tr> <tr><td>1680x1050</td><td>60 Hz</td></tr> <tr><td>1600x1200</td><td>60 Hz</td></tr> <tr><td>1600x900</td><td>60 Hz</td></tr> <tr><td>1440x900</td><td>75, 60 Hz</td></tr> <tr><td>1400x1050</td><td>75, 60 Hz</td></tr> <tr><td>1360x768</td><td>60 Hz</td></tr> <tr><td>1280x1024</td><td>75, 60 Hz</td></tr> <tr><td>1280x800</td><td>85, 75, 60 Hz</td></tr> <tr><td>1280x768</td><td>85, 75, 60 Hz</td></tr> <tr><td>1152x864</td><td>75 Hz</td></tr> <tr><td>1024x768</td><td>85, 75, 60 Hz</td></tr> <tr><td>800x600p</td><td>85, 75, 60 Hz</td></tr> <tr><td>720x576p</td><td>50 Hz</td></tr> <tr><td>720x480p</td><td>60/59.94 Hz</td></tr> <tr><td>640x480p</td><td>85, 75, 60 Hz</td></tr> </table> <p><b>NOTE:</b> The DVI interface also supports all the <a href="#">SD/HD/3G-SDI Input Resolutions</a>.</p>	1920x1200	60 Hz	1680x1050	60 Hz	1600x1200	60 Hz	1600x900	60 Hz	1440x900	75, 60 Hz	1400x1050	75, 60 Hz	1360x768	60 Hz	1280x1024	75, 60 Hz	1280x800	85, 75, 60 Hz	1280x768	85, 75, 60 Hz	1152x864	75 Hz	1024x768	85, 75, 60 Hz	800x600p	85, 75, 60 Hz	720x576p	50 Hz	720x480p	60/59.94 Hz	640x480p	85, 75, 60 Hz
1920x1200	60 Hz																																
1680x1050	60 Hz																																
1600x1200	60 Hz																																
1600x900	60 Hz																																
1440x900	75, 60 Hz																																
1400x1050	75, 60 Hz																																
1360x768	60 Hz																																
1280x1024	75, 60 Hz																																
1280x800	85, 75, 60 Hz																																
1280x768	85, 75, 60 Hz																																
1152x864	75 Hz																																
1024x768	85, 75, 60 Hz																																
800x600p	85, 75, 60 Hz																																
720x576p	50 Hz																																
720x480p	60/59.94 Hz																																
640x480p	85, 75, 60 Hz																																
SD/HD/3G-SDI Input Resolutions	<table> <tr><td>1920x1080p</td><td>60/59.94/50/30/29.97/25/24/23.98 Hz</td></tr> <tr><td>1920x1080i</td><td>60/59.94/50 Hz</td></tr> <tr><td>1280x720p</td><td>60/59.94/50/30/29.97/25 Hz</td></tr> <tr><td>720x480i</td><td>60/59.94 Hz</td></tr> <tr><td>720x576i</td><td>50 Hz</td></tr> </table> <p>*Interlaced shown in fields per second.</p> <p><b>NOTE:</b> For supported video encoding resolutions, see table on <a href="#">page 377</a>.</p>	1920x1080p	60/59.94/50/30/29.97/25/24/23.98 Hz	1920x1080i	60/59.94/50 Hz	1280x720p	60/59.94/50/30/29.97/25 Hz	720x480i	60/59.94 Hz	720x576i	50 Hz																						
1920x1080p	60/59.94/50/30/29.97/25/24/23.98 Hz																																
1920x1080i	60/59.94/50 Hz																																
1280x720p	60/59.94/50/30/29.97/25 Hz																																
720x480i	60/59.94 Hz																																
720x576i	50 Hz																																
Video Bitrates H.264	SD/HD from 32 kbps to 25 Mbps																																
HEVC	SD/HD from 32 kbps to 15 Mbps																																
Rate Control	Variable (VBR) Constant bit rate (CBR) <p><b>NOTE:</b> Enabling Partial Image Skip constrains the bitrate generated by the encoder. See <a href="#">“Partial Image Skip”</a> on page 97.</p>																																

Video Encoding – H.264 AVC/H.265 HEVC (MPEG-4 Part 10) (Cont.)	
Encoding Latency	<p>Less than 55ms (H.264, encoder only) Less than 45ms (HEVC, encoder only)</p> <p><b>NOTE:</b> Encoding latency refers to the time delay between capture of a frame and the instant when the frame is encoded and ready for transmission.</p>
Compression Standards H.264	<ul style="list-style-type: none"> <li>• H.264/AVC (MPEG-4 part 10)</li> <li>• ISO/IEC 14496-10</li> <li>• Baseline, Main, and High Profiles</li> <li>• Up to Level 4.2 and lower Intermediate Levels</li> <li>• I, IP, IBP, and IBBP framing</li> <li>• Configurable Group of Picture (GOP) size</li> <li>• Configurable frame rate</li> <li>• Region of interest coding</li> </ul>
HEVC (with supported hardware)	<ul style="list-style-type: none"> <li>• H.265/HEVC</li> <li>• ISO/IEC 23008-2</li> <li>• Up to Level 4.2 and lower Intermediate Levels</li> <li>• IP framing</li> <li>• Configurable Group of Picture (GOP) size</li> <li>• Configurable frame rate</li> <li>• Deblocking filter</li> <li>• Main Profile</li> <li>• Up to Level 4.1 (1080p60 @ 15 Mbps)</li> </ul>
Macro-block processing limitation	<p>(H.264 only) The aggregate pixel processing power for all video encoding engines cannot exceed 3 x 1080p60 or 1,468,800 macro-blocks per second.</p>
Video Encoding Limits	<ul style="list-style-type: none"> <li>• Up to 3x1080p60 H.264</li> <li>• Up to 1x1080p60 HEVC</li> </ul>



## Supported H.264 Video Encoding Input and Downscale Resolutions

ENCODED OUTPUT RESOLUTIONS		INPUT RESOLUTIONS AND FRAME RATES																	
		1080p						1080i		720p						480i	480P*	576i	576p*
Name	Resolution	60 / 59.94	30 / 29.97	50	25	24	23.98	30 / 29.97	25	60 / 59.94	30 / 29.97	50	25	24	23.98	30 / 29.97	60 / 59.94	25	50
HD 1080p	1920x1080p	2	4	2	4	4	4	4	4	-	-	-	-	-	-	-	-	-	-
HD 1080i	1920x1080i	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	-
3/4 HD 1080p	1440x1080p	2	3	2	3	3	3	4	4	-	-	-	-	-	-	-	-	-	-
3/4 HD 1080i	1440x1080i	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	-
1/2 HD 1080p	960x1080p	2	4	2	4	4	4	4	4	-	-	-	-	-	-	-	-	-	-
1/2 HD 1080i	960x1080i	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	-
HD 720	1280x720p	2	4	2	4	4	4	4	4	4	4	4	4	4	4	-	-	-	-
3/4 HD 720	960x720p	-	-	-	-	-	-	-	-	4	4	4	4	4	4	-	-	-	-
1/2 HD 720	640x720p	-	-	-	-	-	-	-	-	4	4	4	4	4	4	-	-	-	-
SD 480p	720x480p	2	4	-	-	4	4	4	-	4	4	-	-	4	4	4	4	-	-
SD 480i	720x480i	-	-	-	-	-	-	4	-	-	-	-	-	-	-	4	-	-	-
SD 576p	720x576p	-	-	2	4	4	-	-	4	-	-	4	4	4	-	-	-	4	4
SD 576i	720x576i	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	4	-
4CIFp	704x576p	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4
4CIFi	704x576i	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-

ENCODED OUTPUT RESOLUTIONS (CONT.)		INPUT RESOLUTIONS AND FRAME RATES (CONT.)																	
		1080p						1080i		720p						480i	480P*	576i	576p*
Name	Resolution	60 / 59.94	30 / 29.97	50	25	24	23.98	30 / 29.97	25	60 / 59.94	30 / 29.97	50	25	24	23.98	30 / 29.97	60 / 59.94	25	50
3/4 D1 NTSCp	540x480p	-	-	-	-	-	-	-	-	4	4	-	-	4	4	4	4	-	-
3/4 D1 NTSCi	540x480i	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
3/4 D1 PAL	540x576p	-	-	2	4	4	-	-	-	-	-	4	4	4	-	-	-	4	4
3/4 D1 PAL	540x576i	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
70% VGA	448x336p	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Half-D1 NTSC	352x480i/p	2	4	-	-	4	4	4	-	4	4	-	-	4	4	4	4	-	-
Half-D1 PAL	352x576i/p	-	-	2	4	4	-	-	4	-	-	4	4	4	4	-	-	4	4
CIF	352x288i/p	2	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

**Legend:**

“2”, “3” or “4” - Indicates the number of encoding cores that can be supported.

Resolutions marked “-” are not supported.

\* DVI-I only

## Supported H.264 Graphic Encoding Input and Downscale Resolutions (Makito X #S/B-292E-DVI)

OUTPUT RESOLUTIONS		YPbPr / RGBHV / DVI-A & DVI-I Computer Graphic Input Resolutions																	
		1920 x 1200	1680 x 1050	1600 x 1200	1600 x 900	1440 x 900	1400 x 1050	1360 x 768	1280 x 1024	1280 x 800	1280 x 768	1152 x 864	1024 x 768	800 x 600	640 x 480				
Name	Resolution	60	60	60	60	75/60	75/60	60	75/60	85	75/60	85	75/60	75	85	75/60	85	75/60	85/75 /60
HD 1080	1920x1080p	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HD 720	1280x720p	2	2	2	4	4	4	4	4	3	4	3	4	-	-	-	-	-	-
SD 480	720x480p	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-
SD 576	720x576p	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-
CIF	352x288p	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	1920x1200	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1680x1050	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1600x1200	2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1600x900	2	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1440x900	2	2	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
	1400x1050	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
	1360x768	2	2	2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
SXGA	1280x1024	2	2	2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
WXGA	1280x800	2	2	2	3	3	-	-	3	3	3	-	-	-	-	-	-	-	-

OUTPUT RESOLUTIONS (CONT.)		YPbPr / RGBHV / DVI-A & DVI-I Computer Graphic Input Resolutions (Cont.)																	
		1920 x 1200	1680 x 1050	1600 x 1200	1600 x 900	1440 x 900	1400 x 1050	1360 x 768	1280 x 1024	1280 x 800	1280 x 768	1152 x 864	1024 x 768	800 x 600	640 x 480				
WXGA	1280x768	2	2	2	3	3	-	3	3	3	3	3	3	-	-	-	-	-	-
	1152x864	2	2	2	3	3		-	3	-	-	-	-	3	-	-			
XGA	1024x768	2	2	2	4	4	-	4	4	3	4	3	4	4	3	4	-	-	-
SVGA	800x600	2	2	2	4	4	4	4	4	3	4	3	4	4	3	4	3	4	-
VGA	640x480	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

## Audio Encoding

Audio Encoding – MPEG AAC <sup>1</sup>	
Audio Channels	Up to 16 audio channels in channel pair groups (in any combination): <ul style="list-style-type: none"> <li>• 16 embedded audio per blade (SDI)</li> <li>• 2 embedded audio per blade (DVI-D)</li> <li>• 2 analog audio per blade</li> </ul>
Audio Bitrates	Mono: 56 to 160 kbps per audio pair Stereo: 80 to 320 kbps per audio pair
Frequency Response	From 20 Hz to 22 kHz
Sampling Rate	48kHz
Audio Modes	<ul style="list-style-type: none"> <li>• Mono-Right</li> <li>• Mono-Left</li> <li>• Stereo</li> </ul>
Maximum Analog Audio Input Level	From +5dBu to +20dBu (balanced or unbalanced) +6dBu (default)
Compression Standards	MPEG-2 AAC-LC ISO/IEC 13818-7 MPEG-4 AAC-LC ISO/IEC 14496-3
Audio Channel Impedance	Audio single ended → 24KOhms Audio single ended → 48KOhms Audio talkback → 100Ohms

1. Support for analog and embedded audio capture or encoding is not currently provided for the Makito X Ruggedized (#S-292E-X2R or #S-292E-X4R)

## Advanced Features

Advanced Features
Multi-bitrate (MBR) Encoding
HD/SD De-interlacing
Built-in Downscaling
EIA-608-B/NTSC Line 21 Closed Captioning
EIA-708-B/SDI Closed Captioning
Forward Error Correction (FEC) using Furnace format Or PRO-MPEG FEC for TS over RTP streams
AES Encryption 128-bit or 256-bit with Furnace systems or SRT
Aspect ratio configuration
SD AFD and WSS

## Metadata (Optional)

Metadata Inputs:
KLV or CoT over Serial (RS-232 or RS-422)
KLV or CoT over IP/UDP
KLV over HD-SDI
Metadata Processing:
CoT to KLV Conversion
CoT relay to another IP device.
Limited KLV Insertion and Editing
KLV Pass-through
KLV over SDI Metadata Rate Decimation
CC 608/708 Pass-through
SMPTE 336M Compliant
MISB 0601.11 Compliant

MISB 0604.2 Compliant (Synchronous and Asynchronous formats are both supported)
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STANAG 4609 compliant
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## 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 X 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 0601.5, Section 5 UAS Datalink Local Data Set. (See <a href="#">NOTE</a> below for additional implementation considerations).
Stream Insertion	Compressed video frames (and associated KLV data) are time-stamped as per MISB 0604 Section 5.3. It is assumed that users will pre-configure the Makito X Internal System Clock to the desired UTC time.
	The KLV metadata is inserted in the MPEG stream as per MISB 0604, Section 7.2 – Synchronous Carriage of Metadata.
References	SMPTE 336M-2007 Data Encoding Protocol using Key-Length-Value
	MISB 0601.5 UAS Datalink Local Metadata Set
	MISB 0604 Time Stamping Compressed Motion Imagery



**NOTE** In case the KLV serial data is transmitted from the source to the Makito X 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 X 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 X to not recover from potentially corrupted KLV data, the length of a KLV packet shall not exceed 500ms. Beyond this time limit, the Makito X will consider that the incoming serial data was probably corrupted (it was not able to find the KLV packet boundaries) and will therefore look for the next 5-byte preamble.



## Asynchronous KLV Metadata Support

The Makito X supports Asynchronous Key-Length-Value (KLV) metadata stream signaling and AU (Access Unit) transport support (as per MISB 0604.2).

The Makito X allows users to select the encapsulation type to use for each metadata source. This provides increased flexibility with regard to systems inter-working with the Makito X.

The available encapsulation types are as follows:

- Synchronous: The Sync format is implemented in compliance with MISB 0604.2 Section 7.2.1 and ISO 13818-1 Section 2.12. Both content type signaling and data transport use this format.
- Asynchronous: The Async format is implemented in compliance with MISB 0604.2 Section 7.2.2. See also SMPTE RP 217. Both content type signaling and data transport use the Async format.
- Asynchronous With Sync AU: The AsyncWithSyncAu format uses the Async PMT and PES header signaling format as per MISB 0604.2 Section 7.2.2 and SMPTE RP 217. However, the PES payload / metadata AU is formatted in the same manner as the Sync option in compliance with ISO 13818-1 Section 2.12.

The default value for the metadata encapsulation is Synchronous.

The encapsulation type may be selected from the Web Interface (Output Streams Detail View), the CLI (stream command), or via SNMP.

## Network and Management Interfaces

IP Network Interfaces	
Standard	Ethernet 10/100/1000 Base-T, auto-detect, Half/Full-duplex
	Static IP/DHCP (Dynamic Host Configuration Protocol)
	Unicast streaming
	Multicast streaming (IGMPv3, Internet Group Management Protocol)
	Multiple Unicast streaming
	IPv4 (Internet Protocol version 4)
	IGMPv3 (Internet Group Management Protocol) for IP Multicast
Streaming Protocols H.264	MPEG transport stream over UDP/RTP
	Secure Reliable Transport (SRT)
	RTMP (implemented according to requirements of the FMS/Wowza/CDN based on Adobe RTMP specification)
	Direct-RTP (RFC 3984)
	SAP (RFC 2974)
HEVC	MPEG transport stream over UDP/RTP
	Secure Reliable Transport (SRT)
	SAP (RFC 2974)
Connector	RJ45 (TIA/EIA-568)
Management Interfaces	
Physical Interfaces	RS-232
	RS-422 (Only available when the serial port is configured for Metadata (KLV or CoT)) <sup>1</sup>
	RJ45 to RS-232 (DB-9 Serial Management Adapter required, provided with unit) (TIA/EIA-568) <sup>2</sup>
	Ethernet
Management Protocols	HTTPS (Web browser) Command line over SSH, Telnet, or RS-232 serial line SFTP/TFTP/SCP Client/Server SNMP v3

1. Support for RS-422 is not currently provided for the Makito X Ruggedized SDI (#S-292E-X2R or #S-292E-X4R)
2. Support for RJ45 to RS-232 is not currently provided for the Makito X Ruggedized SDI (#S-292E-X2R or #S-292E-X4R)

## Chassis Options

### Single-Height Appliance

Single Height Appliance (#S/B-292E-DVI, #S/B-292E-HDSI2 or #S/B-292E-HDSI1)	
Dimensions (H x W x D)	24mm H x 149mm W x 202mm D (0.92" H x 5.85" W x 8.0" D)
Weight	Approximately 1.13 kg (2.5 lbs.)
Power Requirements	12VDC, 20W (each blade) 100-240VAC 30W external power supply <b>NOTE:</b> IEC 60601-1 Class I and II power supplies are available from Haivision.
Temperature	Operating: 0° to 40°C (32° to 104°F) Non-operating*: -30° to 70°C (-22° to 158° F) *Limited by the power supply storage: -30°C
Relative Humidity	Up to 95% without condensation
Heat	20 Watts or 68.3 BTU/hr
Sound Emission	41.2 dB(A) L'p(AVG)

### Dual-Height Appliance (Storage Mezzanine)

Dual Height Appliance (#S/B-292E-DVI-FS or -RS, #S/B-292E-SDI2-FS or -RS or #S/B-292E-SDI1-FS or -RS)	
Dimensions (H x W x D)	44mm H x 149mm W x 202mm D (1.74" H x 5.85" W x 8.0" D)
Weight	Approximately 1.33 kg (2.9 lbs.)
Power Requirements	12VDC, 25W (each double-height blade) 100-240VAC 60W external locking power supply <b>NOTE:</b> IEC 60601-1 Class I and II power supplies are available from Haivision.
Temperature	Operating: 0° to 40°C (32° to 104°F) Non-operating*: -30° to 70°C (-22° to 158° F) *Limited by the power supply storage: -30°C
Relative Humidity	Up to 95% without condensation

Dual Height Appliance (#S/B-292E-DVI-FS or -RS, #S/B-292E-SDI2-FS or -RS or #S/B-292E-SDI1-FS or -RS)	
Heat	~20 Watts or 68.3 BTU/hr
Sound Emission	41.2 dB(A) L'p(AVG)

## Dual-Height Appliance (HEVC Mezzanine)

Makito X HEVC: Dual-Channel (#S/B-292E-SDI2-HEVC) or Single-Channel (#S/B-292E-SDI1-HEVC)	
Dimensions (H x W x D)	44mm H x 149mm W x 202mm D (1.74" H x 5.85" W x 8.0" D)(1.7" H x 5.7" W x 8.7" D)
Weight	Approximately 1.33 kg (2.9 lbs.)
Power Requirements	12VDC, 25W (each double-height blade) 100-240VAC 60W external locking power supply
Temperature	Operating: 0° to 40°C (32° to 104°F) Non-operating: 30° to 70°C (-22° to 158° F) *Limited by the power supply storage: -30°C
Relative Humidity	Up to 95% without condensation
Heat	~25 Watts or 85.4 BTU/hr
Sound Emission	41.2 dB(A) L'p(AVG)

## MB6X - 6 Blade Chassis

MB6X - 6 Blade Chassis [#F-MB6X-RAC, #F-MB6X-MED, #F-MB6X-DC]	
Dimensions (H x W x D)	19" rack mountable, 1 RU 43.69mm H x 434.98mm W x 420.37mm D (1.72" H x 17.125" W x 16.55" D)
Weight	6 slot empty chassis: 7.94 kg. (17.5 lbs.) Single encoder blade: 230 g. (0.5 lbs.)
Power Requirements	Single Internal Power Supply: <ul style="list-style-type: none"> <li>• Redundant AC type: 90-264VAC 47Hz-63Hz 300 Watt max.</li> <li>• Medical Grade: 90-264VAC 47Hz-63Hz 300 Watt max.</li> <li>• DC type: 20-36 VDC 300 Watt max.</li> </ul>
Temperature	Operating: 0° to 50°C (32° to 122°F) Non-operating: -40° to 70°C [-40° to 158° F)
Relative Humidity	Up to 95% without condensation
Heat	155 Watts or 530 BTU/hr
Sound Emission	<ul style="list-style-type: none"> <li>• Room temperature: 57.0 dB(A) L'p(AVG)</li> <li>• 50°C Ambient: 65.9 dB(A) L'p(AVG)</li> </ul>

## MB21B - 21 Blade Chassis

MB21B - 21 Blade Chassis (#F-MB21B-R)	
Dimensions (H x W x D)	19" rack mountable, 4 RU 178mm H x 439.98mm W x 460mm D (7.00" H x 17.125" W x 18.00" D)
Weight	21 slot empty chassis: 22.68 kg. (50 lbs.) Single encoder blade: 230 g. (0.5 lbs.)
Power Requirements	Redundant Internal Power Supply: <ul style="list-style-type: none"> <li>• 90-132V and 180-240VAC 47Hz-63Hz</li> <li>• 600 Watts</li> </ul>
Temperature	Operating: 0° to 50°C (32° to 122°F) Non-operating: -40° to 70°C (-40° to 158° F)
Relative Humidity	Up to 95% without condensation
Heat	560 Watts or 1910.8 BTU/hr
Sound Emission	64.53 dBA L'p(AVG)

## Makito XR (Military Spec) Appliance

Makito XR (Military Spec) Appliance (#S-292E-X2R OR #S-292E-X4R)	
Dimensions	99mm H x 216mm W x 170mm D (3.9" H x 8.5" W x 6.7" D)
Weight	3 kg (6.81bs.)
Power	28VDC, 30W MIL-STD-1275D
Temperature	Operating: -40° to 70°C (-40° to 158°F) Non-operating: -45°to 85°C (-49° to 185°F)
Relative Humidity	0-100% condensing
IP rating	IP67

## Makito X Harsh Environment Chassis Option

Makito X Harsh Environment Chassis Option (#S-292E-X1H OR #S-292E-X2H)	
Fanless operation for high temperature applications	
Dimensions	44mm H x 137mm W x 203mm D (1.73" H x 5.4" W x 8.0" D)
Weight	1.8 kg (4lbs.)
Power	12VDC, 20W 100-240VAC 30W external locking power supply
Temperature	Operating: -20° to 70°C (32° to 158°F) Non-operating: -40° to 85°C (-40° to 185°F)
Relative Humidity	0-95% condensing
IP rating	IP42

## Supported Storage Devices

Makito X Fixed Storage Mezzanine (#S/B-292E-DVI-FS, #S/B-292E-SDI2-FS or #S/B-292E-SDI1-FS)	
mSATA SSD - 128 GB to 1 TB Recommended Devices: Samsung SSD 850 EVO Series and Crucial MX200 SSD	
Samsung SSD 850 EVO Series	250GB (MZ-M5E250BW) 500GB (MZ-M5E500BW) 1TB (MZ-M5E1T0BW)
Crucial MX200 SSD	250GB (CT250MX200SSD3) 500GB (CT500MX200SSD3)
USB devices up to 1 TB <b>NOTE:</b> Maximum 1 amp. USB hubs are not supported	
SD and SDHC devices up to 32 GB	



<a href="#">Makito X Removable Storage Mezzanine</a> <a href="#">(#S/B-292E-DVI-RS, #S/B-292E-SDI2-RS or #S/B-292E-SDI1-RS)</a>	
2.5" x 7mm SATA SSD - 128 GB to 1 TB Recommended Devices: Samsung SSD 850 PRO Series and Crucial MX200 SSD	
Samsung SSD 850 PRO Series	128GB (MZ-7KE128BW) 256GB (MZ-7KE256BW) 512GB (MZ-7KE512BW) 1TB (MZ-7KE1T0BW)
Crucial MX200 SSD	250GB (CT250MX200SSD1) 500GB (CT500MX200SSD1) 1TB (CT1000MX200SSD1)
SATA SSD can be removed or inserted at least 500 times.	
<a href="#">Network Attached Storage devices</a>	
Any NFS server up to client side version 3	



**NOTE** HDDs (Hard Disk Drives) are not supported.

## Regulatory/Compliance

Regulatory/compliance	
Certification	UL / CSA / CE
Compliance	Electromagnetic Compatibility: EN 55022 (Emissions) / 55024 (Immunity) / EN 61000-3-2 / EN 61000-3-3
	Safety (Low Voltage Directives): EN 60950-1 (CSA C/US) / IEC/EN 60950-1 (International /CB Scheme)
	Industry Canada Warnings: Canadian ICES-003, "Electromagnetic Compatibility" / Avis d'Industrie Canada: la norme NMB-003 du Canada, "La Compatibilité électromagnétique"
	FCC Part 15, Subpart B, Class A
Compliance with Environmental Regulations	RoHS2, European Union Directive 2011/65/EU
	RoHS, Marking Control for China, Regulation SJ/T 11364-2006



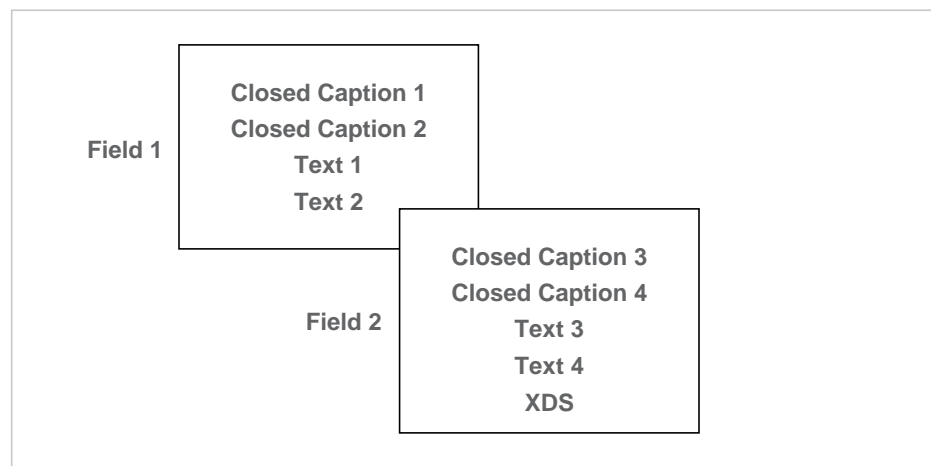
**NOTE** Please refer to the product Declaration of Conformity (DoC) for complete details.

## Closed Captioning

The Makito X supports capture, multiplexing and transport of Closed Captioning (CC) and other Line 21 information over Composite (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 X encoder supports transport of all these services. [Note that Closed Captioning as specified by EIA-608-B does not exist over PAL.]

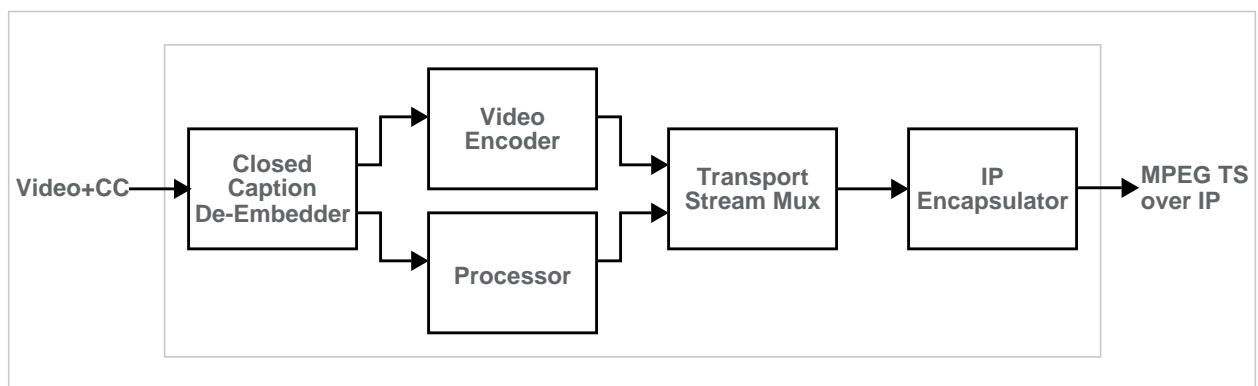
Figure B-1 EIA-608-B Line 21 Services



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:

$$2 \text{ bytes} \times 2 \text{ Fields} \times 30\text{fps} \times 8 \text{ bit/byte} = 960 \text{ bps}$$

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.

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The Makito X 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 X Transport Stream using the encapsulation format specified in ATSC A/72.

The Makito X 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** The Makito X only supports a maximum of three (3) Caption active services at a time plus CC1-4 Text1-4 and XDS.

SMPTE 334-2 defines a Caption Distribution Packet (CDP) consisting of a sequence of bytes that can hold: the CEA-708 DTV caption data, CEA-608 caption data, caption service information, and SMPTE 12M-1 time code. CDP also includes the Caption Service Descriptor (CSD). As defined in ATSC A/65.

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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: Open Source Software Credits

This appendix lists the Open Source software packages currently deployed on the Makito X platform. For more details, please consult the provider of the package.

## References

GNU General Public License [v2: GPL-2.0](#)

GNU General Public License [v3: GPL-3.0](#)

GNU Lesser General Public License v2: [LGPL-2.1](#)

BSD type licenses, or those describe by Regents of the University of California identifier are typically described by the following: [BSD-2-Clause](#) and [BSD-3-Clause](#) (revised BSD license).

Permissive Free Software License: Rights are owned by an individual, group of individuals, institution or consortium but is generally free provided minimal conditions are met. See: [Permissive free software licence wikipedia entry](#) for more information.

## Open Source Software Credits

Haivision is grateful to the following organizations for making available their Open Source software packages:

Package	Version	Description	License
Linux kernel	2.6.37	Linux Kernel	GPL v2, June 1991
Linux-PAM	1.1.3	Linux Pluggable Authentication Module	permissive free software license or GPL V2
bash	4.3.30	Bourne Again Shell - Posix.2 Shell	GPL v3, June 2007
beecrypt	4.2.1	Cryptography library	GPL v2, June 1991
busybox	1.17.3	Common unix utilities.	GPL v2, June 1991
chkconfig	1.3.30c	Service run level configuration	GPL v2, June 1991

Package	Version	Description	License
coreutils	8.9	Basic shell, file and text manipulation	GPL v3, June 2007
cracklib	2.8.18	Password checking library	LGPL v2.1, June 1999
cron	3.0p11	Time base job scheduler	permissive free software license
db	5.1.19	Berkeley Relational Database Library	Oracle 2010 (redistribute as-is) + Berkeley type license
dpkg	1.16.0	Debian Package Manager System	GPL v2, June 1991
e2fsprog	1.41.14	Second Extended File System Management Programs	GPLv2 (applications) LGPL v2 (libraries) BSD (uuid library) MIT (ss library)
ethtool	2.6.38	Network interface controller configuration	GPL v2, June 1991
exfat-fuse	1.1.0	exFAT File System in User Space (FUSE) utilities	GPLv2
expat	2.0.1	XML Parsing Library	Custom License See <a href="#">“expat Custom License”</a> on page 3
fuse	2.9.3	File System in User Space utilities	GPLv2, June 1991
gawk	3.1.8	GNU AWK - Pattern scanning and processing.	GPL v3, June 2007
ifupdown	0.6.10	Network Interface Configuration	GPL v2, June 1991
initscripts	9.22	Run level scripts and assoc processing	GPL v2, June 1991
iperf	2.0.5	Internet Bandwidth Measurement Tool	University of Illinois - permissive free software license
iproute2	2.6.38	Linux TCP/IP traffic control	GPL v2, June 1991

Package	Version	Description	License
jpeg	8b	JPEG Software Tools	Lane & Vollbeding - permissive free software license
lftp	4.6.1	File Transfer Program	GPLv3, June 2007
libevent	2.0.17	Event notification library	3-clause ("modified") BSD License
libuuid	1.0.3	Universal Unique Identifier support library	Modified BSD
lighttpd	1.4.35	Lightweight open-source web server	Jan Kneschke, 2004 - permissive free software license
mDNSResponder	320.10.80	Multicast DNS Responder (Bonjour component)	Apache 2.0 Three-Clause BSD National ICT Australia Limited (NICTA) Public Software
mtd-utils	2.0	Memory Technology Device (MTD) utilities for nor, nand access and UBI & JFFS2 tools.	GPL v2, June 1991
ncurses	5.5	Text-base UI library	Permissive free software license
net-tools	1.60	Network tools.	GPL v2, June 1991
netkit-ftp	0.17	File Transfer Protocol	Regents of the University of California
netkit-telnet	0.17	Telnet	Regents of the University of California
net-snmp	5.5.2.1	Simple Network Management Protocol	Multiple BSD Licenses
ntfs-3g	2014.2.15	NTFS driver	GPL v2, June 1991
ntp	4.2.8p8	Network Time Protocol	University of Delaware - Permissive free software license
openssh	7.1p2	Open SSH	Multiple BSD style licenses
openssl	1.0.1t	Open Secure Socket Layer	Dual OpenSSL / SSLeahy

Package	Version	Description	License
openssl-fips- algvs	2.0	FIPS Algorithms	Multiple Licenses
parted	3.2	GNU Partition Table Editing	GPLv3, June 2007
pcre	8.21	Perl Compatible Regular Expression Library	BSD License
popt	1.16	Command Line Parsing Library	Permissive free software license
postgresql	7.4.1	Postgresql database (support library)	Permissive free software license - (PostgreSQL Development Group and Regents of the University of California)
procs	3.2.8	Process reporting utilities.	GPL v2, June 1991
readline	6.1	Command Line Editing Library	GPL v3, June 2007
rng-tools	4	Random Number Generator tools	GPL v2, June 1991
rpm	4.4.2.3	RPM Package Manager	Dual GPL v2 - June 1991 and LGPL v2 - June 1991
sed	4.2	Stream Editor	GPL v3, June 2007
shadow	4.1.4.2	Shadow Passwords	Permissive free software license.
sudo	1.8.4p5	Privilege modification	Free Software Foundation - Permissive free software license
sysstat	10.0.0	Performance monitoring tools for Linux	GPL v2, June 1991
sysvinit	2.88dsf	Init process	GPL v2, June 1991
tcp_wrappers	7.6	Host base networking Access Control System	Permissive free software license
tcpdump	4.3.0	Network Monitoring and Data Acquisition Tool	BSD



Package	Version	Description	License
tftp-hpa	0.43	TFTP server.	Permissive free software license
u-boot	2010.06	U-Boot boot loader.	GPL v2, June 1991
UDT4	4.11	UDP-based Data Transfer	Permissive free software license See <a href="#">“Third Party License Information”</a> on page 2
zlib	1.2.5	Compression library	Jean-Loup Gailly - Permissive free software license

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

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# Appendix D: Warranty Information

## Haivision 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, WARRANTIES 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 Knowledge Base <http://haivision.com/support/knowledge-base>. If the product is still not functioning properly after making use of these resources, please contact your Authorized Reseller or Haivision at <http://support.haivision.com> using the information provided in the documentation. The Authorized Reseller or Haivision 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.

## Software End User License Agreement

### READ BEFORE USING

THIS SOFTWARE END USER LICENSE AGREEMENT (“AGREEMENT”) IS FOR ANY OR ALL OF THE HAIVISION SOFTWARE PRODUCT(S) LICENSED, DOWNLOADED, INSTALLED AND/OR ACTIVATED BY YOU (“PRODUCT”). THE PRODUCT IS PROTECTED BY NATIONAL AND INTERNATIONAL COPYRIGHT LAWS AND TREATIES.

READ THE TERMS OF THE FOLLOWING AGREEMENT CAREFULLY. BY CLICKING THE ACCEPT BUTTON ON THIS AGREEMENT, OPENING THE SHRINKWRAP AROUND OR USING THE PRODUCT OR ANY PORTION THEREOF, OR BY USING OR DISTRIBUTING ANY VIDEO INFORMATION ENCODED BY, DECODED BY OR OTHERWISE MANIPULATED OR PASSED THROUGH THE PRODUCT, YOU CONFIRM YOUR ACCEPTANCE OF THIS AGREEMENT.

THIS AGREEMENT IS A LEGAL AGREEMENT BETWEEN YOU (A SINGLE CORPORATE ENTITY) AND HAIVISION. IF YOU DO NOT AGREE TO THESE TERMS, HAIVISION IS UNWILLING TO LICENSE THE PRODUCT TO YOU AND YOU ARE NOT AUTHORIZED TO INSTALL OR USE THE PRODUCT.

NOTWITHSTANDING SECTION [6.5](#) BELOW, THIS AGREEMENT ONLY GOVERNS THE PRODUCT(S) IF A SEPARATE SOFTWARE END USER LICENSE AGREEMENT HAS NOT BEEN SIGNED PRIOR TO THIS AGREEMENT FOR THE PRODUCT OR THE AGREEMENT IS NOT SUPERCEDED BY A SEPARATE SOFTWARE END USER LICENSE AGREEMENT FOR THE PRODUCT AT A LATER DATE.

### 1. DEFINITIONS

- 1.1. Entitlement.** The collective set of applicable documents (e.g., warranty, support and maintenance documents, data sheets, etc.) authorized by Haivision Network Video or its affiliate Haivision (collectively, “Haivision”) evidencing your obligation to pay associated fees (if any) for the license, associated Services, and the authorized scope of use of Product under this Agreement.
- 1.2. License Fee.** License Fee shall mean the consideration paid to Haivision for use of the Product. The License Fee is part or all of the price paid for the relevant Product.
- 1.3. Product.** Product shall mean the executable version of Haivision’s computer software, program or code, in object code format (specifically excluding source code), together with any related material including, but not limited to the hardware, Reference Manuals or database schemas provided for use in connection with the Product and including, without limitation, all Upgrades through the date of installation.
- 1.4. Reference Manuals.** Reference Manuals shall mean the most current version of the documentation for use in connection with the Product provided by Haivision to You.
- 1.5. Third-Party Content.** Services or materials, which are not proprietary to Haivision or may not be part of the materials of the company, entity or individual using the Product.
- 1.6. Updates.** Updates shall mean any periodic software releases, additions, fixes, and enhancements thereto, release notes for the Product and related Reference Manuals, (other than those defined elsewhere in this section as Upgrades) which have no value apart from their operation as part of the Product and which add minor new functions to the Product, but none so significant as to warrant classification as an Upgrade, which may be provided by Haivision to fix critical or non-critical problems in the Product on a scheduled, general release basis. Updates to the Product (“Version”) are denoted by number changes to the right of the decimal point for a version and revision number (for example, going from 2.0.0 to 2.1.0).

- 1.7. Upgrades.** Upgrades shall mean any modification to the Product made by Haivision, which are so significant, in Haivision's sole discretion, as to warrant their exclusion under the current license grant for the Product. Upgrades of Product are denoted by number changes to the left of the decimal point for a release number (for example, going from 2.0 to 3.0).
- 1.8. You (or Your).** The legal entity specified in the Entitlement, or for evaluation purposes, the entity performing the evaluation.

## 2. RIGHTS AND RESTRICTIONS

**2.1. License to Use.** Subject to the terms and conditions set forth herein and subject to the terms of your Entitlement, Haivision hereby grants to You a non-exclusive, personal, limited and nontransferable right and license to use the Product in accordance with the terms of this Agreement. This license is granted to You and not, by implication or otherwise, to any parent, subsidiary or affiliate of Yours without Haivision's specific prior written consent. This license is for the limited use of the Product by You for the purpose of creating, managing, distributing and viewing IP Video assets. This license does not grant any license for content whatsoever. All rights not expressly granted to You by this Agreement are reserved by Haivision.

### 2.2. Restrictions.

**(a) Reproduction.** You shall not copy, modify, distribute, use or allow access to any of the Product, except as explicitly permitted under this Agreement and only in the quantities designated in the Entitlement. However, You have the right to make copies of the Product solely for archival purposes, but only in quantities necessary and typical for your Organization. You shall not modify, adapt, translate, export, prepare derivative works from, decompile, reverse engineer, disassemble or otherwise attempt to derive source code, hardware designs or other proprietary information from the Product or any internal data files generated by the Product, or use the Product embedded in any third party hardware or software. You shall also not use the Product in an attempt to, or in conjunction with, any device, program or service designed to circumvent technological measures employed to control access to, or the rights in other work protected by copyright laws. You shall not remove, modify, replace or obscure Haivision's copyright and patent notices, trademarks or other proprietary rights notices affixed to or contained within any Product. No right is granted hereunder for any third party who obtains access to any Product through You to use the Product to perform services for third parties. Most sublicensing arrangements are prohibited under this Agreement. However, if You are a Reseller, You are permitted to sublicense the Product to single end-users under terms and conditions similar to the provisions of this Agreement; however, You are responsible and liable pursuant to the terms and conditions of this Agreement for Your sublicensees' actions and failures to take required actions with respect to the Product.

**(b) Ownership.** The Product is conditionally licensed and not sold. As between the parties, Haivision and/or its licensors owns and shall retain all right, title and interest in and to all of the Product, including all copyrights, patents, trade secret rights, trademarks and other intellectual property rights therein, and nothing in this Agreement shall be deemed to transfer to You any ownership or title to the Product. You agree that you will not remove, alter or otherwise obscure any proprietary rights notices appearing in the Product. All Haivision technical data and computer software is commercial in nature and developed solely at private expense.

## 3. TERM AND TERMINATION

**3.1. Term.** The license and service term are set forth in your Entitlement(s). Additionally, this Agreement may be terminated without cause by You upon thirty (30) days written notice to Haivision.

- 3.2. Termination for Breach.** Your rights under this Agreement will terminate immediately without notice from Haivision if You materially breach this Agreement or take any action in derogation of Haivision's rights to the Product. Haivision may terminate this Agreement should any Software become, or in Haivision's reasonable opinion likely to become, the subject of a claim of intellectual property infringement or trade secret misappropriation.
- 3.3. Termination for Bankruptcy.** Haivision may terminate this Agreement, effective immediately, if You file, or have filed against You, a petition for voluntary or involuntary bankruptcy or pursuant to any other insolvency law, makes or seeks to make a general assignment for the benefit of its creditors or applies for, or consents to, the appointment of a trustee, receiver or custodian for a substantial part of its property.
- 3.4. Termination; Effect; Survival.** Upon the termination of this Agreement for any reason:
- (a) All license rights granted hereunder shall terminate;
  - (b) You shall immediately pay to Haivision all amounts due and outstanding as of the date of such termination or expiration; and
  - (c) You shall return to Haivision all Product and all Haivision Reference Manuals or certify that all such Product and Reference Manuals have been destroyed. Notwithstanding any termination of this Agreement, the following provisions of this Agreement shall survive for the relevant period of time set forth therein, if any: Sections [2.2](#), [4](#), [5](#) and [6](#).

## 4. REPRESENTATIONS, DISCLAIMER AND LIMITATION OF LIABILITY

- 4.1. Limited Warranty.** Haivision warrants that: (i) the Product will operate substantially in accordance with the Reference Manuals provided and (ii) any media on which the Product is provided will be free of material damage and defects in materials and workmanship under normal use for a term of ninety (90) days (the "Warranty Period") after its delivery date. As Your sole and exclusive remedy for any breach of this warranty, Haivision will use its commercially reasonable efforts to correct any failure of the Product to operate substantially in accordance with the Reference Manuals which is not the result of any improper or unauthorized operation of the Product and that is timely reported by You to Haivision in writing within the Warranty Period, provided that in lieu of initiating commercially reasonable efforts to correct any such breach, Haivision may, in its absolute discretion, either: (i) replace the Product with other software or technology which substantially conforms to the Reference Manuals or (ii) refund to You a portion of the fee paid for the relevant Product, whereupon this Agreement shall terminate. This warranty shall immediately terminate if You or any third party makes or attempts to make any modification of any kind whatsoever to the Product, engages in any improper or unauthorized operation of the Product, including uses prohibited by the Entitlement or installs or uses the Product on or in connection with any hardware or software not specified in the Entitlement or product data sheets.
- 4.2. Warranty Disclaimers.** THE EXPRESS WARRANTIES SET FORTH IN SECTION [4.1](#) ABOVE IN RESPECT TO THE PRODUCT ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, OR STATUTORY, REGARDING THE PRODUCT, OR ITS OPERATION, FUNCTIONALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS (ALL OF WHICH ARE DISCLAIMED). HAIVISION DOES NOT WARRANT THAT ANY OF THE PRODUCT(S) WILL MEET ALL OF YOUR NEEDS OR REQUIREMENTS, OR THAT THE USE OF ANY OF THE PRODUCT(S) WILL BE UNINTERRUPTED OR ERROR-FREE, OR THAT ALL ERRORS WILL BE DETECTED OR CORRECTED.
- 4.3. Liability Limitation.** IN NO EVENT SHALL HAIVISION OR ITS OFFICERS, EMPLOYEES, AGENTS, REPRESENTATIVES, OR MEMBERS, NOR ANYONE ELSE WHO HAS BEEN



INVOLVED IN THE CREATION, PRODUCTION OR DELIVERY OF THE PRODUCT, BE LIABLE TO YOU, YOUR CUSTOMERS OR TO ANY OTHER THIRD PARTY FOR CONSEQUENTIAL, INDIRECT, INCIDENTAL, PUNITIVE OR SPECIAL DAMAGES, LOST PROFITS, LOSS OF USE, INTERRUPTION OF BUSINESS OR FOR ANY DAMAGES FOR ANY BREACH OF THE TERMS OF THIS AGREEMENT OR FOR LOST OR CORRUPTED DATA ARISING FROM ANY CLAIM OR ACTION HEREUNDER, BASED ON CONTRACT, TORT OR OTHER LEGAL THEORY (INCLUDING NEGLIGENCE) AND WHETHER OR NOT SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. HAIVISION SHALL NOT BE LIABLE FOR DAMAGES FOR ANY CAUSE WHATSOEVER IN AN AMOUNT IN EXCESS OF THE FEE PAID TO HAIVISION BY YOU FOR THE RELEVANT PRODUCT.

## 5. INDEMNIFICATION

### 5.1. Indemnification by Haivision.

- (a) Haivision shall indemnify and hold You harmless against any and all actions, claims, losses, damages, liabilities, awards, costs and expenses (including reasonable attorneys' fees) ("Claims") arising out of (i) any accusation or purported violation of any third person's US and Canadian copyright, trademark, patent rights or trade secrets, proprietary information on account of Your use of the Product when used in accordance with the terms of this Agreement, or (ii) relating to or arising out of any negligence or willful misconduct on the part of Haivision or any breach by Haivision of the terms of this Agreement or any Maintenance and Support Agreement, or applicable law. You shall promptly notify Haivision in writing of any such Claim and promptly tender the control of the defense and settlement of any such Claim to Haivision. Haivision shall thereafter undertake the defense of any such Claim using counsel of its choice. You shall cooperate with Haivision, in defending or settling such Claim at the expense of Haivision; provided that Haivision shall not settle any Claim against You which would require the payment of money by You without the prior written consent of You, which consent shall not be unreasonably withheld. You shall have the right to consult and provide input into the defense with counsel of its choice at its own expense. Haivision shall not reimburse You for any expenses incurred by You without the prior written approval of Haivision, which approval shall not be unreasonably withheld.
- (b) If any Product is, or in the opinion of Haivision may become, the subject of any Claim for infringement, then Haivision may, or if it is adjudicatively determined that any of the Product infringes in the manner described above (except to the extent that any translation, modification, addition or deletion or combination by You is the sole source of such Claim), then Haivision shall, at its option, either (i) procure for You the right to continue use of the Product for the term hereof, (ii) replace or modify the Product with other suitable and reasonably equivalent products so that the Product becomes non-infringing, or (iii) terminate this Agreement and refund to You a portion of the fee paid for the relevant Product.
- (c) Haivision shall have no liability for: (i) the use of other than the then current release of the Product; (ii) the use of the Product other than as set forth in its accompanying documentation and as permitted herein; (iii) the modification of any of the Product by any party other than Haivision; or (iv) any infringement arising from the use of any Product by You after Haivision has issued a written notice to You requiring You to cease using such Product when Haivision exercises its option to terminate the License pursuant to Section 3.2 (collectively, "Exclusions"). SECTION 5.1 STATES HAIVISION'S ENTIRE OBLIGATION WITH RESPECT TO ANY CLAIM REGARDING THE INTELLECTUAL PROPERTY RIGHTS OF ANY THIRD PARTY.

- 5.2. Indemnification by You.** You shall indemnify and hold Haivision harmless against any and all Claims directly or indirectly arising out of, or in any manner whatsoever associated or connected with Your performance, purported performance or non-performance of your rights and obligations under this

Agreement, and against any and all Claims incurred by or on behalf of any of the foregoing in the investigation or defense of any and all such Claims.

## 6. OTHER PROVISIONS

- 6.1. Export and Other Restrictions.** This Agreement, and all Your rights and Your obligations under this Agreement, are subject to all applicable Canadian and U.S. Government laws and regulations relating to exports including, but not limited to, the U.S. Department of Commerce Export Administration Act and its associated Regulations and all administrative acts of the U.S. Government thereunder. In the event the Product or the Hardware is exported from the United States or re-exported from a foreign destination, You shall ensure that the distribution and export/re-export of the Product or the Hardware is in compliance with all laws, regulations, orders, or other restrictions of the U.S. Export Administration Act and its associated Regulations. You agree that neither you nor any of your Affiliates will export/re-export any Product, any hardware on which the Product is loaded or embedded, technical data, process, or service, directly or indirectly, to any country for which the Canadian government or United States government (or any agency thereof) requires an export license, other governmental approval, or letter of assurance, without first obtaining such license, approval or letter.
- 6.2. Content.** Your data and/or your use of the Product may not: (i) interfere in any manner with the functionality or proper working of the Product; (ii) stream any material that is copyrighted, protected by trade secret or otherwise subject to third party proprietary rights, including privacy and publicity rights, unless You are the owner of such rights or have permissions from the rightful owner to post the material; (iii) constitute, promote, facilitate or permit any illegal activities, including without limitation, activities that might be libelous or defamatory, invasive of privacy or publicity rights, abusive or otherwise malicious or harmful to any person or entity; (iv) distribute, share or facilitate unauthorized data, malware, viruses, Trojan horses, spyware, worms or other malicious or harmful distributions; or (v) otherwise violate, misappropriate or infringe the intellectual property, privacy, publicity, contractual or other proprietary rights of any third party.
- 6.3. Consent to Use Data.** You agree that Haivision may collect and use technical data and related information, including but not limited to technical information about Your device, system and application software and peripherals, that is gathered periodically to facilitate the provision of software updates, product support and other services to You (if any) related to the Product. Haivision may use this information, as long as it is in a form that does not personally identify You, to improve its products or to provide services or technologies to You.
- 6.4. Transfer and Assignment.** Haivision may assign, sublicense, or transfer this Agreement and/or any or all of its rights or obligations hereunder. You may not assign, transfer or delegate any of its rights or obligations hereunder (whether by operation of law or otherwise) without the prior written consent of Haivision. For purposes of the preceding sentence, and without limiting its generality, any merger, consolidation or reorganization involving You (regardless of whether You are a surviving or disappearing entity) will be deemed to be a transfer of rights, obligations or performance under this Agreement for which Haivision's prior written consent is not required. Any unauthorized assignment, transfer or delegation by You shall be null and void. This Agreement is binding upon and inures to the benefit of the parties hereto and their respective permitted successors and assigns.
- 6.5. Waiver and Amendment.** No modification, amendment or waiver of any provision of this Agreement shall be effective, unless in writing signed by both parties. No failure or delay by either party in exercising any right, power or remedy under this Agreement, except as specifically provided herein, shall operate as a waiver of any such right, power or remedy. Without limiting the foregoing, any additional legal terms and conditions submitted by You in any other documents, including but not limited to the Entitlement, shall be of no legal force or effect.



- 6.6. Enforcement by Third Party.** For any Product licensed by Haivision from other suppliers, the applicable supplier is a third party beneficiary of this Agreement with the right to enforce directly the obligations set forth in this Agreement against You.
- 6.7. Third Party Content.** Haivision is not responsible for examining or evaluating the data, accuracy, completeness, timeliness, validity, copyright compliance, legality, decency, quality or any other aspect of any Third Party Content. Haivision does not warrant or endorse and does not assume and will not have any liability or responsibility to You or any other person for any Third Party content. You agree that any Third Party Content may contain proprietary information and material that is protected by applicable intellectual property and other laws, including but not limited to copyright, and that you will not use such proprietary content, information or materials in any way whatsoever except for permitted uses of the Third Party Content.
- 6.8. Third Party Royalties.** Your further reuse, retransmission, rebroadcast, display or other distribution of your Third Party Content using the Product may require that you obtain a license from and / or pay royalties to the owners of certain third party audio and video formats. You are solely responsible for obtaining such licenses and paying such royalties.
- 6.9. Governing Law/Submission to Jurisdiction.** This Agreement shall be governed by and construed in accordance with the laws of the Province of Québec, Canada and the Laws of Canada applicable therein (excluding any conflict of laws rule or principle, foreign or domestic), exclusive of the U.N. Convention on the International Sale of Goods. You hereby consent to the jurisdiction of any provincial or federal court located within the Province of Quebec and waive any objection which You may have based on improper venue or forum non conveniens to the conduct of any proceeding in any such court.
- 6.10. Severability.** If any provision of this Agreement is held by a court of competent jurisdiction to be contrary to law, such provision shall be changed and interpreted so as to best accomplish the objectives of the original provision to the fullest extent allowed by law and the remaining provisions of this Agreement shall remain in full force and effect.
- 6.11. Force Majeure.** Neither party shall be liable to the other party for any failure or delay in performance to the extent that such delay or failure is caused by fire, flood, explosion, war, terrorism, embargo, government requirement, labor problems, export controls, failure of utilities, civil or military authority, act of God, act or omission of carriers or other similar causes beyond its control. If any such event of force majeure occurs, the party delayed or unable to perform shall give immediate notice to the other party, and the party affected by the other's delay or inability to perform may elect, at its sole discretion, to terminate this Agreement or resume performance once the condition ceases, with an option in the affected party to extend the period of this Agreement up to the length of time the condition endured. Unless written notice is given within 30 calendar days after the affected party is notified of the condition, the latter option shall be deemed selected. During an event of force majeure, the affected party shall exercise reasonable effort to mitigate the effect of the event of force majeure.
- 6.12. Entire Agreement.** This Agreement, together with the Entitlement and all other documents that are incorporated by reference herein, constitutes the sole and entire agreement between Haivision and You with respect to the subject matter contained herein, and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to such subject matter.
- 6.13. Language.** The parties confirm that it is their wish that this Agreement, together with the Entitlement and any other documents relating hereto, have been and shall be drawn up in the English language only. Les parties confirment que c'est leur volonté expresse que ce contrat et tous documents y étant relative, y compris les bons de commande, le avis, les annexes, les autorisations, les pièces jointes et les amendements soient rédigés en langue anglaise seulement.

- 6.14. Headings Not Controlling.** The headings used in this Agreement are for reference purposes only and shall not be deemed a part of this Agreement.
- 6.15. US Government Rights.** Some Products are commercial computer software, as such, term is defined in 48 C.F.R. §2.101. Accordingly, if You, as the Licensee, is the US Government or any contractor therefor, You shall receive only those rights with respect to the Product and Reference Materials as are granted to all other end users under license, in accordance with:
- (a) 48 C.F.R. §227.7201 through 48 C.F.R. §227.7204, with respect to the Department of Defense and their contractors; or
  - (b) 48 C.F.R. §12.212, with respect to all other US Government licensees and their contractors.
- 6.16. Notices.** All notices, requests, consents, claims, demands, waivers and other communications hereunder shall be in writing and shall be deemed to have been given:
- (a) When delivered by hand (with written confirmation of receipt);
  - (b) When received by the addressee if sent by a nationally recognized overnight courier (receipt requested);
  - (c) On the date sent by facsimile (with confirmation of transmission) if sent during normal business hours of the recipient, and on the next business day if sent after normal business hours of the recipient; or
  - (d) On the third day after the date mailed, by certified or registered mail, return receipt requested, postage prepaid. Such communications must be sent to the respective parties at the addresses set forth on the Entitlement (or to such other address as may be designated by a party from time to time in accordance with this Section **6.16**).

If you have questions, please contact Haivision Systems Inc., at 4445 Garand, Montréal, Québec, H4R 2H9 Canada or [legal@haivision.com](mailto:legal@haivision.com).

