



# HAIVISION

**Makito X Decoder 2.3**  
User's Guide

HVS-ID-UG-MAKX-DEC-23, Issue 01

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# About This Document

## Conventions

The following conventions are used to help clarify the content.

### Typographic Conventions and Elements

<i>Italics</i>	Used for the introduction of new terminology, for words being used in a different context, and for placeholder or variable text.
<b>bold</b>	Used for strong emphasis and items that you click, such as buttons.
Monospaced	Used for code examples, command names, options, responses, error messages, and to indicate text that you enter.
>	In addition to a math symbol, it is used to indicate a submenu. For instance, <b>File &gt; New</b> where you would select the New option from the File menu.
...	Indicates that text is being omitted for brevity.

## Action Alerts

The following alerts are used to advise and counsel that special actions should be taken.



### Tip

Indicates 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. This alert 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. It may also be used to alert against unsafe practices.

**⚠ Warning**

Indicates a potentially hazardous situation that may result in physical harm to the user.

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This user's guide describes how to install, configure, and manage the Makito X decoder to receive audio, video, and data over an Ethernet-based IP network, using either the Web interface, the Command Line Interface (CLI), or an SNMP server.

# Introduction

This section provides a brief overview of Haivision's Makito X decoder, along with a description of the main hardware components and key features.

## Topics Discussed

- [New Product Features](#)
- [Product Overview](#)
  - [Makito X Decoder Features](#)
  - [Chassis Styles](#)
  - [Single/Dual Channel Variants](#)
  - [Secure Reliable Transport \(SRT\)](#)
  - [Applications](#)
  - [IPv6 Support](#)
- [Physical Description](#)
  - [Audio/Video Interfaces](#)
  - [LED Status Indicators](#)
- [Audio Talkback](#)
- [Hardening](#)

## New Product Features

Makito X Version 2.3 introduced the following new features and enhancements to existing capabilities:

### IPv6 Support

The Makito X now supports deployment on IPv6 or mixed IPv6/IPv4 networks in addition to the existing IPv4 network support. This includes IPv6 network and device administration and streaming support.

### SRT Streaming Stats in SNMP

SRT streams can be monitored in real-time using an SNMP network management system (NMS). The SNMP MIB now includes SRT statistics which are useful for monitoring the health of an SRT link.

### Device Discovery Aids

Enhancements have been added to allow easier determination of the IP address or location of a Makito X device. These include the display of the device IP address on the serial port login prompt (SDI encoder blades/appliances only), as well as enhancements to encourage the use of mDNS for easier device discovery on a network.

### Device Location (Blinking LEDs)

The Makito X face-plate LEDs can be optionally set to blink which allows easy location of the device in large server room deployments. For example, the blinking LEDs can be used to help identify a specific blade in a rack.

### Security Enhancements

The operator and user accounts are now locked at factory to minimize the chances of unauthorized access.

### AC-3 Decoding

The Makito X Decoder can now decode and output audio which is encoded using the AC-3 algorithm (as per ATSC A/52). >MPEG-2 TS streams received containing AC-3 audio will be down-mixed to a stereo pair for output on the HDMI and SDI interface.

### SRT Encrypted Listener Streams

When encryption is enabled, SRT Listener streams can now be configured to reject unencrypted SRT Caller streams.

### Stream Starting in CLI

You can now start/stop the decoder by way of the stream ID (similar to the Makito X Encoder). Previously the Makito X Decoder CLI only started decoders, not streams.

### Related Topics

- [IPv6 Support](#)
- [Viewing System Status Information](#)
- [Managing User Accounts](#)
- [SDI Decoder Statistics](#) ("Algorithm")
- [SRT Stream Settings](#) ("Reject Unencrypted Callers")
- [stream](#) (CLI command)

## Product Overview

The Makito X Decoder Family is a series of IP video appliances designed to be paired with the Makito X Encoder Family. The Makito X decoder can be configured to decode video from a Haivision encoder (Makito X, Makito "Classic", or Hai1000/Piranha) or a third party compatible encoder. The Makito X decoder delivers single or dual-channel HD digital video to 3G-SDI and HDMI interfaces.

The Makito X decoder supports H.264 High Profile video sources and delivers HD digital video with embedded digital and separate (balanced and unbalanced) analog audio output. The HEVC-capable variant supports decoding of a single or dual stream containing High Efficiency Video Coding (HEVC/H.265) compressed video content. When paired with the Makito X HEVC encoder, the Makito X HEVC decoder yields up to 1080p60 video from a HEVC or H.264 stream with extremely low end-to-end latency.

The Makito X decoder is available as a compact standalone appliance or as mini-blades within rack mountable chassis. It can be configured to decode up to 12 channels within a single rack unit.



### **Note**

In this guide, "SDI" refers to any of the SD, HD and 3G variants. The actual standard used by the decoder is determined by the resolution and frame rate of the received video stream.

**The Makito X decoder is a general purpose decoder capable of decoding many stream formats generated by Haivision and third party encoders. It accepts streams that are remotely generated and de-encapsulates them depending on the stream format.**

- MPEG-2 TS/UDP (with optional Furnace-compatible FEC)
- MPEG-2 TS/RTP (as described in RFC 2250) with optional Pro-MPEG compatible FEC
- SRT (Haivision's Secure Reliable Transport) technology to optimize video streaming performance across unpredictable Internet networks.
- RTSP stream ingest to improve interoperability with Makito Classic Encoders and Axis Cameras/Encoders.

The Makito X decoder supports decoding Baseline, Main and High Profile H.264 4:2:0 coded elementary stream NALs which use B frames (I, IP, IBP and IBBP GOP structures), Intra-Refresh, VBR or CBR rate control, intra-partitioning, CABAC or CAVLC entropy coding, and GOP sizes ranging from 1 to 1000.

The Makito X decoder's implementation of the Advanced Encryption Standard (AES) protocol delivers video content securely and ensures high quality even on congested or unreliable networks. The Makito X decoder provides recovery from packet loss with forward error correction (FEC) and an adjustable receive buffer to tune its performance in varying networks.

## Topics in This Chapter

- [Makito X Decoder Features](#)
- [Chassis Styles](#)
- [Single/Dual Channel Variants](#)
- [Secure Reliable Transport \(SRT\)](#)
- [Applications](#)
- [IPv6 Support](#)

## Makito X Decoder Features

Makito X decoder features and benefits include the following:

- General decoder features:
  - Unicast/Multicast Stream support
  - Still image insertion on loss of video stream
  - Output interface frame rate or resolution control for display matching for HDMI
  - A/V Sync Modes for clock recovery
  - Output Delay Buffer (0-2000 ms) Selection
  - KLV / SDI insertion (Licensable) (H.264 and HEVC)
  - CEA-708-B Closed Caption/SDI insertion with line control
  - AFD/SDI insertion with line control
  - SMPTE 12M ATC\_VITC timecode/SDI insertion with insertion line control
  - Intra-Partitioning (supporting 8x8 and 4x4 MB partitioning tools)
  - Intra-Refresh support
- High Efficiency Video Coding (HEVC/H.265) decoding of a single or dual stream:
  - Only available on HEVC-capable dual-height Makito X decoder
  - Supports interlaced or progressive streams and resolutions up to one channel of 1080p60 or two channels of 1080p30
  - Stream type is automatically determined on decoder startup
- Multi-Track audio support (to inter-work with Makito X encoder v1.1 and later):
  - Up to eight audio decoders supported
  - MPEG-2 AAC-LC (ADTS) support
- Support for two video decoders feeding two different SDI interfaces up to 1080p60
- Ability to select which video stream is displayed on the HDMI interface up to 1920x1200p60 resolution
- Visual notifications displayed on systems with unsaved configurations at login, logout, or reboot to warn users to save their current configuration as a preset
- Redundant stream failover:
  - Each decoder channel can support an alternate stream as input which is switched to if the primary fails
  - Allows high availability applications to minimize down-time due to network connectivity faults
- Support for the administrative features required to comply with the Common Criteria NDPP v1.1
- Secure Reliable Transport (SRT) Streaming support
- Field licensing (where applicable) of the video decoder instances, SRT and KLV

## Chassis Styles

The Makito X decoder is available in the following chassis styles:

- as an ultra-compact appliance (single-height or dual-height) for single or dual-channel decoding.

- as a blade within a 1RU chassis (MB6X) that can contain up to six single-height or three dual-height Haivision encoder/decoder blades.
- as a blade within a 4RU chassis (MB21) that can contain up to 21 single-height or ten dual-height Haivision encoder/decoder blades.
- the Makito X "Harsh" semi-ruggedized, industrial SDI decoder appliance (H.264-only).

The Makito X single-height and dual-height chassis appliances are shown below, followed by the MB21 and MB6X chassis and Makito X Harsh decoder.

### *Makito X Decoder (Single-Height Chassis Front and Rear Views)*



### *Makito X HEVC Decoder (Dual-Height Chassis Front and Rear Views )*



## MB6X Multichannel Chassis ( Front and Rear Views, #MB6X-RAC)



**Note**

The MB6X is available with a single AC, DC, or medical grade AC power supply. For details, please refer to the *MB6 Chassis Installation Guide*.

## MB21 Multichannel Chassis ( Front and Rear Views, #F-MB21X-R )



### *Makito X Harsh (Dual SDI Decoder Appliance)*





**Note**

For instructions on installing the Makito X Harsh decoder, please refer to the *Makito X Harsh Installation Guide*.

### Single/Dual Channel Variants

The dual-height Makito X decoder supports decoding of a single or dual stream containing AVC/H.264 or High Efficiency Video Coding (HEVC/H.265) compressed video content.

- On the dual-channel Makito X decoder, one or two streams may be actively decoded at any given time. Each video decoder is independent and supports up to four (4) channel pairs of AAC/LC audio decoding.
- The Makito X decoder is also available in a single channel variant that mirrors the decoded stream to all output interfaces and supports up to eight (8) channel pairs of AAC/LC decoding from a single stream.

**Note**

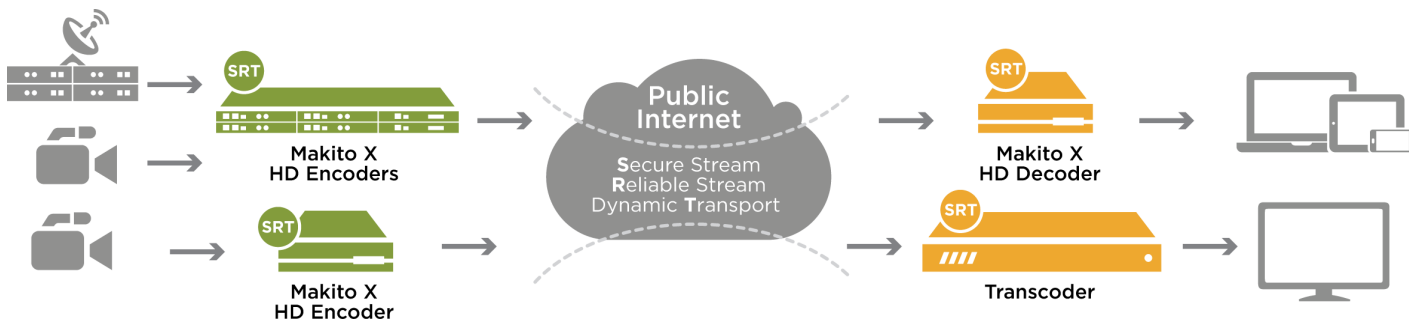
The Makito X decoder can support either H.264-only (single-height blade/appliance) or H.264/HEVC (dual-height blade/appliance) end-user applications.

### 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 realtime network performance between the encode / decode / transcode endpoints. The endpoints can be dynamically adjusted for optimal stream performance and quality.

**Makito X SRT Workflow**



For additional information required to set up and tune SRT streams from the encoder to the decoder, please refer to the [SRT Deployment Guide](#).

## Related Topics

- [Configuring TS over SRT](#)

## Applications

Typical examples of Makito X decoder applications include:

- **General low-latency decoding over an enterprise class network** - The Makito X decoder is used as a point-to-point device paired with a Makito X encoder. Video is captured live at the encoder and transmitted over an enterprise class network to the decoder. Low latency and image quality are primary drivers for this application. Use cases include broadcast backhaul, FED range video transport, Medical intra-room video transport, and intra-stadium video transport (using multicast stream tuning).
- **Over a fixed link between remote sites** - When two different locations are connected with a dedicated link, the Makito X encoders and decoders can be used to transport audio, video and metadata content between the different sites.
- **Over the public Internet streaming using SRT** - The Makito X decoder is used as an Internet streaming solution to transport content over the public Internet using the SRT streaming technology. Configuration is point-to-point between two locations geographically distant and passing through a firewall. Firewall ports must be manually opened to allow traffic through.

## IPv6 Support

Version 2.3 introduced IPv6 support for Makito X encoders and decoders in addition to the existing IPv4 network support. Makito X devices now support IPv6-only networks as well as dual IPv4 and IPv6 network environments. You can install the Makito X on an IPv6 network or on a network supporting both IPv4 and IPv6. You will be able to access the Web Interface, CLI and SNMP via the IPv4 and/or IPv6 addresses assigned to the device. You will be able to perform normal administrative functions from the IPv4 and/or IPv6 addresses.

Version 2.3 IPv6 capabilities include the following:

1. Static and dynamic assignment of IPv6 addresses via DHCPv6 or Stateless Autoconfiguration (SLAAC) to Makito X products in addition to the existing IPv4 capabilities.
2. Dual-stack IPv4 and IPv6 may be used simultaneously for management and video streaming purposes.
3. All administration functions may be performed from an IPv6 network client, including upgrade/downgrade, preset import/export, license install, system snapshots and specifying audit servers.
4. User functions include creating and starting streams, specifying an NFS server for recording, specifying a Talkback device, capturing image snapshots, and importing logos and still image files from an IPv6 device.

### Related Topics

- [Configuring Network Settings](#)
- [Enabling and Disabling Network Services](#)
- `ipv6config` (CLI command)

## Physical Description

Following is a description of the Makito X decoder (single chassis) interfaces, connectors, and LED status indicators:

## System Interface

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

### *Ethernet Connection (Makito X HEVC, Dual-Height Chassis, Rear View)*



## Related Topics

- [Audio/Video Interfaces](#)
- [LED Status Indicators](#)
- [Connecting the Decoder to the Network](#)

## Audio/Video Interfaces

### **Note**

The Makito X decoder supports one or two independent video decoders that feed the two SDI interfaces. On the single channel variants, with SDI-compatible output formats, the HDMI and both of the mini-BNC connectors show the decoder output. With computer graphics resolution formats, only the HDMI interface shows the decoder output.

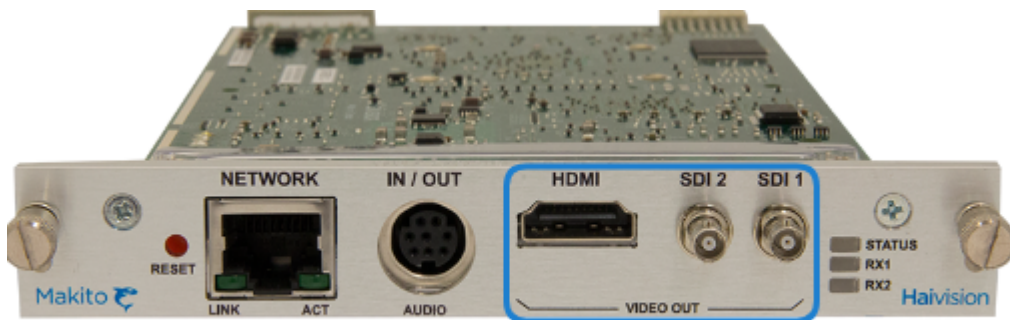
The HDMI port can be configured to mirror the same content that is seen on either Decoder 1 or Decoder 2. If the stream contains computer graphics resolutions, that content can only be displayed on the HDMI interface.

All of the decoder's Video Output connectors are active, and both Analog Audio and Embedded Digital Audio are active. This means that the decoder is capable of simultaneously outputting analog and digital audio as well as both SDI and HDMI digital video.

## Video and Embedded Digital Audio Output Interfaces

The Makito X decoder video interface consists of two BNC connectors (SDI 1 and SDI 2) and one HDMI connector (faceplate shown below).

- The BNC connectors are used for the SD/HD/3G-SDI video signals. A 75 coaxial cable connects from Video Out to a video monitor. HD-BNC to BNC Adapter Cable(s) are included in the package.
- The HDMI connector is used for High Definition audio/video output signals. An HDMI Type-A cable connects from HDMI Out to a video monitor. Note that HDCP content protection is not applied to the HDMI output.



The audio is also embedded in the SDI and HDMI video. The SDI video supports up to 16 audio channels (8 pairs) and the HDMI supports 8 channels (4 pairs).

### Related Topics

- [Connecting the Decoder to A/V Displays](#)

## 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 output (one stereo pair) and a mono audio input (for Audio Talkback).

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 the pinout, see [Audio Connector Pinout](#).

## Related Topics

- [Connecting the Decoder to A/V Displays](#)
- [Audio Talkback](#)
- [Audio Breakout Cables](#)

## LED Status Indicators

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



### General Network Port

#### General

Function	Color	Description	Indication
Status	Red/Green	Off	No power
		Red Solid	Error/Fault
		Green Blinking	Booting/Initialization
		Green Solid	No Fault/OK
RX1/RX2	Amber/Green	Off	No active stream is being decoded
		Amber Solid	At least one of the conditions below is sufficient to turn on the LED Amber: <ul style="list-style-type: none"> <li>• Decoder booting</li> <li>• No video stream is being decoded</li> <li>• No audio stream is being decoded</li> </ul>
		Green Solid	When all the conditions below are met: <ul style="list-style-type: none"> <li>• A video stream is being decoded</li> <li>• An audio stream is being decoded</li> </ul>

### General Network Port

#### Network Port

Function	Color	Description	Indication
LINK	Green	Off	Not connected



Function	Color	Description	Indication
		Green Blinking once per second	Connected at 10 Mbps
		Green Blinking twice per second	Connected at 100 Mbps
		Green Blinking three times per second	Connected at 1000 Mbps
ACT	Green	Off	No Activity
		Green Intermittent	Little activity (e.g., management). The LED should be lit when there is activity.
		Green Solid	Intense Activity (e.g., transmitting video traffic)

## Related Topics

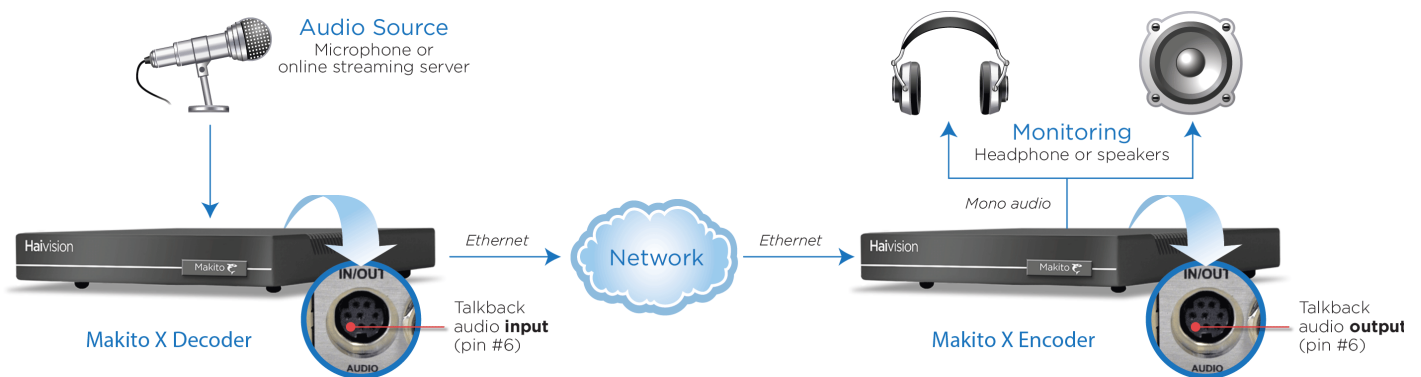
- [Powering Up the Decoder](#)

## Audio Talkback

The Audio Talkback network service allows users to stream a mono channel of audio back to a Makito X encoder over a reliable LAN or WAN. Audio talkback uses the decoder’s audio input to enable end users monitoring a streaming session to “talk back” to individuals at the encoder. For example, talkback enables students at remote classroom locations to ask their teacher questions, or a chief surgeon observing a surgery to collaborate.

The talkback audio stream is input via a microphone connected to the decoder’s 8-pin MiniDIN connector (see [Analog Audio Interface](#)).

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



Administrators can enable or disable audio talkback on the decoder and specify the UDP port to transmit (i.e., the destination port used by the encoder). They can also select the talkback activation mode (either Push Button or Toggle Switch) from the Web interface.

- Push Button 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.
- The Toggle Switch stays active until the user clicks the button again.

The Talkback network service may be enabled and disabled from the Web interface (Services page, see [Enabling and Disabling Network Services](#)) or using the `service` CLI command.

**Note**

For Talkback to start automatically when the unit is rebooted, a default preset should be created while talkback is active and the button mode is set to Toggle Switch.

Once the Talkback service is enabled, a user simply selects the stream and presses the Talkback button from the Web Interface (Streams page) to start streaming the audio from the microphone to the encoder of that stream. For details, see [Starting and Stopping Audio Talkback](#).

CLI commands may be used to start or stop transmission of talkback audio, specify the talkback port, clear talkback statistics, and display talkback information. For details, see “talkback” (CLI). Talkback audio is not configurable through SNMP.

**Note**

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

**Related Topics**

- [Enabling and Disabling Network Services](#)
- [service](#)

## 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.

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 the [Download Center](#) on the Haivision Support Portal: Resources>Download Center>Support Documentation>Makito X).

The *Makito X Hardening Guide* provides the procedures to install and configure Makito X encoders and decoders 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.

**Note**

Any Makito X decoder at Version 1.2 or higher can be hardened by following the procedures described in this guide.

# Installing the Decoder

## Note

For instructions on installing the Makito XH (Harsh) decoder, please refer to the [Makito XH Installation Guide](#).

For the steps to install the MB6 or MB21 chassis, please refer to the [MB Chassis Installation Guide](#).

## Topics in This Chapter

- [Setting Up the Decoder](#)
- [Connecting the Decoder to the Network](#)
- [Connecting the Decoder to A/V Displays](#)
- [Powering Up the Decoder](#)
- [Resetting the Decoder](#)
- [Hardware Maintenance](#)

## Setting Up the Decoder

Always read the instructions carefully and keep this user's guide for future reference.

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

### **Caution**

The MB21 chassis must either be installed on a securely fastened rack shelf, or fastened directly to the rack using support brackets. For instructions on how to properly secure or support the MB21, refer to the *MB Chassis Installation Guide* (available at <https://doc.haivision.com>).

## Safety First

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

- 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.
- Refer to [Safety Guidelines](#).

## Safety Guidelines

### **Warning**

This product is intended for installation in a restricted area. Limited access areas are protected by a specific mechanism, lock and key or other security device.

**ATTENTION** Ce produit est destiné à être installé dans une zone d'accès restreint. Les zones d'accès limité sont protégées par un mécanisme spécifique, une serrure et une clé ou tout autre dispositif de sécurité.

### **Warning**

When using the AC/DC power adapter, the power cord is the main disconnect device. Ensure that the socket-outlet is located/installed near the equipment and is easily accessible.

**ATTENTION** Quand on utilise l'adaptateur AC à DC, le cordon d'alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée à proximité de l'équipement et être facile d'accès.

### **Warning**

The installation of the equipment must comply with local and national electrical regulations.

**ATTENTION** L'installation de l'équipement doit être conforme aux réglementations électriques locales et nationales en vigueur.

**Warning**

Any power supply shipped with a Haivision Makito X Series encoder or decoder is to be used *only* with that product. Haivision supplied power supplies are *not* for general use.

**ATTENTION** Tout bloc d'alimentation électrique livré avec un encodeur ou un décodeur de la série Haivision Makito X doit être utilisé uniquement avec ce produit. Les blocs d'alimentation fournis par Haivision ne sont pas destinés à un usage général.

**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 floor pads and workbench pads.

**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.

## EMC Warnings

### Notice with respect to Class A (FCC)

Changes to equipment without the permission of Haivision may result in its failure to comply with the FCC requirements for Class A digital devices. If applicable, your rights to use the equipment may be limited by the FCC rules and you may be able to remedy, at your own expense, any interference with radio or television equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference that may occur when the equipment is used in a commercial environment. This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Use of this equipment in residential areas may cause harmful interference. If necessary, users will have to resolve these issues at their own expense.

### Avis relatif aux appareils de classe A (FCC)

Toute modification de l'équipement sans l'autorisation de Haivision peut entraîner sa nonconformité aux exigences de la FCC concernant les appareils numériques de classe A. Le cas échéant, vos droits d'utilisation de l'équipement seront susceptibles d'être limités par les règlements de la FCC et vous pourrez être amené à remédier, à vos frais, aux éventuelles interférences avec des dispositifs radiophoniques ou télévisuels. Cet équipement a été testé et jugé conforme aux limites d'un périphérique numérique de classe A en vertu de la partie 15 des règlements de la FCC. Ces limites ont pour but de fournir une protection raisonnable contre les interférences nuisibles susceptibles de se produire, lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut émettre de l'énergie radioélectrique. S'il n'est pas installé ni utilisé conformément au manuel d'instructions, il peut provoquer des interférences nuisibles aux communications radio. L'utilisation de cet équipement dans les zones résidentielles est susceptible de causer des interférences nuisibles. Le cas échéant, les utilisateurs devront résoudre ces problèmes à leurs frais.

### Notification for Class A (Canada)

This Class A digital apparatus complies with Canadian ICES-003.

### Notification pour les appareils de classe A (Canada)

Cet appareil numérique de Classe A est conforme à la norme NMB-003 du Canada.

### Safety instructions for Class A for CISPR32

**WARNING:** This product is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may need to take appropriate measures.

### Consigne de sécurité relative à la Classe A pour CISPR32

**ATTENTION:** Il s'agit d'un produit de Classe A. Dans un environnement domestique, ce produit peut entraîner des perturbations radioélectriques, auquel cas l'utilisateur devra éventuellement prendre des mesures adéquates.

## Waste Electrical and Electronic Equipment (WEEE) Disposal

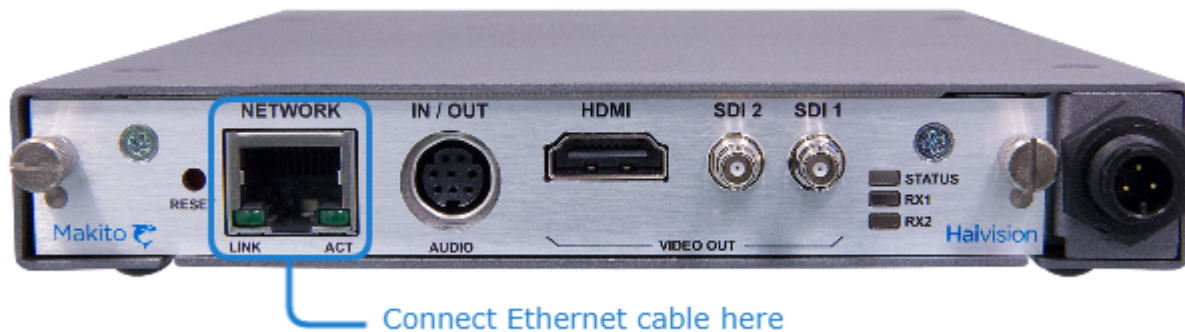
	<p>This symbol on Haivision products or packaging means that the product should not be disposed of with general waste. It is your responsibility to dispose of your waste equipment by handing it over to a designated recycling collection point. The correct disposal of your end-of-life equipment will help prevent potential negative consequences to the environment and human health.</p> <p>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.</p> <p>For more information, please visit our website at: <a href="https://www.haivision.com/environment">https://www.haivision.com/environment</a>.</p>
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## Connecting the Decoder to the Network

To connect the Network Interface:

1. Connect the decoder'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.



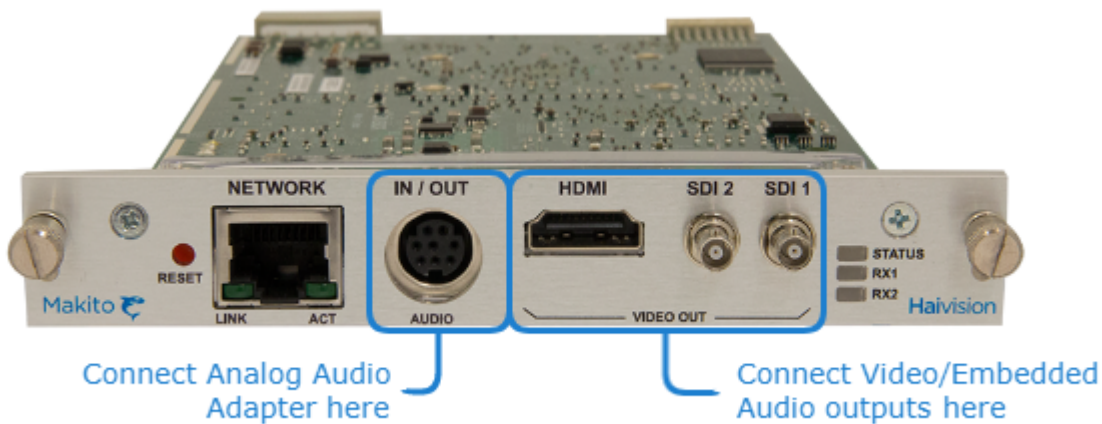
### Related Topics

- [Physical Description](#)

## Connecting the Decoder to A/V Displays

**Note**

The Makito X decoder supports two independent video decoders that feed the two SDI interfaces. The HDMI port can be configured to mirror the same content that is seen on either Decoder 1 or Decoder 2. If the stream contains (supported) computer graphics content, that content can only be displayed in its native format on the HDMI interface. All of the decoder’s Video Output connectors are active, and both Analog Audio and Embedded Digital Audio are active. This means that the decoder is capable of simultaneously outputting analog and digital audio as well as both SDI and HDMI digital video.



To connect to Decoder to A/V Displays:

**1. 3G-SDI Video Output with Embedded Audio:**

Connect one or both of the decoder’s SDI outputs to TV or display monitors, using the HD-BNC to BNC Adapter Cable(s) (included in the package for appliances).



**Note**

To install blades in an MB6X or MB21 chassis, see [HD-BNC Connector Assembly](#) to mount the HD-BNC connector directly on the cable run. All blades manufactured by Haivision are can be installed and removed with the chassis powered on (i.e., are hot-swap capable).

**2. HDMI Video Output with Embedded Audio:**

Connect the decoder’s HDMI output to a TX or display monitor.

**Note**

By default, HDMI displays the SDI 1 content. To monitor the SDI 2 channel, see [Configuring the HDMI Display](#).

For the HDMI pinout, refer to [HDMI Audio/Video Output Connector Pinout](#).

3. **Analog Audio Out:** Connect the decoder's audio output to the audio sound system/speakers.
  - For unbalanced audio, use the 8-pin audio to 3-RCA female cable adapter (included in the package, shown following).
  - A balanced audio cable adapter is available from Haivision upon request. (See [Audio Breakout Cables](#).)



White - Channel 1 / Left Out  
Red - Channel 2 /Right Out  
Black - Talkback In

Refer to [Audio Connector Pinout](#) for the balanced/unbalanced audio pinout.

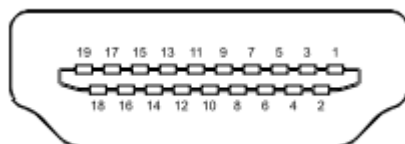
**Note**

Selection between analog and digital (SDI) audio may be done via the Web interface or the Command Line Interface (CLI).  
To configure the decoders, see [Configuring Decoder Outputs](#) (Web interface), or [viddec](#) (CLI).

## HDMI Audio/Video Output Connector Pinout

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

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



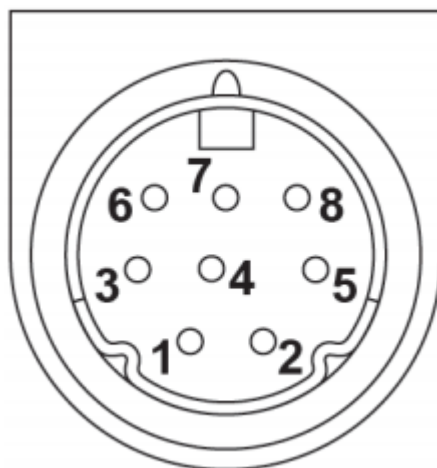
### Related Topics

- [Connecting the Decoder to A/V Displays](#)

## Audio Connector Pinout

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

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

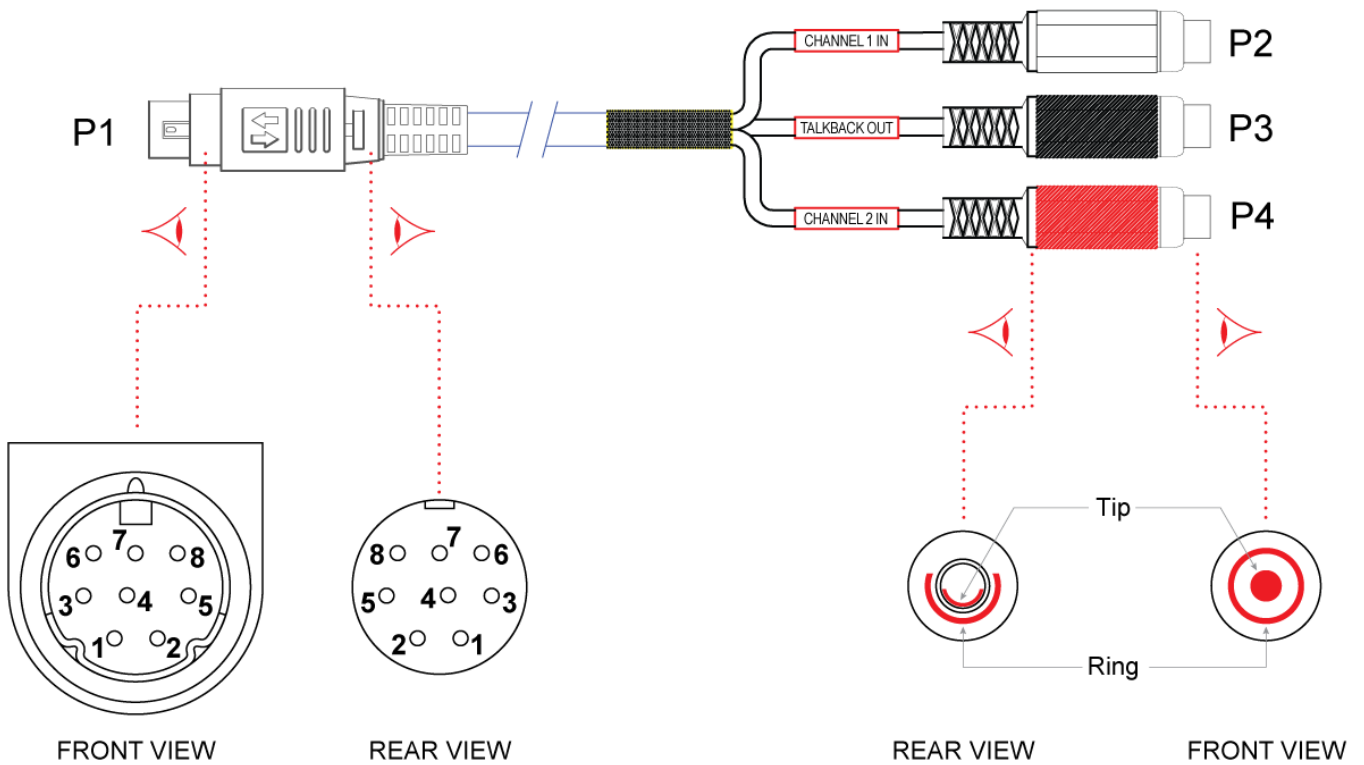
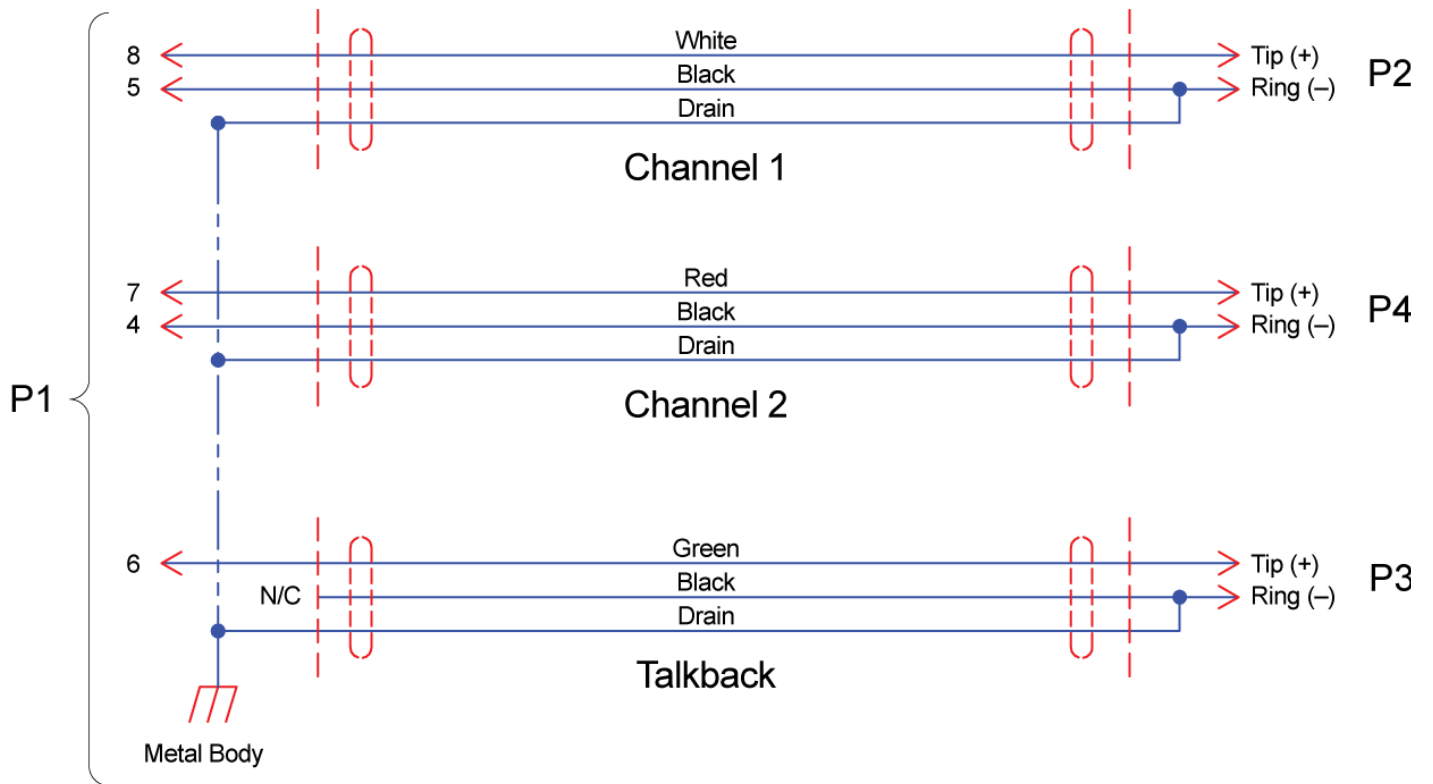


### Related Topics

- [Connecting the Decoder to A/V Displays](#)
- [Unbalanced Audio Connections](#)
- [Balanced Audio Connections](#)



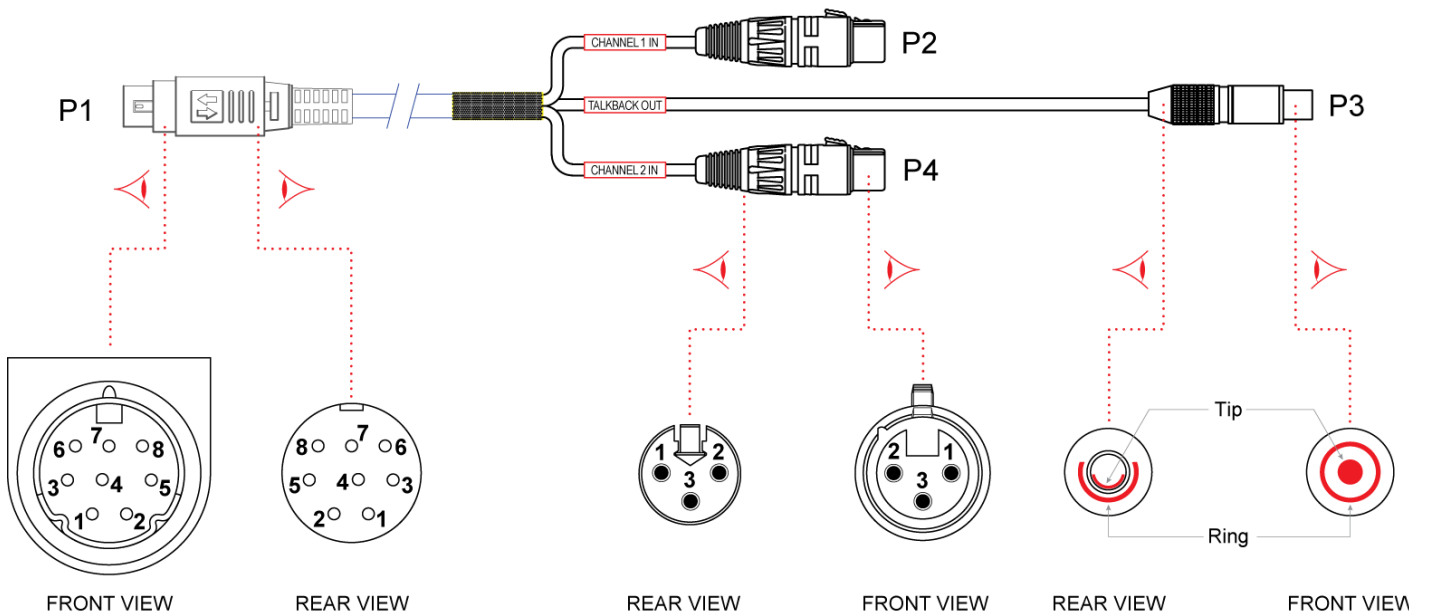
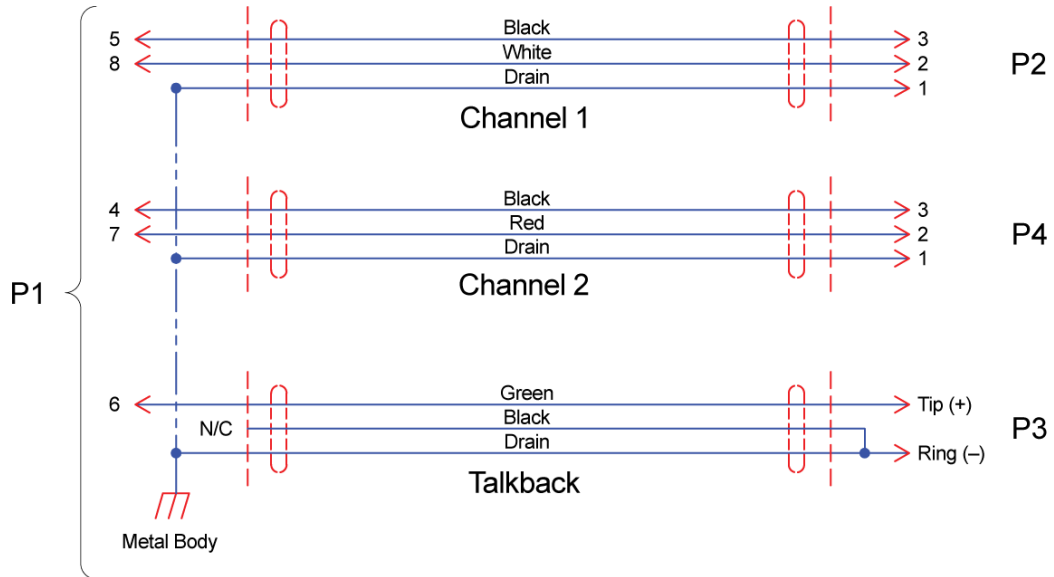
## Unbalanced Audio Connections







## Balanced Audio Connections



### Related Topics

- [Audio/Video Interfaces](#)
- [Unbalanced Audio Connections](#)

## Audio Breakout Cables

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

Cable	Description	Part Number
Audio Breakout Cable, Unbalanced	Unbalanced mini-DIN 8 to RCA Female <ul style="list-style-type: none"> <li>• 2 channels output</li> <li>• 1 channel input for talkback support (future use)</li> </ul> Included in the package (shown in <a href="#">Connecting the Decoder to A/V Displays</a> ).	CA-292-2RTB
Audio Breakout Cable, Balanced	Balanced mini-DIN 8 to XLR Female <ul style="list-style-type: none"> <li>• 2 channels output</li> <li>• 1 RCA female channel input for talkback support (future use)</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
Audio Breakout Cable, Balanced	Balanced mini-DIN 8 to XLR Male <ul style="list-style-type: none"> <li>• 2 channels output</li> <li>• 1 RCA female channel input for talkback support (future use)</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-292-2XMTB

## HD-BNC Connector Assembly

Although the HD-BNC to BNC adapter cables are provided with Makito X blades, for long cable runs, we recommend that you mount the HD-BNC connector directly on the cable (instead of using a converter) to enhance signal levels.

The vendor and ordering part-number for an HD-BNC extractor/mating tool is as follows: Amphenol p/n 227-T2000

The HD-BNC plug can be mounted on many 75 Ohm coaxial cables. Following are the most popular coaxial cables from Belden followed by the HD-BNC connector part number recommended by Amphenol.

Description	Part Number
Plug for Belden Cable 1855A	Amphenol 34-1026
Plug for Belden Cable 1505A	Amphenol 34-1025
Plug for Belden Cable 1695A	Amphenol 34-1027
Plug for Belden Cable 1694A	Amphenol 34-1017-300

## Powering Up the Decoder

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

### ⚠ Caution

To prevent damage to the Makito X and/or power supply, be sure to connect the power supply to the chassis first and then to the AC source. Always use the AC power cord and power supply provided with the unit. The single and dual-height chassis have different power supply units and chassis connectors.

### 📌 Important

There is no power switch on the Makito X appliance. The power is automatically on when the unit is plugged in. When using the AC/DC power adapter, 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 3-pin connector on the 12V power supply into the Power input jack at the rear of the decoder.
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 decoder is booting up.
3. Wait until the Status LED stays solid green, indicating that the decoder is ready for operation.

### [Single-Height Chassis](#)    [Dual-Height Chassis](#)

#### Single-Height Chassis

*Rear View (#S-292D-HD2) showing Conxall 3-pin Locking Connector*



*Power Adapter 12VDC with Conxall 3-pin Connector*



Single-Height Chassis [Dual-Height Chassis](#)

## Dual-Height Chassis

*Rear View (Dual-Channel HEVC #S-292D-HD2-HEVC)*



*Power Adapter 12VDC with HiRose 3-pin Connector*





## Resetting the Decoder

- [Default Network Settings](#)

This section describes the steps to perform a hardware reset on the Makito X. The Reset button is used either to reset the system or to restore the factory default settings.

- **System Reset:** In some cases, if your decoder is experiencing a problem, resetting the system can return the decoder to normal operation.
- **Factory Reset:** If the problem remains after performing a reset, it may help to restore the decoder to its factory default settings. A factory reset returns the decoder to the same settings it originally had when shipped from Haivision, including the factory default IP address, subnet, and gateway.

**Note**

After a Factory reset, only the firmware revision, serial number, and MAC address are preserved. All other data is deleted (including saved presets, added user accounts, modified passwords, and decoding settings). All settings are returned to their factory preset conditions (including the IP address).

Use one of the following methods to either reset or restore the Makito X settings:

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



2. **System Reset:** Press the recessed 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.  
-or-  
**Factory Reset:** Press and hold the recessed micro switch for five (5) seconds.
3. Wait for the decoder to reboot.

As soon as the lights stop blinking and the Status LED is solid green, the decoder is ready.

## Default Network Settings

After a factory reset, the Network settings are reset to:

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 decoder appliance.

- [Cleaning the Ventilation Intake-Outtake](#)
- [Monitoring the Fan Operation](#)
  
- [Replacing the RTC Battery](#)

### Cleaning the Ventilation Intake-Outtake

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 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).
- You can check the Web Interface (Status page) or use the CLI (`temperature get` command) to get information from the built-in temperature sensors. If the internal temperature of the unit is rising, that is an indication that the fan may not be operating properly.
- See [temperature](#).



## 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.

Ruggedized enclosures such as the Makito XR and the Makito XCR do not have a battery.

### ✓ Tip

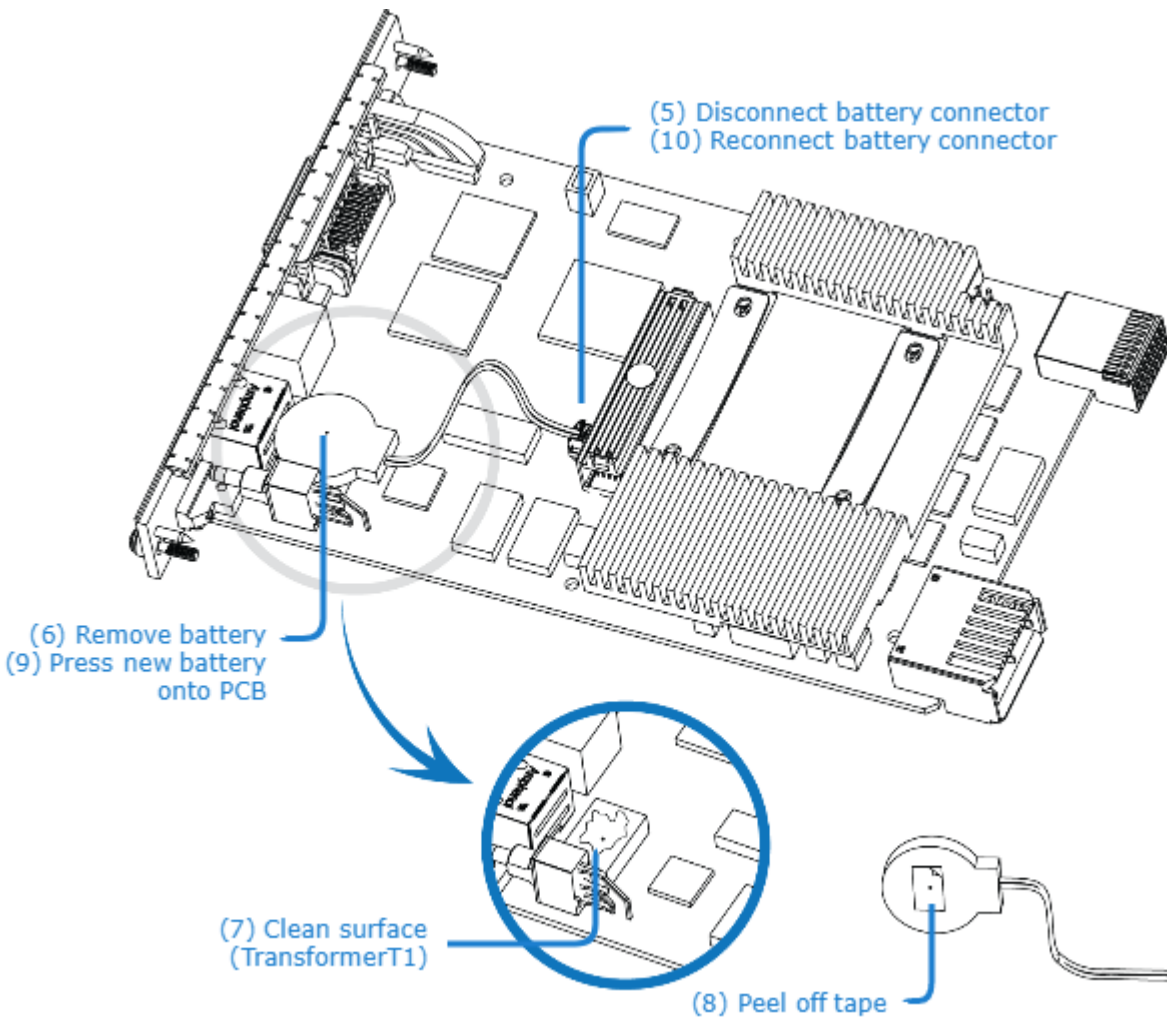
The RTC battery needs to be replaced if at a power-cycle event, the system time and date are reset to within 24 hours, depending on your time zone, of January 1, 1970 (Coordinated Universal Time, UTC).

### ⚠ 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.



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.

# Getting Started with the Web Interface

## ! Important

Before proceeding, make sure that the decoder is set up correctly and all necessary network and A/V connections are established. See [Installing the Decoder](#).

All Makito X decoder 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 decoder through its Ethernet LAN port.

## i Note

Most Audio/Video settings are defined at the encoder end, and the decoder adjusts to the settings embedded in the received stream.

## Topics in This Chapter

- [Accessing the Decoder Web Interface](#)
- [Signing In to the Web Interface](#)
- [Exploring the Web Interface](#)
- [Changing Your Password](#)
- [Signing Out](#)

## Accessing the Decoder Web Interface

- [Security Steps](#)
- [Default Decoder IP Address](#)

Managing the Makito X decoder from the Web interface requires a connection from the unit's LAN port to your network. You must then connect a computer with a Web browser to the network to access the Web interface.

For the steps to configure and manage the decoder from the Web interface, see [Accessing the Decoder Web Interface](#).

To access the decoder configuration Web page:

1.

**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 (available from the [Download Center](#) on the Haivision Support Portal) for any limitations for specific versions of these browsers.

2. Type the decoder's IP Address in the browser's address bar and press Enter.

3. Sign in. (See [Signing In to the Web Interface](#).)

- For a list and description of the CLI commands to configure and manage the decoder, see [CLI Command Reference](#).
- For information on SNMP management of the decoder, see [Configuring A/V Services Using SNMP](#).

## Security Steps

Only secured HTTP (HTTPS) is supported for the Web interface; therefore, a server certificate is required. The decoder 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 decoder, 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).

### Note

The Makito X decoder identity certificate and trusted root certificates are managed using the CLI `certificate` command or Web interface Certificates page. For details, see [certificate](#) or [Managing Certificates](#).

## Default Decoder IP Address

### Note

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

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

### Tip

After you change the decoder IP Address, be sure to document it somewhere or label the chassis. Otherwise if you do not know the current IP Address, you will need to reset the Makito to its factory settings, which will return the unit to the default IP address (and you will lose any saved configurations and settings). For more information, see [Resetting the Decoder](#).

## Role-based Authorization

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

Role	Default Username	Privileges
Guest	user	Read-only access to the system.
Operator	operator	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	All access rights and Administrator privileges.

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

Functional Module	Role		
	Guest	Operator	Administrator
<b>Operation</b>			
Streams	Read-only	Yes	Yes
Video Decoder	Read-only	Yes	Yes
Audio Decoder	Read-only	Yes	Yes
<b>Administration</b>			
Network Configuration	-	-	Yes
System Status	Read-only	Yes	Yes
(Configuration) Presets	-	Yes	Yes
Firmware Upgrades	-	-	Yes
Services	-	-	Yes
Licensing	-	-	Yes
Still Images	-	-	Yes
<b>Security</b>			
My Account/Accounts	Yes <sup>1</sup>	Yes	Yes
Messages	-	-	Yes
Banner	-	-	Yes
Cryptographic Policies	-	-	Yes

Certificates	-	-	Yes
Security Audit	-	-	Yes

1. Guest and Operator accounts see “My Account” on the **Administration** sidebar and can only view/change their own account settings. Administrator accounts see “Accounts” on the **Administration** sidebar and can view/manage all user accounts.

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

Please refer to the *Important Notice* (postcard included in the box or available from the [Download Center](#) on the Haivision Support Portal) for the default sign-in credentials.

**⚠ Caution**

For security purposes, Haivision strongly advises you to change the default password for all accounts during initial configuration.

**Administrators can create, delete, lock, and unlock user accounts, including changing the password, from the Accounts page (see [Managing User Accounts](#)). Operators and guests can manage their password from the My Account page (see [Changing Your Password](#)).**

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.

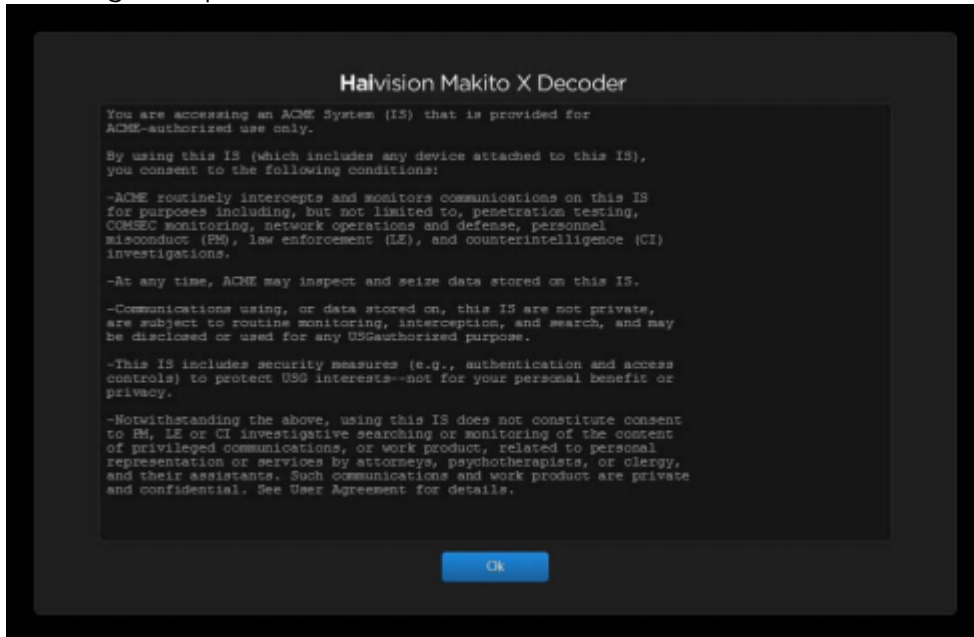
**Related Topics**

- [Command Summary and Access Control](#)

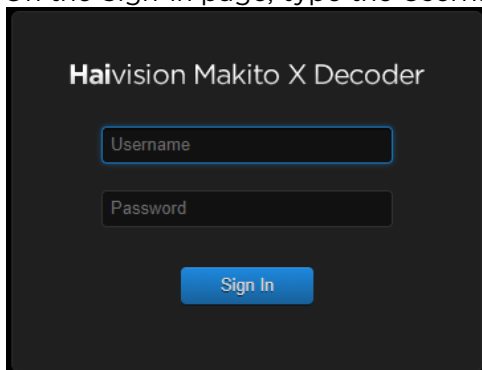
## Signing In to the Web Interface

To sign in to the Makito X decoder configuration Web page:

1. From your Web browser, type the Makito X decoder’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**.
3. On the Sign-in page, type the Username and Password and click **Sign In** (or press Enter).



Please refer to the *Important Notice* (postcard shipped with the appliance or available from the [Download Center](#) on the Haivision Support Portal) for the default sign-in credentials.

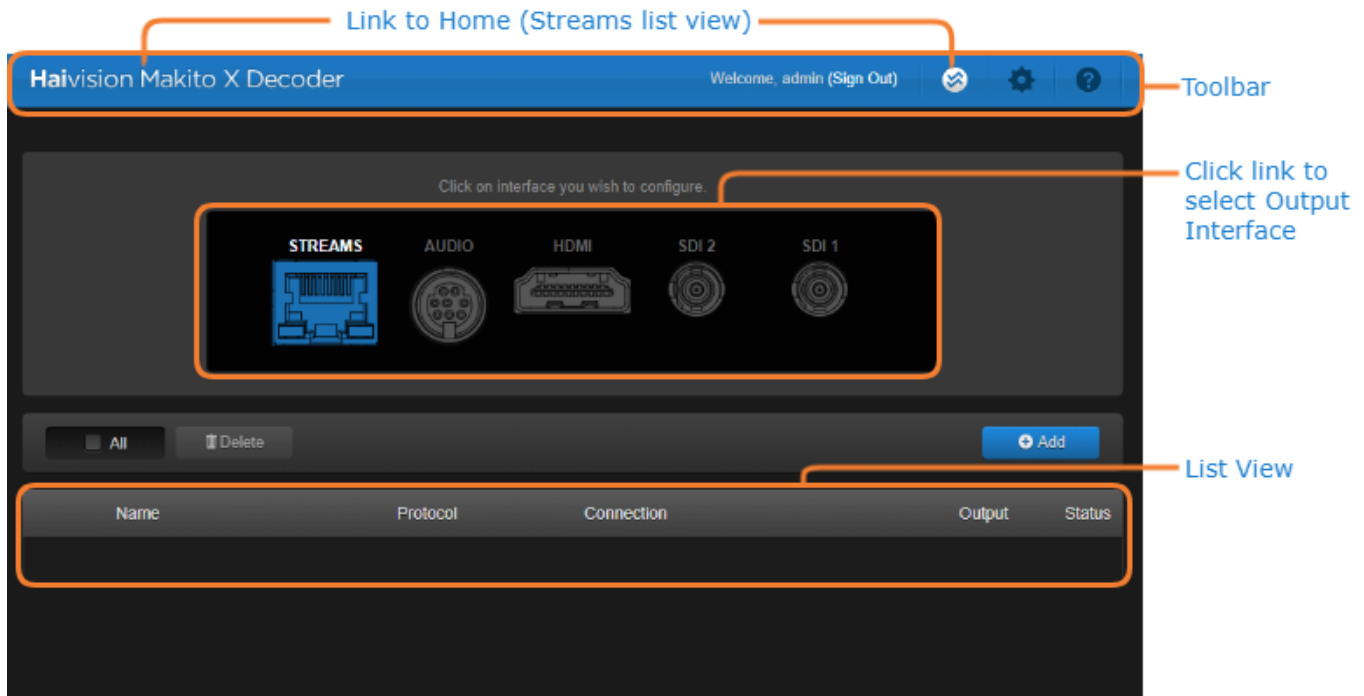
Makito X provides three pre-defined user accounts. For information, see [Role-based Authorization](#).



## Exploring the Web Interface

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

The Web interface opens to the Streams List View (as shown in the following example). Your account information is displayed on the toolbar (along the top).




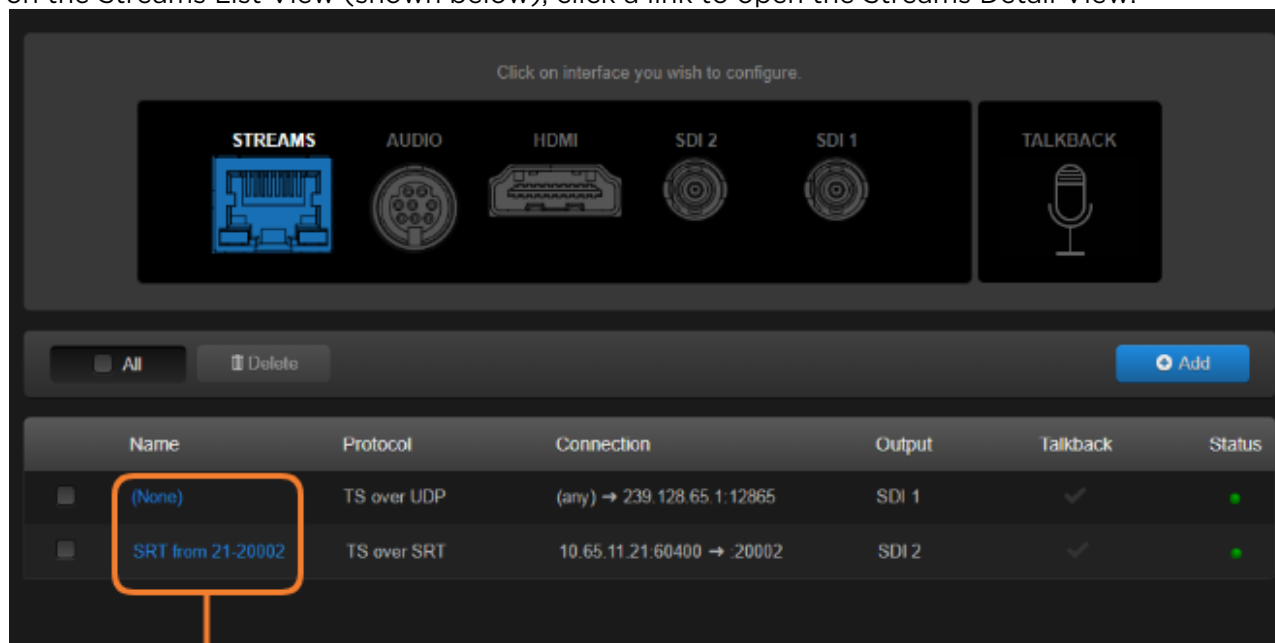
- To create streams or set up decoding, select the output interface, either **STREAMS**, **AUDIO**, **HDMI**, **SDI 1**, or **SDI 2**.
- If SAP listening is enabled, you can switch the display between “Configured” and SAP-advertised streams, or “All” from the Display drop-down list. For details, see [Enabling and Disabling Network Services](#).
- If Audio Talkback has been enabled, you will see the Talkback button (as shown in the following figure). Once a stream has started, you can start **Talkback**. For details, see [Starting and Stopping](#)

## Audio Talkback.



Click to start Talkback on selected stream

- To access the decoder administration settings, click the  **Administration** icon on the toolbar, and then select the area 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 Streams List View (shown below), click a link to open the Streams Detail View.



Click link to open Detail view

**Note**

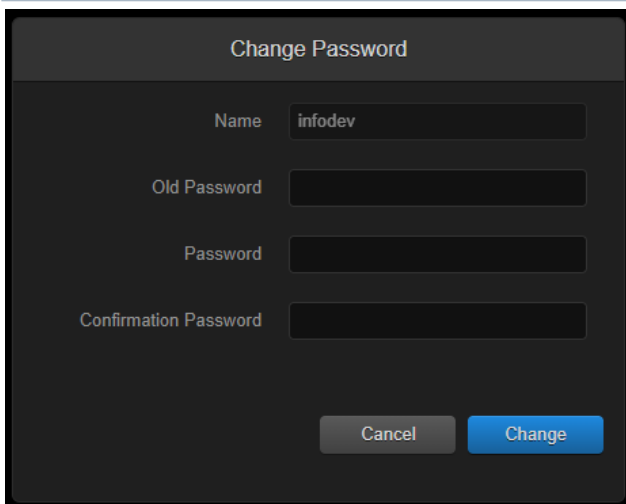
A warning indication appears in the title bar on systems with unsaved configurations. The indication is displayed when you sign in or out, or reboot a Makito X when the current configuration has not been saved in a preset. See [Saving and Loading Presets](#).

## Changing Your Password

- [Password Requirements](#)

**Important**

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




The screenshot shows a dark-themed dialog box titled "Change Password". It contains four input fields: "Name" (with the text "infodev"), "Old Password", "Password", and "Confirmation Password". At the bottom of the dialog, there are two buttons: "Cancel" and "Change".

Users assigned either **Operator** or **Guest** roles can also change their passwords from the My Account page, as described in this section. This is useful when logging into a Makito X decoder on which the factory defaults have not been changed.

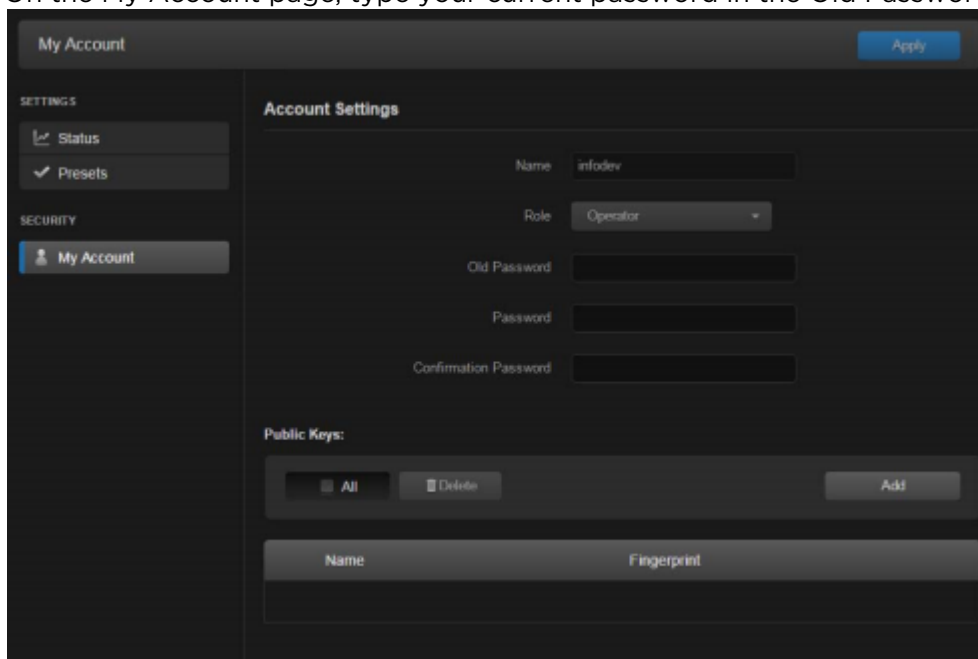
**Note**

The Accounts List View and Account Settings page are available to administrators only.

To change your password:

1. To navigate to the Administration page, click the  **Administration** icon on the toolbar and then click **My Account** (or **Accounts**) on the sidebar (under **Security**).

2. On the My Account page, type your current password in the Old Password field.



The screenshot shows the 'My Account' page. The left sidebar has 'My Account' selected under the 'SECURITY' section. The main content area is 'Account Settings'. It includes a 'Name' field with 'infodev', a 'Role' dropdown set to 'Operator', and three password fields: 'Old Password', 'Password', and 'Confirmation Password'. Below these is a 'Public Keys' section with 'All', 'Delete', and 'Add' buttons, and a table with columns 'Name' and 'Fingerprint'.

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.

**Tip**

Be sure to write down the new password.

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 decoder. For more information, see [Managing Public Key Authentication](#).

## Password Requirements

Unable to render include or excerpt-include. Could not retrieve page.

## Signing Out

After you finish using the Makito X decoder, be sure to sign out. To do so, click **Sign Out** from the toolbar.

Signing out prevents misuse and unauthorized access to the decoder.

# Managing the Decoder

## Note

For a management overview of the Makito X as well as an overview of the Web interface, see [Getting Started with the Web Interface](#).

## Topics in This Chapter

- [Setting Up Decoder Streams](#)
- [Configuring Decoder Outputs](#)
- [Configuring the HDMI Display](#)
- [Configuring the Analog Audio Output](#)


## Setting Up Decoder Streams

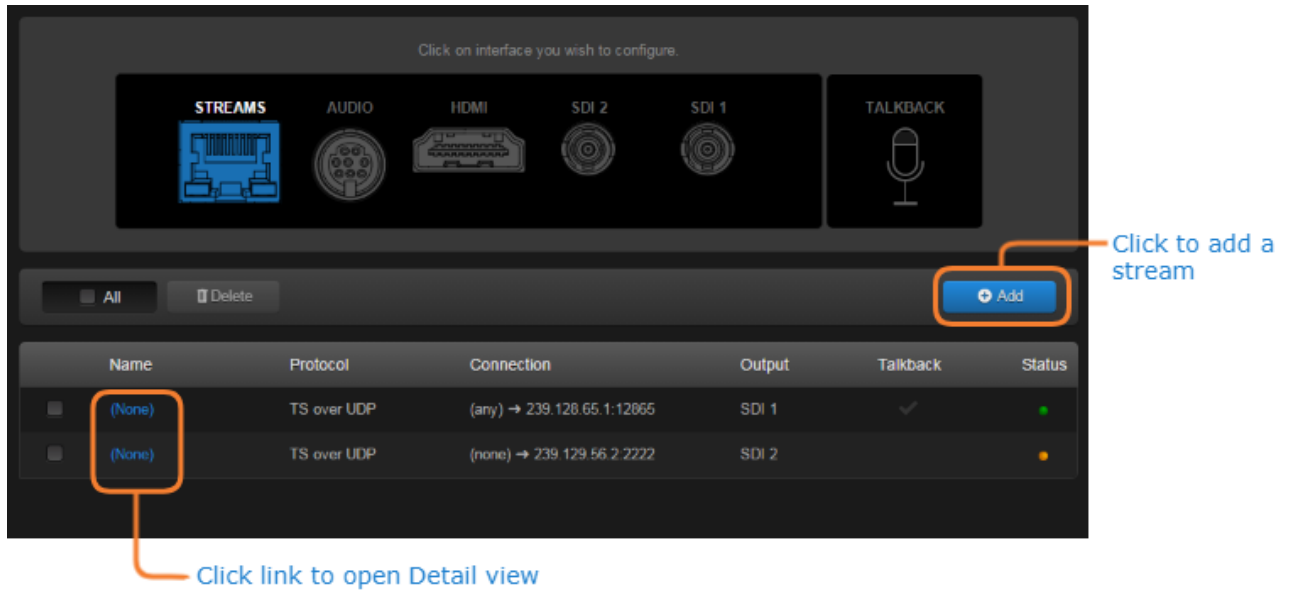
The Makito X decoder provides a Streams List View and separate Detail Views for creating and configuring streams to map the decoder inputs to output interfaces.

### Streams List View

The Streams List View displays a summary of defined streams for the decoder, including the Name, Protocol, Connection details, and status LED for each stream. It also shows the selected Outputs (once streams have been bound to the SDI 1 and SDI 2 output interfaces). If Talkback is enabled, it shows the stream selected for Talkback.

To display the Streams List View:

1. (If not already on the Streams List View) Click the  **Streaming** icon on the toolbar. The Streams List View opens, showing the defined streams for the decoder (see following example).



- To add a decoder stream, click **+ Add**. See [Configuring Decoder Streams](#).
- To view details of an existing stream, click a link in the table to open the Streams Detail View. See [Configuring Decoder Streams](#).
- To display SAP-advertised streams, select “Discovered (SAP)” or “All” from the Display drop-down list. (SAP listening must be enabled; for details, see [Enabling and Disabling Network Services](#).)
- To start Audio Talkback (if enabled), click **TALKBACK** and begin talking into your microphone. For details, see [Starting and Stopping Audio Talkback](#).

- To delete an existing stream, check the checkbox next to one or more streams in the list (or check **All**), and click **Delete**.

## Streams Status LEDs and Connection Information

On the Streams List View, the following LEDs indicate the stream status:

Status LED Color	Indication
Grey	Stopped or not associated with a decoder.
Yellow	Configured and listening (waiting to receive data).
Green	Receiving data.
Red	Stream connection has failed or a fault has occurred.

The form of the stream Connection information is:

`SenderIP[:SenderPort] → [ListeningIP]:RecvPort`

where:

SenderIP	Can be "any", "none", hostname, or a unicast IPv4 or IPv6 address.
SenderPort	(SRT modes only) Is the UDP destination port of the peer SRT device used for the connection.
ListeningIP	Can be a Multicast IP address or optionally the unicast IP address of the decoder.
RecvPort	Is the UDP port on which the decoder is receiving the stream.

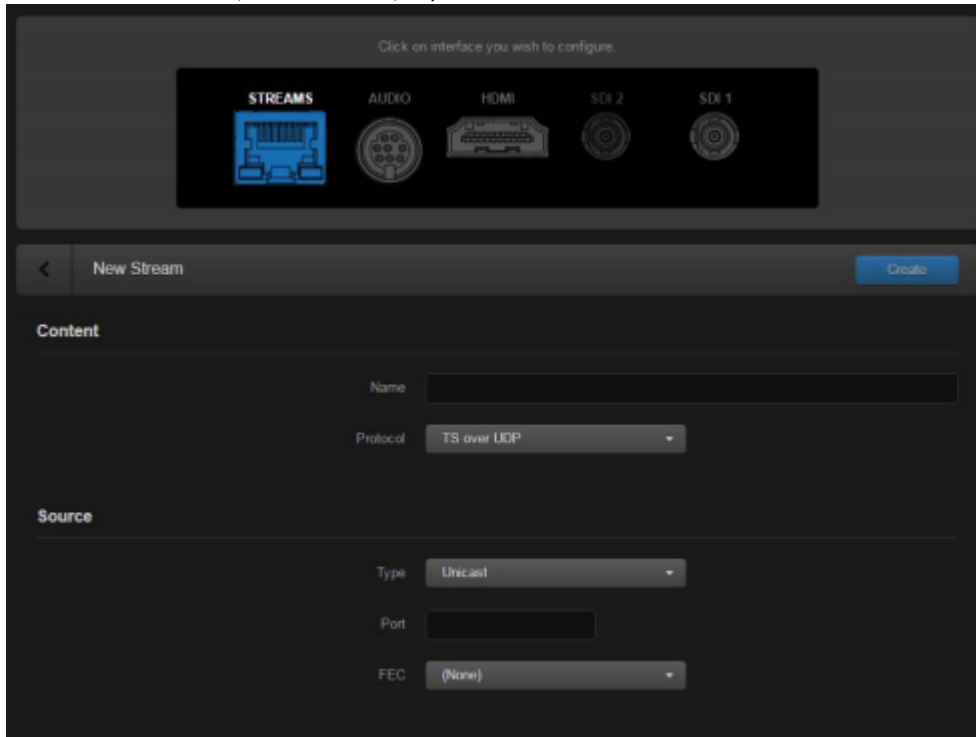


## Configuring Decoder Streams

From the Streams Detail View, you can create streams and define the stream settings.

To add a stream:

1. From the Streams List View, click **Add**.  
The New Stream (Detail View) opens.



2. Under Content, type a name for the stream in the Name field.
3. Select the stream Protocol, either TS over UDP, TS over RTP, TS over SRT, or RTSP.  
The remaining fields vary depending on the stream Protocol. For details see [Stream Settings](#).

**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 ).

4. Click **Create** to create the stream.

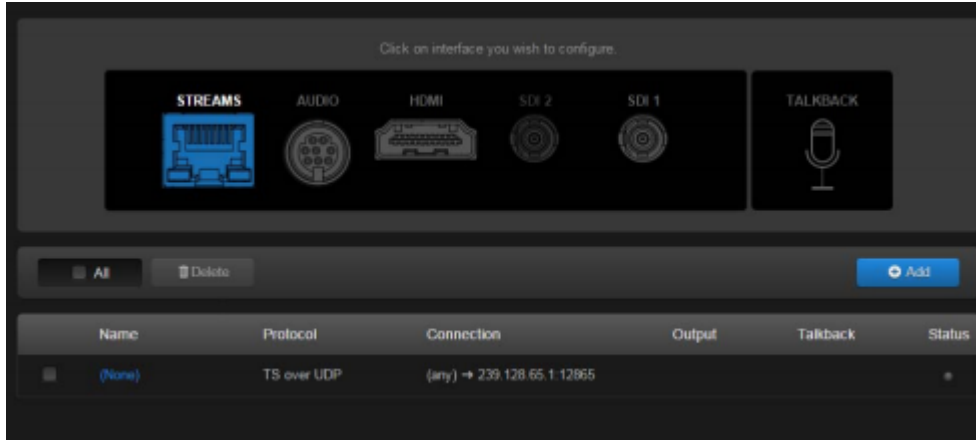
**Tip**

Intra-refresh (video encoding support) requires that the decoder and streams be started first.

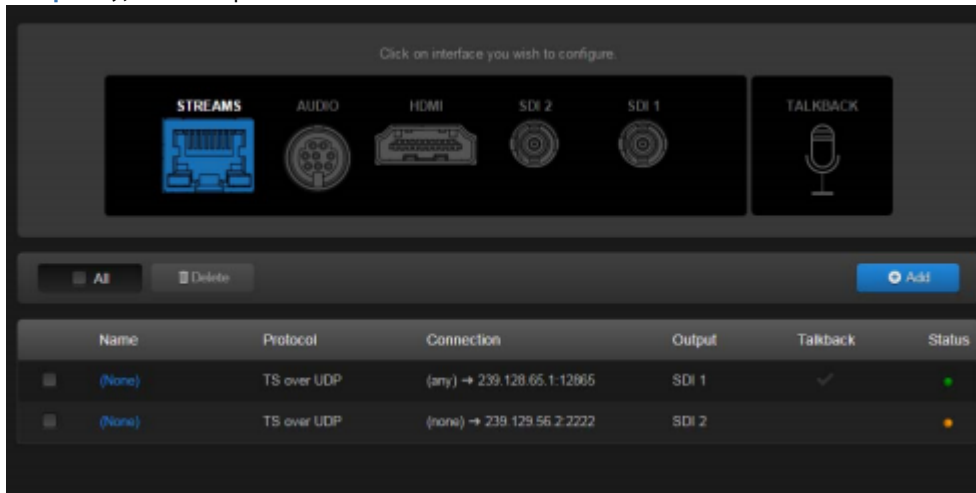
5. To view statistics for the stream, click **Statistics**. For details, see [Stream Statistics](#).

6. To return to the Streams List View, click the **(Back)** button.


The stream you have created is added to the list. The following example shows the List View after a stream has been created, but not yet bound to output interfaces. (Audio Talkback is available but not enabled.)



After streams have been bound to the SDI 1 and SDI 2 output interfaces (see [Configuring Decoder Outputs](#)), the outputs will be listed.



To edit a stream:

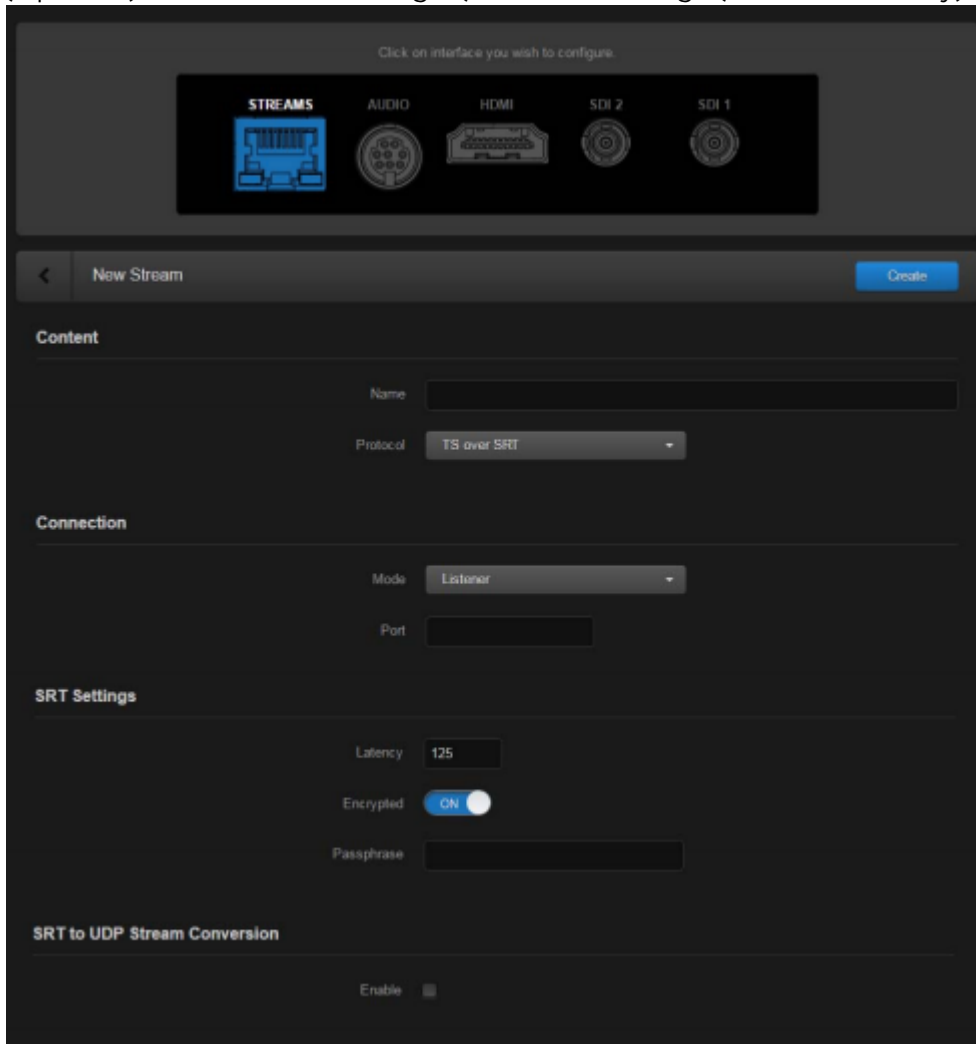
1. From the Streams List View, click a link in the table to open the Streams Detail View.
2. Select or enter the new value(s) in the appropriate field(s). For details see [Stream Settings](#).
3. To apply your changes, click **Apply**.
4. To return to the Streams List View, click the  (**Back**) button.

## Configuring TS over SRT

Haivision’s 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. For more information, see [Secure Reliable Transport \(SRT\)](#).

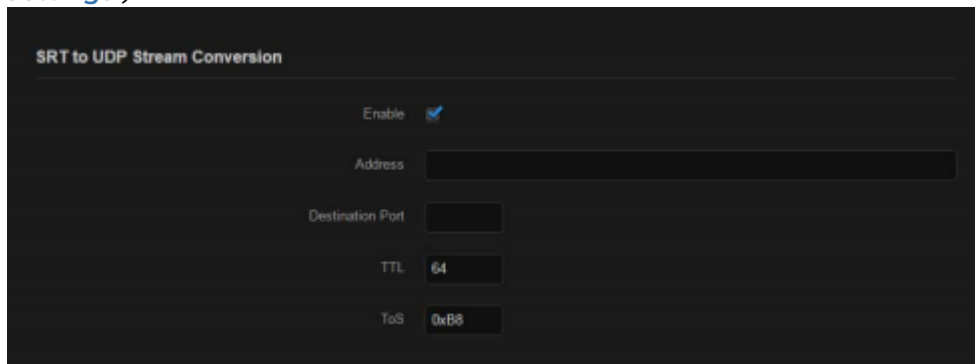
To create an SRT connection:

1. On the Streams Detail View, follow the steps in [Configuring Decoder Streams](#) to add a decoder stream.
2. Select the SRT call Mode (Listener, Caller or Rendezvous) for the stream, and fill in the Connection settings. (See “Connection (TS over SRT only)” in [SRT Stream Settings](#).)
3. (Optional) Fill in the SRT settings. (See “SRT Settings (TS over SRT only)” in [SRT Stream Settings](#).)



4. (Optional) To convert SRT streams to UDP, check the Enable (SRT to UDP Conversion) checkbox and fill in the fields. (See “SRT to UDP Stream Conversion (TS over SRT only)” in [SRT Stream](#)

Settings.)



The screenshot shows a dark-themed settings panel titled "SRT to UDP Stream Conversion". It contains several configuration options:

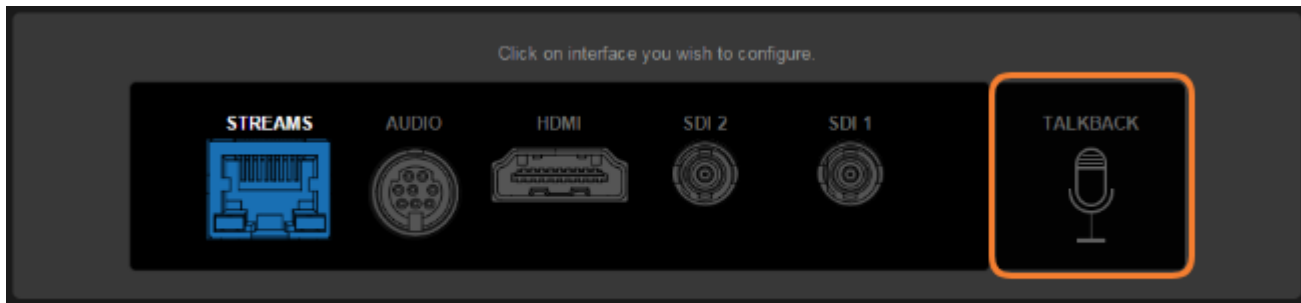
- Enable:** A checkbox that is checked, with a blue checkmark icon to its right.
- Address:** A text input field that is currently empty.
- Destination Port:** A text input field that is currently empty.
- TTL:** A text input field containing the value "64".
- ToS:** A text input field containing the value "0xB8".

5. Click **Apply** to create the stream.
6. To view statistics for the stream, click **Statistics**. For details, see [Stream Statistics](#).

## Starting and Stopping Audio Talkback

The Audio Talkback feature allows users to stream a mono channel of audio back to a Makito X encoder over a reliable LAN or WAN. Audio talkback uses the decoder’s audio input to enable end users monitoring a streaming session to “talk back” to individuals at the encoder. Audio Talkback must be enabled and configured by an administrative user. For more information, see [Audio Talkback](#).

If Talkback is enabled on your system, you will see the **Talkback** button on the Streams List View (as shown in the following figure).

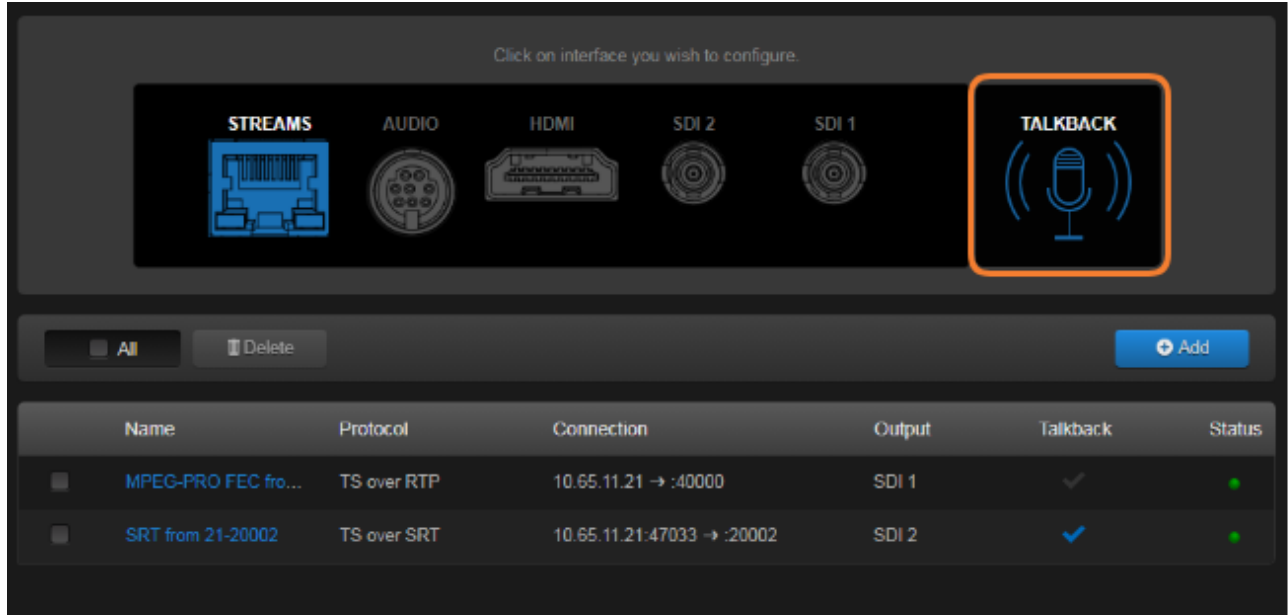


Your system will have been configured to one of two possible talkback activation modes:

- Push-button (“push-to-talk”) requires you to click and hold the **TALKBACK** button to transmit audio.
- Toggle switch stays active until you click the **TALKBACK** button again.

To start Audio Talkback:

1. From the Streams List View, click the checkmark under Talkback to select the stream. (The stream must have been started.)
2. Click **TALKBACK** and begin talking into your microphone. When Talkback is active, the **TALKBACK** button icon is blue with a radio wave.



- To stop a Talkback session, release the **TALKBACK** button (if using “push-to-talk” mode), or click **TALKBACK** again to toggle the return audio channel off.

## Stream Settings

The following table lists the decoder stream controls and settings:

Content    Source

### Content

Stream Setting	Default	Description/Values
Name	N/A	Specify a name for the stream. 1 to 32 characters

Stream Setting	Default	Description/Values
Protocol	TS over UDP	<p>Select the Encapsulation Protocol type for the decoded stream.</p> <ul style="list-style-type: none"> <li>• TS over UDP: MPEG transport stream over UDP (no RTP header)</li> <li>• TS over RTP: MPEG2 transport stream over RTP</li> <li>• TS over SRT: Haivision's Secure Reliable Transport (see <a href="#">Secure Reliable Transport (SRT)</a>)</li> <li>• RTSP: Real Time Streaming Protocol (RFC2326) with control over RTSP.</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>RTSP stream ingest is supported to provide interoperability with Makito Classic Encoders and Axis Cameras/ Encoders.</p> </div>
Statistics	N/A	Click to view statistics for the stream. See <a href="#">Stream Statistics</a> .

Content [Source](#)

### Source (TS over UDP, TS over RTP and RTSP)

Setting	Default	Description/Values
Type	Unicast	<p>Select the Stream Type for the decoded stream.</p> <ul style="list-style-type: none"> <li>• Unicast</li> <li>• Multicast</li> </ul>
Multicast Address	N/A	(Multicast streams only) Enter the multicast IP address in dotted-decimal format.
Source Address	N/A	<p>(Multicast streams only) The Source Address specifies where the multicast stream is coming from (i.e., what address is broadcasting).</p> <p>In cases where many devices are sending multicast streams on the same multicast address, specifying the source encoder address can reduce the amount of multicast traffic being forwarded on your network. Only the multicast traffic from that specific source to that address will be forwarded (instead of all of them).</p>
Address	N/A	(TS over RTP, Unicast streams only) Enter the source IP address in dotted-decimal format.
Port	N/A	Enter the source UDP port for the stream. Enter a number in the range 1025..65,535. Note that RTP streams use even numbers only within this range.



Setting	Default	Description/Values
FEC	None	<p>(Optional) Enable Forward Error Correction (FEC). Select either:</p> <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> <div style="border: 1px solid #f0e68c; padding: 5px; margin: 10px 0;"> <p><b>Note</b> VF FEC is a proprietary FEC and is not interoperable with devices outside of the Haivision family.</p> </div> <p>On the Encoder, you set all these parameters, whereas on the decoder they are detected from the stream, and are available in the stream stats.</p>
RTSP URL	N/A	<p>(RTSP streams only) Enter the RTSP address in the form:  <code>addr=rtsp://user:password@ip.add.re.ss/path?var=value&amp; var2=value2...</code>                      For example: <code>rtsp://10.70.5.95/axis-media/media.amp?videocodec=h264&amp;resolution=1280x720</code></p>

## SRT Stream Settings

The following table lists the TS over SRT-specific parameters:

[Connection](#)   [SRT Settings](#)   [SRT to UDP Stream Conversion](#)

### Connection

Setting	Default	Description/Values
Mode	Listener	Specifies the SRT Connection Mode (to simplify firewall traversal): <ul style="list-style-type: none"> <li>• Caller: The decoder acts like an SRT caller and connects to a server listening and waiting for an incoming call.</li> <li>• Listener: The decoder acts like an SRT listener and listens for a server to connect to it.</li> <li>• Rendezvous: Allows calling and listening at the same time. To simplify firewall traversal, Rendezvous Mode allows the encoder and decoder to traverse a firewall without the need for IT to open a port.</li> </ul>
Address	n/a	(Caller and Rendezvous Connection modes) Specifies the destination IP address for the SRT stream.
Source Port	Auto-Assign	<div style="border: 1px solid #f0e68c; padding: 5px;"> <p><b>Note</b></p> <p>This simplifies firewall configuration as the firewall/NAT rules can be precisely tailored to the SRT stream.</p> </div>
Destination Port	n/a	(Caller and Rendezvous Connection modes) Specifies the UDP destination port for the SRT stream.
Port	n/a	(Listener Connection mode only) Specifies the UDP local port for the SRT stream.

[Connection](#)   [SRT Settings](#)   [SRT to UDP Stream Conversion](#)

### SRT Settings

Setting	Default	Description/Values
Latency	20	<p>Specifies how long the decoder will buffer received packets.</p> <div style="border: 1px solid #f0e68c; padding: 5px; margin: 5px 0;"> <p><b>Note</b> The SRT buffer, configured as “Latency”, is the time reserved in the decoder to recover missing packets.</p> </div> <p>Because real-time video cannot be paused, restarted, slowed down, or accelerated, the buffer adds a fixed delay in the end-to-end latency. If a lost packet cannot be recovered, this may result in an A/V artifact. In this case, you should increase the SRT latency as it is likely too low. Please see the <a href="#">SRT Deployment Guide</a> for tuning guidance.</p>
Encrypted	Off	Toggle to On to enable decryption of encrypted streams.
Passphrase	n/a	(Encrypted must be On; must match encoder passphrase) This parameter is required if the stream is encrypted and is used to retrieve the cryptographic key protecting the stream. Range = 10-79 UTF8 characters
Reject Unencrypted Callers	On	(Listener Connection mode only, and Encrypted must be On) For security reasons, when encryption is enabled in the decoder’s SRT Listener stream configuration, this option causes the decoder to reject all unencrypted SRT Caller streams.

## SRT to UDP Stream Conversion

Setting	Default	Description/Values
Enable	Disabled	<p><b>Note</b></p> <p>The SRT input stream may be encrypted and includes error correction. Enable this to rebroadcast the SRT stream on the local LAN without the encryption and error correction elements over UDP. A single multicast or unicast destination TS/UDP stream is supported for re-streaming.</p>
Destination IP Address	n/a	Specifies the destination IP address for the stream.
Destination Port	n/a	Specifies the UDP source port for the stream.
TTL	64	<p>(Time-to Live for stream packets) Specifies the number of router hops that IP packets from this stream are allowed to traverse before being discarded.</p> <p>Range = 1..255</p>
ToS	184 or 0xB8	<p>(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.</p> <p>Range = 0..255 (decimal) or 0x00..0xFF (hex)</p> <p><b>Important</b></p> <p>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.</p> <p><b>Note</b></p> <p>The ToS setting must be chosen so as to not interfere with Voice over IP systems and other equipment that may reside on your network. For example, when the ToS value for a stream is set to 0xB8, it can interfere with some third party Voice / IP Telephony systems.</p>

## Stream Statistics

The following table lists the Stream statistics:

[General](#) [SRT](#) [SRT Graph](#) [Pro-MPEG FEC](#)

### General

Statistic	Description/Values
<b>Stream</b>	
ID	The stream number (in sequence on the list).
Name	The stream name.
<b>Statistics</b>	
Encapsulation	The active streaming protocol.
State	The current operating status of the stream, either: <ul style="list-style-type: none"> <li>• STREAMING</li> <li>• LISTENING</li> <li>• STOPPED</li> <li>• PAUSED</li> </ul>
Output	The output destination for the stream.
Bitrate	The stream bitrate (in kbps).
Source Address	IP address of the stream source (sender).
Received Packets	Number of RTP or UDP packets received for that stream.
Received Bytes	Number of Bytes received for that stream.
Last Received	Time since packets were last received for the stream.
<b>Errors</b>	
MPEG2TS Lost Packets	Number of RTP or UDP lost packets.
Corrupted Frames	Number of audio or video frames that were corrupted by missing packets.
Pauses	The number of times the decoder has sensed that no new stream has been received for > 1 second.
Last Error	The last error received for the stream.
Occurred	Time since the last error occurred for the stream.
Reset	Click to reset the Stream statistics.

[General](#) [SRT](#) [SRT Graph](#) [Pro-MPEG FEC](#)

### SRT

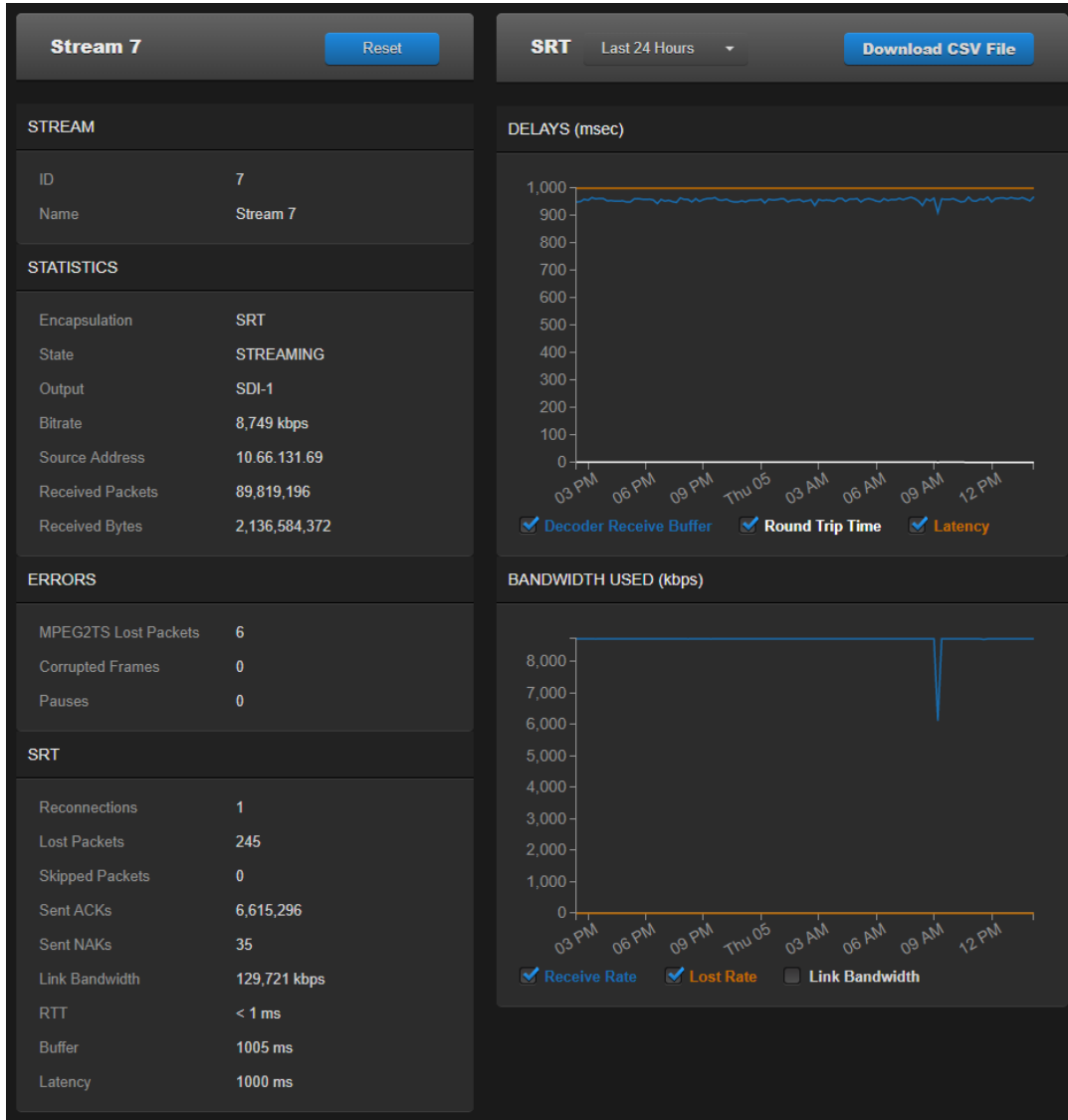
Statistic	Description/Values
Reconnections	Number of reconnections since the stream started. Severe network congestion may cause the connection to drop and automatically reconnect.
AES Encryption	Indicates whether AES encryption has been enabled. Either On or Off.
Key Length	(AES encryption must be enabled) The key length for AES encryption. Either None, AES-128 or AES-256.
Decryption	(AES encryption must be enabled) Indicates whether the decoder can decrypt the stream. Either Active, Initializing, Inactive (no passphrase), or Inactive (invalid passphrase).
Lost Packets	<p><b>Note</b></p> <p>This is the raw number of packets dropped by the network. Most are recovered by retransmission at the source and so do not necessarily result in any artifacts.</p>
Skipped Packets	<p><b>Note</b></p> <p>These are packets that have arrived at the destination device too late, or that never arrive at all. The time to play the packet has arrived and the lost packet was not recovered, so the decoder/receiver will continue playing. Some type of video artifact may result (i.e., a replayed frame or video blocking artifacts).</p> <ul style="list-style-type: none"> <li>• If this statistic increments slowly, the best thing to do is increase the SRT Latency.</li> <li>• If this statistic increments in large jumps, the best thing to do is lower your video bitrate or increase your overhead if you have available BW.</li> </ul>
Sent ACKs	Transmission progress acknowledgment and feedback sent.
Sent NAKs	Lost packet reports sent.
Link Bandwidth	An estimate of the actual link bandwidth.
RTT	Measured Round Trip Time.
Buffer	<p>Decoder buffer in milliseconds.</p> <p><b>Tip</b></p> <p>If the Buffer goes to 0 often, then there is most likely insufficient BW to support the desired bitrate. In this case, decrease your bitrate.</p> <p>If the Buffer occasionally goes to 0, then the SRT Latency should be increased.</p>
Latency	<p>Maximum of the decoder and encoder configured Latency. For example:</p> <p>Encoder Configured SRT Latency = 750 ms            Decoder Configured SRT Latency = 20 ms</p> <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>

---

Statistic	Description/Values
Download CSV File	Click to download the statistics in CSV (“Comma Separated Value”) file format, which may be used to exchange data with applications such as Microsoft Excel.

## SRT Graph

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



**Note**

Not all browsers can support the statistics graphics for SRT. You need an up-to-date version of Firefox, Chrome (Chromium), Safari (WebKit), Opera, or IE9 (or higher) to support the graphics in the SRT statistics page.



 **Tip**

For both the Delays and Bandwidth Used displays, you can select the inputs, such as the link bandwidth available over the time period.

## Pro-MPEG FEC

Statistic	Description/Values
Level	The level of FEC protection: <ul style="list-style-type: none"> <li>• A (Column only): uses the column FEC stream.</li> <li>• B (Row and Column): uses both column and row FEC streams.</li> </ul>
Number of Columns/Rows	Number of columns and number of rows are the dimensions of the FEC matrix.
Block Aligned	The type of FEC matrix scheme: <ul style="list-style-type: none"> <li>• Yes: Sequential columns within a group start on the same row.</li> <li>• No: Each column starts on the row below the row on which the previous column started.</li> </ul>

## Configuring Decoder Outputs

From the SDI 1 and SDI 2 Decoder pages, you can manage video decoding for the SDI 1 and SDI 2 ports. This includes binding the video output(s) to the stream(s) you have created and configuring properties such as the Output Resolution and Frame Rate.

Each decoder channel can support an alternate (secondary) stream as input which is switched to if the primary fails in order to minimize down-time. You can also select a Still Image such as a black screen that the decoder will display if it is no longer receiving video (for example, if the encoder stream has stopped or the network connection is lost).

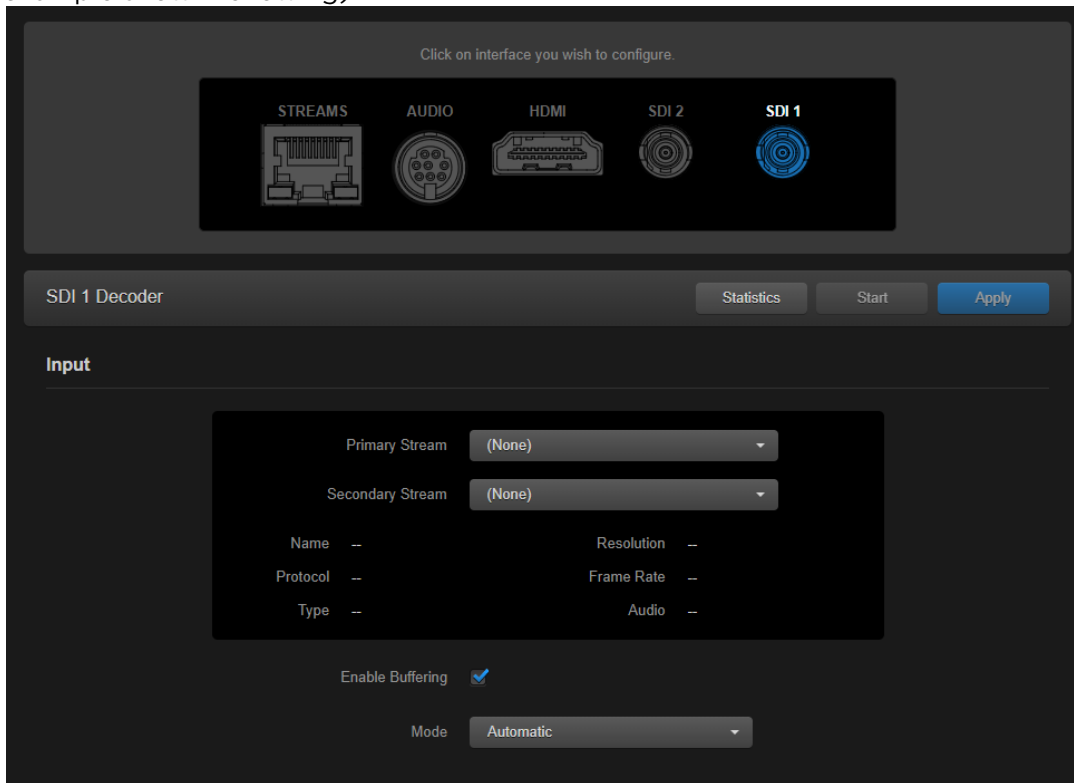
### Note

The Makito X decoder supports two independent video decoders that feed the two SDI interfaces. The HDMI port can be configured to mirror the same content that is seen on either Decoder 1 or Decoder 2. If the stream contains computer graphics content, that content can only be displayed on the HDMI interface.

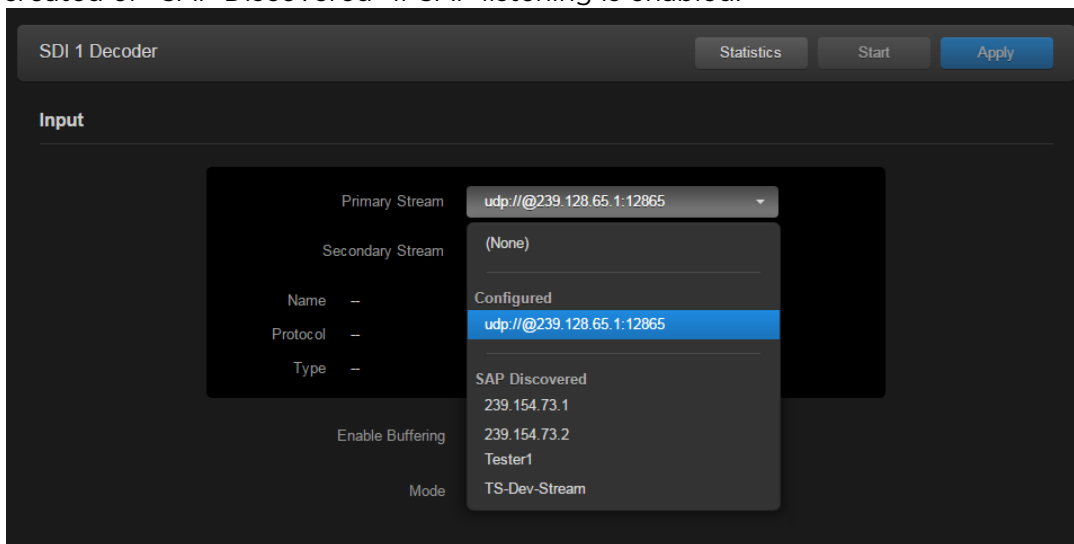
## Configuring the SDI Decoder Output

To display the SDI Decoder Settings:

1. Click **SDI 1** or **SDI 2** from the output interface bar.  
The SDI 1 or SDI 2 Decoder page opens, displaying the current video decoding settings (SDI 1 example shown following).

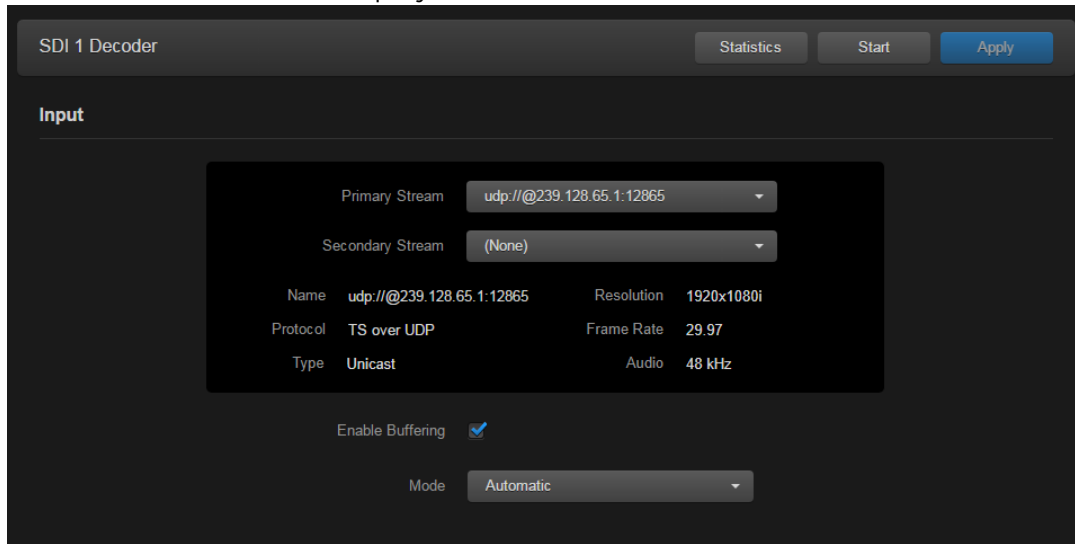


2. Under Input, select the Primary input stream from the drop-down list of the stream(s) you have created or “SAP Discovered” if SAP listening is enabled.

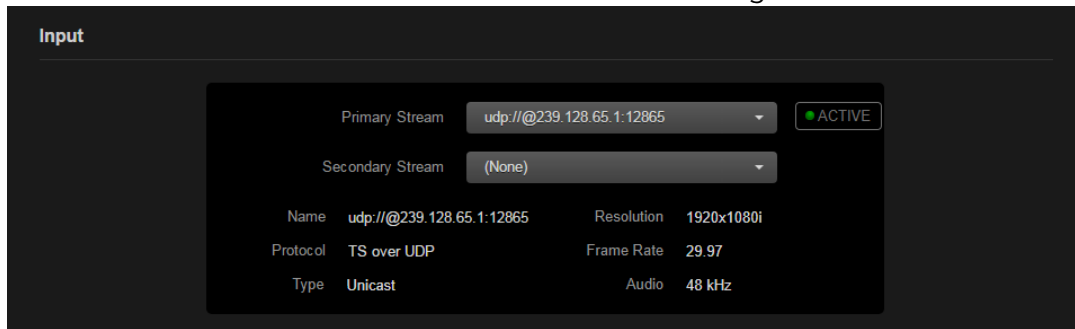


The Name, Protocol, Type, incoming Resolution, Frame Rate, and Audio Sampling Rate for the

selected stream now are displayed.



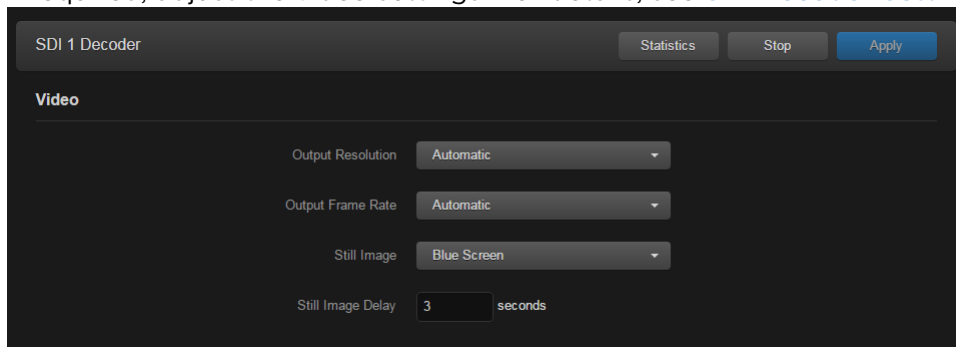
- To start decoding, click **Start**.  
The Active status LED turns on if the decoder is receiving data.



- Note**

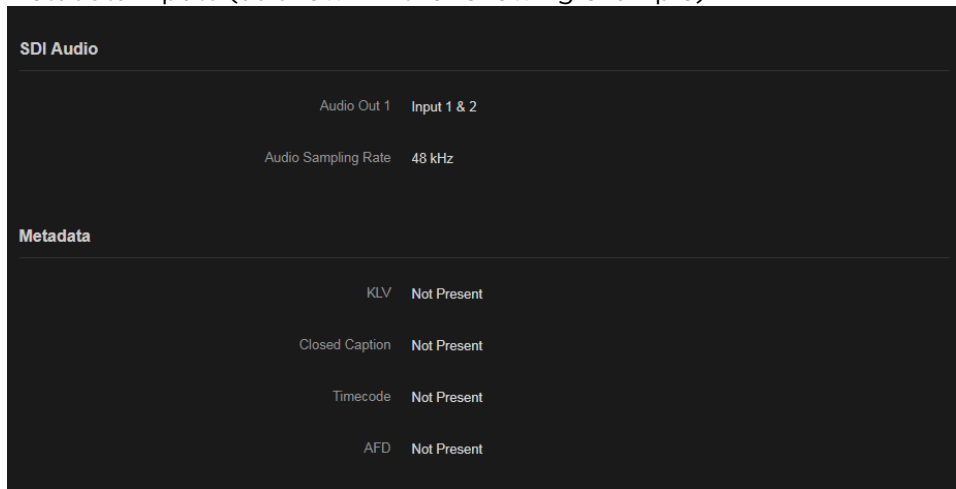
The stream’s encapsulation protocol must match the Primary Stream. The decoder will automatically switch to the Secondary Stream if the Primary Stream is lost and vice-versa.

- If required, adjust the video settings. For details, see [SDI Decoder Settings](#).



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

When you scroll down the page, you will see a status summary of embedded digital audio and metadata inputs (as shown in the following example).



- To view statistics for the decoder, primary stream, and secondary stream (if configured), click **Statistics** (example shown below).

**SDI 1 Decoder**
Reset

Decoder
Stream
SRT Graph

**STATISTICS**

Up Time	19h31m47s
Restarts	0

**VIDEO DECODER**

Algorithm	H.264
Profile	Main
Level	4.2
State	RUNNING
Buffering Mode	Automatic
Format	1920x1080p59
Bitrate	8,103 kbps
Decoded Frames	4,213,663
Skipped Frames	0

**VIDEO OUTPUT**

Format	1920x1080p59
Output Frames	4,212,002
Skipped Frames	1,486
Replayed Frames	1,257

**AUDIO DECODER**

Algorithm	AACLC/ADTS
State	RUNNING
Bitrate	127 kbps
Sample Rate	48 kHz
Number Of Pairs	1

 **Tip**

The stream type is automatically determined on decoder startup. The decoder Video Algorithm statistic shows which codec algorithm (H.264 or HEVC) is in use for a decode channel.

## Multi-channel Synchronization

The Makito X multi-channel synchronization feature is designed to work in the broadcast industry where remote producers typically capture multiple views of the same content and transport it over a network to a central production facility. All these channels need to be synchronized to within one frame period at the decoders, so that downstream equipment does not experience replay issues when switching between video and audio sources.

Following is a summary of the steps to configure multi-channel sync on the Makito X encoder and decoder to synchronize content across multiple channels. For additional information, please refer to the *Multi-Channel Synchronization Technical Brief* (available through the [Download Center](#) on the Haivision Support Portal.).

[Step 1: NTP](#)   [Step 2: Encoder](#)   [Step 3: Decoder Pass 1](#)   [Step 4: Measure \(Decoder Pass 2\)](#)  
[Step 5: Finalize \(Decoder Pass 3\)](#)

### Configure NTP Settings

The source of timecodes must be “NTP locked” on both the Makito X encoder and decoder. You can configure the encoder and the decoder to use NTP (Network Time Protocol) on the (Web interface) Administration> Date and Time page. For the decoder, see [Configuring Date and Time](#).

 **Note**

The Makito X encoder can also pass the timecode from the video signal, so the camera can also be the source. In this case, encoder does not need to be synced to an NTP server, but the cameras do (in order to generate the timecodes).

There are two possible options for multi-channel sync:

Option 1 - The encoder is configured to use “System” timecodes and must be “NTP locked”.

Option 2 - The encoder is configured to use “Video” timecodes; therefore, the video source must generate timecodes which are locked to the same master clock.

 **Tip**

Make sure your devices are configured to use the same fast, precise NTP server. We recommend an offset (difference between local clock and remote clock) of around 5 ms.



Step 1: NTP   [Step 2: Encoder](#)   Step 3: Decoder Pass 1   Step 4: Measure (Decoder Pass 2)

Step 5: Finalize (Decoder Pass 3)

---

### Configure Encoders

On the Video Encoder settings page:

1. Set the Timecode Source to:
  - "System" if the timecodes are to be generated by the encoder.
  - or-
  - "Video" if the timecodes are pre-synchronized by the upstream equipment and embedded into the SDI signal.
2. Start the stream output on all encoders.

Step 1: NTP   Step 2: Encoder   [Step 3: Decoder Pass 1](#)   Step 4: Measure (Decoder Pass 2)

Step 5: Finalize (Decoder Pass 3)

---

### Configure Decoders

For each decode channel to be synchronized, on the SDI 1 or SDI 2 Decoder page:

1. Enable buffering and select MultiSync for the buffering Mode. (See [SDI Decoder Settings](#).)
2. Initially, enter a value such as the default (1000ms) for the MultiSync Delay (unless SRT is configured, then add the negotiated SRT latency value for the stream).
3. Start the stream reception on all decoders.

Step 1: NTP   Step 2: Encoder   Step 3: Decoder Pass 1   [Step 4: Measure \(Decoder Pass 2\)](#)

Step 5: Finalize (Decoder Pass 3)

---

### Observe Delay Ranges

On the SDI 1 or SDI 2 Decoder page:

1. Wait 10 to 20 seconds while the decoder starts receiving the stream and gathers statistics.
2. Either open the Statistics pane or check beside the MultiSync Delay field, and you will see a range of valid multisync values, such as "Min=1,317 ms, Max=3,112 ms".
3. Note down the min/max ranges for all channels to be synchronized.

#### Note

A yellow or red triangle is displayed next to the fixed delay box if it is currently outside the acceptable range with a hover tip explaining the problem if it is out of range.

#### Tip

If you are synchronizing many decoder channels, complete **Step 3** for all of them and then go back to record the range values.



Step 1: NTP   Step 2: Encoder   Step 3: Decoder Pass 1   Step 4: Measure (Decoder Pass 2)

**Step 5: Finalize (Decoder Pass 3)**

---

**Configure MultiSync Delay**

Based on the results of Decoder Pass 2:

1. Select a single delay value that is in the acceptable range for all of the decoders. Avoid using the minimum or maximum values.
2. On the SDI 1 or SDI 2 Decoder page, set the MultiSync Delay on all of the decoder channels to the same value.

After a few seconds of playback, all of the decoder channels will be playing in sync with each other.

## SDI Decoder Settings

The following table lists the SDI 1 and SDI 2 decoder settings:

**Input**   Video

**Input**

Setting	Default	Description/Values
Primary Stream	(None)	Select the primary input stream from the dropdown list of the stream(s) you have configured or “SAP Discovered” streams (if SAP listening is enabled). See <a href="#">Setting Up Decoder Streams</a> .
Secondary Stream	(None)	(Optional) Select an alternate (secondary) stream for the decoder channel.
Name	N/A	(Read-only) The Name of the selected primary input stream.
Protocol	N/A	(Read-only) The encapsulation Protocol for the stream, e.g., TS over SRT.
Type	N/A	(Read-only) The stream Type, e.g., Unicast or Multicast.
Resolution	N/A	(Read-only) The input signal detected from the incoming video stream. It includes the number of pixels per line, and whether the video is interlaced or progressively scanned (indicated by <b>i</b> or <b>p</b> ).
Frame Rate	N/A	(Read-only) The frame rate per second of the incoming video stream.
Audio	N/A	(Read-only) The sampling rate of the incoming audio signal.
Enable Buffering	Enabled	<div style="border: 1px solid #ccc; padding: 5px;"> <p><b>i Note</b></p> <p>When buffering is disabled, the decoded picture buffer is passed to the output interface with no buffering to compensate for stream jitter. This is the lowest latency mode, but may have noticeable skip and replay artifacts.</p> </div>

Setting	Default	Description/Values
Mode	Automatic	<p>("Enable Buffering" must be checked) The type of buffering to use. A jitter buffer temporarily stores arriving packets in order to remove the effects of jitter from the decoded stream.</p> <ul style="list-style-type: none"> <li> <p><b>Note</b></p> <p>The added delay will not decrease with time even if the video jitter disappears.</p> </li> </ul> <p>The added delay depends on the monitored video jitter. It also depends on the audio arrival time; if the audio is late, this delay will be added to the current calculated delay. For example, if the audio is late by 500 ms (vs Video), an additional 500 ms delay will be added to allow the Audio/Video synchronization.</p> <ul style="list-style-type: none"> <li> <p><b>Note</b></p> <p>The decoder has a minimum buffer set based on the resolution and frame-rate of the stream content. In addition, users can add more delay if desired: (1) to achieve a specific decoding latency for inter-channel synchronization purposes; (2) to deal with unusually large amounts of jitter in the stream; or (3) to allow A/V sync to occur when the stream content is highly out of sync.</p> </li> <li> <p><b>Note</b></p> <p>Audio artifacts may occur if audio is streamed after video when using Adaptive Low Latency.</p> </li> </ul> <p>This mode does not consider the audio arrival time. If the audio is late by 500 ms, the audio /video will be unsynchronized by at least 500 ms. In theory the audio should play smoothly as long as there is not significant jitter. If the audio jitter is over 40 ms, audio artifacts will be noticeable.</p> <ul style="list-style-type: none"> <li> <p><b>MultiSync:</b> Use to synchronize the content across multiple channels to within one frame period. This is designed to allow down-stream equipment to switch smoothly between video and audio sources. You need to set the "MultiSync Delay" on all of the decoder channels to the same value. For the steps to configure multi-channel sync on the Makito X encoder and decoder, see <a href="#">Multi-channel Synchronization</a>.</p> </li> </ul>
Delay	0 ms	<p>("Enable Buffering" must be checked and "Mode" must be Fixed) The delay in ms when using buffering in Fixed mode. Range = 0...2000 ms</p> <ul style="list-style-type: none"> <li> <p><b>Note</b></p> <p>The maximum delay is 2000 ms. If for any reason the system requires more than this value to play smoothly, video or audio artifacts will be noticed.</p> </li> </ul>

Setting	Default	Description/Values
MultiSync Delay	1000 ms	<p>("Enable Buffering" must be checked and "Mode" must be MultiSync) The delay in ms required to ensure that two or more decoder channels are synchronized. Range = 0...10000 ms</p> <div style="border: 1px solid #f0e68c; padding: 5px;"> <p><b>Note</b></p> <p>The difference in the values between the decoder channels cannot exceed 2000 ms.</p> </div>

Input Video

Video

Setting	Default	Description/Values
Output Resolution	Automatic	<p>The dimensions of the frames (width and height) to send to the display with an indicator ( i or p ) whether the video is interlaced or progressively scanned.</p> <ul style="list-style-type: none"> <li> <div style="border: 1px solid #f0e68c; padding: 5px;"> <p><b>Note</b></p> <p>Attempts to up/down-scale incoming video that is not supported to a nearest or best matching supported resolution.</p> </div> </li> <li>Native: The display format chosen is always the same as stream's encoded format regardless of the connected display's capabilities. If the stream's encoded format is supported as a display format, the display shows video in that format. Otherwise, no video is displayed. Statistics show the format in which the video is encoded.</li> <li>TV Resolutions: 1920x1080p...720x480i</li> <li>Computer Resolutions: 1920x1200... 640x480</li> </ul>
Output Frame Rate	Automatic	<p>The frame rate per second generated for the displays:</p> <ul style="list-style-type: none"> <li>Automatic: The decoder will select the best display frame rate based on the stream parameters and the connected display's capabilities.</li> <li>75, 60, 59, 50, 30, 29, 25, 24 or 23</li> </ul> <div style="border: 1px solid #f0e68c; padding: 5px;"> <p><b>Note</b></p> <p>If Automatic is selected, the actual frame rate generated will be the next highest valid frame rate supported by the SDI and HDMI interface, plus the one that gives the best decimation factor. For example, 30 Hz could be chosen instead of 29.970 Hz.</p> </div>

Setting	Default	Description/Values
Still Image	Freeze	<p>The type of static image to display when the decoder is not receiving a video stream.</p> <ul style="list-style-type: none"> <li>• Freeze: continues to display the last decoded video frame.</li> <li>• Black Screen: displays a black screen.</li> <li>• Blue Screen: displays a blue screen.</li> <li>• Color Bars: displays a series of vertical color bars across the width of the display.</li> <li>• Mute: disables the video output.</li> <li>• Select Image: opens the Still Images selection dialog for you to select a custom still image. Images must be uploaded by an administrative user. Custom still images are not supported for HEVC streams; instead the Freeze still image will apply. For details, see <a href="#">Configuring Still Image Streaming</a>.</li> </ul> <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>When the still image is substituted on the display outputs, the video frame rate and resolution will be maintained.</p> </div>
Still Image Delay	3	<p>The delay in seconds before the still image is displayed.</p> <p>Range = 1...1000 seconds</p>

## SDI Decoder Statistics

The following tables list the SDI 1 and SDI 2 Decoder statistics:

[Statistics & Video Decoder](#)   [Video Output](#)   [Audio Decoder & Output](#)


### Statistics & Video Decoder

Statistic	Description/Values
<b>Statistics</b>	
Up Time	The length of time the decoder is actively decoding (e.g., 5d22h15m25s).
Restarts	The number of times the decoder was internally restarted due to a change in encoded stream parameters (resolution and/or frame rate) or because of excessive errors in the stream.
<b>Video Decoder</b>	
Algorithm	The compression algorithm detected in the decoded stream, either: <ul style="list-style-type: none"> <li>• AVC/H.264</li> <li>• HEVC/H.265</li> <li>• MPEG2</li> <li>• Invalid (the video compression algorithm is not recognized)</li> </ul>
Profile	The application profile class for the incoming video stream: <ul style="list-style-type: none"> <li>• (AVC/H.264) Main, High, or Baseline</li> <li>• (HEVC/H.265) Main or High</li> <li>• <b>Note</b> The profiles and levels are defined in the corresponding MPEG-2/H.262, AVC/H.264 or HEVC/H.265 specifications.</li> </ul>
Level	The required level of decoder performance to be able to process the incoming video stream: <ul style="list-style-type: none"> <li>• (AVC/H.264) 3, 3.2, 4, or 4.2</li> <li>• (HEVC/H.265) 1, 2, 2.1, 3, 3.1, 4, 4.1, 5, 5.1, 5.2, 6, 6.1 or 6.2</li> <li>• (MPEG-2/H.262) Low, Main or High</li> </ul>
State	The current operating status of the decoder, either: <ul style="list-style-type: none"> <li>• INACTIVE: Decoder has not been started</li> <li>• RUNNING: Decoder is currently running with signal</li> <li>• INVALID: Decoder is currently running with no signal</li> </ul>
Buffering Mode	The type of buffering used.
MultiSync Delay	The delay in ms from timecode stamping at the encoder to display when buffering in MultiSync mode.
MultiSync Status	An indication of whether or not MultiSync buffering is working properly. May provide helpful information on what is missing (e.g., "Timecode is NOT PRESENT").
MultiSync Delay Set	An indication of whether or not the MultiSync delay setting is within the acceptable range. (See "MultiSync Delay Range" below)
MultiSync Delay Range	The range of values within which the MultiSync delay must lie.




(Input) Format

The input signal detected from the encoder.

Bitrate	The bitrate for the decoded video.
Decoded Frames	<div style="border: 1px solid green; padding: 5px;"> <p> <b>Tip</b> Video frames are complete pictures sent in a cascade for display at a distinct point in time. See "Decoded Frames" under "Audio Decoder &amp; Output".</p> </div>
Skipped Frames	The number of frames that were not sent to the video decoder.

Statistics & Video Decoder   Video Output   Audio Decoder & Output

### Video Output

Statistic	Description/Values
(Output) Format	The output signal sent from the decoder.
Output Frames	The number of video frames output from the decoder.
Skipped Frames	Skipped frames occur when the time to play a video frame has already passed when the decoder is finished producing a new video frame. In this case, the video frame is dropped (never displayed) and it is counted as skipped. The decoder does this to minimize the latency and maintain audio/video sync. The most likely reason for this to occur is that the video is complex and takes more time to decode than is expected by the decoder.
Replayed Frames	<div style="border: 1px solid green; padding: 5px;"> <p> <b>Tip</b> If the Replayed Frames statistic increments periodically and video playback is not smooth, we recommend that you try running the decoder using Fixed mode with a delay added of up to 2000ms of buffering, or less as playback quality permits. This should take care of most non-congestion related skip/replay situations.</p> </div>
Display Errors	The number of display errors.

Statistics & Video Decoder   Video Output   Audio Decoder & Output

### Audio Decoder & Output

Statistic	Description/Values
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Algorithm

The audio compression algorithm, either:

- AAC-LC / ADTS: decodes audio using the ISO/IEC 13818-7 MPEG-2 Part 7 AAC-LC algorithm with ADTS headers.
- AAC-LC / LATM: decodes audio using the ISO/IEC 14496-3 MPEG-4 Part 3 AAC-LC algorithm with LOAS/LATM headers.
- MPEG1 Layer 1/2/3 (ISO/IEC 11172-3) designated as MP1, MP2 and MP3, respectively.
- AC-3: decodes a TS stream containing AC-3 audio formatted as per ATSC A/52.

**Note**

Any AC-3 audio received will be down-mixed to a stereo pair for output on the HDMI and SDI interfaces.  
The two channels of AES3 data are output within the SMPTE 272/299 embedded audio ancillary packets of the SDI HANC space.

State	The current operating status of the decoder, either: <ul style="list-style-type: none"> <li>• RUNNNG</li> <li>• STOPPED</li> </ul>
Bitrate	The bitrate for the decoded audio.
Sample Rate	The number of audio samples per second taken from the output signal. 48 kHz only.
Number of Pairs	The number of audio channel streams played as surround sound over the HDMI interface.
Input Layout 1	The stream's channel configuration as received and decoded. This statistic reports what the channel configuration was before the down-mixing and/or resampling step.
Decoded Frames	<div style="border: 1px solid green; padding: 5px;"> <p> <b>Tip</b> Audio frames are same-sized groups of audio samples to be played back. See "Decoded Frames" under "Statistics &amp; Video Decoder".</p> </div>
<b>Audio Output</b>	
Output Frames	The number of audio frames output.
Output Layout	<div style="border: 1px solid orange; padding: 5px;"> <p> <b>Note</b> If the Input Layout is mono, it will be mixed to stereo as the output.</p> </div>
Skipped Frames	The number of skipped audio frames.

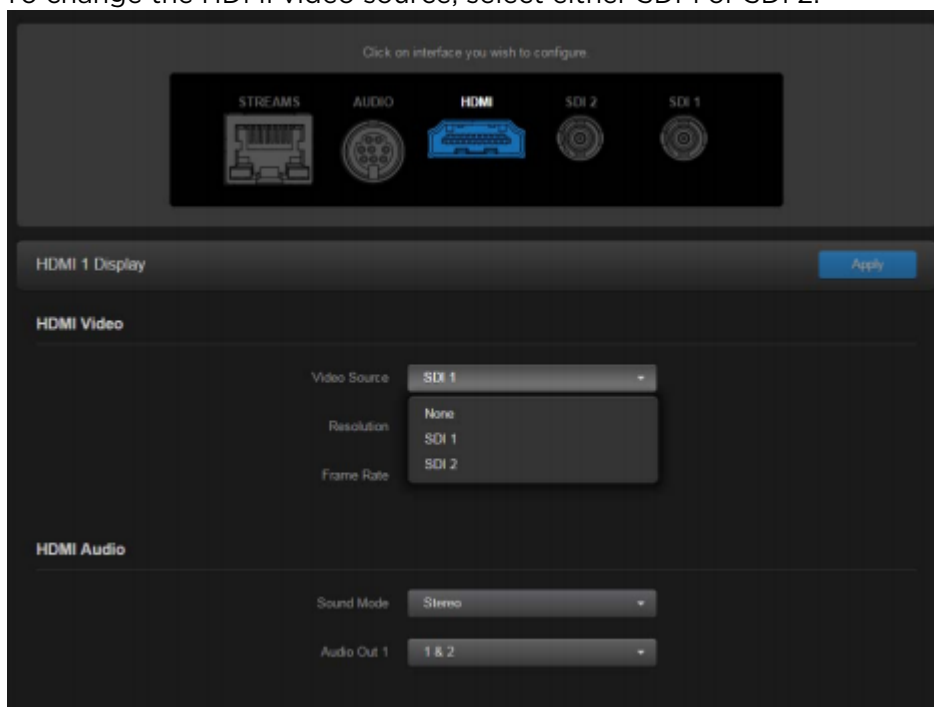
## Configuring the HDMI Display

### Note


By default, HDMI displays the SDI 1 content, so you only need to change the HDMI setting to monitor the SDI 2 channel.

### To display the HDMI Display Settings:

1. Click **HDMI** from the output interface bar.  
The HDMI page opens, displaying the current HDMI decoding settings.
2. To change the HDMI video source, select either SDI 1 or SDI 2.



3. To play streams containing multiple audio channel pairs as surround sound over the HDMI interface, select Surround for the Sound Mode.

4.  **Note**  
When the decoder is licensed for one channel only, the SDI2 interface is not available.
5. To apply your changes, click **Apply**.

## Configuring the Analog Audio Output

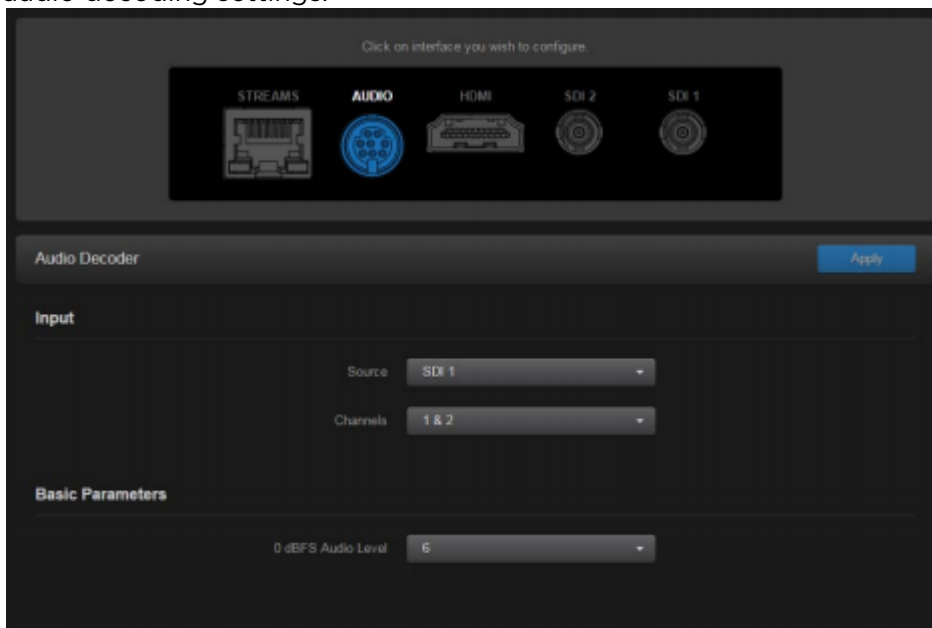
**Note**

On the dual channel decoder, two streams are received and can be displayed on either SDI video port. Analog audio can be selected from embedded channels on either stream. *Both Analog Audio and Embedded Digital Audio are active.*

From the Audio Decoder page, you can bind the analog audio output to either the SDI 1 or SDI 2 video decoder. You can also configure audio settings such as the Audio Level and view the Audio Sampling Rate.

To display the Decoder Audio Settings:

1. Click **AUDIO** from the output interface bar. The Audio page opens, displaying the current analog audio decoding settings.



2. Select or enter the new value(s) in the appropriate field(s). For details, see [Analog Audio Settings](#).
3. To apply your changes, click **Apply**.

## Analog Audio Settings

The following table lists the decoder analog audio controls and settings:

### Input Basic Parameters

#### Input

Setting	Default	Description/Values
Source	SDI 1	<p>The input source for analog audio, either:</p> <ul style="list-style-type: none"> <li>• SDI 1</li> <li>• SDI 2</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>When the decoder is licensed for one channel only, the SDI2 option is not available. The content on SDI2 mirrors the content from the SDI1 interface.</p> </div>
Channels	1&2	<p>The input channel for analog audio, either:</p> <ul style="list-style-type: none"> <li>• 1&amp;2</li> <li>• 3&amp;4</li> <li>• 5&amp;6</li> <li>• 7&amp;8</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>When the decoder is licensed for one channel only, the channel pairs 9&amp;10, 11&amp;12, 13&amp;14, and 15&amp;16 are also available.</p> </div>

### Input Basic Parameters

#### Basic Parameters

Setting	Default	Description/Values
0 dBFS Audio Level (dBu)	+6 dbu	<p>(Analog Input only) Adjusts the maximum analog Audio Output level (0 dBfs) from +5dBu up to +20dBu .</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>This is useful in applications such as broadcast and streaming to allow higher audio headroom.</p> </div>



# System Administration

## Note

Most of these pages/functions require Administrator privileges. The exceptions are as follows:

- Status is accessible to all users.
- Presets is accessible to Operators as well as Administrators.

## Topics in This Chapter


- [Viewing System Status Information](#)
- [Saving and Loading Presets](#)
- [Installing Firmware Upgrades](#)
- [Configuring Network Settings](#)
- [Configuring Date and Time](#)
- [Enabling and Disabling Network Services](#)
- [Managing Licenses](#)
- [Configuring Still Image Streaming](#)

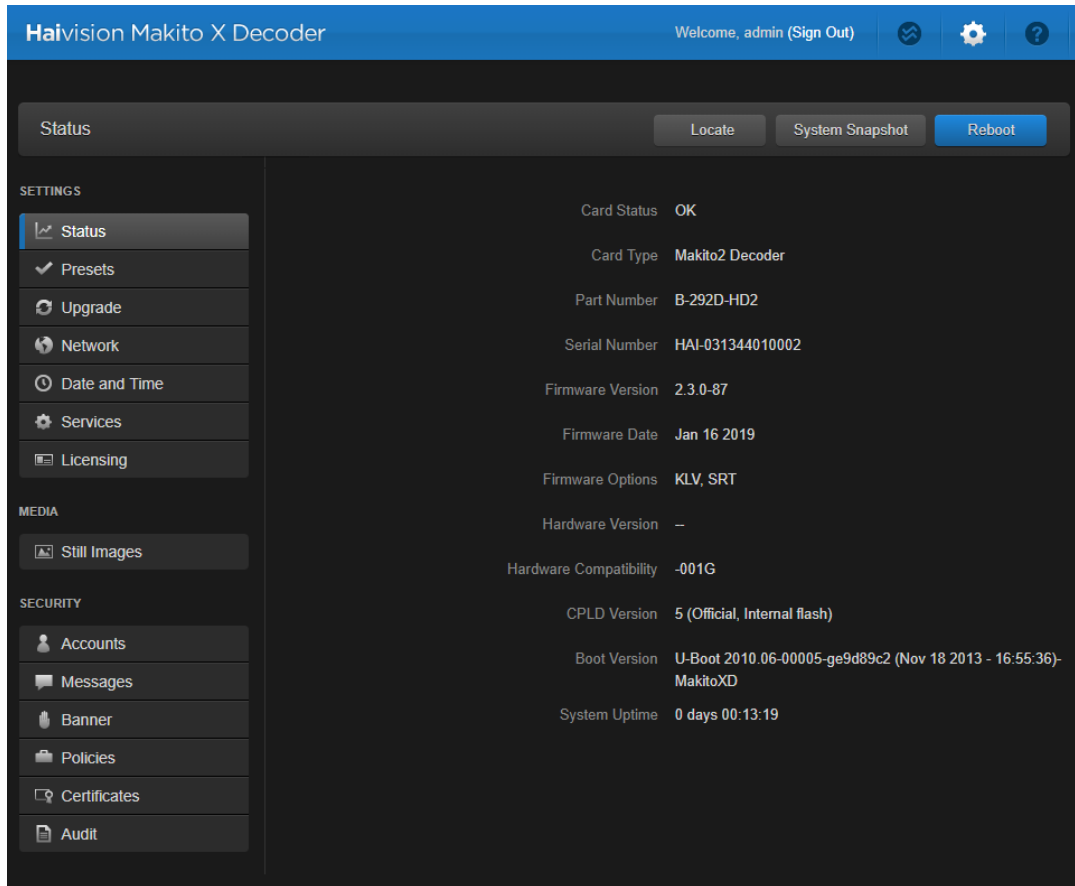
## Viewing System Status Information

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 initiate blinking of the Status and RX LEDs (to help locate particular decoders in a lab or rack), as well as take a system snapshot and reboot the decoder.

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

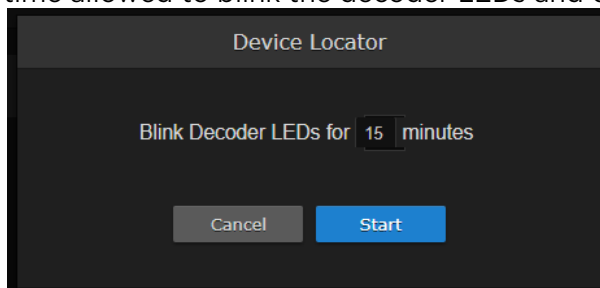
To view status information:

1. Click the  **Administration** icon on the toolbar.  
The Administration Status page opens to the Status page.



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

2. To display a snapshot of system information, see [Taking a System Snapshot](#).
3. To initiate blinking of the Status and RX leds, click **Locate**. On the Device Locator dialog, adjust the time allowed to blink the decoder LEDs and click **Start**.



**Note**

The blinking can last from 1 minute to 1 hour; the default is 15 minutes.

4. To reboot the decoder, see [Rebooting the Decoder](#).


## 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 device, e.g., Makito2 Dual-SDI Encoder or Makito2 Decoder.
Part Number	The Haivision part number for the encoder or decoder, e.g., B-292E-HDSDI2
Serial Number	The serial number for this appliance or card.
Firmware Version	The firmware version of the device, e.g., v2.2-47
Firmware Date	The firmware release date.
Firmware Options	(If applicable) Firmware options installed, e.g., KLV-COT (Metadata Capture KLV & COT) or SRT.
Hardware Version	The hardware version of the device.
Hardware Compatibility	-001G (basic card assembly).
Mezzanine	(applicable hardware only) Indicates whether the mezzanine board is present.
Mezzanine Type	(applicable hardware only) The type of mezzanine board, e.g., HEVC Encoder.
CPLD Version	The CPLD version of the device.
Boot Version	The Boot version of the device.
System Uptime	The length of time the encoder or decoder has been "up" and running (e.g., 1 day 03:42:03).
Encoding Chipset Load	(Encoder only) The combined video encoding processor usage in percentage% (combining both Hi and Lo streams).
Temperature	The current board temperature in degrees Celsius.

## Rebooting the Decoder

To reboot the Decoder:

1. Click the  **Administration** icon on the toolbar, and then click **Status** on the sidebar.
2. On the Status page, click **Reboot**.  
The decoder will reboot and you will be returned to the Sign-in page. Any active streaming sessions will be momentarily disrupted.

 **Tip**

You can also reboot the decoder from other pages such as Network, Date and Time, and Policies. See [Configuring Network Settings](#).

## 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 decoders and status checks, configured audio decoders 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 generate a snapshot of system information in a new window, as shown in the following example:

```

⚠ Not secure | https://10.65.148.27/apis/pool_system_snapshot
=====
START OF SYSTEM SNAPSHOT
=====
-----
Credentials:
-----
uid=500(admin) gid=511(haiadmin) groups=510(haisecur),511(haiadmin),512(haioper)
-----
Local Time:
-----
Thu May 11 11:17:25 EDT 2017
-----
Universal Time:
-----
Thu May 11 15:17:25 UTC 2017
-----
System UP Time:
-----
11:17:25 up 20:31, 0 users, load average: 0.08, 0.09, 0.08
-----
Manufacturing Information:
-----
MAC Address : 5c:77:57:00:a0:49
Serial Number : HAI-031708010004
Boot Revision : U-Boot 2010.06 (Mar 19 2014 - 10:37:19)-MakitoXD 0.9.14
Nand : MT29F16G08ABACAWP
-----
Card Temperature:
-----
Temperature Status:
Current Temperature : 54 Celsius measured 2s ago
Maximum Temperature : 56 Celsius measured 3h4m52s ago
Minimum Temperature : 51 Celsius measured 20h30m40s ago
-----
System Information:
-----
Card Type : "Makito2 Decoder"
Part Number : B-292D-HD1-HEVC
Serial Number : HAI-031708010004
MAC Address : 5c:77:57:00:a0:49
Firmware Version : 2.0.0-68
Firmware Date : "May 9 2017"
Firmware Time : "19:16:25"
Firmware Options : "KLV, SRT"
Hardware Version : B
Hardware Compatibility : -001G (Updated NAND)
Mezzanine : Present
Mezzanine Type : "HEVC Decoder"
CPLD Version : 5 (Official, Internal flash)
Boot Version : "U-Boot 2010.06 (Mar 19 2014 - 10:37:19)-MakitoXD 0.9.14"
-----
Installed Debian Packages:
-----
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)

```

2. Save the file.

## Saving and Loading Presets

**Note**

The Presets page is only accessible to administrators and operators.

Each Makito X is configured by users' selecting and setting values of applicable settings, such as encoder or decoder 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.

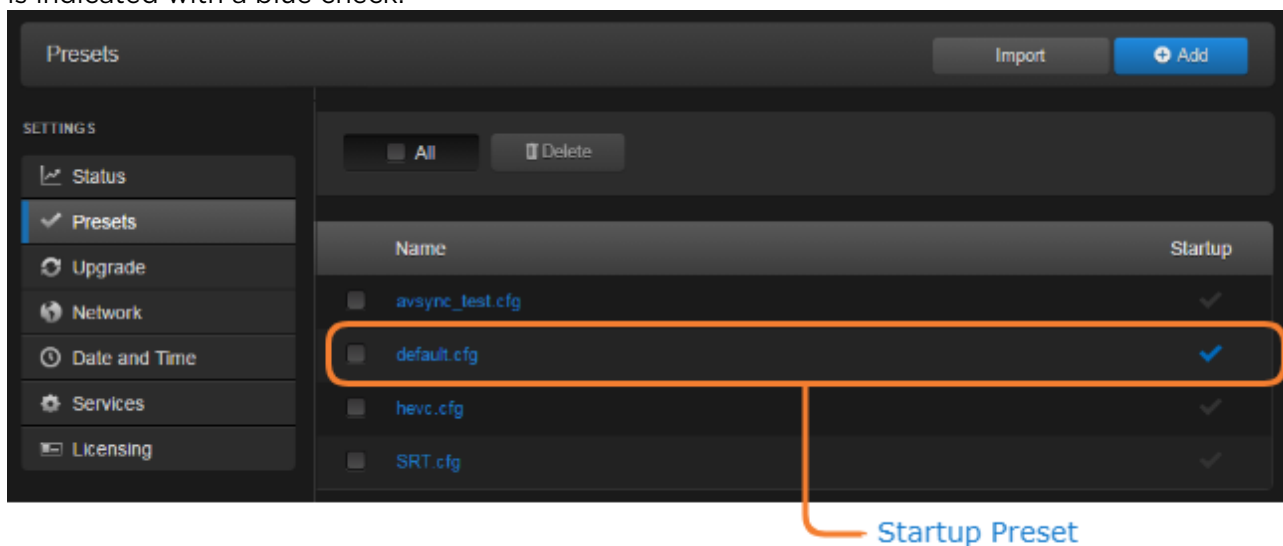
**Note**

Presets do not include System Administration (e.g., Network) or Security settings.

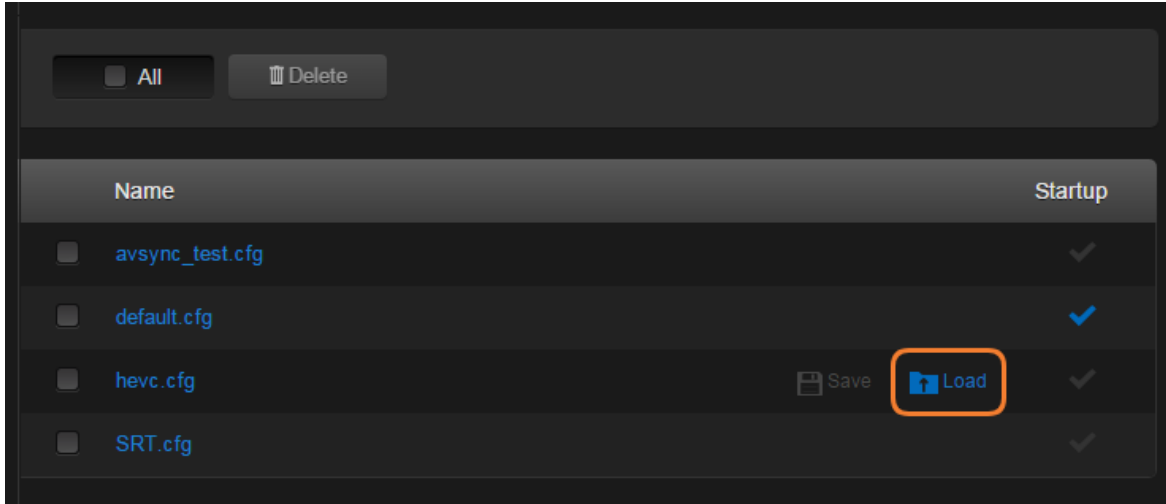
From the Presets page, you can view the list of saved presets, load a saved preset, and save the current settings as a preset. You can also view the contents of a preset file, delete a preset, and select the preset to load at startup.

To view and manage presets:

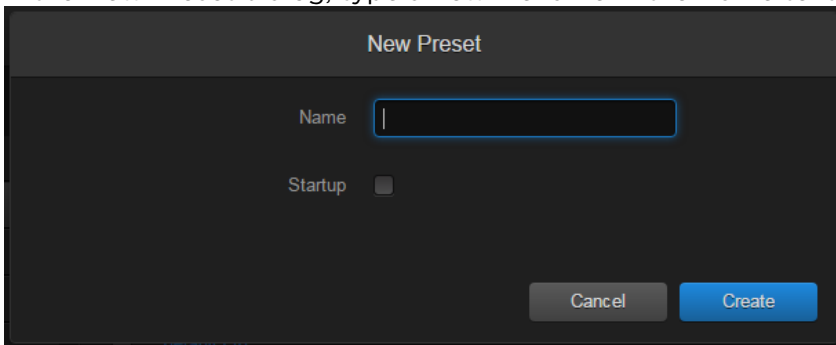
1. On the Administration page, click **Presets** on the sidebar (under **Settings**).  
The Presets List View opens displaying the list of saved presets for the decoder. The startup preset is indicated with a blue check.



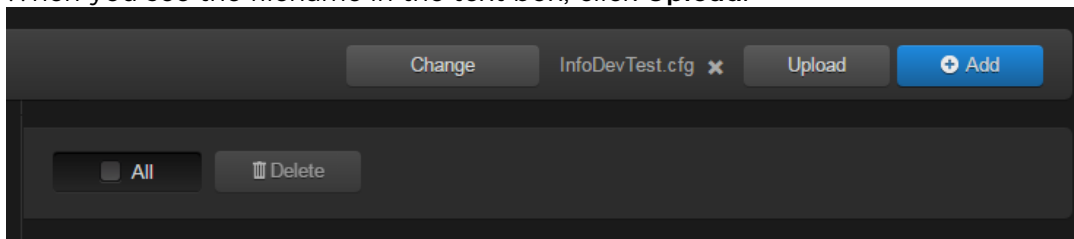
2. To load an existing preset into the current session, hover over the preset name or anywhere in the row and click **Load**.



3. To select an existing preset to load at startup, hover over the preset row and click the (greyed out) checkmark under **Startup**.
4. To save the current settings as a new preset, click **Add**.
  - a. 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 **Apply**.
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 Xs, 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, 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 **X**.



9. To delete one or more presets, check the checkbox next to one or more preset names (or check **All**) and click **Delete**.

## Installing Firmware Upgrades

**Note**

The Upgrade page is only accessible to administrators

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: <https://support.haivision.com>.

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

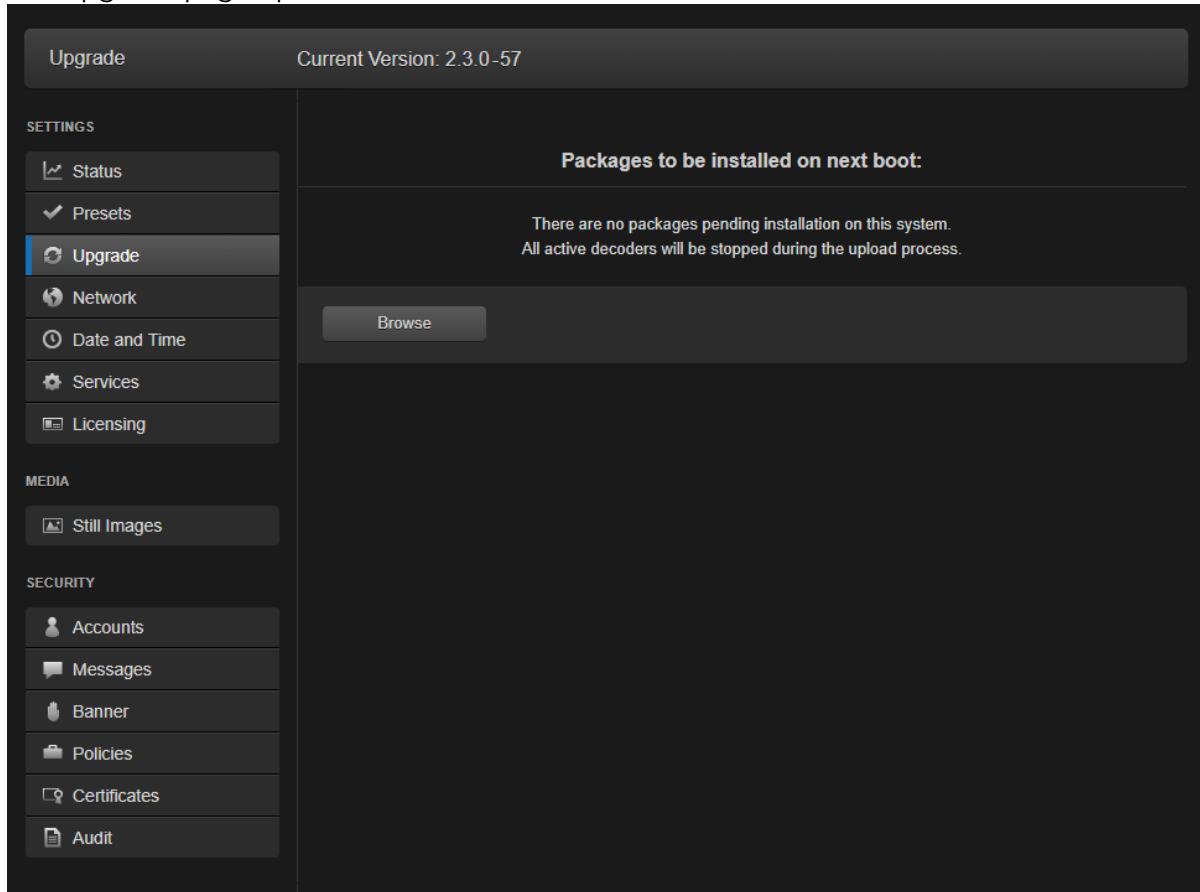
When a firmware upgrade becomes available, you can easily install it from the Web interface. You will first need to copy the upgrade file to your local computer or network.

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.

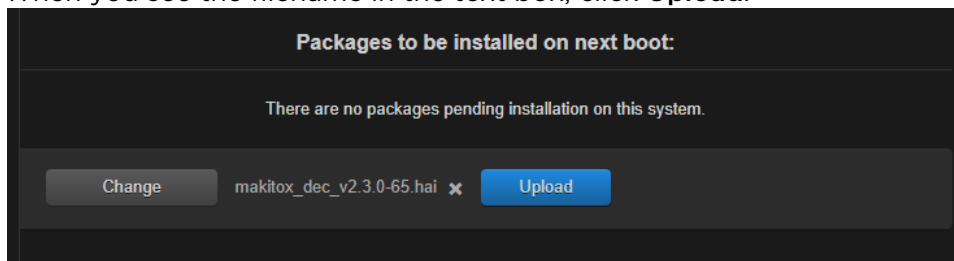
This section provides instructions to install a firmware upgrade from the Web interface.

To install a firmware upgrade:

1. On the Administration page, click **Upgrade** on the sidebar. The Upgrade page opens.



2. Click **Browse** and select the file in the Open File dialog box.
3. When you see the filename in the text box, click **Upload**.

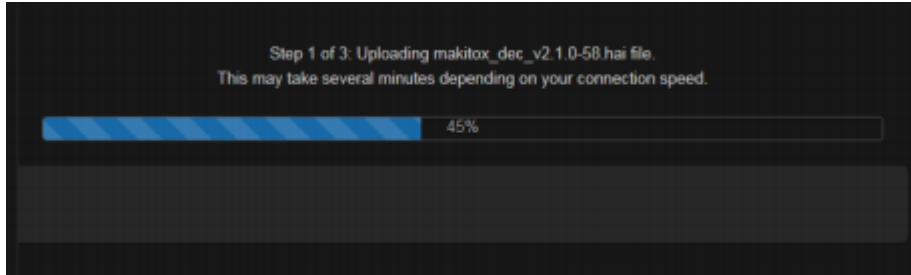


**Tip**

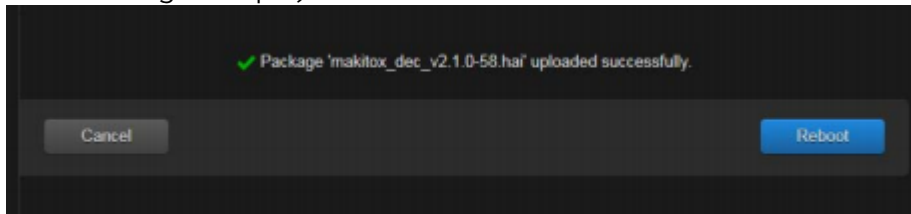
To select a different file, Click **Change**.

**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.



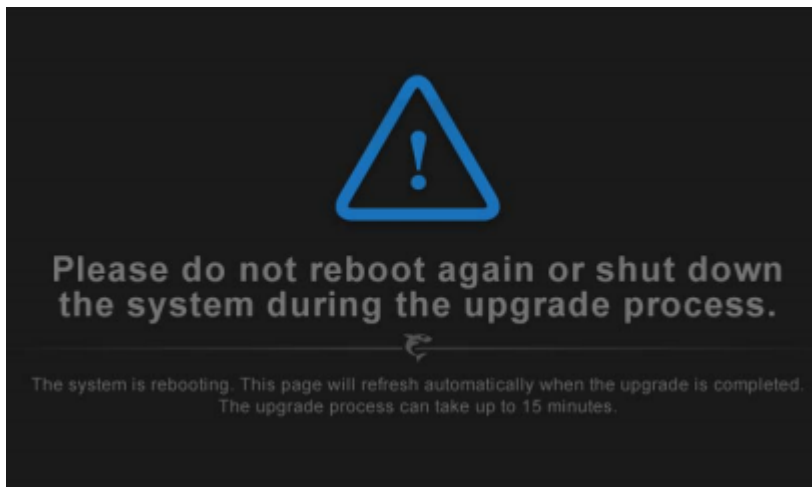
If any of the package components has been modified or is not signed by a valid certificate, the verification will fail and the downloaded package will be discarded. When the file is uploaded and verified successfully, you will see a confirmation page (as shown in the following example).



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

**⚠ Caution**

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



Once the unit has rebooted, the browser will display the Sign-In page for the Web interface (depending on your Web browser and settings). If not, reload the Sign-In page.

**✔ Tip**

It's a good idea to clear your browser cache after the firmware upgrade.

5. Sign in again in order to access the decoder. For more information, see [Signing In to the Web Interface](#).

**Note**

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

## Configuring Network Settings

### **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 sign in again in order to access the encoder.

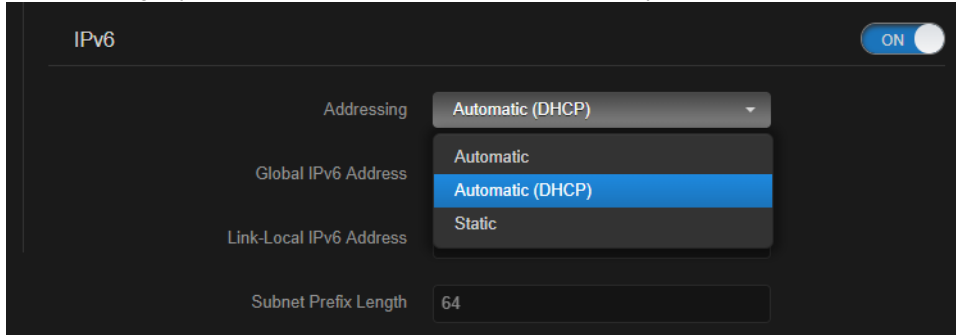
If you are connecting to the Makito X through an IPv4 connection, disabling the IPv4 interface will drop your connection after a reboot. You will need to reconnect using IPv6 or the serial interface (if available).

To view and configure the Network settings:

1. On the Administration page, click **Network** on the sidebar. The Network configuration page opens.

2. Select or enter the new value(s) in the appropriate field(s). See [Network Settings](#).

- To configure IPv4 or IPv6 addressing, toggle the IPv4 or IPv6 button to On and select the Addressing option. Enter the new value(s) as required.

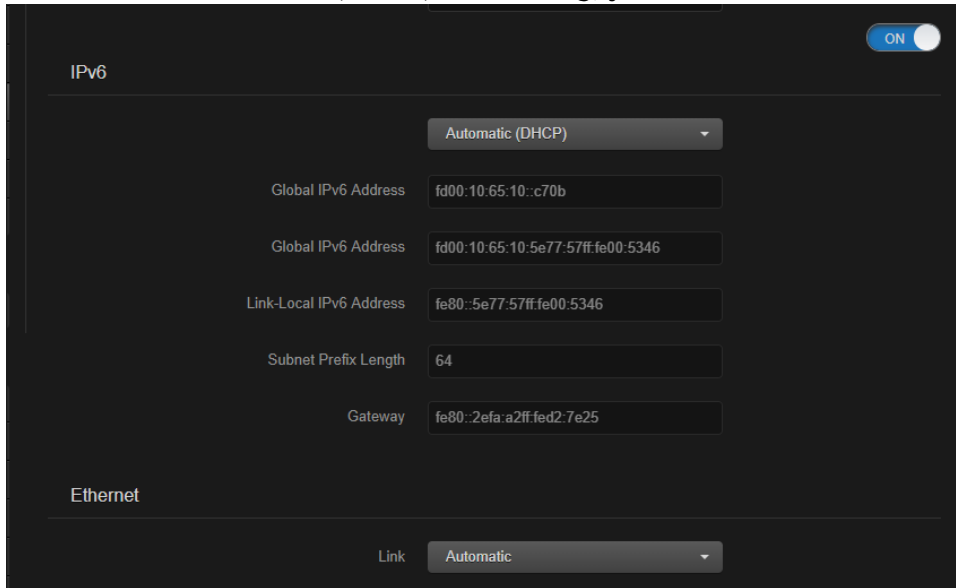


- Click the **Apply** button.
- Click the **Reboot** button.

**Note**

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

After the encoder reboots, you will be returned to the Sign-In page. When you open the Network Configuration page again, if you configured the unit using either Automatic or Automatic (DHCP) Addressing, you will see the IP addresses obtained by the system.



## Network Settings

The following table lists the shared Encoder-Decoder Network settings:

### General

Setting	Description/Values
Hostname	Enter a unique name for the Makito X.
IPv4	When set to On, configures the network to use IPv4 addressing.
IPv6	When set to On, configures the network to use IPv6 addressing.



## IPv4

Setting	Description/Values
Addressing	<p>Select DHCP or Static to enable or disable the Dynamic Host Configuration Protocol.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>When DHCP is enabled, the Makito X will get an IP Address from a DHCP server on the network. When it is disabled, you must manually enter the device's IP Address, Netmask &amp; Gateway Address.</p> </div>
DHCP Vendor Class ID	<p><b>(DHCP must be enabled)</b> 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" or "Haivision Makito X Decoder" (as applicable).</p>
Assign Link-Local Address When DHCP Fails	<p><b>(DHCP must be enabled)</b> When this checkbox is checked, and DHCP is used but no DHCP server is present to assign an IP address to the device, the Makito X will automatically assign itself an IP address in the 169.254.0.0/16 range. 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. If DHCP 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-bit mask used to divide an IP address into subnets and specify the network's available hosts. If DHCP 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). If DHCP is disabled, you may enter a gateway address in dotted-decimal format.</p>
<b>Decoder-specific</b>	
Enable IP Address Display	<p>Check this checkbox to display the IP address of the decoder during the boot sequence of the device. This provides a simple way for users to determine the IP address by examining the HDMI or SDI outputs on a display. The IP address is displayed as an overlay in the top left corner of the monitor.</p>
Duration	<p><b>(Enable IP Address Display must be enabled)</b> The duration for the display of the IP address: 15, 30, 45, or 60 seconds.</p>
Resolution	<p><b>(Enable IP Address Display must be enabled)</b> The resolution for the display of the IP address (default = 720p60).</p>

## IPv6


Setting	Description/Values
Addressing	Select one of the following options to obtain an IPv6 address for the unit: <ul style="list-style-type: none"> <li>• Automatic: Uses SLAAC (Stateless Address Autoconfiguration) to obtain IP addresses automatically without the need for a DHCP server</li> <li>• Automatic (DHCP): Enables the Dynamic Host Configuration Protocol to get an IP address from a DHCP server on the network</li> <li>• Static: Use to manually configure the device's IP and gateway addresses.</li> </ul>
Global IPv6 Address	Displays the IPv6 Address for the Makito X. This is a unique address that identifies the unit in the IP network. There may be multiple IPv6 addresses on a single interface. If Static Addressing is used, enter an IPv6 address in hexadecimal notation.
Subnet Prefix Length	The Prefix Length in IPv6 is the equivalent of the Subnet Mask in IPv4. However, instead of being expressed in four octets as it is in IPv4, it is expressed as an integer between 1 through 128.
Gateway	Displays the gateway address of the network (typically the address of the network router). If Static Addressing is used, enter a gateway address in hexadecimal notation.
Enable Privacy Extensions	( <b>Automatic</b> Addressing only) Check this checkbox to enable SLAAC Privacy Extensions. As documented in <a href="#">RFC 4941</a> "Privacy Extensions for Stateless Address Autoconfiguration in IPv6", this entails using randomly generated, temporary, global scope IPv6 addresses that are regularly discarded and replaced with different addresses.
Link-Local IPv6 Address	A link-local address is an Internet Protocol (IP) unicast address intended to be used only to connect to the hosts on the same network. A link-local address starts with fe80: The link-local address is always automatically assigned; you cannot configure it.

## Ethernet

Setting	Description/Values
Link	Determines whether the Ethernet link settings will be negotiated automatically or configured manually: <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>
Speed	Select the Ethernet Speed (in Mbps): <ul style="list-style-type: none"> <li>• Any (default)</li> <li>• 1000</li> <li>• 100</li> <li>• 10</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>When Link is set to Automatic, setting the Ethernet speed to anything other than Any means that only that specific value will be advertised to the connected hub/switch during the negotiation process. This makes it possible, for instance, when connected to a GigE switch to force the link down to 100Mb when some network problems are encountered.</p> </div>
Current Speed	(Read-only) Displays the actual Ethernet Speed.

Duplex	If Link is Auto, displays the actual value for the Duplex Mode (read-only). If Link is Manual, select the Duplex Mode: <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.
<b>Encoder-specific</b>	
Total TX Bandwidth Limit	(Encoder only) The maximum transmit bandwidth for the Makito X in kbps. Specifies the bandwidth "ceiling" for the Ethernet port.

## DNS Settings

Setting	Description/Values
Domain Name	Enter the domain for the Makito X.
Obtain DNS Settings Automatically	(Addressing cannot be <b>Static</b> ) Check this checkbox to obtain DNS settings from DHCP. 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).
Primary DNS Server Address	( <b>Obtain DNS Settings Automatically</b> must be disabled) Enter the primary DNS server address for your network.
Alternate DNS Server Address	( <b>Obtain DNS Settings Automatically</b> must be disabled) Enter an alternate DNS server address for your network. The alternate DNS server is used only if the primary server is not responding.
DNS Precedence	Select either IPv4 or IPv6 to specify the priority for DNS resolution. On systems with both IPv6 and IPv4 enabled, if users use HOSTNAMES instead of specifying IP addresses when creating connections, the default behavior is to resolve to IPv6 first if it is available.
Enable mDNS	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. <div style="border: 1px solid green; padding: 5px; margin-top: 10px;"> <p> <b>Tip</b> Enabling mDNS allows an mDNS application to automatically find the Makito X. mDNS is enabled on units shipped from the factory or reset to factory defaults to allow them to advertise their existence. A user can then click <b>Locate</b> (Status page) to start the Status and TX or RX LEDs flashing in order to discover the location of the device, for example, within a large server room.</p> </div>
mDNS Identifier	(Optional) Enter a unique name for the Makito X. By default, the system creates a unique name "MakitoXD (%HOSTNAME%)" for the device.

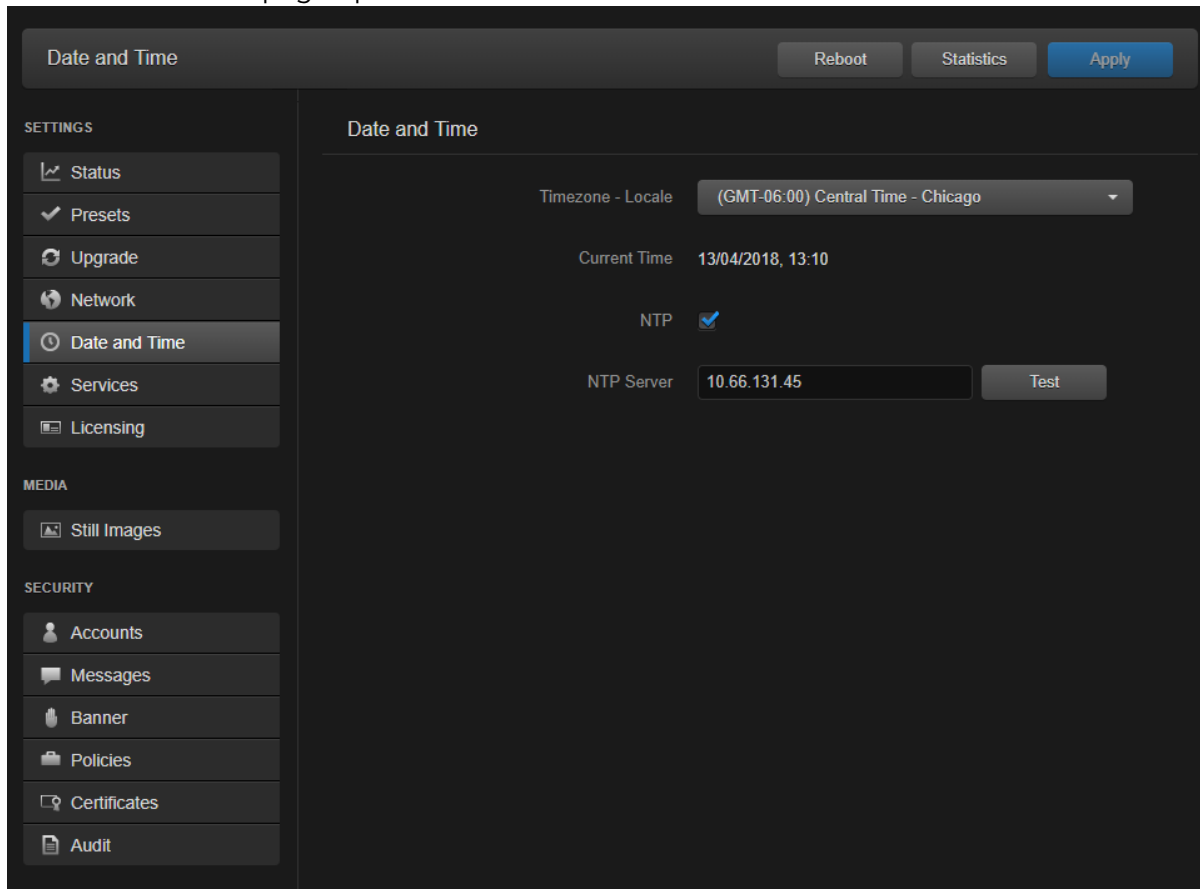


## Configuring Date and Time

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

To view and configure the date and time:

1. On the Administration page, click **Date and Time** on the sidebar. The Date and Time page opens.



2. Select or enter the new value(s) in the appropriate field(s). See [Date and Time Settings](#).
3. To apply your changes, click **Apply**.
4. To validate that the NTP server is reachable, click **Test** next to the NTP server field.
5. To view statistics for the NTP server, click **Statistics**. For details, see [NTP Statistics](#).

## Date and Time Settings

The following table lists the Date and Time settings:

Date and Time Setting	Description/Values
Timezone-Locale	Select the desired time zone and corresponding city. <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>The times are based on hours added to or subtracted from Greenwich Mean Time (GMT).</p> </div>
Current Time	(Read-only) The current local date and time.
NTP	Check this checkbox to connect to a Network Time Protocol (NTP) server to synchronize the encoder or decoder clock.
NTP Server	If NTP is enabled, enter the IP address of the NTP server.
Manually Set Date & Time	If NTP is disabled, select the date and time from the calendar.
<b>Test</b>	If NTP is enabled, click to validate that the NTP server is reachable.
<b>Statistics</b>	If NTP is enabled, click to display tracking and source information, and source statistics for the NTP server.

### Related Topics

- [NTP Statistics](#)

## NTP Statistics

Following is an example of the NTP Statistics:

```

NTP STATISTICS

Tracking

Reference ID   : ADFFD7D1 (173.255.215.209)
Stratum       : 3
Ref time (UTC) : Fri Nov 16 18:31:14 2018
System time   : 0.000289718 seconds slow of NTP time
Last offset   : -0.000132380 seconds
RMS offset    : 0.001290162 seconds
Frequency     : 14.224 ppm slow
Residual freq : -0.002 ppm
Skew          : 0.122 ppm
Root delay    : 0.078535207 seconds
Root dispersion : 0.020434881 seconds
Update interval : 1029.6 seconds
Leap status   : Normal

Sources

210 Number of sources = 4
MS Name/IP address      Stratum Poll Reach LastRx Last sample
=====
^+ 213.141.154.170      2 10  377  835  -507us[ -639us] +/-  77ms
^* 173.255.215.209     2 10  373  815 -1030us[-1162us] +/-  66ms
^+ 193.225.118.163     2 10  377  825  +742us[ +610us] +/-  72ms
^- 211.233.84.186      2 10  377  825  -708us[ -840us] +/- 175ms

Source Stats

210 Number of sources = 4
Name/IP Address        NP  NR  Span  Frequency  Freq Skew  Offset  Std Dev
=====
213.141.154.170       36  19  155m  +0.070     0.193    -419us  852us
173.255.215.209      34  21  156m  -0.039     0.134    -454us  483us
193.225.118.163      27  16  149m  -0.093     0.919    +782us 3169us
211.233.84.186       36  23  156m  -0.089     0.653    +248us 2661us
    
```

## Enabling and Disabling Network Services

**Note**

The Services page is only accessible to administrators.

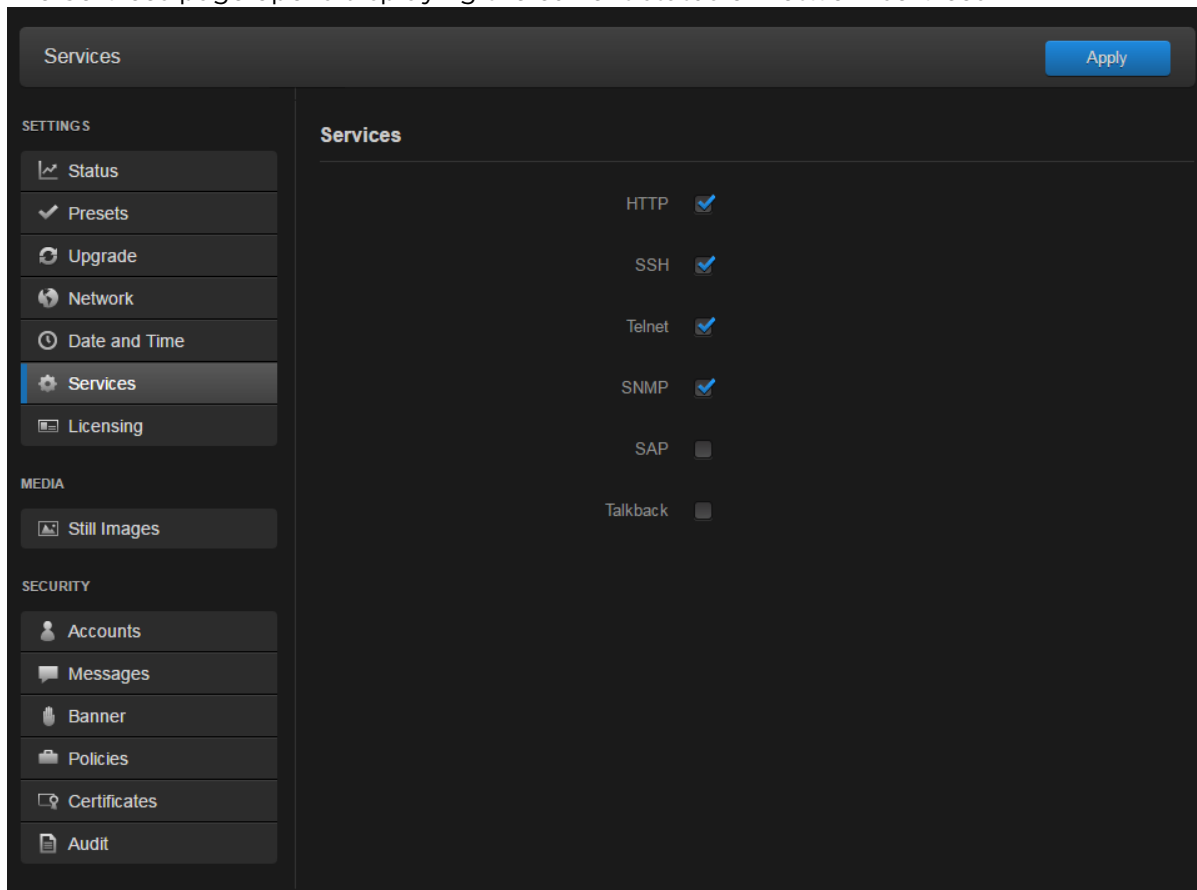
**Important**

In order to optimize your decoder’s performance, it is recommended that only the required network services be enabled. Please review the network services to make sure services used for your application are enabled or disabled as appropriate.

When SAP is enabled, you can specify the multicast IP address and port on which the device will listen for advertised sessions. The SAP service will populate the device’s Streams table with the learned (i.e., announced) sessions, which users can then select as the input for the SDI 1 or SDI 2 decoders.

To enable or disable network services:

1. On the Administration page, click **Services** on the sidebar. The Services page opens displaying the current status of network services.



2. To enable or disable a service, check or clear the associated checkbox. See the following section, [Service Settings](#).



- To specify an IP address and port for the SAP service other than the defaults provided, fill in the IPv4 or IPv6 Listening Address and Port.

The screenshot shows a configuration interface titled "Services". It lists several services with checkboxes and associated settings:

- HTTP**
- SSH**
- Telnet**
- SNMP**
- SAP** 
  - IPv4 Listening Address: Automatic
  - IPv6 Listening Address: Automatic
  - Port: 9875
- Talkback** 
  - Port: 9177
  - Button Mode: Toggle Switch

- Tip**

The Button Mode determines how users activate talkback: either push button (“push-talk”) or toggle switch.

**Note**

By default, the Talkback port is 9177, which is the default port used by the Makito X encoder.

- To apply your changes, click **Apply**. The service(s) will be stopped or started immediately.

**Tip**

Network services can also be enabled/disabled using the CLI service `command` .

## Service Settings

The configurable Services are as follows:

### Network Services

Service	Description/Values
HTTP	<p>Hypertext Transfer Protocol, used for Web browsers acting as a client.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 5px;"> <p><b>Note</b></p> <p>Only secured HTTP (HTTPS) is supported. See <a href="#">Managing Certificates</a> (Encoder) or <a href="#">Managing Certificates</a> (Decoder) to manage HTTP TLS certificates.</p> </div>
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.
Haivision EMS	EMS (Element Management System) allows simple management of Haivision-only devices.

### Encoder-specific

Service	Description/Values
VF	Protocol used for communication between the encoder and Furnace servers. Note that VF Pilot provides access to encoder configuration settings.
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> .
Serial Pass-Through	<p>Bi-directional serial pass-through for controlling serially attached devices such as PTZ controlled cameras. Both RS-232 and RS422 are supported.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 5px;"> <p><b>Note</b></p> <p>The COM Port Mode must first be set to Pass-Through (see <a href="#">Managing the COM Port</a>).</p> </div>
Port	(Serial Pass-Through must be enabled) Specifies the TCP port that the Makito X will listen on for remote commands.
RTSP	Enables streaming of video feeds from the Makito X encoder to a Milestone server for archiving and analysis using the RTSP protocol.
ONVIF	Enables the ONVIF management API to send commands from the Milestone XProtect video management software (VMS) to the Makito X encoder.

## Decoder-specific

Service	Description/Values
SAP	Session Announcement Protocol, used to populate the device's Streams table with streams advertised via the SAP protocol.
Talkback	Audio Talkback (a Makito X feature) allows end users monitoring a streaming session to "talk back" to individuals at the video source (encoder), via a microphone connected to the decoder. For details, see <a href="#">Audio Talkback</a> .
<b>SAP only</b>	
IPv4 Listening Address	<p>Specifies the multicast IPv4 address on which the SAP service will listen (as defined in RFC 2974).</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Note</b></p> <p>The Makito X decoder listens for SAP on three different addresses when Automatic is selected:</p> <ul style="list-style-type: none"> <li>• 224.2.127.254 (IPv4 global scope announcement multicast address)</li> <li>• 239.255.255.255 (IPv4 local scope announcement multicast address)</li> <li>• 239.195.255.255 (IPv4 organization local scope announcement multicast address)</li> </ul> <p>The standard IP addresses and ports for multicast SAP announcements are defined in RFC 2974.</p> </div>
IPv6 Listening Address	<p>Specifies the multicast IPv6 address on which the SAP service will listen (as defined in RFC 2974).</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Note</b></p> <p>The Makito X decoder listens to <code>FF0X::2:7FFE</code> where X is the 4-bit scope value.</p> </div>
Port	Specifies the UDP port on which the SAP service will listen.
<b>Talkback only</b>	
Port	Specifies the destination port used by the encoder. Default = 9177.
Button Mode	<p>Specifies whether the Web interface provides a push button or toggle switch for users to activate talkback.</p> <ul style="list-style-type: none"> <li>• Push Button provides "push-to-talk" functionality, which requires that users push a button to transmit audio and keep pushing the button to use the talkback channel. This prevents a user from accidentally locking and not releasing the channel.</li> <li>• Toggle Switch stays active until the user pushes it again.</li> </ul>

## Managing Licenses

- [License File Errors](#)

Feature licensing allows you to add new functionality to already deployed systems.

To acquire a new license, please contact your Authorized Reseller or Haivision at: <https://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.

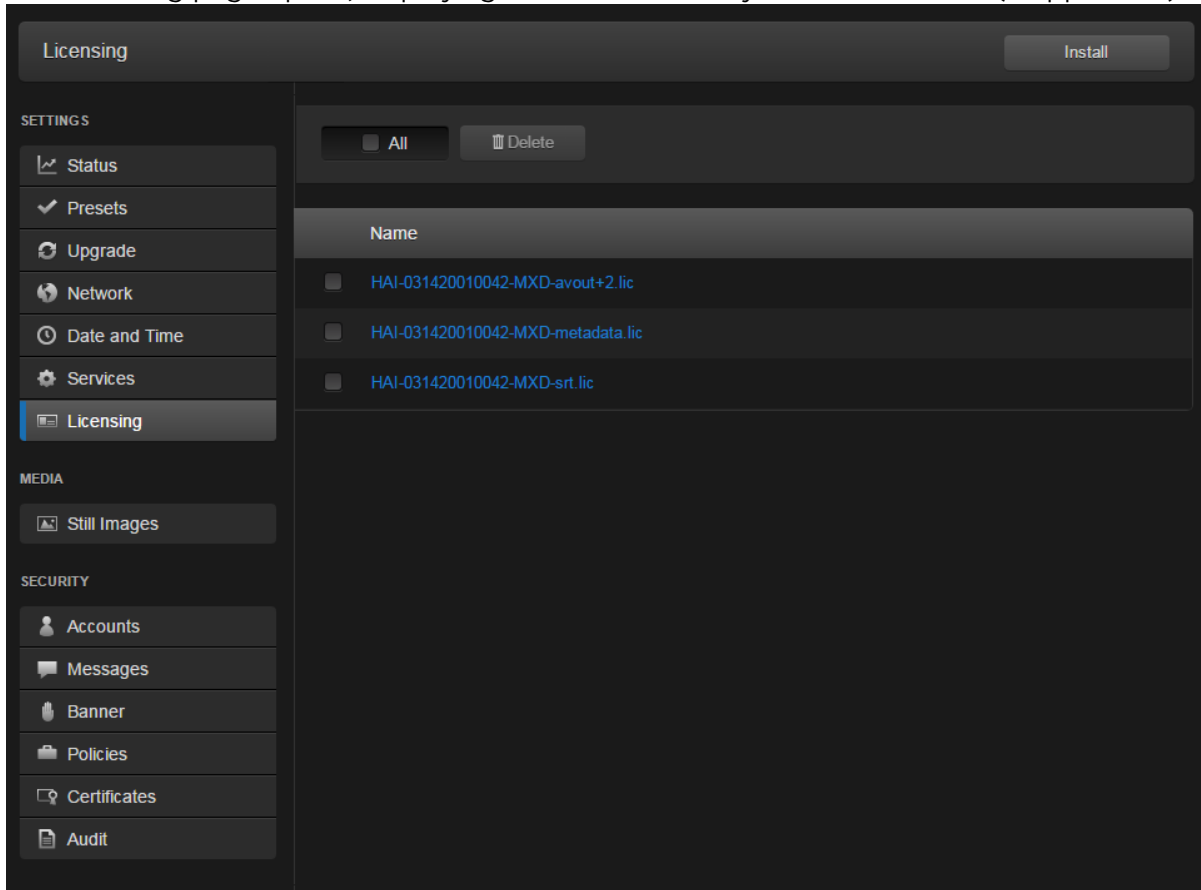
This section provides instructions to install a license from the Web interface as well as view current licenses on your system.

### Caution

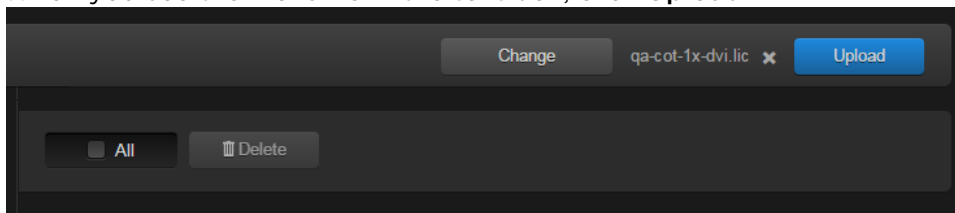
- Do not delete existing licenses before uploading the new license.
- New licenses are typically add-ons to complement the base license. You should only delete existing licenses if instructed to do so by Haivision.

To install a license file:

1. On the Administration page, click **Licensing** on the sidebar. The Licensing page opens, displaying the list of currently installed licenses (if applicable).



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 the **X** button.

4. To apply your changes, click **Reboot**. The decoder will reboot and you will be returned to the Login page.

- To view an installed license file, click the file in the list. The license file opens in a separate window (as shown in the following example).

```

Not secure | https://10.65.11.22/apis/licenses/John-MXD.lic
#----BEGIN LICENSED FEATURE---- metadata.lcf ----
[INFO]
Feature=Metadata
Description=Metadata KLV

[KLV]
Enabled=On

#----END LICENSED FEATURE---- metadata.lcf ----
#----BEGIN LICENSED FEATURE---- srt.lcf ----
[INFO]
Feature=SRT
Description=Secure Resilient Transport

[SRT]
Enabled=On

#----END LICENSED FEATURE---- srt.lcf ----
#----BEGIN LICENSED FEATURE---- avout.lcf ----
[INFO]
Feature=Audio/Video Output Channels
Description=Licensed 2nd audio/video output channel

[AVOUT]
VideoOutputs=2

#----END LICENSED FEATURE---- avout.lcf ----
#----BEGIN LICENSING DATA-----
[LIC-SIGNATURE]
CreatedOn=2014-12-05 17:10:04
CreatedBy=jlinton@haivision.com
Sequence=fw100396_metadata.lic

[LIC-DEVICES]
HAI-031420010028=Yes

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

Verifying license file "John-MXD.lic"...
License verification successful.

```

- 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.

### Related Topics

- [license](#) (CLI command)

## Configuring Still Image Streaming

From the Still Images page, you can manage the collection of custom static images that the decoder can display when there is no input stream present. Once uploaded, the custom still image can be selected from the SDI 1 and SDI 2 Decoder configuration pages.

**Note**

It is not necessary to have a different version of the custom still image for every display format. The decoder automatically resizes the selected image for proper display

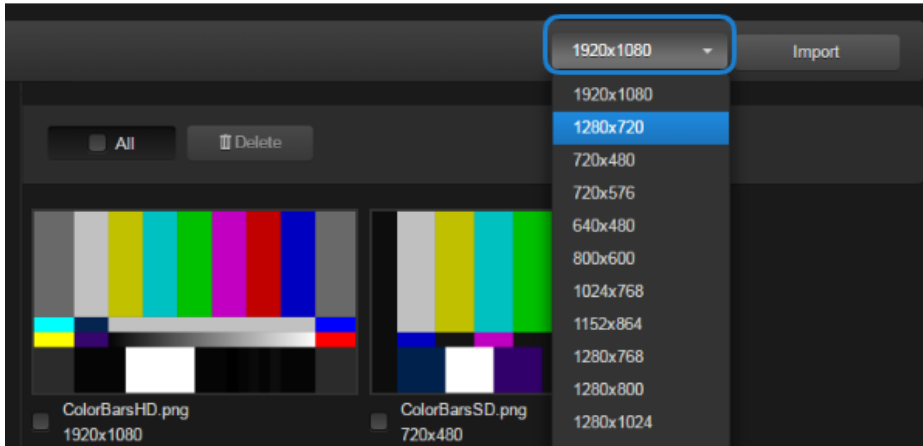
To upload a static image:

1. On the Administration page, click **Still Images** on the sidebar (under **Media**). The Still Images page opens, displaying the list of still images that have been uploaded for the decoder.

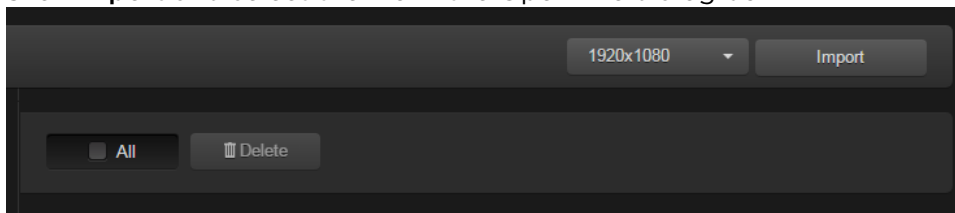


2. To upload a new image file, first select the Output Resolution for the image.

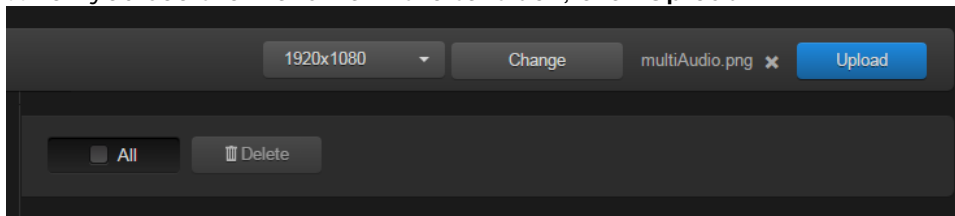




3. Click **Import** and select the file in the Open File dialog box.



4. 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 **X** button.

5. 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 Users and Security

**Note**

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

## Topics in This Chapter

- [Managing User Accounts](#)
- [Managing Messages](#)
- [Managing Banners](#)
- [Managing Security Policies](#)
- [Managing Certificates](#)
- [Managing Audits](#)

## 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 password. For information, see [Changing Your Password](#).

### **Important**

Makito X Series devices ship from the factory with only the `admin` account enabled. For security reasons, the two default user accounts (`user` and `operator`) are locked at the factory as well as after a factory reset. An administrator must unlock them and change the passwords to use them for the first time.

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](#).

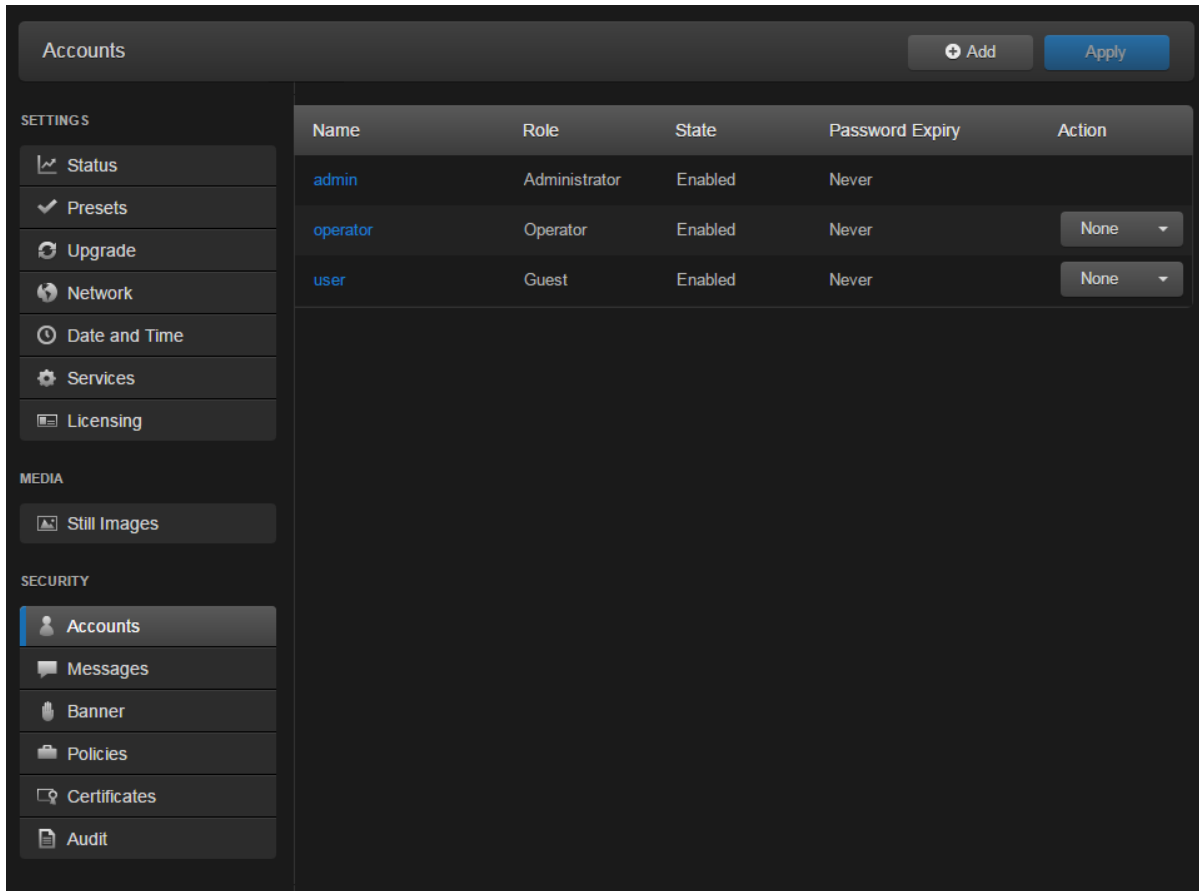
Using system-wide parameters, administrators can configure the allowable password strength and composition (i.e., to force the selection of strong passwords), as well as the periodic change of passwords. For details, see [Managing Security Policies](#).

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 systemwide parameter. For details, see [Managing Security Policies](#).

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 decoder.

To open the Accounts List View:

1. On the Administration page, click **Accounts** on the sidebar (under **Security**).  
The Accounts List View opens, displaying the list of defined user accounts for the decoder, as shown in the following example.



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](#).
3. To add a new account, click **Add**. For details, [Account Management](#).
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.

## 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.

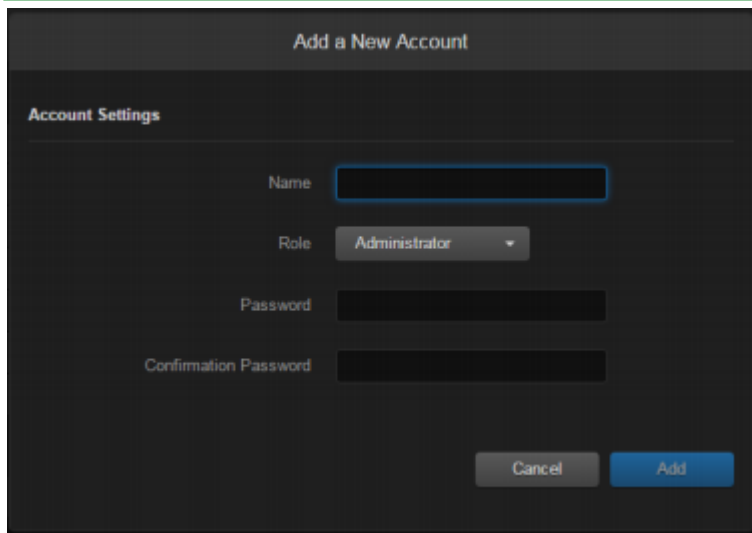
**To add a new account:**

1. From the Accounts List View, click **Add**.

2.

✓ **Tip**

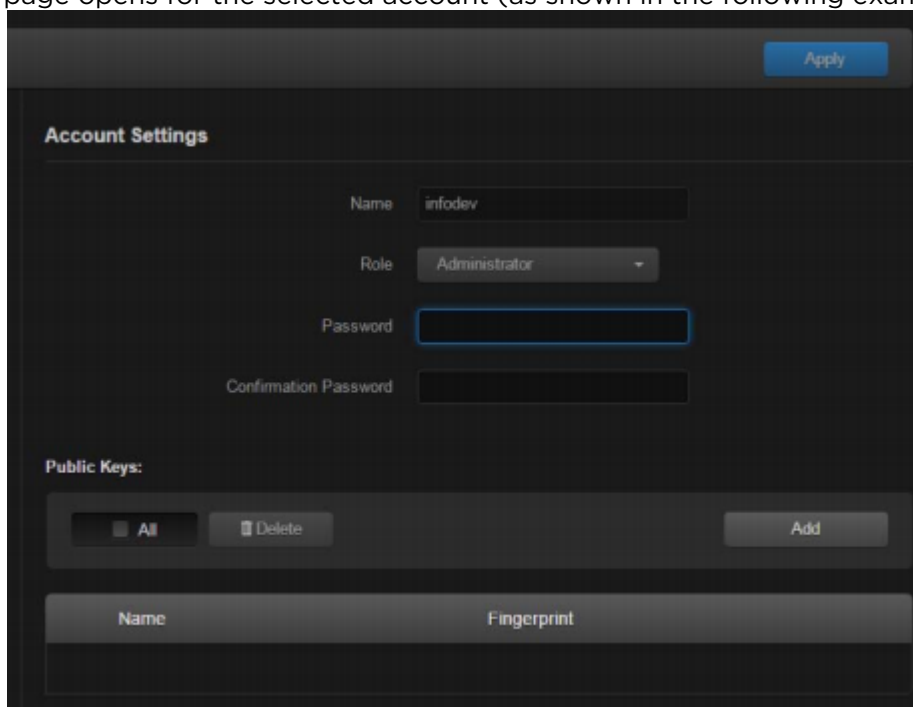
The user name must comply with Unix restrictions (lower case letters a-z, numbers 0-9, hyphen and underscore).



3. Select the Role for the user. See "Role" in [Account Settings](#).
4. Type the initial password in the Password field and again in the Confirmation Password field. For the allowed characters, see "Password Requirements" in [Changing Your Password](#).
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).



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" in [Changing Your Password](#).

3. **Note**

New users must change their passwords the first time they sign in as well as when the administrator resets the password of an existing account. When you change your password, the new password takes effect immediately.

4. To upload a public key for the account, follow the steps in [Managing Public Key Authentication](#).
5. To get the fingerprint for a public key, select the public key in the list. For more information, see [Account Settings](#).
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	(Read-only for existing accounts) The user name for the account. (New account) Type in a unique name for the account, meeting the following requirements: <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; must start with [a-z]</li> <li>• After the first character, can contain [a-z 0-9]</li> </ul>
Role	n/a	(Read-only for existing accounts) The Role assigned to the account. (New account) Select the Role for the user account, either: <ul style="list-style-type: none"> <li>• Administrator</li> <li>• Operator</li> <li>• Guest</li> </ul>
Old Password	n/a	(Your own account only) Type in your current password. <div style="border: 1px solid #ffc107; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>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> </div>
Password	n/a	Type in the new password.
Confirmation password	n/a	Re-type the new password.
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 <b>Upload</b>.</li> <li>• To delete a public key, select it from the list and click <b>Delete</b>.</li> </ul>
Fingerprint	n/a	Displays the fingerprint for the selected public key (when you click a filename in the Public Keys list). <div style="border: 1px solid #28a745; padding: 5px; margin-top: 10px;"> <p><b>Tip</b></p> <p>A public key fingerprint is a short sequence of bytes which you can copy and use to identify or look for a public key.</p> </div>

### Related Topics

- [Role-based Authorization](#)
- "Password Requirements" [Changing Your Password](#).
- [Managing Public Key Authentication](#)



## Managing Public Key Authentication

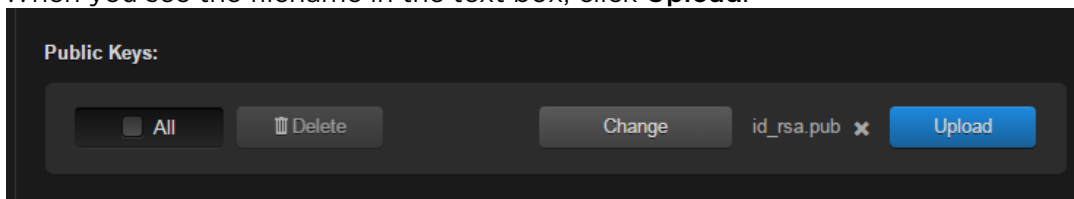
In order to use a public key for account authentication (instead of password-based authentication), you must first get the public key of your SSH client. Note that in the current release, this only applies to SSH CLI access to the Makito X.

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, under Public Keys, click **Add** and select the file in the Open File dialog box.

The public key file must have a `.pub` extension.

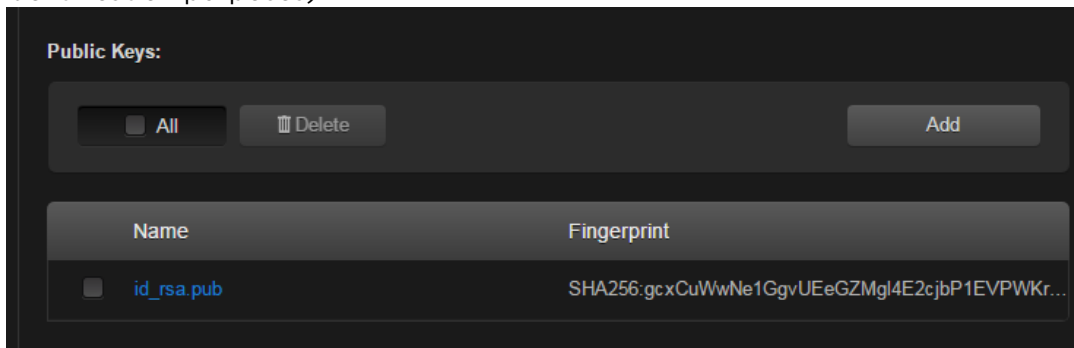
3. When you see the filename in the text box, click **Upload**.



**Tip**

To select a different public key file, click **Change**. To remove the selection, click **X**.

The file is then added to the Public Keys list of along with the fingerprint for the key (e.g., for identification purposes).



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**.

**Tip**

You can now access the CLI interface from your 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 sign-in.

The log of the actions recorded includes the following:

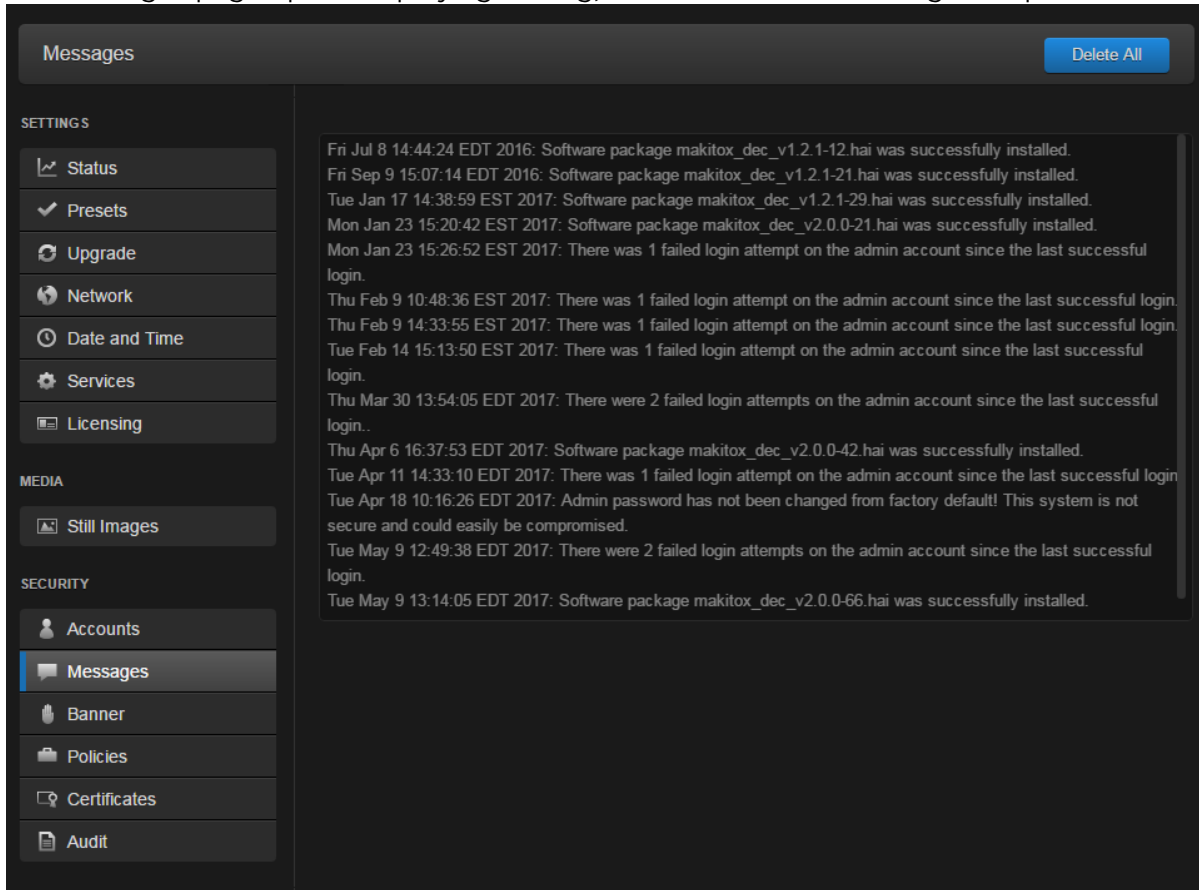
- The user initiating the action and the action being initiated.
- The time of the action.
- The results of the action (success/failure).

### Note

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

To view the messages:

1. On the Administration page, click **Messages** on the sidebar. The Messages page opens displaying the log, as shown in the following example.



2. To delete the messages, click **Delete All**. The messages will be deleted immediately.

## Managing Banners

**Note**

The Banner page is only accessible to administrators.

The `banner` command is used to manage the Advisory Notice and Consent Banner. This is a single text file that is displayed to users who sign in for interactive sessions on Makito X Series devices. The banner is typically an advisory/warning notice to be displayed before the Sign-in page.

Only ASCII file format is supported for the banner file; the maximum file size for the banner is 4KB.

**Note**

The `banner` command can only be used by an administrator.

### Synopsis

```
banner enable
banner disable
banner install bannerfile
banner get
banner delete
```

### Actions

Action	Description
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. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Important</b></p> <p>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 Series supports FTP and TFTP client, as well as SCP client and server for downloading and uploading files.</p> </div>
get	Displays banner status information
delete	Deletes the banner file from the system.

### 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.

## Examples

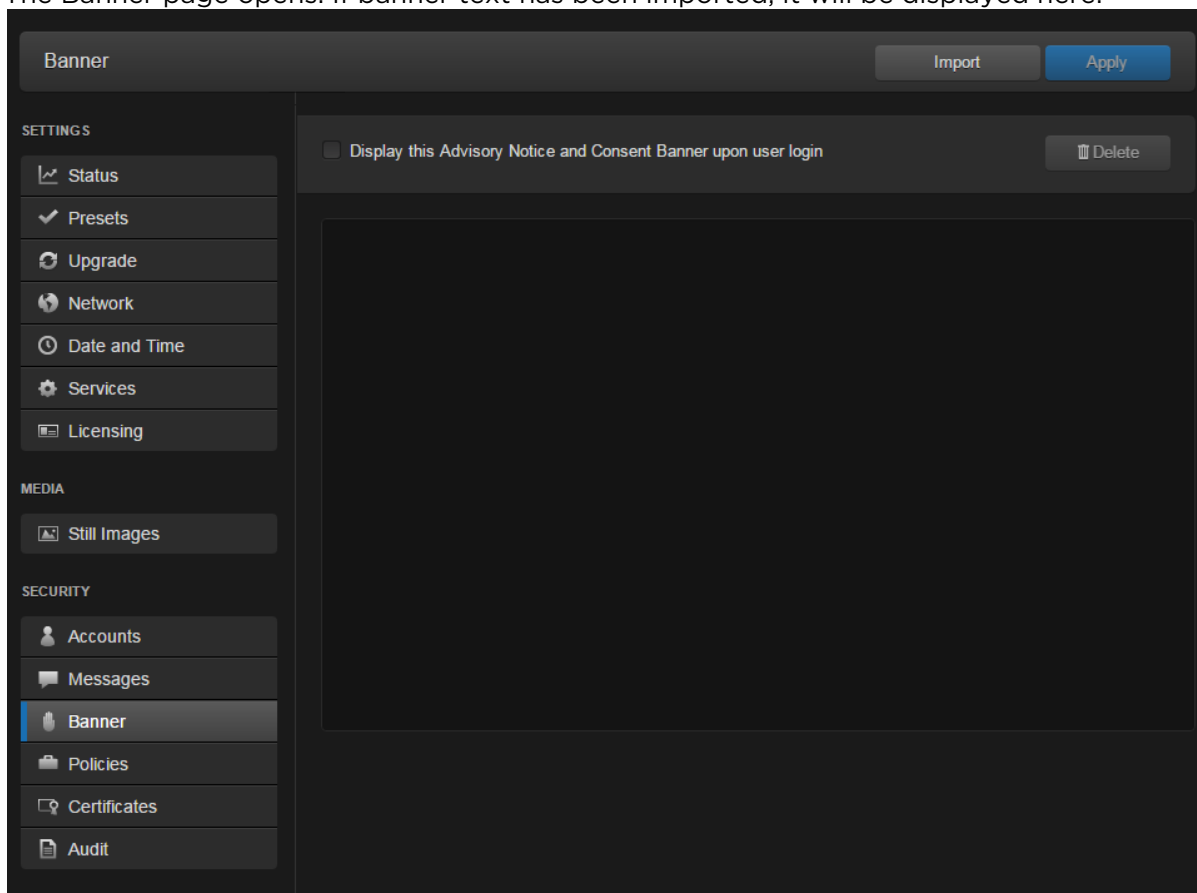
```
# banner get
The Advisory Notice and Consent Banner is disabled.
Unable to display banner: No banner file.
If enabled, the following banner is displayed upon user login:
-----
*****
                        * WARNING *
*****

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.

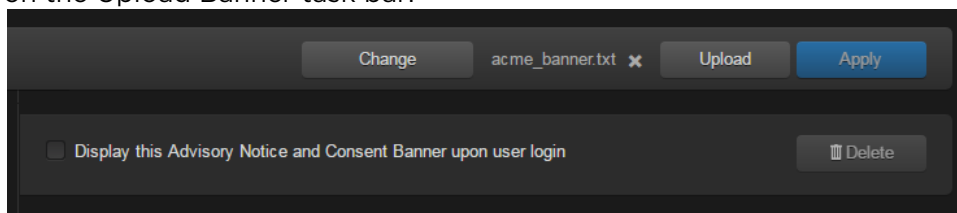
*****
                        * Haivision Systems - Makito X QA *
*****
```

To upload a text file for the Banner page:

1. On the Administration page, click **Banner** on the sidebar.  
The Banner page opens. If banner text has been imported, it will be displayed here.



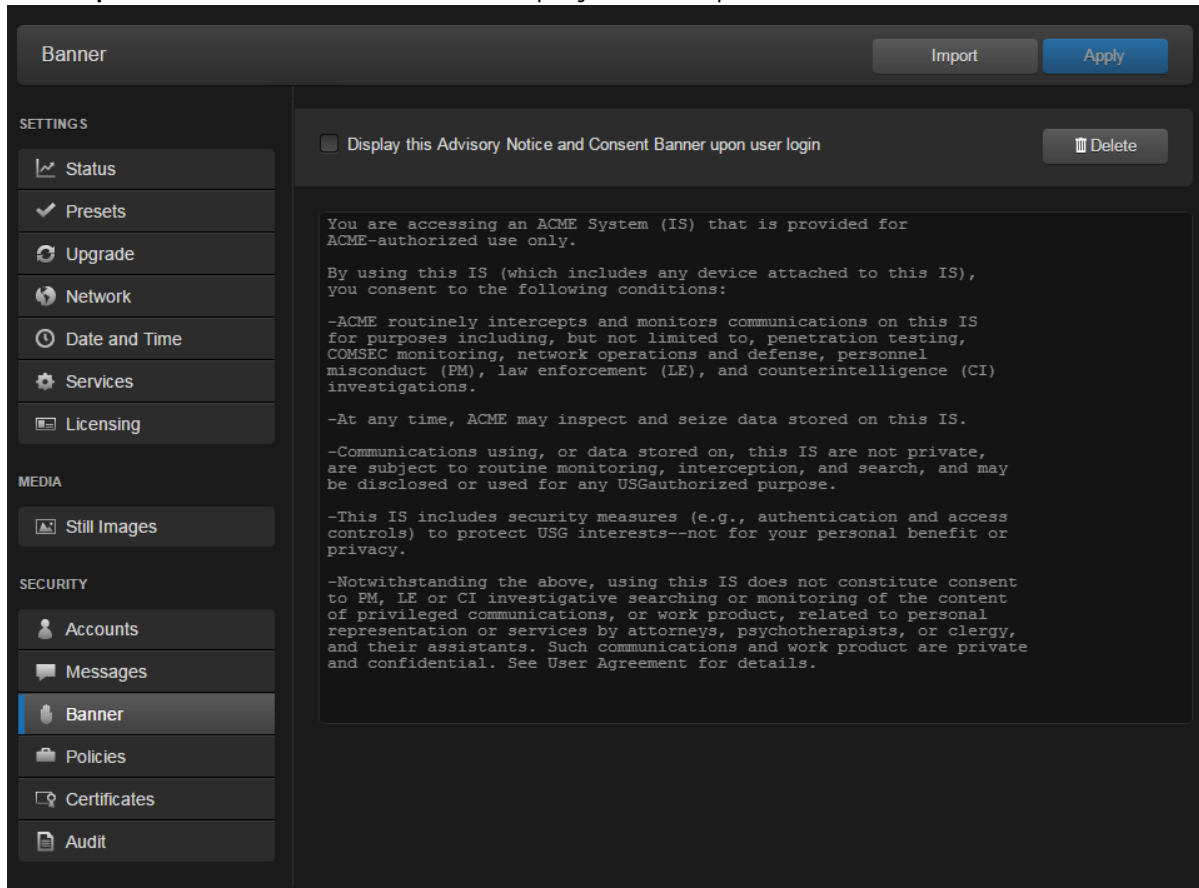
2. Click **Import** and select the file in the Open File dialog box. The banner filename is now displayed on the Upload Banner task bar.



**Tip**

To select a different banner file, click **Change**. To remove the selection, click the **X** button.

3. Click **Upload**. The banner text is now displayed in the pane.



4. **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 decoders to be "hardened". For more information, see [Hardening](#).

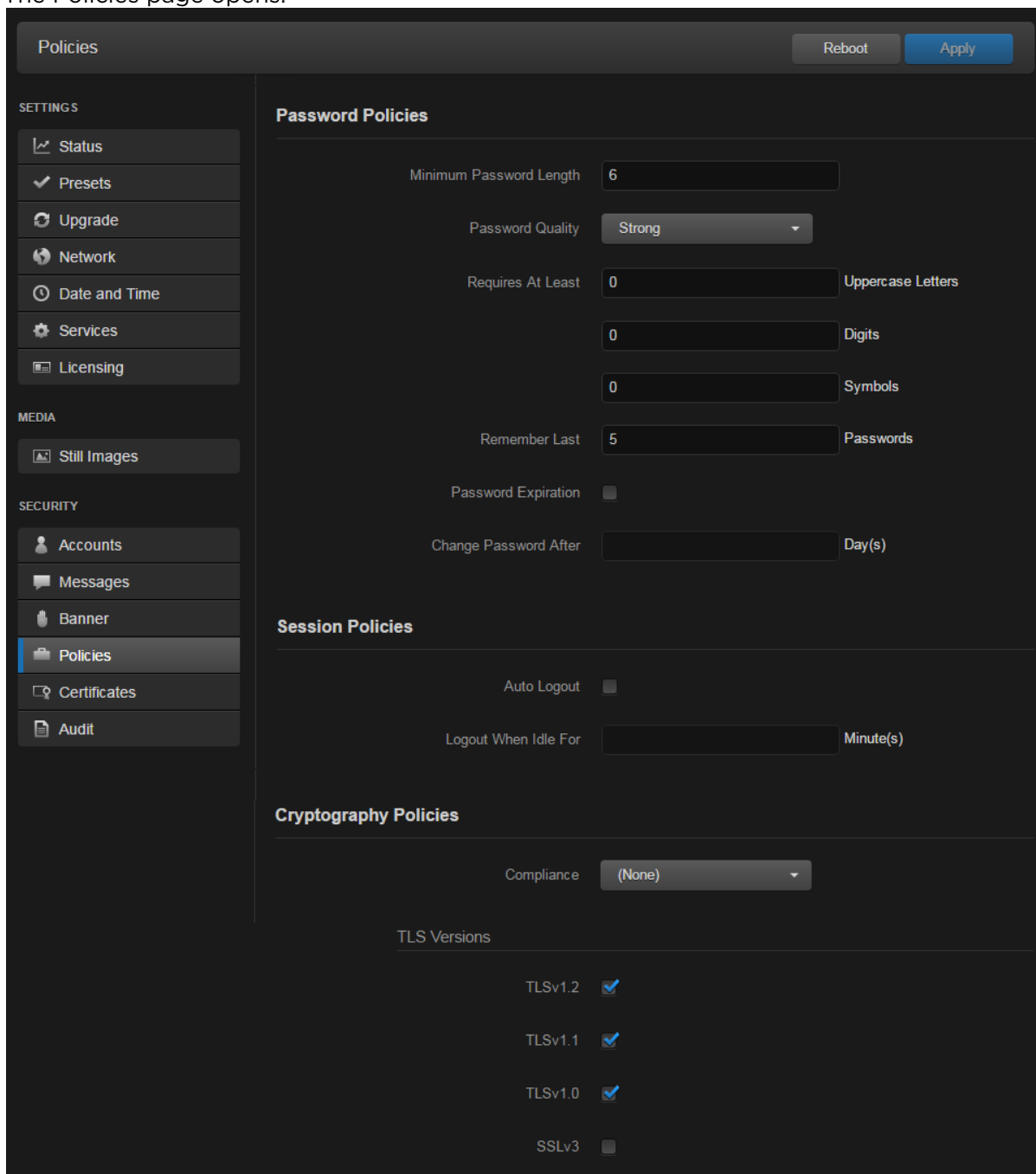
The Policies page is only accessible to administrators.

**From the Policies page, administrators can set policies for passwords, session timeout, and cryptographic strength for Makito 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 decoder:



1. On the Administration page, click **Policies** on the sidebar. The Policies page opens.



2. Select or enter the new value(s) in the appropriate field(s). See [Policy Settings](#).
3. To apply your changes, click **Apply**.

## Policy Settings

The following table lists the Policy settings for the decoder:

### Password Policies

Policy Setting	Default	Description/Values
Minimum password length	6 characters	Type in the minimum password length (from 6-40 characters).  <div style="border: 1px solid #f0e68c; padding: 5px;"> <p><b>Note</b> Passwords can be up to 80 characters.</p> </div>
Password quality	Basic	Select the required password quality; works in conjunction with Password requires at least below: <ul style="list-style-type: none"> <li>Basic: Sets the minimum password length as the only requirement to accept a new password.</li> <li>Strong: Adds more strict requirements to the password structure. Checks for minimum length as well as other criteria such as minimum number of required upper case characters, digits, and symbols.</li> </ul>
Password requires at least	0	(Password quality 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.
Remember Last	5	(Password quality must be Strong) This option determines the number of unique new passwords that must be associated with a user account before an old password can be reused. The range is from 5 to 500.
Password expiration	Disabled	To enable Password expiration, check the checkbox.
Change password after	N/A if Disabled ----- --- 90 days if Enabled	(Password expiration must be enabled) Type in the number of days after which users must change their passwords (from 1-180 days).

### Session Policies

Policy Setting	Default	Description/Values
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 Sign-in page.

Policy Setting	Default	Description/Values
Logout when idle for	N/A if Disabled ----- ---- 15 minutes if Enabled	(Auto Logout must be enabled) Type in the maximum length of time the system may be idle before the user will be logged out (from 1 - 1440 minutes).

## Cryptography Policies

Policy Setting	Default	Description/Values
Compliance	None	<p>Specifies the required cryptographic compliance, either:</p> <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: Activates cryptographic security to a level compliant with the 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 800-52, Revision 1.</li> </ul> <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p><b>⚠ Note</b> Either selection will reinforce security for all management functions of the decoder in terms of cryptography. This setting will take effect upon the next reboot.</p> </div>
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> <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p><b>⚠ Note</b> SSLv3 can be enabled only if Compliance is set to None. At least one TLS version must be enabled.</p> </div>

## Managing Certificates

### Note

The Certificates page is only accessible to administrators.

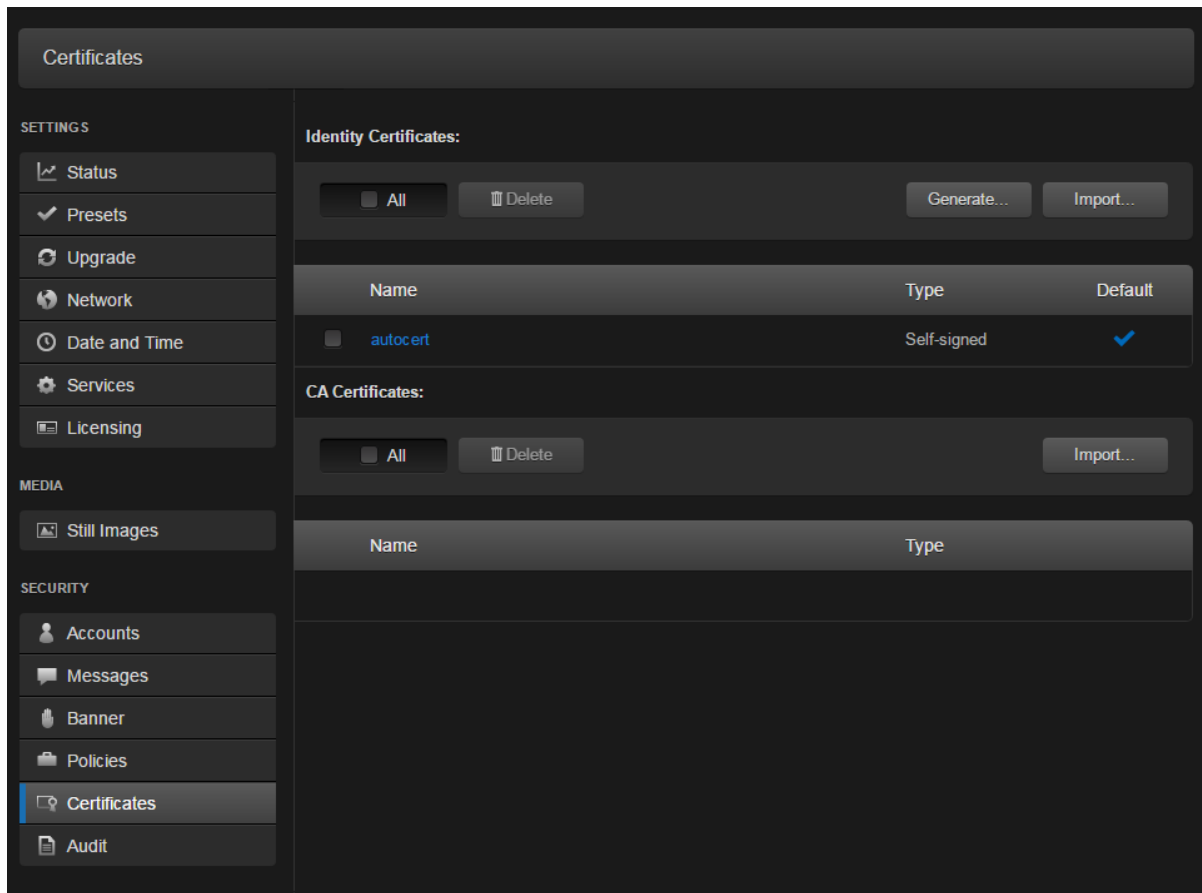
The Certificates page shows the list of Identity and CA Certificates installed on Makito X Series devices.

- **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 device'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 Makito X 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:

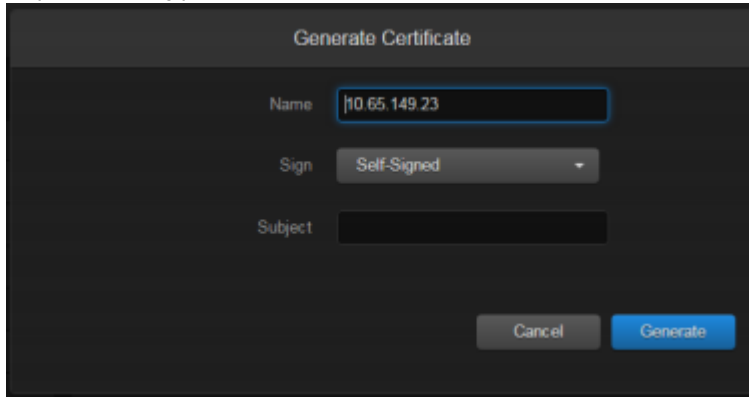
1. On the Administration page, click **Certificates** on the sidebar.  
The Certificates page opens.



The default Identity Certificate is indicated with a blue check.

To generate a Certificate Signing Request:

1. On the Certificates page, click **Generate**.
2. (Optional) Type a name for certificate in the Generate Certificate dialog.



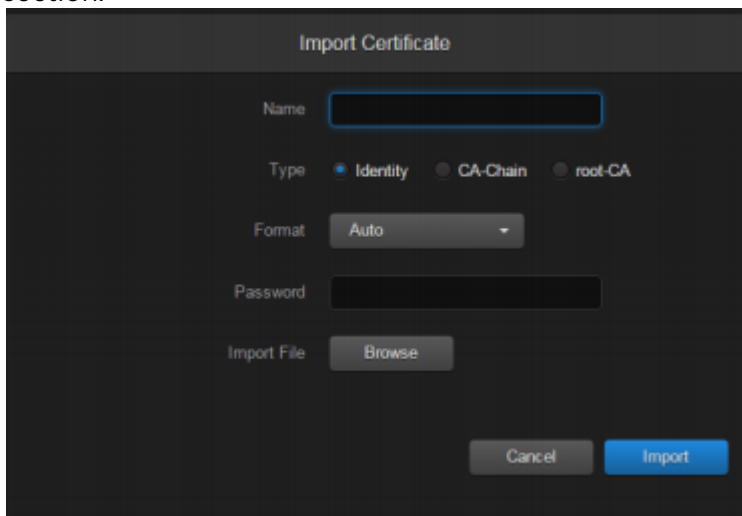
3. Select either Self-signed or Certificate Signing Request from the drop-down list. For more information, see "Sign" in [Certificate Settings](#).
4. For the subject, type in information about the device that the Identity Certificate represents. For more information, see "Subject" in [Certificate Settings](#).
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 it back later by clicking on the Import button (using the same name as the request).

**Tip**

Keep in mind that there is a difference between importing a new certificate (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" in [Certificate Settings](#).

To manage Certificates:

1. To import a Certificate, click **Import** next to either the Identity Certificates or CA Certificates section.



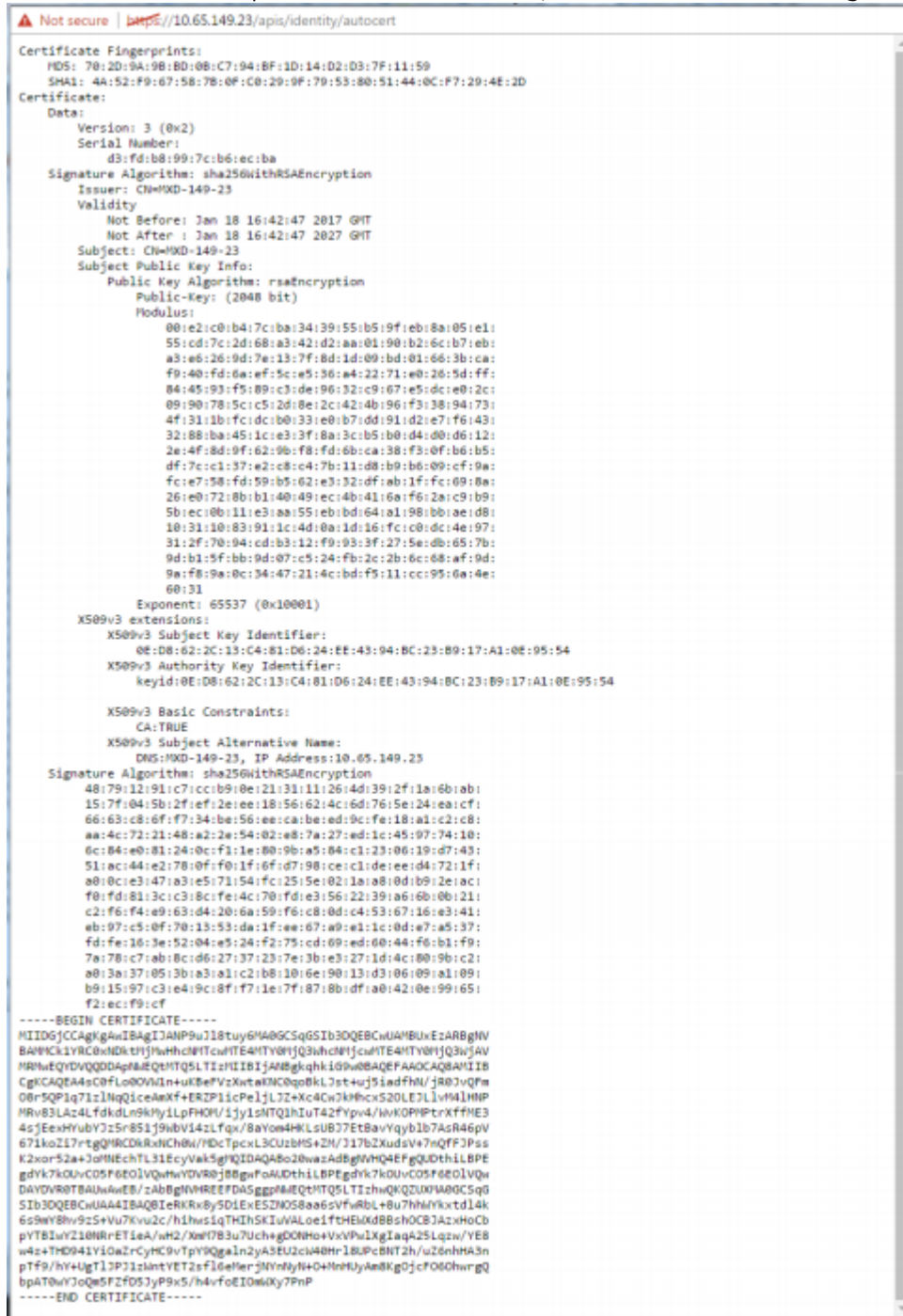
- a. Type in the Certificate Name.

- b. Select or enter the new value(s) in the remaining field(s). See "Import Identity or CA Certificate dialog" in [Certificate Settings](#).
  - c. Click **Import**.
2. To view the details of a certificate, select 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 (greyed out) checkmark under **Default**. The selected certificate will be saved as the default certificate, and its effect will be directly applied to the Audit but does not apply to HTTP until the next service restart or system reboot.

## Viewing Certificate Details

To view the details of a certificate file:

1. On Certificates page, click the certificate name from the list of Identity or CA Certificates. The certificate file opens in a new window (as shown in the following example).



2. (Optional) Save the file.





## Certificate Settings

The following table lists the Certificates controls and settings:

### Generate Certificate Dialog

Setting	Default	Description/Values
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 (CSR): A request will be generated, and its name will be added to the list of Identity Certificates. A copy of the request is saved in the current administrator's home directory, or it can be copied and pasted into a new file in a text editor from the CSR view. 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.</li> </ul>
Subject		<p>The Subject identifies the device being secured, in this case, the Makito X.</p> <p>Entering the special value "auto" (or leaving the field blank) sets the Common Name to the device's FQDN if DNS is set, or the IP address otherwise. The Subject Alternative Name extension is also set to the FQDN, hostname, and IP Address of the device (there is no other method to enter Subject Alternative Name values).</p> <p>Type in the subject in the form: <code>"/C=US/ST=Maine..."</code></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>Note that parameters with spaces should be enclosed in quotation marks.</p>

### Import Certificate Dialog

Setting	Default	Description/Values
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>

Setting	Default	Description/Values
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>

Setting	Default	Description/Values
		<p><b>⚠ Note</b></p> <p>Even though you can see the Type buttons, clicking <b>Import</b> 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	<p>Select the file format for the Certificate (the formats differ in the way the file is encrypted):</p> <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	<p>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.</p>
Import File	n/a	<p>Click <b>Choose File</b> to select the file.</p>

**Related Topics:**

- [Configuring Network Settings](#)

## Managing Audits

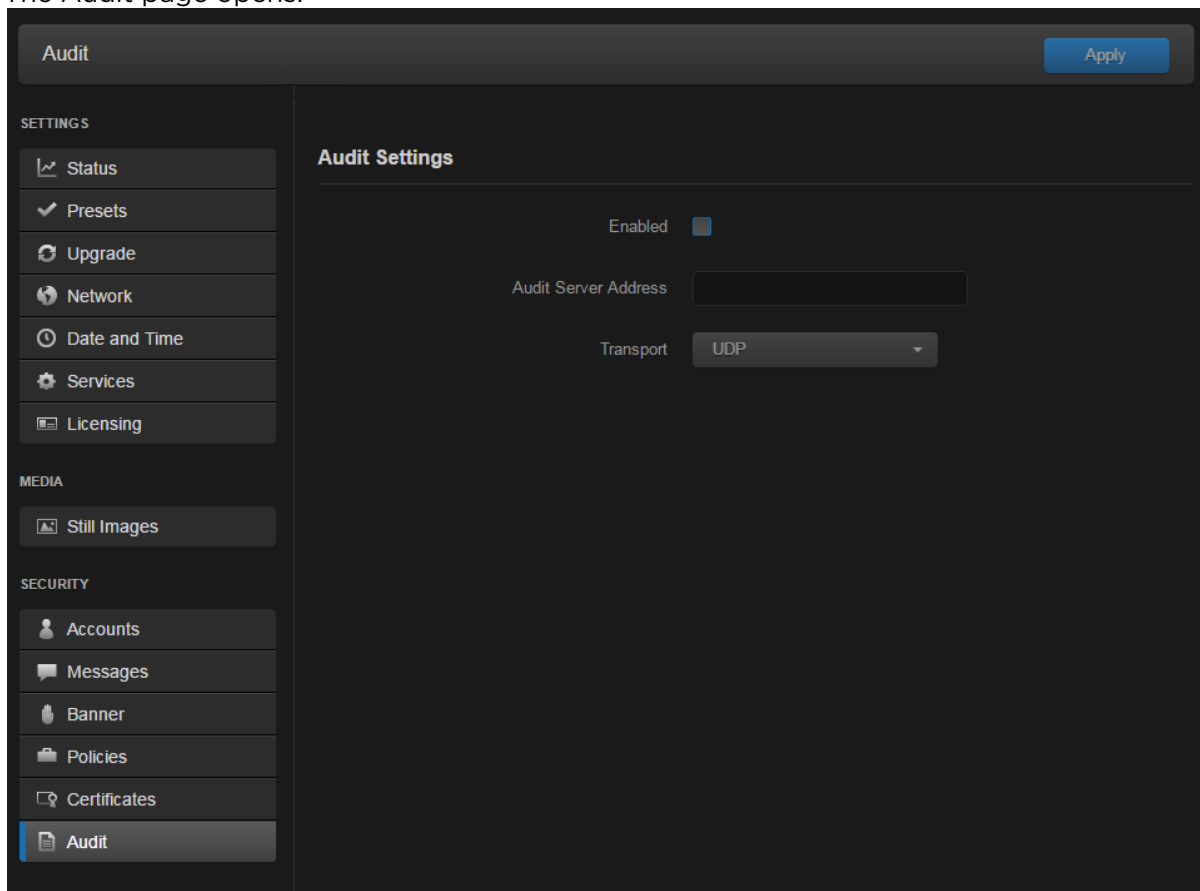
### Note

The Audits page is only accessible to administrators.

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

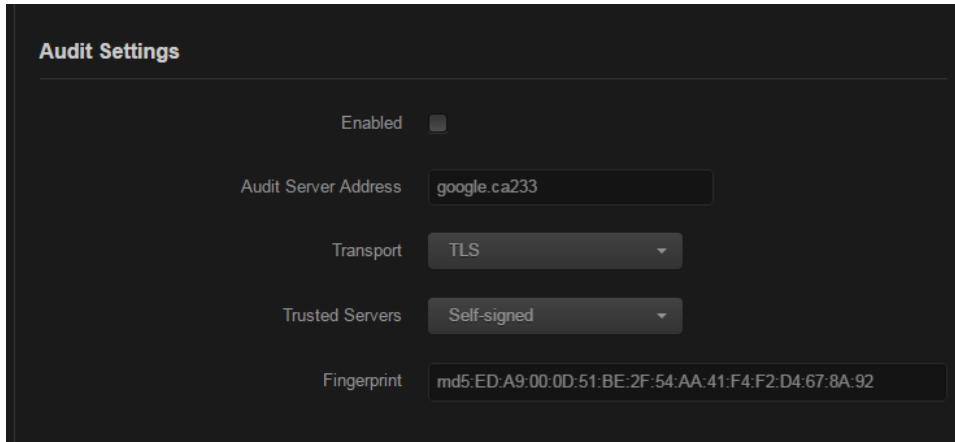
To configure an Audit server:

1. On the Administration page, click **Audit** on the sidebar. The Audit page opens.



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](#) for more details. The server address must be the Common Name or one of the Subject Alternative Names in the server's certificate for successful authentication if TLS and CA-signed trusted server is set.
4. Set the type of transport protocol that will be used to send the logs to the audit server. See details in [Audit Settings](#).
5. If TLS is selected as Transport, choose the type of audit server to be accepted as a trusted server: either All (no server authentication), CA-signed, or Self-signed. If Trusted Servers is set to CA-signed, the root-CA certificate of the audit server certificate chain must be imported in the decoder (see [Managing Certificates](#)) for the TLS connection to succeed.

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



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

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

## Audit Settings

The following table lists the Audit controls and settings:

Audit Setting	Default	Description/Values
Enable Audit	disabled	Check or clear this checkbox to enable or disable audits for the system.
Audit Server Address	n/a	Type in the address and port of the remote server, in one of the following formats: <ul style="list-style-type: none"> <li>fqdn[:port]</li> <li>ipv4_addr[:port]</li> <li>ipv6_addr[:port]</li> <li>hostname[:port]</li> </ul> If the port is not provided, the default port for the chosen Transport will be used:
Transport	UDP	Select the Transport Type from the drop-down list: <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	(TLS must be selected for Transport) Select the type of certificate exchange: <ul style="list-style-type: none"> <li>All: Server authentication is disabled. Any server that is set in the Audit Server Address field will be accepted as a trusted server, and the authentication step is skipped.</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>

Audit Setting	Default	Description/Values
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 Audit Server Address.</p>

# Using SNMP to Configure A/V Services

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

## Audience



### Tip

To develop new SNMP applications, see the list of [Supported MIBs](#).

## Topics in This Chapter

- [SNMP Overview](#)
- [Supported MIBs](#)
- [SNMP Agent Components](#)
- [SNMPv3](#)
- [SNMP Utilities](#)
- [SNMP Syntax for Setting Up Streams](#)

## SNMP 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 Version 5.5.2 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 IP networks.

## 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>• IPV6-MIB.txt</li> </ul>	RFC-2465	Management Information Base for IP Version 6.
<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.
<b>Encoder-specific</b>		
<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.

Decoder-specific		
<ul style="list-style-type: none"> <li>HAI-MAKITO-X-DEC-CAPS.txt</li> </ul>	Haivision Enterprise	This MIB formally specifies the capabilities of the Makito X Series (decoder) 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.

**Note**

You can download the MIBs directly from your Makito X under: `/usr/share/snmp/mibs/HAI-*.txt`

## SNMP Agent Components

This section presents key components used to set up SNMP management on the Makito X.

- `snmpd`
- `snmpd.conf`
- `snmpd.local.conf`
- `nmcfg`

### 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 Series device 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 a Makito X Series device, 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 Series 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` (readonly) 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 Series 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/netsnmp/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>
```

## SNMPv3

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

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

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

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

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

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

```
rwuser johndoe auth
```

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

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

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

```
group _operators_auth_ usm johndoe
```

## Examples

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

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

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

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

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

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

```
# snmpset -v3 -u johndoe -a SHA -A "password" -x AES -X "pass phrase" -l authPriv localhost  
haiAvtStreamEncapsulation.1 i directRtp HAI-AVT-STREAM-MIB::haiAvtStreamEncapsulation.1 = INTEGER:  
directRtp(1) #
```

## SNMP Utilities

The following table summarizes the SNMP commands which can be used to set values or request information from the MIB objects on the local host or on other SNMP agents reachable over the IP networks.

To do this...	Use this command...
To retrieve the value of an object from a network entity.	snmpget
To set information on a network entity.	snmpset
To retrieve management information from a network entity.	snmpstatus
<div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Note</b></p> <p>The retrieval of a complete subtree is referred to as “walking the MIB.”</p> </div>	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.

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

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` ).



## Examples

The following example, using `netsnmp` CLI commands on the Makito X decoder, creates a streaming session with IP Multicast Address `233.252.0.106` on port `2000`. The Stream ID `0` (`haiAvtStreamTable` index) is used to create a stream; this value will be set to the first available Stream ID ( $>=1$ ) on `createAndGo` or when set to active after `createAndWait`:

```
>snmpset -v2c -c admin localhost haiAvtStreamAddrType.0 = ipv4 haiAvtStreamAddr.0 d 233.252.0.106
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 AddrType = ipv4 Addr d 233.252.0.106 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.ipv4.4.233.252.0.106.2000
HAI-AVT-STREAM-MIB::haiAvtStreamInverseID.ipv4."233.252.0.106".2000 = HaiAvtStreamID: 5
```

To create a Stream with a known ID, the `haiAvtStreamNewID.0` object reports the next available Stream ID.

```
>snmpget -v2c -c admin localhost haiAvtStreamNewID.0
HAI-AVT-STREAM-MIB::haiAvtStreamNewID.0 = HaiAvtStreamID: 5

>snmpset -v2c -c admin -IS haiAvtStream -Is .5 localhost AddrType = ipv4 Addr d 233.252.0.106 Port u 2000
Encapsulation i tsUdp RowStatus i createAndGo
```

The stream just created is not started until it is attached to a decoder and its output. The System Inventory variable `haiHdcSysInvVideoDecs.0` can tell how many decoders are present.

The following commands verify how many decoders are present, link stream 5 to decoder 2, and start it.

```
>snmpget -v2c -c admin localhost haiHdcSysInvVideoDecs.0
HAI-HDC-MIB::haiHdcSysInvVideoDecs.0 = INTEGER: 2

>snmpset -v2c -c admin localhost haiHdcVideoDecStreamID.2 = 5 haiHdcVideoDecAdminStatus.2 = start
```

Finally the decoder output is routed to an audio/video output connector. The SDI outputs are normally hard-linked to their corresponding decoder. The decoder/output configuration is set in the `haiHdcVideoOutTable`. The analogAudio and hdmi output can be feed by any of the decoders present using the `haiHdcVideoOutSourceID` OID.

The commands below list the Video Output Table and feed the hdmi output with decoder 2.

```
>snmptable -v2c -c admin localhost haiHdcVideoOutTable
SNMP table: HAI-HDC-MIB::haiHdcVideoOutTable

haiHdcVideoOutName haiHdcVideoOutSourceID haiHdcVideoOutSourceName haiHdcVideoOutAudioLevel
AUDIO          1          Decoder 1          6 dBu
SDI 1          1          Decoder 1          ?
SDI 2          2          Decoder 2          ?
HDMI           1          Decoder 1          ?

>snmpset -v2c -c admin localhost haiHdcVideoOutSourceID.hdmi.1 = 2
HAI-HDC-MIB::haiHdcVideoOutSourceID.hdmi.1 = INTEGER: 2
```

# CLI Command Reference

Management via the CLI is possible through a telnet session or SSH. This alphabetical command reference lists and describes the available Command Line Interface (CLI) commands to configure and manage the Makito X decoder.

## Accessing the CLI

To access the decoder CLI:

1. Open a telnet session to the decoder (for the default encoder IP address, see [Accessing the Decoder Web Interface](#)).
2. At the login prompt, type the username and password (see [Role-based Authorization](#)).

## Syntax Conventions

The following syntax conventions are used in this appendix:

Convention	Description
Monospaced font	Indicates command names and options, filenames and code samples.
<i>italic font</i>	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 Access Control

The Makito X decoder CLI commands are divided in two main groups: operation and administration:

- **Operation Commands** are used to manage video decoding. 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.

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

[Operation Commands](#)   [Administration Commands](#)   [Access](#)   [Other/Utilities](#)

### Operation Commands

Command	Role			Description
	Admin	Operator	Guest	
<a href="#">auddec</a>	Yes	Yes	" get " only	Manage audio decoding settings.
<a href="#">hdmi</a>	Yes	Yes	" get " only	Manage decoder HDMI settings.
<a href="#">leds</a>	Yes	Yes	" get " only	Initiate blinking of the Status and RX LEDs on the Makito X faceplate in order to help locate the device.
<a href="#">mkstill</a>	Yes	Yes	No	Generate still images from a picture.
<a href="#">sap</a>	Yes	Yes	" get " only	Manage SAP settings.
<a href="#">still</a>	Yes	Yes	" list " only	Manage still image files on the Makito X file system.
<a href="#">stream</a>	Yes	Yes	" get " only	Create and manage streams to map decoder inputs to output interfaces.
<a href="#">talkback</a>	Yes	Yes	" get " only	Start and stop transmission of audio talkback and manage audio talkback settings.
<a href="#">temperature</a>	Yes	Yes	" get " only	Display the current temperature of the unit.
<a href="#">viddec</a>	Yes	Yes	" get " only	Manage video decoding for the SDI 1 and SDI 2 ports.

[Operation Commands](#)   [Administration Commands](#)   [Access](#)   [Other/Utilities](#)

## Administration Commands

Command	Role			Description
	Admin	Operator	Guest	
<b>Network and Management</b>				
<b>config</b>	Yes	Yes	" list " only	Manage configurations on the Makito X.
<b>date</b>	Yes	Yes	Yes	Display the current date.
<b>ethercfg</b>	Yes	No	No	View, manually control, and save the Ethernet configuration parameters.
<b>haiversion</b>	Yes	Yes	Yes	Display the Firmware Build ID, Build Time, and serial number for the Makito X.
<b>ipconfig</b>	Yes	No	No	Set and view the parameters that specify the networking context for the Makito X, including the IP settings, hostname, and DNS.
<b>license</b>	Yes	No	No	Manage licensed features.
<b>package</b> (for upgrade)	Yes	No	No	View and manage software packages, including firmware upgrades.
<b>passwd</b>	Yes	" operator " password only	" user " password only	Change the password for a user account.
<b>reboot</b>	Yes	No	No	Halt and restart the Makito X.
<b>service</b>	Yes	No	No	Enable and disable network services, including HTTP, passthrough, snmp, ssh, talkback, telnet, and vf.
<b>Security Commands</b>				
<b>account</b>	Yes	No	No	Manage user accounts for the decoder.
<b>audit</b>	Yes	No	No	Enable remote logging of security and administrative events and configure the remote audit ( syslog ) server connection.
<b>banner</b>	Yes	No	No	Manage the Advisory Notice and Consent Banner.
<b>certificate</b>	Yes	No	No	Manage TLS certificates for the Web interface HTTPS server and the secured TLS connection to the remote audit server.
<b>messages</b>	Yes	No	No	View and manage administrative login messages.
<b>policy</b>	Yes	No	No	Manage security policy settings.

---

pubkey	Yes	Yes	Yes	Manage the user's own authorized SSH public keys.
--------	-----	-----	-----	---

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## Access

Command	Role		
	Admin	Operator	Guest
Web access	Yes	Yes	Yes
Telnet to/from decoder	Yes	Yes	Yes

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## Other Commands and Utilities

Command	Role			Description
	Admin	Operator	Guest	
iperf	Yes	Yes	Yes	Measure and tune network performance.
ping	Yes	Yes	Yes	Send packets to network hosts to test a network connection.
tcpdump	Yes	—	—	Display TCP/IP and other packets being transmitted or received over a network interface.
tracert	Yes	Yes	Yes	Display the route (path) and measure transit delays of packets across an IP network.

For an overview of system access control on the Makito X decoder, see [Role-based Authorization](#).

## Operation Commands

- `auddec`
- `hdmi`
- `leds`
- `mkstill`
- `sap`
- `still`
- `stream`
- `talkback`
- `temperature`
- `viddec`



## auddec

The `auddec` command is used to manage audio decoding settings. This includes binding the analog audio output to either the SDI 1 or SDI 2 video decoder. You can also configure audio settings such as the Audio Level and view the Audio Sampling Rate.

**Note**

When the decoder is licensed for one channel only, it mirrors the decoded stream to all interfaces and supports up to eight (8) channel pairs of AAL-LC audio decoding for a stream.

## Synopsis

```
auddec set parameter=value [parameter=value ...]
auddec get
```

## Actions

Action	Description
set	Modifies decoder analog audio parameter(s). A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">Parameters</a> below.
get	Displays decoder analog audio status information.

## Parameters

Parameter	Default	Description/Values
source	SDI1CH12	The input source for analog audio, either SDI 1 or SDI 2: <ul style="list-style-type: none"> <li>SDI1CH12, SDI1CH34, SDI1CH56, SDI1CH78</li> <li>SDI2CH12, SDI2CH34, SDI2CH56, SDI2CH78</li> </ul>
level	6	The maximum analog audio output level in dBu (decibels unloaded), from +5dBu to +20dBu.

## Examples

```
# auddec get all
```

Returns audio configuration information for the decoder, such as:

```
Audio Analog Configuration:
Output Source      : SDI1Ch1+2
Output Level      : 6 dBu
```

```
# auddec set level="6"
```

Sets the audio level to 6. You will receive the following confirmation:

```
Decoder analog configured successfully.
```

## Related Topics

- [Configuring the Analog Audio Output](#)

## hdmi

The `hdmi` command is used to manage decoder HDMI settings.

### Note

The HDMI port can be configured to mirror the same content that is seen on either Decoder 1 or Decoder 2. If the stream contains computer graphics content, that content can only be displayed on the HDMI interface. By default, HDMI displays the SDI 1 content, so you only need to change the HDMI setting to monitor the SDI 2 channel.

## Synopsis

```
hdmi set parameter=value [parameter=value ...]
hdmi get
```

## Actions

Action	Description
set	Configures HDMI settings. A series of one or more parameter=value pairs can be specified at once. See <a href="#">Parameters</a> below.
get	Displays HDMI status information.

## Parameters

Parameter	Default	Description/Values
videoSource	Decoder1	None, Decoder1, Decoder2.
audioSource	Chan12	Chan12, Chan34, Chan56, Chan78
surroundSound	no	yes, no

## Example

```
# hdmi get

Displays the current HDMI configuration and status.
Decoder Hdmi Information:
Video Source      : Decoder1
Audio Source      : Chan1+2
Surround Sound    : No
Decoder 1 State   : Running
Current Resolution : 1280x720 Progressive
Current FrameRate : 60
```

## Related Topics

- [Configuring the HDMI Display](#)



## leds

The `leds` command may be used to help locate a Makito X by initiating blinking of the Status and TX or RX LEDs on the Makito X face-plate. This allows easy location of the device in large server room deployments, for example, to help identify a specific blade in a rack.

### Synopsis

```
leds get
leds start [duration=15]
leds stop
```

### Actions

Action	Description
start	Initiates blinking of the Status and TX or RX LEDs on the Makito X Encoder or Decoder face-plate.
stop	Cancels blinking of the Status and TX or RX LEDs on the Makito X Encoder or Decoder face-plate.
get	Displays LED status information for the Makito X.

### Parameters

Parameter	Default	Description/Values
duration	n/a	The blinking duration can be set from 1 to 60 minutes. If no duration is set, blinking will last for 15 minutes.

### Examples

```
# leds start duration=2
```

Initiates blinking of the Status and TX or RX LEDs, provides the following confirmation:  
LEDs set to blink for 2 minutes.

```
# leds get
```

- Displays current LED status (Makito X Encoder, blinking initiated above):  
LED States:  
Status LED : Green-Blinking  
TX1 LED : Green-Blinking  
TX2 LED : Green-Blinking  
Blinking will stop in 1m50s
- Displays current LED status (Makito X Decoder, LEDs not blinking):  
LED States:  
Status LED : Green  
RX1 LED : Green  
RX2 LED : Green

```
# leds stop
```

Cancels blinking of the LEDs.  
LEDs no longer blinking.

## Related Topics

- [Viewing System Status Information](#)

## mkstill

The `mkstill` command is used to generate still images from a picture. The static image will be displayed when the decoder is not receiving a video stream.

### 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`.

## Synopsis

```
mkstill <infile> resolution [-f]
```

where:

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

## Parameters

Name	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> <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>
-f		Forces overwrite of the still image at the destination.

## Example

```
# mkstill myimage.jpg resolution=1080
```

Converts the image file `myimage.jpg` into a 1920x1080 still image.

## Related Topics

- [still](#)
- [Configuring Still Image Streaming](#)

## sap

### Note

To display the list of advertised sessions, use the `stream get all` command. See [stream](#).


## Synopsis

```
sap get
sap enable
sap disable
sap start
sap stop
sap set
```

## Actions

Action	Description
get	Displays SAP configuration information.
enable	Enables the SAP service and starts listening for session advertisements.
disable	Disables the SAP service, stopping the listening for session advertisements and deleting any discovered streams.
start	Starts listening for SAP advertisements; service must be enabled.
stop	Stops listening for SAP advertisements and deletes any discovered streams.
set	Configures SAP settings. See <a href="#">Parameters</a> below. A series of one or more <code>parameter=value</code> pairs can be specified at once.

## Parameters

Parameter	Default	Description/Values
address	n/a	<p>The multicast IPv4 address to listen on for IPv4 session announcements.</p> <p>Use <code>0.0.0.0</code> to listen on the standard IPv4 scoped address.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b> Important</b></p> <p>For IPv4, the decoder listens for SAP on three different addresses when automatic is selected:</p> <ul style="list-style-type: none"> <li>• 224.2.127.254 (IPv4 global scope announcement multicast address)</li> <li>• 239.255.255.255 (IPv4 local scope announcement multicast address)</li> <li>• 239.195.255.255 (IPv4 organization local scope announcement multicast address)</li> </ul> <p>The standard IP addresses and ports for multicast SAP announcements are defined in RFC 2974.</p> </div>



Parameter	Default	Description/Values
v6address		<p>The multicast IPv6 address to listen on for IPv6 session announcements.</p> <p>Use <code>::</code> to listen on the standard IPv6 scoped addresses.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>! Important</b></p> <p>For IPv6, the decoder listens to <code>FF0X::2:7FFE</code> where X is the 4-bit scope value.</p> </div>
port	n/a	The UDP port to listen on for SAP messages.

## Examples

```
# sap get

Returns sap configuration information for the decoder, such as:
Configuration:
Address          : 224.2.127.254
UDP Port         : 9875

# sap enable v6address=::

Returns the following confirmation:
SAP enabled successfully.
```

## Related Topics

- [Enabling and Disabling Network Services](#)
- [Configuring the SDI Decoder Output](#)

## still

The `still` command is used to manage available still image files on the Makito X file system.

Static image files must already have been generated (see following NOTE) and be located the folder `/usr/share/haivision/still_images` on the Makito X file system.

### **Note**

You can generate the image file either using the `mkstill` command, or from the Web interface (see [Configuring Still Image Streaming](#)).

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 `viddec set` command with the parameters `[stillimage=custom]` and `[stillFile=]`.

## Synopsis

```
still list
still delete <filename>
still delete all
```

## Actions

Action	Description
list	Lists the available still image files in <code>/usr/share/haivision/still_images</code>
delete	Deletes the specified still image file or all still image files.

## Example

```
# still delete myimage.png
Deletes the image file myimage.png
```

## Related Topics

- [mkstill](#)
- stillImage under [viddec](#) Parameters

## stream

The stream command is used to create and manage streams to map the decoder inputs to output interfaces.

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. The IP Address (addr field) is only required for multicast, but not for unicast streams.

Most commands will accept the stream id or name in order select the proper stream to manage.

Starting with v2.3, once a stream is connected to the decoder (using viddec), you can start/stop the decoder by way of the stream ID (e.g., "stream 1 start"). Previously you could only start/stop the decoder using viddec.

## Synopsis

```
stream create port=udpport [addr=ipaddr] [id=number] [name=text]
  [encapsulation=ts-udp | ts-rtp | ts-srt | ts-rtsp]
  [sourceaddr=mcastsenderaddr]
stream id/name delete
stream id/name start
stream id/name stop
stream id/name/all get [config | stats | all]
stream all get table
stream id/name clear
```

## Possible Encapsulation Formats

```
ts-rtp: MPEG2 transport stream over RTP
  [fec=yes,no]
ts-udp: MPEG2 transport stream over UDP (no RTP header)
  [fec=yes,no]
ts-srt: MPEG2 transport stream over SRT (Secure Reliable Transport)
  [latency=number] [passphrase=text] [rejectunencrypted=yes,no]
  [mode=listener | caller | rendezvous] [sourceport=udpport]
  [flipaddr=ipaddr] [flipport=udpport] [flipttl=ipttl] [fliptos=iptos]
rtsp: Real-time Transport Protocol (RFC3984) with control through RTSP (RFC2326).
  For rtsp streams, you can specify the address as
  addr=rtsp://user:password@ip.add.re.ss/path?var=value&var2=value2...
```

## Actions

Action	Description
create	Creates a decoder streaming session. A series of one or more <code>parameter=value</code> pairs can be specified at once.
delete	Deletes the specified stream.
start	<p><b>Note</b></p> <p>If the stream is already active, <code>start</code> will stop and then restart the stream.</p>
stop	Stops the stream and its associated decoder.
get	<p>Displays stream information. See <a href="#">Parameters</a> below. You can specify to display the stream configuration, statistics, or all. <code>stream all get table</code> displays a summary of all the streams in a table format.</p> <p><b>Note</b></p> <p>If <code>sap</code> is enabled, <code>stream get all</code> displays the list of advertised sessions. See <a href="#">sap</a>.</p>
clear	Clears the stream's statistics.
help	Displays usage information for the <code>stream</code> command.

## Parameters

Parameter	Default	Description/Values
port	n/a	The UDP port for the Decoder. Enter a number in the range <code>1025..65,535</code> . Note that RTP streams use even numbers only within this range.
addr	n/a	<p>(Optional, only required for multicast) Enter a Multicast IP address in dotted-decimal format.</p> <p><b>Note</b></p> <p>The Multicast address range is from <code>224.0.0.0</code> to <code>239.255.255.255</code>. Multicast addresses from <code>224.0.0.0</code> to <code>224.0.0.255</code> 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 (<code>239.192.0.0/14</code>).</p>
<b>Optional stream Parameters</b>		

id	n/a	<p><b>Note</b></p> <p>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.</p> <p>Most commands will accept the stream id or name (see below) in order to select the proper stream to manage.</p>
name	n/a	(Optional) When creating a stream, you can also specify a name for the stream. <code>1</code> to <code>32</code> characters
encapsulation	ts-rtsp	<p>(Optional) The Encapsulation Type for the stream.</p> <ul style="list-style-type: none"> <li><code>ts-rtsp</code> - MPEG2 transport stream over RTP</li> <li><code>ts-udp</code> - MPEG2 transport stream over UDP (no RTP header)</li> <li><code>ts-srt</code> - MPEG2 transport stream over SRT (Secure Reliable Transport)</li> </ul> <p><b>Note</b></p> <p>RTSP stream ingest is supported to provide interoperability with Makito Classic Encoders and Axis Cameras/Encoders.</p>
sourceaddr	n/a	(Multicast streams only) Enter the multicast sender IP address in dotted-decimal format (i.e., what address is broadcasting). See "Source Address" under <a href="#">Stream Settings</a> .
<b>ts-rtsp and ts-udp only</b>		
FEC	None	<p>(Optional) To enable Forward Error Correction (FEC), specify <code>fec=yes</code>.</p> <p>FEC varies with the protocol (encapsulation):</p> <ul style="list-style-type: none"> <li>TS over UDP = VF FEC</li> <li>TS over RTP = Pro-MPEG FEC</li> </ul> <p>NOTE: VF FEC is a proprietary FEC and is not interoperable with devices outside of the Haivision family.</p> <p>The FEC level is read from the encoded stream.</p>
<b>ts-srt only</b>		
latency	125	Specifies how long the decoder will buffer received packets, from 20-8000 ms. See "Latency" under <a href="#">SRT Stream Settings</a> .
passphrase	n/a	(Optional) A sequence of words or other text used to control access to the stream. Similar to a password in usage, but is generally longer for added security. This parameter is required if the stream is encrypted and is used to retrieve the cryptographic key protecting the stream. From 10-79 characters.
rejectunencrypted	yes	(Listener Connection mode only) For security reasons, when encryption is enabled in the decoder's SRT Listener stream configuration, this option causes the decoder to reject all unencrypted SRT Caller streams.
mode	listener	<p>Specifies the SRT Connection Mode (to simplify firewall traversal):</p> <ul style="list-style-type: none"> <li><code>caller</code> : The SRT stream acts like a client and connects to a server listening and waiting for an incoming call.</li> <li><code>listener</code> : The SRT stream acts like a server and listens and waits for clients to connect to it.</li> <li><code>rendezvous</code> : Allows calling and listening at the same time. Also, to simplify firewall traversal, Rendezvous Mode allows the encoder and decoder to traverse a firewall without the need for IT to open a port.</li> </ul>
<b>SRT to UDP Stream Conversion (ts-srt only)</b>		

---

flipaddr	n/a	Specifies the destination IP address for the stream. See “SRT to UDP Stream Conversion (TS over SRT only)” under <a href="#">SRT Stream Settings</a> .
flipport	n/a	Specifies the UDP source port for the stream.

flipttl	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
fliptos	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)

## stream Examples

```
# stream create addr=10.6.230.106 port=2000 name=infodev
```

Creates a streaming session from IP Address 10.6.230.106 at port 2000. Returns a confirmation such as:  
Stream created successfully - ID: 1.

```
# stream create encap=rtsp addr="rtsp://10.66.131.64/high"
```

Creates an RTSP stream.

```
# stream 1 start
```

Starts the decoder by way of the stream ID. Returns a confirmation such as:  
Stream started successfully.

### Note

The stream must already be created and configured with a decoder (e.g., `viddec 1 set stream=1`).

```
# stream 1 get all
```

Returns configuration information for decoder stream #1, such as:

```
Stream ID      : 1
Name          : (None)
Configuration:
Address       : 236.65.140.44
UDP Port     : 4440
Encapsulation : TS-UDP
```

Statistics:

```
State         : STREAMING
Output        : DECODER-2
Up Time       : 2d4h38m22s
Bitrate       : 6,195 kbps
Received Packets : 20,236,609
Received Bytes  : 1,313,514,014
Received Errors : 0
Last Received  : 0s ago
Stream PCR    : 0x1f89765ca
MPEG2TS Lost Packets : 4
Corrupted Frames : 2
Pauses        : 0
Source Address : fd00:10:65:132:5e77:57ff:fe00:ae6a
```

```
# stream 10 get all
```

Returns configuration information for decoder stream #10, where it is an SAP Discovered stream:

```
Stream ID      : 10
Name          : "DVI42"
Configuration:
  Address      : 239.146.42.101 (SAP Discovered)
  UDP Port    : 4900
  Encapsulation : TS-UDP
```

Statistics:

```
State         : STOPPED
Output        : Not Configured
Bitrate       : 0 kbps
Received Packets : 0
Received Bytes  : 0
Received Errors : 0
```

```
# stream 1 get stats
```

Returns status information for decoder stream #1, such as:

```
Stream ID      : 1
Name          : (None)
Statistics:
  State        : Streaming
  Output       : DECODER-1
  Up Time      : 2d4h42m4s
  Bitrate      : 6,149 kbps
  Received Packets : 20,260,289
  Received Bytes  : 1,479,361,480
  Received Errors : 0
  Last Received  : 0s ago
  Stream PCR    : 0x1f9c7ab31
  MPEG2TS Lost Packets : 4
  Corrupted Frames : 2
  Pauses       : 0
  Source Address : fd00:10:65:132:5e77:57ff:fe00:ae6a
```

```
# stream 1 delete
```

Deletes Stream #1.

## Related Topics

- [Setting Up Decoder Streams](#)
- [Stream Statistics](#)



## talkback

The `talkback` command is used to start and stop transmission of audio talkback and manage audio talkback settings.

### Synopsis

```
talkback ID start [timeout=C(in secs)]
talkback stop
talkback set
talkback get
talkback clear
```

### Actions

Action	Description
start	Starts transmission of talkback audio for the specified decoder (1 or 2). Time is specified in seconds (default is 30 seconds). <code>timeout=0</code> means infinity
stop	Stops transmission of talkback audio.
set	Configures talkback settings. A series of one or more <code>parameter=value</code> pairs can be specified at once.
get	Displays talkback information (i.e., the UDP port). You can specify configuration, stats, or all talkback information.
clear	Clears talkback statistics.

### Parameters

Parameter	Default	Description/Values
port	9177	UDP port on which to send for talkback audio packets. Should match the encoder's output port.

### talkback Examples

```
# talkback 1 start
Starts transmission of audio talkback on decoder #1. If not specified, the duration is 30 seconds (default).
Returns the following:
Talkback started successfully.

# talkback get
Returns the following audio talkback configuration:
UDP Port           : 9233
```

```
# talkback get all
```

Returns talkback configuration and statistics, such as:

Configuration:

```
UDP Port          : 9233
```

Statistics:

```
State             : STOPPED
Transmitted Packets : 2,823
Transmitted Bytes  : 2,484,240
Last Transmitted   : 1s ago
Last Decoder ID    : 1
Destination Address : 10.65.10.124
Last Tx Time Length : 30 (Secs)
Received Packets   : 2,823
Received Bytes     : 2,484,240
```

```
# talkback 1 start timeout=60
```

Starts transmission of audio talkback on decoder #1 for 60 seconds.

Returns the following:

```
Property "timeout=60" set successfully.
Talkback started successfully.
```

```
# talkback 2 start timeout=0
```

Starts transmission of audio talkback on decoder #2 with not auto shut-off.

```
# talkback get all
```

Returns talkback configuration and statistics, such as:

Configuration:

```
UDP Port          : 9233
```

Statistics:

```
State             : TRANSMITTING
Transmitted Packets : 3,027
Transmitted Bytes  : 2,663,760
Last Transmitted   : 0s ago
Last Decoder ID    : 1
Destination Address : 10.65.10.124
Last Tx Time Length : 60 (Secs)
Received Packets   : 3,027
Received Bytes     : 2,663,760
```

```
# talkback set port=9233
```

Sets the UDP port to **9233**.

## Related Topics

- [Audio Talkback](#)
- [service](#)
- For "Talkback Audio Format Specifications", please refer to the *Makito X User's Guide*.

## temperature

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.

### Synopsis

```
temperature get
```

### Actions

Action	Description
get	Displays the current temperature status of the unit.

### Parameters

N/A

### 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
```

## viddec

The `viddec` command is used to manage video decoding for the SDI 1 and SDI 2 ports. This includes binding the video outputs to the streams and configuring properties such as the Output Resolution and Frame Rate.

Each decoder channel can support an alternate (secondary) stream as input which is switched to if the primary fails in order to minimize down-time. You can also select a Still Image such as a black screen that the decoder will display if it is no longer receiving video (for example, if the encoder stream has stopped or the network connection is lost).

## Synopsis

```
viddec ID start
viddec ID stop
viddec ID set parameter=value [parameter=value ...]
viddec ID get [config, stats, all]
viddec ID clear
```

## Actions

Action	Description
start	Activates decoding of the video input.
stop	Stops (mutes) decoding of the video input.
set	Modifies decoder video parameter(s). A series of one or more <code>parameter=value</code> pairs can be specified at once. See <a href="#">Parameters</a> below.
get	Displays decoder video status information. You can specify to display the configuration ( <code>config</code> ), <code>stats</code> , or <code>all</code> .
clear	Clears the decoder's statistics.
help	Displays usage information for the <code>viddec</code> command.

## Parameters

Parameter	Default	Description/Values
streamId	n/a	Specifies the primary stream to bind to the video output. Positive stream index. See <a href="#">Configuring Decoder Outputs</a> .
altStreamId	n/a	Specifies the alternative stream to bind to the video output. Positive stream index. See <a href="#">Configuring Decoder Outputs</a> .

Parameter	Default	Description/Values
frameRate	Auto	<p>The output frame rate for the displays. Auto, 23, 24, 25, 29, 30, 50, 59, 60, 75</p> <p>If Auto is selected, the actual frame rate generated will be the next highest valid frame rate supported by the SDI interface, plus the one that gives the best decimation factor. For example, 30Hz could be chosen instead of 29.970 Hz. Values set which are impossible to implement will be treated as Auto. Reasons for not supporting the selection can range from "Display does not support the frame rate" or "Frame rate is undefined for the detected input resolution".</p>
stillImage	freeze	<p>The type of static image to display when the decoder is not receiving a video stream.</p> <ul style="list-style-type: none"> <li>freeze: continues to display the last decoded video frame.</li> <li>black: displays a black screen.</li> <li>blue: displays a blue screen.</li> <li>bars: displays a series of vertical color bars across the width of the display.</li> <li>mute: disables the video output.</li> <li>custom: displays a custom static image. See <a href="#">mkstill</a>.</li> </ul> <p>NOTE: When the still image is substituted on the display outputs, the video frame rate and resolution will be maintained. When the video decoder receives a new video stream, it will wait until it receives a new IDR frame and will re-start the display with that IDR frame.</p>
stillDelay	3	<p>The delay in seconds before the still image is displayed.</p> <p>1...1000</p>
stillFile	n/a	<p>File name of custom still image.</p>
resolution	n/a	<p>The output resolution:</p> <ul style="list-style-type: none"> <li>Auto: The decoder will select an output resolution that attempts to closely match the coded picture resolution, taking into account the capabilities of any displays connected to the HDMI interface.</li> <li>Native: The output resolution will be exactly the same as the coded picture resolution. If the coded picture resolution is not compatible with the output interfaces, nothing will be displayed. See "Output Resolution" in <a href="#">SDI Decoder Settings</a>.</li> <li>1080p, 720p, 1080i, 480i, 576i, 480p, 576p, Xga, Sxga, Vga, Svga, 1152x864p, 1280x768p, 1280x800p, 1360x768p, 1366x768p, 1400x1050p, 1440x900p, 1600x900p, 1600x1200p, 1680x1050p, 1920x1200p</li> </ul>

Parameter	Default	Description/Values
syncmode	stc	<p>The mode of synchronization of sound and picture for the decoded stream:</p> <ul style="list-style-type: none"> <li>• <code>stc</code> : Synchronizes with the encoder system clock by comparing the packet timestamp with the reference clock.</li> <li>• <code>passthrough</code> : Decodes packets without comparing the packet timestamp to synchronize video and audio. This may result in A/V sync issues, but may be required in circumstances where network performance hinders synchronization. See <a href="#">Video Decoder Buffering Passthrough</a>.</li> </ul>
buffering	automatic	<p>(<code>syncmode</code> must be <code>stc</code> ) The type of buffering to use. A jitter buffer temporarily stores arriving packets in order to remove the effects of jitter from the decoded stream.</p> <ul style="list-style-type: none"> <li>• <code>Automatic</code> : Automatic mode favors smooth playing content with good synchronization between audio and video. The incoming stream is monitored and the optimal required delay is determined so that stream packet and video picture jitter is absorbed. The calculated delay may change slowly as network and video conditions change. See "Mode" in <a href="#">SDI Decoder Settings</a>.</li> <li>• <code>Fixed</code> : Fixed mode allows users to specify a delay to be added to the decode pipeline after the content is decoded. The amount of delay does not vary and artifacts may result if a too low value is used.</li> </ul> <div style="border: 1px solid #f0e68c; padding: 5px; margin: 5px 0;"> <p><b>Note</b></p> <p>The decoder has a minimum buffer set based on the resolution and frame-rate of the stream content. In addition, users can add more delay if desired: (1) to achieve a specific decoding latency for inter-channel synchronization purposes; (2) to deal with unusually large amounts of jitter in the stream; or (3) to allow A/V sync to occur when the stream content is highly out of sync. (See <code>delay</code> below.)</p> </div> <ul style="list-style-type: none"> <li>• <code>Adaptive (Low-Latency)</code> : The decoder measures the stream packet and video picture jitter and adds in a delay so that artifacts are minimized while also minimizing video latency. Provides backward compatibility with older decoder versions.</li> </ul> <div style="border: 1px solid #f0e68c; padding: 5px; margin: 5px 0;"> <p><b>Note</b></p> <p>Audio artifacts may occur if audio is streamed after video when using Adaptive Low Latency.</p> </div> <ul style="list-style-type: none"> <li>• <code>multisync</code>: Use to synchronize the content across multiple channels to within one frame period. This is designed to allow down-stream equipment to switch smoothly between video and audio sources . You need to set the <a href="#">MultiSync Delay</a> on all of the decoder channels to the same value. See <a href="#">Multi-channel Synchronization</a> for the steps to configure multi-channel sync on the Makito X encoder and decoder.</li> </ul>

Parameter	Default	Description/Values
delay	0 ms	<p>The delay in ms when using stc <b>syncmode</b> with <b>fixed buffering</b>. 0..2000 ms</p> <div style="border: 1px solid #f9e79f; padding: 5px;"> <p><b>Note</b></p> <p>The maximum delay is 2000 ms. If for any reason the system requires more than this value to play smoothly, video or audio artifacts will be noticed.</p> </div>
multiSyncDelay	1000 ms	<p>The delay in ms required to ensure that two or more decoder channels are synchronized when using stc <b>syncmode</b> and multisync <b>buffering</b> . 0...10000 ms</p> <div style="border: 1px solid #f9e79f; padding: 5px;"> <p><b>Note</b></p> <p>The difference in the values between the decoders cannot exceed 2000 ms.</p> </div>



## viddec Examples

```
# viddec 1 get all
```

Returns video configuration information and statistics for decoder #1, such as:

```
Decoder ID           : 1

Configuration:
Stream ID           : 1
Alternative Stream ID : (None)
State               : STARTED
Resolution          : Auto
Frame Rate          : Auto
Still Image         : Freeze
Still Delay         : 3 (s)
Sync Mode           : Stc
Buffering           : Automatic

Statistics:
State               : Running
Active Stream ID    : 1
Hdmi Output         : Yes
Up Time             : 0 days 21 hours 33 minutes 17 seconds
Number of Restarts  : 0
Audio vs Video delay : ~ 37 ms (Video late)

Video:
Algorithm           : H.264
Profile             : Main
Level               : 4.0
State               : Running
Sync Mode           : Stc
Buffering           : Automatic
Buffering Delay     : 330 ms
Input Format         : 1920x1080 Interlaced
Output Format        : 1080i29
Still Image         : Freeze (Not Active) [Count=0]
Bitrate             : 6,034 kbps
Framerate           : 29.97
Decoded Frames      : 2,325,501 (100.00%)
Discarded Frames    : 0 (0.00%)
Displayed Frames    : 2,325,443 (100.00%)
Skipped Frames      : 7 (0.00%) last one at 2019-01-17 13:40:31.322
Replayed Frames     : 19 (0.00%) last one at 2019-01-17 13:40:31.222

Audio:
Algorithm           : AACLC/ADTS
Implementation      : Software
State               : Running
Bitrate             : 128 kbps
Sample Rate         : 48 kHz
Number of Pairs     : 1
Audio1 Input Layout : 2.0 (FrontL FrontR)
Audio Output Layout : 2.0 (FrontL FrontR)
Decoded Frames      : 3,637,340 (100.00%)
Output Frames       : 3,637,197 (100.00%)
Skipped Frames      : 143 (0.00%)

KLV: Not Present

CC: Not Present

TC: Not Present
```

AFD: Not Present

```
# viddec 1 set stillimage=blue
```

Sets the static image to blue. You will receive the following confirmation:

Decoder configured successfully.

```
# viddec 1 get stats
```

Returns video configuration statistics for decoder #1, such as:

```
Decoder ID          : 1
```

Statistics:

```
State              : Running
Active Stream ID   : 3
Hdmi Output        : Yes
Up Time            : 1 days 0 hours 32 minutes 0 seconds
Number of Restarts : 0
Audio vs Video delay : ~ 39 ms (Video late)
```

Video:

```
Algorithm          : H.264
Profile            : Baseline
Level              : 4.2
State              : Running
Sync Mode          : Stc
Buffering          : Automatic
Buffering Delay    : 440 ms
Input Format        : 1920x1080 Progressive
Output Format       : 1080p59
Still Image        : Colorbars (Not Active) [Count=0]
Bitrate            : 7,882 kbps
Framerate          : 59.94
Decoded Frames     : 5,291,184 (99.99%)
Discarded Frames   : 302 (0.01%)
Displayed Frames   : 5,286,432 (99.84%)
Skipped Frames    : 4,560 (0.09%) last one at 2019-01-18 10:02:14.888
Replayed Frames   : 3,701 (0.07%) last one at 2019-01-18 10:02:14.857
```

Audio:

```
Algorithm          : AACLC/ADTS
Implementation     : Software
State              : Running
Bitrate            : 128 kbps
Sample Rate        : 48 kHz
Number of Pairs    : 1
Audiol Input Layout : 2.0 (FrontL FrontR)
Audio Output Layout : 2.0 (FrontL FrontR)
Decoded Frames     : 4,139,042 (100.00%)
Output Frames      : 4,139,009 (100.00%)
Skipped Frames     : 33 (0.00%)
```

KLV: Not Present

CC: Not Present

TC: Not Present

AFD: Not Present

 **Tip**

The stream type is automatically determined on decoder startup. The `viddec` Video Algorithm statistic shows which codec algorithm (H.264 or HEVC) is in use for a decode channel.

## Video Decoder Buffering Passthrough

Passthrough is a special mode that instructs the decoder to bypass its internal jitter buffer and output video/audio as data becomes available to play (while maintaining AV sync). Normally, the decoder will adapt to the detected network jitter to preserve smooth play of the video. Passthrough mode is intended for use within QoS-enabled enterprise class networks that have well controlled network jitter.

The advantage of this mode is a perceptible reduced latency.

The side effect of passthrough is that, occasionally, even the most pristine networks may have issues that, when passthrough mode is enabled, are more likely to cause the decoder to drop or replay a video frame.

### Related Topics

- [Configuring Decoder Outputs](#)
- [SDI Decoder Statistics](#)

## Network and Management Commands

- `config`
- `date`
- `ethercfg`
- `haiversion`
- `ipconfig`
- `ipv6config`
- `license`
- `nmcfg`
- `package`
- `passwd`
- `pubkey`
- `reboot`
- `service`

## config

The `config` command is used to manage configurations on the Makito X decoder. This includes saving the current configuration, loading a saved configuration, and specifying the configuration file to load at startup.

All configuration files are stored in `/usr/share/haivision/config`.

### **Note**

This is equivalent to saving and loading Presets in the Web interface. See [Saving and Loading Presets](#).

## Synopsis

```
config save [cfgname] [startup=yes,no]
config load [cfgname]
config delete [cfgname/all]
config list
```

## Actions

Action	Description
save	Saves the current configuration. Saves every parameter in the system, including decoder settings and stream destination and status (excluding the system IP address). All configuration files are stored in <code>/usr/share/haivision/config</code> . See NOTE regarding <code>cfgname</code> .
load	Loads a previously saved configuration identified by <code>&lt;cfgname&gt;</code> . Reassigns every parameter in the system, including decoder settings and stream destination and status (excluding the system IP address).
delete	Deletes a previously saved configuration identified by <code>&lt;cfgname&gt;</code> . If no filename is specified, the system deletes the default configuration ( <code>haistartupcfg.ini</code> ).
list	Displays a list of the available configuration files.
help	Displays usage information for the <code>config</code> command.

## Examples

```
# config save Class200 startup=yes
```

Saves the current configuration under the name "Class200" and sets it to be the startup configuration.

```
# config load Class200
```

Loads a previously saved configuration identified by the name "Class200" (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](#)

## date

The `date` command is used to display the current date and time.

### Synopsis

```
date
```

### Actions

N/A

### Parameters

N/A

### Example

```
# date  
Displays the current date, e.g.:  
Tue Jun 9 17:04:18 EDT 2020
```

### Related Topics

- [Configuring Date and Time](#)

## ethtool

The `ethtool` command is used to view, manually control, and save the Ethernet configuration parameters. When the Makito X decoder 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.

```
# ethtool
Speed : 1000Mbps
Duplex : Full
Auto-Negotiation : On
Advertised Mode : All
Link Detected : Yes
Ceiling : 100Mbit
```

## Synopsis

```
ethtool [-a on|off] [-s 10|100|1000] [-d half|full] [-c bandwidth] [-w yes|no]
```

## Options

Name	Type	Description
-a	--autoneg	Enables or disables autonegotiation.
-s	--speed	If autonegotiation is disabled, sets the speed. If autonegotiation is enabled, this will be the only advertised supported speed.
-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).

**Example**

```
# ethercfg -s 100

Sets the line speed to 100 Mbps (which modifies the advertised mode, see following example).
# 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](#)

## haiversion

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

### Synopsis

```
haiversion
```

### Example

```
# haiversion

Displays the Serial Number, Firmware Version and Date for the unit, such as:
Card Type           : "Makito2 Decoder"
Part Number         : B-292D-HD2
Serial Number       : HAI-031325030002
MAC Address         : 5c:77:57:00:42:b2
Firmware Version    : 2.0.0-85
Firmware Date       : "Jun 8 2017"
Firmware Time       : "14:42:19"
Firmware Options    : "SRT"
Hardware Version     : --
Hardware Compatibility : -001G
CPLD Version        : 5 (Official, Internal flash)
Boot Version        : "U-Boot 2010.06 (Mar 19 2014 - 10:37:19)
                    -MakitoXD 0.9.14"
```

### Related Topics

- [Viewing System Status Information](#)

## ipconfig

The `ipconfig` command is used to set and view the parameters that specify the networking context for the Makito X decoder, including the IP settings, hostname, and DNS.

The `ipconfig` command is also used to:

- Configure the display of the decoder IP address during the boot sequence, so users can determine the IP address simply by examining the HDMI or SDI outputs on a display.
- Enable the Multicast DNS (mDNS) protocol to allow the Safari Web browser (or other mDNS application) to automatically find the decoder. In Safari, navigate to Bookmarks and then select Bonjour to see the Makito X listed.
- Set the Network Time Protocol (NTP) server address and Time Zone.

When DHCP is enabled, you can configure the DHCP Vendor Class ID (option 60), which is set by default to “Haivision Makito X Decoder”. This allows IT departments to identify Makito X devices on their networks. You must reboot for any changes to take effect.

As shown in the following example, when you enter the `ipconfig` configure command, the system displays the current IP settings and takes you through a series of prompts enabling you to change the IP settings, optionally enable DHCP, and change the hostname, DNS settings, NTP settings, and/or Time Zone setting.

The `ipconfig display` command returns the current IP settings.

## Synopsis

```
ipconfig display
ipconfig configure
ipconfig renew
ipconfig release
```

## Actions

Action	Description
display	Displays the current IP configuration.
configure	Configures IP settings.
renew	Renews DHCP address lease.
release	Releases current DHCP address lease.

## Examples

```
# ipconfig display
```

Returns current IP settings for the decoder, when configured to use DHCP:

```
Current IP Settings (Obtained via DHCP):
  IP Address       : 10.65.133.135
  Network Mask    : 255.255.255.0
  Gateway         : 10.65.133.1
  Link-Local Address : (Auto-assigned when DHCP is
                        unavailable)
  Hostname        : MXD-133-22
  DHCP Vendor Class ID : "Haivision Makito X Decoder"
Current IP On Screen Display Settings:
  Startup Display  : On
  Display Duration : 15 seconds
  Display Format    : 1080p60
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          : 10.5.0.1
  Timezone        : "America/Montreal"
```

```
# ipconfig display
```

Returns current IP settings for a decoder that does not use DHCP:

```
Current IP Settings:
  IP Address       : 10.5.1.2
  Network Mask    : 255.255.255.0
  Gateway         : 10.5.0.1
  Hostname        : MakitoX_Dec2
Current IP On Screen Display Settings:
  Startup Display  : On
  Display Duration : 60 seconds
  Display Format    : 1080i30
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          : pool.ntp.org
  Timezone        : "America/Montreal"
```

```
# ipconfig configure

Prompts you as follows to modify current settings:
Current IP Settings:
  IP Address       : 10.5.1.2
  Network Mask    : 255.255.255.0
  Gateway         : 10.5.0.1
Change IP settings? (y,N): y
Use DHCP to obtain IP address automatically? (y,N): n
Enter IP address (10.5.1.2) : 10.65.131.31
Enter netmask (255.255.255.0): 255.255.255.0
Enter default gateway (10.5.0.1): 10.65.131.1

Current IP On Screen Display Settings:
  Startup Display   : Off
  Display Duration  : 60 seconds
  Display Format     : 1080i30
Change OSD settings? (y,N): y
Display IP address on screen at startup? (Y,n): On

Current Hostname : MakitoX_Dec2
Change hostname? (y,N): y
Enter hostname (MakitoX_Dec2): MXD-31

Current DNS Settings :
  Domain           : eqa.haivision.com
  Primary Server   : 10.65.158.10
  Alternate Server  : (None)
Change DNS settings? (y,N): n

Current Multicast DNS (mDNS) Settings:
  Responder        : Disabled
Change Multicast DNS Settings? (Y,n): y
Enable mDNS responder? (y,N): y

Current NTP Settings:
  Server           : 206.186.255.228
  Timezone         : "America/Montreal"
Change NTP server? (y,N): n
Change Timezone? (y,N): n

Network settings updated successfully.
Host name updated successfully.
Multicast DNS settings updated successfully.
You must REBOOT for any changes to take effect!
```

## Related Topics

- [Configuring Network Settings](#)

## ipv6config

The `ipv6config` command is used to view and set the parameters that specify the IPv6 network configuration of Makito X Series devices.

As shown in the examples that follow, when you enter the `ipv6config configure` command, the system displays the current IPv6 settings and takes you through a series of prompts enabling you to change these settings. You can either assign a static IPv6 address or use DHCPv6 (Dynamic Host Configuration Protocol for IPv6).

You must reboot for any changes to take effect.

### Synopsis

```
ipv6config display
ipv6config configure
ipv6config disable
```

### Actions

Action	Description
display	Displays the current IPv6 configuration.
configure	Configures IPv6 settings.
disable	Disables IPv6 functionality. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 5px;"> <p><b>Note</b> You cannot disable IPv6 if IPv4 is already disabled.</p> </div>

### Parameters

N/A

## Examples

```
# ipv6config display

Returns current IPv6 settings for an encoder configured to use IPv6:
Current IPv6 Settings:
Current configured IPv6 Settings:
  IPv6 Global Address      : fd00:10:65:10:5e77:57ff:fe00:5346/64
  IPv6 Link-Local Address : fe80::5e77:57ff:fe00:5346/64
  Gateway Address         : fe80::2efa:a2ff:fed2:7e25
  Hostname                 : MXD-John

Current DNS Settings:
  Domain                   : haivision.com
  Primary Server           : 10.65.0.10
  Alternate Server         : (None)
  DNS Resolve Precedence  : IPv6

Current NTP Settings:
  Server                   : 10.66.131.45
  Timezone                 : "America/Chicago"
```

Or indicates that IPv6 is disabled:  
IPv6 is disabled on this device.

```
# ipv6config disable

Disables IPv6.
IPv6 has been successfully disabled.
You must REBOOT for any changes to take effect!
admin@x-enc-storage-fixed:~$ reboot
```

```
# ipv6config configure

Prompts you to configure IPv6 settings (on system where IPv6 is disabled, using auto-configure):
IPv6 is currently disabled on this device.
Do you want to enable IPv6 functionality? (Y,n): y
Configure IPv6 automatically (Y,n): y
Use DHCPv6 to obtain IP address (Y,n): y

Current Hostname      : MXD-John
Change hostname? (y,N) : n

Current DNS Settings:
  Domain               : haivision.com
  Primary Server       : 10.65.0.10
  Alternate Server     : (None)
Change DNS settings? (y,N): n

IPv6 has been successfully configured.

You must REBOOT for any changes to take effect!
```

```
# ipv6config configure
```

Prompts you to configure IPv6 settings (on system where IPv6 has been disabled, re-configuring IPv6 to the last configured settings):

IPv6 is currently disabled on this device.

Do you want to enable IPv6 functionality? (Y,n): y

Last Configured IPv6 Settings:

IPv6 Global Address : fc00::2/24

Gateway : fc00::1

Change IPv6 settings? (y,N): n

IPv6 has been successfully configured.

You must REBOOT for any changes to take effect!



## Related Topics

- [Configuring Network Settings](#)

## license

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 decoder. For more information, see [Managing Licenses](#).


### Note

Multiple licenses may be installed on the same device at the same time.

## Synopsis

```
license list
license view <features.lic>
license install <features.lic>
license verify <features.lic>
license delete <features.lic>
```

## Actions

Action	Description
list	Displays a list of installed licenses. Licenses are stored on the Makito X decoder file system in the folder <code>/usr/share/haivision/licenses</code> .
view	Displays the content of the specified license file.
install	<div style="border: 1px solid #ccc; padding: 5px;"> <p> <b>Important</b></p> <p>The license file must be uploaded to the decoder and locally stored in the current (administrative) user's folder before it can be installed. The Makito X decoder supports FTP and TFTP client, as well as SCP client and server for downloading and uploading files.</p> </div>
verify	Verifies the specified license (either installed or uploaded).
delete	Deletes a previously installed license file from the system.

## license Example

```
# license list

Displays a list of licenses currently installed on the system:
License Files (in /usr/share/haivision/licenses):
  metadata-P0123456.lic
```

## Related Topics

- [Managing Licenses](#)



## nmcfg

**Note**

You must be logged in with administrative privileges to enter `nmcfg` commands.

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 decoder. 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 decoder user groups (`admins`, `operators`, and `users`).

Note that traps are not supported by the `nmcfg` script.

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

For more information, see "nmcfg" (in [SNMP Agent Components](#)).

### Synopsis

```
nmcfg help
nmcfg access help
nmcfg access usm permit <uname> {<group>|ro|rw} [{noauth|auth|priv}]
nmcfg access usm delete

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>
```

### Options

Option	Description
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.

---

Option	Description
community	Defines community-based (v1v/2c) security configuration for the Makito X decoder.

Option	Description
system	Defines contact and location system parameters.
user	Defines user-based (v3) security configuration for the Makito X decoder.

## Actions

Action	Description
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	<div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Note</b></p> <p>Access permissions may be additive. For example, permitting a new source for an existing community adds to the existing one if it complements it.</p> </div>
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 decoder settings which are lost when the unit is rebooted unless saved as a configuration.

## Example #1: Initialize a Community-Based (v1/v2c) System

In the example below, a system with default settings is configured 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.ord>"
# nmcfg system define location "Media Lab"
# nmcfg community permit admin rw 198.51.100.122
```

## Example #2: Create 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 johnsmith operators
```

### Examples #3: Initialize 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 "89ss6dkj" AES "jfdsf78998sd"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg user define guest MD5 "nososecret"
nmcfg: snmp agent is not running, user settings will apply when started
# nmcfg access usm permit joenet admins priv
# nmcfg access usm permit johnsmith operators priv
# nmcfg access usm permit guest users
# nmcfg agent start
# nmcfg

system parameter  value
-----
engineid          0x80001f88802054a68b4b75388e
contact           "joe net <jnet@example.org>"
location          "Media Lab"

model perm/groupleveluser/community  source
-----
usm users      auth  guest      -
usm admins     priv  joenet     -
usm operators  priv  johnsmith  -

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

#### Related Topics

- "nmcfg" (in [SNMP Agent Components](#))



## package

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 the Administrators (see `messages` CLI command). A successful package installation notice is added to the messages upon successful installation.

## 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
```

## Actions

Action	Description
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 <code>all</code> .
cancel	Cancels installation of a package scheduled for the next reboot.

## Example #1: Package Download and Installation

```
# package download makitox_dec_v1.0.0-39.hai mytftp.example.com
1/5) Temporarily pausing decoder(s)...
2/5) Downloading package makitox_dec_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 decoder(s)...
Package downloaded successfully.
$ package install makitox_dec_v1.0.0-39.hai
Package makitox_dec_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_dec_v1.0.0-39.hai mytftp.example.com
1/5) Temporarily pausing decoder(s)...
2/5) Downloading package makitox_dec_v1.0.0-39.hai from mytftp.example.com...
3/5) Verifying integrity of downloaded package... Package verification failed!
Try downloading the package again.
```

## package Examples

```
# package list
```

Displays the list of downloaded packages:

```
Package Files (in
/usr/share/haivision/packages/):
makitox_dec_v1.0.0-51.hai
makitox_dec_v1.0.0-52.hai
makitox_dec_v1.0.0-53.hai
makitox_dec_v1.0.0-54.hai
```

```
# package info makitox_dec_v1.0.0-54.hai
```

Displays information about the package.

```
# package install makitox_dec_v1.0.0-54.hai
```

Installs the package.

## passwd

The `passwd` command is used to change the password for the current user account.

### Note

Use the `account` command to reset the password of other users.

## Synopsis

```
passwd [<name>]
```

## Example

```
# passwd
```

Changes the password for the current user account. The system prompts you to enter the old password and then the new password.

## Related Topics

- [Role-based Authorization](#)

## pubkey

The `pubkey` command is used to manage your account's authorized SSH public keys.

**Note**

The `pubkey` command can only be used by an administrator.

## Synopsis

```
pubkey add <KEYFILE.pub>
pubkey remove <KEYFILE.pub>
pubkey list
```

## Actions

Action	Description
add	Uploads a new public key file ( <code>.pub</code> extension) to the decoder.
remove	Removes the specified public key file from the decoder.
list	Lists the public key files currently loaded on the decoder.

## Examples

```
# pubkey add makito.pub
```

Uploads the public key file `makito.pub` to the decoder.

```
# pubkey list
```

Lists all public key files currently loaded on the decoder 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](#)

## reboot

The `reboot` command is used to halt and restart the Makito X decoder. Any unsaved configurations will be lost. The decoder will restart with the saved startup configuration.

### Synopsis

```
reboot
```

### Example

```
# reboot
```

**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 sign in again.

### Related Topics

- [Rebooting the Decoder](#)

## service

For security purposes, you may need to stop one or more network services from accessing the Makito X decoder. The `service` command is used to enable and disable the following network services: HTTP, SAP, SNMP, SSH, Talkback, and Telnet.

**Note**

To specify SAP Source Address and Port, use the `sap` command.

## Synopsis

```
service svcname action [svcname action] [...]
where:
svcname can be: all, http, sap, snmp, ssh, talkback, telnet
```

## Actions

Action	Description
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.

## Examples

```
# service all status

Displays information about all services, such as:
http service is currently enabled
http service is enabled at system startup
sap service is currently enabled
sap service is enabled at system startup
snmp service is currently enabled
snmp service is enabled at system startup
ssh service is currently enabled
ssh service is enabled at system startup
talkback service is currently disabled
talkback service is disabled at system startup
telnet service is currently enabled
telnet service is enabled at system startup

# service telnet stop

Stops telnet connection to the decoder.
```

```
# service all stop
```

Stops all network connections to the decoder.

## Related Topics

- [Enabling and Disabling Network Services](#)
- [Audio Talkback](#)



## Security Commands

- [account](#)
- [audit](#)
- [banner](#)
- [certificate](#)
- [messages](#)
- [policy](#)

## account

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

### Note

The `account` command can only be used by an administrator.

### Important

Makito X Series devices ship from the factory with only the `admin` account enabled. For security reasons, the two default user accounts ( `user` and `operator` ) are locked at the factory as well as after a factory reset. An administrator must unlock them and change the passwords to use them for the first time.

## 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
```

## Actions

Action	Description
create	Creates a new user account. See <a href="#">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 decoder, including account name, role, state, password expiry status, and public key(s).
list	Lists the account information for the user or the decoder in table format.
passwd	Modifies the user account password. You will be prompted to enter and confirm the password (which the user will have to change upon first login). For the allowed characters, see "Password Requirements" <a href="#">Changing Your Password</a> .
pubkey add  remove keyfile	Adds or removes a public key to the user account. See <a href="#">Managing Public Key Authentication</a> 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).

---

Action	Description
delete	Deletes the user account.

## Parameters

Parameter	Default	Description/Values
role		Use with account <code>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> .

## Examples

```
# account all list

name          role          state  pwd expiry  pubk
-----
admin         Administrator Enabled never      No
fdfdf         Guest           Enabled never      No
infodev       Operator        Enabled by admin No
operator      Operator        Locked  never      No
user          Guest           Enabled never      No
```

## Related Topics

- [Managing User Accounts](#)

## audit

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.

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.

## Synopsis

```
audit start
audit stop
audit set parameter=value [parameter=value ...]
audit get [config|stats|all]
audit verify [debug]
```

## Actions

Action	Description
start	Establishes a connection from the Makito X Series device 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="#">Parameters</a> below.
get	Displays audit configuration and connection status information. You can specify configuration, statistics, or all information.
verify	Verifies the validity of the TLS connection parameters. <div style="border: 1px solid green; padding: 5px; margin-top: 10px;"> <p><b>Tip</b></p> <p>Connect to the audit server in verbose mode to help diagnose connection or certificate problems.</p> </div>

## Parameters

Parameter	Default	Description/Values
server	n/a	<p>The server IP address. Enter an IP address in one of the following formats:</p> <ul style="list-style-type: none"> <li>fqdn[:port]</li> <li>ipv4_addr[:port]</li> <li>[ipv6_addr][:port]</li> </ul> <div style="border: 1px solid #ffc107; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>When configuring an IPv6 server, the address must be enclosed in square brackets.</p> </div> <ul style="list-style-type: none"> <li>hostname[:port]</li> </ul>
transport	UDP	<p>The transport protocol, either:</p> <ul style="list-style-type: none"> <li>UDP (User Datagram Protocol): Default UDP port = 514</li> <li>TLS (Transport Layer Security): Default TLS port = 6514</li> </ul>
trusted	All	<p>If transport is TLS, the type of server authentication:</p> <ul style="list-style-type: none"> <li>All : No server authentication</li> <li>CA-signed : Root-CA certificate imported</li> <li>Self-signed : Fingerprint</li> </ul>
fingerprint	n/a	<p>If trusted is self-signed, specify the audit server certificate fingerprint ( md5 or sha1 ):</p> <ul style="list-style-type: none"> <li>md5-fingerprint:</li> <li>sha1-fingerprint:</li> </ul>

## 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](#)

## banner

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 sign in for interactive sessions on the Makito X decoder.

**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.

## Synopsis

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

## Actions

Action	Description
enable	Enables display of the installed Advisory and Consent Banner page at sign-in (a banner must be installed).
disable	Disables display of the current Advisory and Consent Banner page at sign-in.
install	<div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Important</b></p> <p>The text file must be downloaded to the decoder and locally stored in the current (administrative) user's directory before it can be installed from the CLI. The Makito X decoder supports FTP and TFTP client, as well as SCP client and server for downloading and uploading files.</p> </div>
get	Displays banner status information.
delete	Deletes the banner file from the system.

## 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 decoder.

## Examples

```
# banner get

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

*****
*           Haivision Systems - Makito X decoder #4           *
*****
```

## Related Topics

- [Managing Banners](#)



## certificate

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.

## 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
```

## Actions

Action	Description
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 decoder, including the type and name.
view	Displays the content of the named certificate file.
create	Generates a Self-signed certificate or a Certificate Signing Request. The sign and subject can be specified. See <a href="#">Parameters</a> below.
delete	Deletes the selected certificate. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>The type specification may be added to specify the deletion of the Identity certificate, the chain associated with it, or the CA certificate with the given name.</p> </div>
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.
verify	Verifies the validity of the specified certificate.

## Parameters

Parameter	Default	Description/Values
sing	self	The signature type for the certificate: <ul style="list-style-type: none"> <li><code>self</code> : Creates a self-signed identity certificate.</li> <li><code>Request</code> : 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><code>auto</code> : Automatically gets the subject Common Name which is <code>HOSTNAME.DOMAIN</code> if DNS is configured, or <code>IPADDR</code> otherwise. The subject Alt Name is set to <code>DNS:HOSTNAME.DOMAIN, DNS:HOSTNAME, IPAddress:IPADDR</code></li> <li><code>query</code> : Prompts the user for Distinguished Name (DN) attributes</li> <li><code>DN</code> : Distinguished Name in the form: <code>"/C=US/ST=Maine..."</code> where the most common attributes are:               <ul style="list-style-type: none"> <li><code>/C</code> Two Letter Country Name</li> <li><code>/ST</code> State or Province Name</li> <li><code>/L</code> Locality Name</li> <li><code>/O</code> Organization Name</li> <li><code>/OU</code> Organizational Unit Name</li> <li><code>/CN</code> Common Name</li> </ul> </li> </ul>
type	id	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> <p><b>Note</b></p> <p>Only ID certificates can be generated. Chain and CA certificates can only be imported.</p> </div> <ul style="list-style-type: none"> <li><code>id</code> : Identity certificate (for HTTPS service and audit)</li> <li><code>chain</code> : Identity certificate CA chain (Import only)</li> <li><code>ca</code> : Certificate Authority Certificate (for peer certificate validation, Import only)</li> </ul>
fmt	auto	The format in which the certificate is encrypted: <ul style="list-style-type: none"> <li><code>auto</code> : Detects the certificate format based on file extension when importing.</li> <li><code>pem</code> : Privacy Enhanced Mail Base64 encoded DER certificate</li> <li><code>p7</code> : PKCS#7</li> <li><code>p12</code> : PKCS#12</li> <li><code>px</code> : PKCS#12</li> <li><code>der</code> : Distinguish Encoding Rules</li> </ul>
infile	n/a	<div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Note</b></p> <p>The administrator has previously downloaded/uploaded the certificate file to import in its home directory (using SCP, for example).</p> </div>

## Related Topics

- [Managing Certificates](#)

## messages

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.

### 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 decoder may be compromised, and it is recommended to re-installed the firmware.

## Synopsis

```
messages add <msgtext>
messages get
messages delete
```

## Actions

Action	Description
add <msgtext>	Adds the message text to the log. This could be used to send messages to other administrators.
get	Displays messages.
delete	Deletes the messages.

## Related Topics

- [Managing Messages](#)

## policy

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.

**Note**

The `policy` command can only be used by an administrator.

## Synopsis

```
policy password set [quality=basic] [minlen=6] [minuppers=0] [mindigits=0]
    [minsymbols=0] [expiry=yes] [lifetime=90]
policy session set [autologout=yes] [idletimeout=15]
policy crypto set [compliance=None]
policy pname/all get
```

## Actions

Action	Description
password set	Modifies the password policy parameters. A series of one or more <code>parameter=value</code> pairs can be specified at once. See password under <a href="#">Parameters</a> below.
session set	Modifies the session policy parameters. A series of one or more <code>parameter=value</code> pairs can be specified at once. See session under <a href="#">Parameters</a> below.
crypto set	Specifies the cryptographic policy. The <code>compliance</code> parameter can be specified. See crypto under <a href="#">policy Parameters</a> below.
pname/all get	Displays the policy information for either the policy (i.e., <code>password</code> , <code>session</code> , or <code>crypto</code> ) or the decoder.

## 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>• FIPS140: All management cryptography is operated in the FIPS 140-2 mode.</li> <li>• NDPP1: Activates cryptographic security to a level compliant with the Network Device Protection Profile v1.1.</li> <li>• SP800-52 Revision 1: Applies cryptographic modules accredited under the National Institute of Standards and Technology (NIST) Special Publication 800-52, Revision 1.</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>Either selection will reinforce security for all management functions of the decoder in terms of cryptography. This setting will take effect upon the next reboot.</p> </div>
<b>password</b>		
quality	Basic	<p>The required password strength, either:</p> <ul style="list-style-type: none"> <li>• Basic</li> <li>• Strong</li> </ul>
minlen	6	The minimum password length. Range: 6-40
minuppers	N/A if Basic ----- 0 if Strong	(Password quality must be Strong) The minimum number of uppercase letters. Range: 0-40
mindigits	N/A if Basic ----- 0 if Strong	(Password quality must be Strong) The minimum number of digits. Range: 0-40
minsymbols	N/A if Basic ----- 0 if Strong	(Password quality must be Strong) The minimum number of symbols. Range: 0-40
expiry	No	<p>Enables or disables password expiration:</p> <ul style="list-style-type: none"> <li>• Yes, No</li> </ul>
lifetime	90 days	(Password expiry must be Yes) The number of days after which users must change their passwords. Range: 1-180 days
remember	0	The number of stored passwords. Range: 5-400
<b>session</b>		
autologout	No	<p>Enables or disables Auto Logout:</p> <ul style="list-style-type: none"> <li>• Yes, No</li> </ul>
idletimeout	15 minutes	(autologout must be Yes) The maximum length of time the system may be idle before the user will be logged out. Range: 1-1440 minutes

## policy Examples

```
# policy crypto set compliance=NDPP11
```

```
# policy password set quality=strong minlen=10 minuppers=1 minsymbols=1 expiry=yes lifetime=30
```

Sets the password policy for the decoder 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.

## Related Topics

- [Managing Security Policies](#)





# Technical Specifications

This appendix lists the technical specifications for the Makito X decoder.

## Topics in This Chapter

- [Audio/Video Interface Specifications](#)
- [Video Decoding](#)
- [Audio Decoding](#)
- [Advanced Features](#)
- [Metadata \(Optional\)](#)
- [Network and Management Interfaces](#)
- [Chassis Options](#)
- [Regulatory/Compliance](#)

## Audio/Video Interface Specifications

<p><b>Video Outputs:</b></p> <ul style="list-style-type: none"> <li>• HDMI 1.4</li> <li>• SD-SDI SMPTE 259M-C</li> <li>• HD-SDI SMPTE 292M &amp; 296M &amp; 274M</li> <li>• 3G-SDI SMPTE 424M (Level A only) &amp; 425M</li> </ul>
<p><b>Audio Outputs:</b></p> <p>Two analog audio channels per blade</p> <p>Up to 8 channels of embedded audio per blade, in channel pair groups. The channel pair sources are:</p> <ul style="list-style-type: none"> <li>• SDI1ch1&amp;2, SDI1ch3&amp;4, SDI1ch5&amp;6, SDI1ch7&amp;8</li> <li>• SDI2ch1&amp;2, SDI2ch3&amp;4, SDI2ch5&amp;6, SDI2ch7&amp;8</li> </ul> <p>Available through a mini-DIN-8 locking connector:</p> <ul style="list-style-type: none"> <li>• Balanced / Unbalanced stereo analog audio</li> </ul> <p>Digital Embedded Audio</p> <ul style="list-style-type: none"> <li>• SD-SDI SMPTE 272M</li> <li>• HD/3G-SDI SMPTE 299M</li> <li>• HDMI 1.4</li> </ul>
<p><b>Talkback:</b></p> <p>Analog Audio Input</p> <ul style="list-style-type: none"> <li>• Level: 2.2 dBu (1Vrms)</li> <li>• Impedance: 100 Ohms</li> </ul>

## Video Decoding

<b>Video Output (TV) Resolutions:</b>	
Supported by SDI	
<ul style="list-style-type: none"> <li>• 1920x1080p 60/59.94/50/30/29.97/25/24/23.98 Hz</li> <li>• 1920x1080i 60/59.94/50 Hz</li> <li>• 1280x720p 60/59.94/50/30/29.97/25 Hz</li> </ul>	<ul style="list-style-type: none"> <li>• 720x576i 50 Hz</li> <li>• 720x480i 60/59.94 Hz</li> </ul>
(interlaced shown in fields per second) See <a href="#">Supported Decoding TV/Computer Resolutions</a> .	
Supported by HDMI	
<ul style="list-style-type: none"> <li>• 1920x1080p 60/59.94/50/30/29.97/25/24/23.98 Hz</li> <li>• 1920x1080i 60/59.94/50 Hz</li> <li>• 1280x720p 60/59.94/50 Hz</li> </ul>	<ul style="list-style-type: none"> <li>• 720x576p 50 Hz</li> <li>• 720x576i 50 Hz</li> <li>• 720x480p 60/59.94 Hz</li> <li>• 720x480i 60/59.94 Hz</li> </ul>
(interlaced shown in fields per second)	
<b>Computer Output Resolutions: (supported only by HDMI)</b>	
<ul style="list-style-type: none"> <li>• 1920x1200 60 Hz</li> <li>• 1680x1050 60 Hz</li> <li>• 1600x1200 60 Hz</li> <li>• 1600x900 60 Hz</li> <li>• 1440x900 60 Hz</li> <li>• 1400x1050 60 Hz</li> <li>• 1366x768 60 Hz</li> <li>• 1360x768 60 Hz</li> </ul>	<ul style="list-style-type: none"> <li>• 1280x1024 60 Hz</li> <li>• 1280x800 60 Hz</li> <li>• 1280x768 60 Hz</li> <li>• 1152x864 75 Hz</li> <li>• 1024x768 60 Hz</li> <li>• 800x600 60 Hz</li> <li>• 640x480 60 Hz</li> </ul>
<p><b>Note</b> All computer output resolutions are progressive. See <a href="#">Supported Decoding TV/Computer Resolutions</a>.</p>	
<b>Video Bit Rates:</b>	
SD/HD from 32 kbps to 25 Mbps (Single Channel H.264 video)	
SD/HD from 32 kbps to 14 Mbps (Single Channel HEVC video)	
<b>Compression Standards:</b>	
H.264 (MPEG-4 AVC part 10) <ul style="list-style-type: none"> <li>• ISO/IEC 14496-10</li> <li>• Baseline, Main, and High Profiles</li> <li>• Up to Level 4.2 (1080p60) and lower intermediate levels</li> <li>• I, IP, IBP, IBBP framing</li> </ul>	H.265/HEVC <ul style="list-style-type: none"> <li>• ISO/IEC 23008-2</li> <li>• Main Profile</li> <li>• Up to Level 4 (1080p60)</li> <li>• IP framing</li> </ul>

## Supported Decoding TV/Computer Resolutions

The Makito X decoder accepts many input resolutions and frame rates and will scale as appropriate to a supported resolution as listed in the [Video Decoding](#), with the following limitations:

- A received stream with progressive video cannot be output as interlaced. If the input stream is progressive, the decoder will display progressive.
- Users may manually select a specific output resolution if the automatic choice does not produce the desired results.

## Audio Decoding

Audio Decoding	
Audio Channels	<ul style="list-style-type: none"> <li>• 2 Analog audio per blade</li> <li>• SDI Embedded audio (4 or 8 audio pairs) per output port</li> <li>• HDMI Embedded audio pairs per blade</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>When the decoder is licensed for one channel only, it mirrors the decoded stream to all interfaces and supports up to eight (8) channel pairs of AAC-LC or AC-3 audio decoding for a stream. MPEG-2 TS streams received containing AC-3 audio will be down-mixed to a stereo pair for output on the HDMI and SDI interface.</p> </div> <p>See “Audio Channel Details/Breakout” below.</p>
Audio Bit Rates	<ul style="list-style-type: none"> <li>• Mono: From 56 to 160 kbps per audio pair</li> <li>• Stereo: From 80 to 320 kbps per audio pair</li> </ul>
Frequency Response	From 20 Hz to 22 kHz
Sampling Rate	48kHz
Maximum Analog Audio Output Level	From +5dBu to +20dBu (balanced or unbalanced) (+6dBu = default)
Compression Standards	<ul style="list-style-type: none"> <li>• MPEG-2 AAC-LC / ADTS ISO/IEC 13818-7</li> <li>• MPEG-4 AAC-LC / LATM ISO/IEC 14496-3</li> <li>• MPEG1 Layer 1/2/3 (ISO/IEC 11172-3)</li> <li>• AC-3 (as per ATSC A/52)</li> </ul>

Audio Channel Details/Breakout	
Analog Audio	
Single Channel	Analog audio can select any channel pair in a stream up to the eighth pair: <ul style="list-style-type: none"> <li>• SDI1ch1&amp;2, SDI1ch3&amp;4, SDI1ch5&amp;6, SDI1ch7&amp;8, SDI1ch9&amp;10, SDI1ch11&amp;12, SDI1ch13&amp;14, SDI1ch15&amp;16</li> </ul>
Dual Channel	Analog audio can select from the first 4 channel pairs of either SDI interface: <ul style="list-style-type: none"> <li>• SDI1ch1&amp;2, SDI1ch3&amp;4, SDI1ch5&amp;6, SDI1ch7&amp;8</li> <li>• SDI2ch1&amp;2, SDI2ch3&amp;4, SDI2ch5&amp;6, SDI2ch7&amp;8</li> </ul>
HDMI Embedded Audio	
Single Channel	HDMI embedded audio can select either a single channel pair or a set of four channel pairs when in surround sound: <p>Single Pair:</p> <ul style="list-style-type: none"> <li>• SDI1ch1&amp;2, SDI1ch3&amp;4, ... SDI2ch15&amp;16</li> </ul> <p>Surround Sound uses up to 4 channel pairs from:</p> <ul style="list-style-type: none"> <li>• SDI1</li> </ul>

## Audio Channel Details/Breakout

Dual Channel

Single Pair:

- SDI1ch1&2, SDI1ch3&4, ... SDI1ch7&8
- SDI2ch1&2, SDI2ch3&4, ... SDI2ch7&8

Surround Sound uses up to 4 channel pairs from:

- SDI1 or SDI2

Audio Channel Details/Breakout	
SDI Embedded Audio	
Single Channel	Supports up to 16 channels (8 channel pairs) of embedded audio on the SDI interface: <ul style="list-style-type: none"> <li>• SDI1ch1&amp;2, SDI1ch3&amp;4, ... SDI2ch15&amp;16</li> </ul>
Dual Channel	Supports up to 8 channels (4 channel pairs) of embedded audio per SDI interface: <ul style="list-style-type: none"> <li>• SDI1ch1&amp;2, SDI1ch3&amp;4, SDI1ch5&amp;6, SDI1ch7&amp;8</li> <li>• SDI2ch1&amp;2, SDI2ch3&amp;4, SDI2ch5&amp;6, SDI2ch7&amp;8</li> </ul>

## Related Topics

- "Algorithm" under Audio Decoder & Output on [SDI Decoder Statistics](#)



## Advanced Features

<b>Advanced Features</b>
HD/SD de-interlacing
Built-in downscaling
EIA-708-B/SDI closed captioning
Forward Error Correction (FEC)
AES decryption 128-bit or 256-bit with Furnace & SRT
Active Format Description (AFD)
Advanced buffering control
Still image insertion on loss of input stream

## Metadata (Optional)

<b>Output Metadata Features</b>
KLV over SD-SDI/HD-SDI/3G-SDI
<b>Metadata Processing:</b>
SMPTE 336M compliant
CC 608/708 pass-through
MISB 0601.11 Compliant
MISB 0604.2 Compliant, supporting Synchronous and Asynchronous formats
SMPTE 12M Timecode
SMTPE 2016 AFD

**Note**

KLV Metadata may be de-encapsulated from a supported format and provided to an SDI output interface. KLV metadata is inserted into the VANC of the video frame whose PTS most closely matches the PTS associated with the KLV AU.

## Network and Management Interfaces

IP Network and Management Interfaces	
Networking Standards	Ethernet 10/100/1000 Base-T, Auto-detect, Half/full-Duplex
	IPv4 (Internet Protocol Version 4)
	DHCP (Dynamic Host Configuration Protocol)
	IGMPv3 (Internet Group Management Protocol) for IP Multicast
	DNS (Domain Name System)
Connector	RJ45 (TIA/EIA-568)
Streaming Protocols	Unicast Streaming
	Multicast Streaming
	MPEG Transport Stream over UDP / RTP
	Secure Reliable Transport (SRT)
	MPEG2 Transport Stream as per ITU-T Rec. H.222.0   ISO/IEC 13818-1 and RFC 2250
	SAP (RFC 2974)
Management Protocols	HTTPS (Web browser)
	Command line over SSH/Telnet/RS-232
	SFTP/TFTP/SCP
	SNMP v3

## Chassis Options

**Tip**

All blades manufactured by Haivision are hot-swap capable, meaning that they can be installed and removed with the chassis powered.

## Single-Height Appliance

<b>Single Height Appliance (#S/B-292D-HD2)</b>	
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 single-height blade)  <b>Note</b> IEC 60601-1 Class I and II power supplies are available from Haivision.
Power Connector	On unit: Conxall p/n 17282-3PG-300 Mating connector: Conxall p/n 16282-3SG-318
Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating*: -30°C to 70°C (-22°F to 158°F) *Limited by the power supply storage: -30°C
Relative Humidity	Up to 95% without condensation
Heat	20 Watts or 68 BTU/hr
Sound Emission	41.2 dB(A) L'p(AVG)

## Dual-Height Appliance (HEVC Mezzanine)

<b>Dual Height Appliance (#S/B-292D-HD1-HEVC OR S/B-292D-HD2-HEVC)</b>	
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 1.36 kg (3 lbs.)
Power Requirements	12VDC, 25W (each double-height blade) 100-240VAC 60W external locking power supply NOTE: IEC 60601-1 Class I and II power supplies are available from Haivision.
Power Connector	On unit: Hirose p/n HR30-6R-3P(71) Mating connector: Hirose p/n HR30-6P-3S(71)
Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating*: -30°C to 70°C (-22°F to 158°F) *Limited by the power supply storage: -30°C

<b>Dual Height Appliance (#S/B-292D-HD1-HEVC OR S/B-292D-HD2-HEVC)</b>	
Relative Humidity	Up to 95% without condensation
Heat	-20 Watts or 68.3 BTU/hr
Sound Emission	41.2 dB(A) L'p(AVG)

## MB6X - 6 Blade Chassis

<b>MB6X - 6-Blade Chassis (#F-MB6X-RAC, #F-MB6X-MED, #F-MB6X-DC)</b>	
Dimensions (H x W x D)	19" rack mountable, 1 RU 44.069mm H x 440.004mm W x 420.37mm D (1.735" H x 17.323" W x 16.55" D) Tolerances are +/-0.50mm (+/- 0.020in.)
Weight	6 slot empty chassis: 7.94 kg. (17.5 lbs.) Single blade: Approximately 240 g (0.529 lbs.)
Power Requirements	Single Internal Power Supply: <ul style="list-style-type: none"> <li>F-MB6X-RAC (Redundant AC type): 90-264VAC 47Hz-63Hz</li> <li>F-MB6X-MED (Medical Grade): 90-264VAC 47Hz-63Hz</li> <li>F-MB6X-DC (DC type): 20-36 VDC</li> </ul> 300 watt maximum (all types)
Temperature	Operating: 0°C to 50°C (32°F to 122°F) Non-operating: -40°C to 70°C (-40°F 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 (#F-MB21B-R)

<b>MB21B - 21-Blade Chassis (#F-MB21B-R)</b>	
Dimensions (H x W x D)	19-inch rack mountable, 4RU *177.29 mm H x *441.35 mm W x 462.55 mm D (6.980 inches H x 17.376 inches W x 18.211 inches D) *186.76 mm / 7.353 inches H with rubber feet installed †482.60 mm / 19.000 inches W including mounting flanges
Weight	Empty 21-slot chassis: 17.24 kg. (38 lbs.) Each blade: 230 g. (0.5 lbs.)
Power (internal power supply)	Quad redundant power supplies: <ul style="list-style-type: none"> <li>90-132V and 180-240VAC 47Hz-63Hz</li> <li>400 watt maximum per PSU</li> </ul>
Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: -40°C to 70°C (-40°F to 158°F)
Relative Humidity	Up to 95% without condensation
Heat	560 Watts or 1910 BTU/hr *assumes chassis full of Makito X or other Haivision blades
Sound Emission	<ul style="list-style-type: none"> <li>Room temperature: 56.4 dB(A) L'p(AVG)</li> <li>50°C Ambient: 63.3 dB(A) L'p(AVG)</li> </ul>

## MB21X (#F-MB21X-R)

<b>MB21X - 21-Blade Chassis (#F-MB21X-R)<sup>1</sup></b>	
Dimensions (H x W x D)	19-inch rack mountable, 4RU *177.29 mm H x †441.35 mm W x 461.92 mm D (6.980 inches H x 17.376 inches W x 18.186 inches D) *186.76 mm / 7.353 inches H with rubber feet installed †482.60 mm / 19.000 inches W including mounting flanges
Weight	Empty 21-slot chassis: 32.5 pounds Single blade: Approximately 240 gm (0.529 lbs.)
Power (internal power supply)	Dual redundant power supplies: <ul style="list-style-type: none"> <li>• 100-240VAC 47Hz-63Hz</li> <li>• 600 watt maximum per PSU</li> </ul>
Temperature	Operating: 0°C to 50°C (32°F to 122°F) Non-operating: -40°C to 70°C (-40°F to 158°F)
Relative Humidity	Up to 95% without condensation
Heat	560 Watts or 1910 BTU/hr *assumes chassis full of Makito X Series blades
Sound Emission	<ul style="list-style-type: none"> <li>• Room temperature: 56.4 dB(A) L'p(AVG)</li> <li>• 50°C Ambient: 63.3 dB(A) L'p(AVG)</li> </ul>
Advanced Features	<ul style="list-style-type: none"> <li>• Removable fan trays</li> <li>• Station Alarm Interface</li> </ul>

1. Supports Makito X/X4 products *only*; excludes classic Makito encoder/decoder or Torpedo blades

## Makito X Harsh Decoder Environment Chassis

<b>Makito X Harsh Environment Chassis Option (#S-292E-X1H, #S-292E-X2H or #S-292D-X2H)</b>	
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: 0°C to 70°C (32°F to 158°F) Non-operating: -40°C to 85°C (-40°F to 185°F)
Relative Humidity	0-95% condensing
IP rating	IP42

## 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
	STANAG 4609 compliant (NATO Digital Motion Imagery Standard)
Compliance with Environmental Regulations	RoHS2, European Union Directive 2011/65/EU
	RoHS, Marking Control for China, Regulation SJ/T 11364-2006
Acoustic Noise	Telcordia GR-63 Section 4.6, Issue 3

**⚠ Note**

Please refer to the product Declaration of Conformity (DoC) for complete details.



# Open Source Software Credits

This appendix lists the Open Source software packages currently deployed on the Makito X decoder 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

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## Topics in This Chapter

- [Open Source Software Credits List](#)
- [Third Party License Information](#)

## Open Source Software Credits List

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	LGPL v2.1
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
chrony	3.2.1	Alternate Network Time Protocol (NTP) alternative	GPL v2, June 1991
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
ethtool	2.6.38	Network interface controller configuration	GPL v2 - June 1991
ffmpeg	3.0.0	Multimedia framework	LGPL v2.1
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
ipv4ll	1.5	Simple IPv4 Link-Local addressing	LGPL v2.1
jpeg	8b	JPEG Software Tools	Lane & Vollbeding - permissive free software license
libevent	2.0.17	Event notification library	3-clause ("modified") BSD License
lighttpd	1.4.41	Lightweight open-source Web server	Jan Kneschke, 2004 - permissive free software license
mDNS responder	320.10.80	Multicast Domain Name System	Apache License 2.0
mtd-utils	2.0	Memory Technology Device (MTD) utilities for nor, nand access and UBI & JFFS2 tools.	GPL v2 - June 1991
mtr	0.92	MyTraceroute: ping and traceroute combination in a single utility	BSD styled
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	Simple Network Management Protocol	Multiple BSD Licenses
nsyslog	1.84	syslog for NetBSD	BSD License
ntp	4.2.8p10	Network Time Protocol	University of Delaware - Permissive free software license

Package	Version	Description	License
openssh	7.3p1	Open SSH	Multiple BSD style licenses.
openssl	1.0.2n	Open Secure Socket Layer	Dual OpenSSL / SSLeahy
openssl-fipsalgs	2.0	FIPS Algorithms	Multiple Licenses.
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)
procps	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 acquisition	BSD
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
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.

## Third Party License Information

### UDT4, 4.11, UDP-based Data Transfer, Permissive free software license.

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# Warranties

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## EXCLUSIONS AND LIMITATIONS

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- (c) to damage caused by operating the product outside the permitted or intended uses described by Haivision;
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- (e) if any Haivision serial number has been removed or defaced.

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## OBTAINING WARRANTY SERVICE

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

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

## APPLICABLE LAW

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

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

## EULA - End User License Agreement

### READ BEFORE USING

THE LICENSED SOFTWARE IS PROTECTED BY COPYRIGHT LAWS AND TREATIES. READ THE TERMS OF THE FOLLOWING END USER (SOFTWARE) LICENSE AGREEMENT ("AGREEMENT") CAREFULLY BEFORE ACCESSING THE LICENSED SOFTWARE. BY SCANNING THE QR CODE TO REVIEW THIS AGREEMENT AND/OR ACCESSING THE LICENSED SOFTWARE, YOU CONFIRM YOUR ACCEPTANCE OF THIS AGREEMENT. IF YOU DO NOT AGREE TO THESE TERMS, HAIVISION IS UNWILLING TO LICENSE THE LICENSED SOFTWARE TO YOU AND YOU ARE NOT AUTHORIZED TO ACCESS THE LICENSED SOFTWARE.

Click the following link to view the Software End-User License Agreement: [Haivision EULA.pdf](#)

*If you have questions, please contact [legal@haivision.com](mailto:legal@haivision.com)*

## SLA - Service Level Agreement

### 1. Introduction

This Service Level and Support supplement forms a part of and is incorporated into the Service Agreement (the "Agreement") between You and Haivision Network Video Inc. ("Haivision"). Capitalized terms used but not otherwise defined in this supplement shall have the meaning ascribed to them in the Agreement. Haivision may, upon prior written notice to You, amend this supplement to incorporate improvements to the service levels and support commitments at no additional cost to You. This supplement applies only to those products and services set forth below.

### 2. Definitions

- "Audience Member" means an individual or entity that accesses Your Published Media Objects through a public URL.
- "Access Service" means the service provided by Haivision VCMS that verifies an Audience Member's credentials.
- "Digital Media File" means a computer file containing text, audio, video, or other content.
- "Outage" is a 12-minute period of consecutive failed attempts by all six agents to PING the domain on the Haivision Streaming Media network.
- "Published Media Object" means a Digital Media File with a public URL.
- "Transaction" means the creation of a right for an Audience Member to access a Media Object and the completion of an order logged in the order history service.

### 3. Service Levels for the Video Content Management System

The service levels in this [Section 3](#) apply only to the hosted version of Haivision VCMS and the Haivision VCMS development kit (collectively, the "Standard Hosted Components" of Haivision Video Cloud Services). Subject to the exceptions noted in [Section 4](#) below, the aforementioned components of Haivision Video Cloud Services will be available for use over the course of each calendar month as follows:

Type of Access	Definition	Availability Level
Write Functions	<ul style="list-style-type: none"> <li>• Access to all functions through the administrative user interface.</li> <li>• Ability to add or modify objects and metadata through the application programming interface (“API”)</li> <li>• Ability of ingest service to check for new or updated files or feeds</li> </ul>	99.999%
Read-Only Functions	<ul style="list-style-type: none"> <li>• Ability to retrieve data through the API</li> <li>• Ability for Audience Members to authenticate through the Access Service</li> <li>• Ability for Audience Members to play Published Media Objects</li> <li>• Ability for Audience Members to play Haivision VCMS-authenticated or entitled Published Media Objects</li> <li>• Ability to complete Transactions</li> </ul>	99.999%

#### 4. Exceptions to Availability for the VCMS

The Standard Hosted Components may not be available for use under the following circumstances, and in such case such periods of unavailability shall not be counted against Haivision Video Cloud for purposes of calculating availability:

- a. Normal Maintenance, Urgent Maintenance and Upgrades as defined in the table below;
- b. Breach of the Agreement by You as defined in the Agreement;
- c. The failure, malfunction, or modification of equipment, applications, or systems not controlled by Haivision Video Cloud;
- d. Any third party, public network, or systems unavailability;
- e. Acts of Force Majeure as defined in the Agreement;
- f. Modification of software made available to You as part of Haivision Video Cloud Services by You or a third party acting on Your behalf; and
- g. Any third party product or service not incorporated into Haivision Video Cloud Services or any third party plug-in.

Haivision Video Cloud shall make commercially reasonable efforts to notify, or work with, applicable third parties to repair or restore Haivision VCMS functionality affected by such exceptions.

Type of Maintenance	Purpose	Write Functions Available	Read Functions Available	Maximum Time Per Month	Continuous Time in Mode (Max)	Window (Central Time)	Min Notice
Normal	<ul style="list-style-type: none"> <li>• Preventive maintenance on the software/hardware components of Haivision VCMS</li> <li>• Addition of new features/functions</li> <li>• Repair errors that are not immediately affecting Your use of Haivision VCMS</li> </ul>	No	Yes	10 Hours	6 Hours	10:00p m - 5:00a m	48 Hours
Urgent	<ul style="list-style-type: none"> <li>• Repair errors that are immediately affecting Your use of Haivision VCMS</li> </ul>	No	Yes	30 Minutes	15 Minutes	Any Time	3 Hours



Type of Maintenance	Purpose	Write Functions Available	Read Functions Available	Maximum Time Per Month	Continuous Time in Mode (Max)	Window (Central Time)	Min Notice
Upgrades	<ul style="list-style-type: none"> <li>Perform upgrades on software or hardware elements necessary to the long term health or performance of Haivision VCMS, but which, due to their nature, require that certain components of Haivision VCMS to be shut down such that no access is possible</li> </ul>	No	No	1 Hour	1 Hour	12:00am - 4:00am M-F	5 Days

## 5. Credits for Downtime for the VCMS

Haivision Video Cloud will grant a credit allowance to You if You experience Downtime in any calendar month and you notify Haivision Video Cloud thereof within ten (10) business days after the end of such calendar month. In the case of any discrepancy between the Downtime as experienced by You and the Downtime as measured by Haivision Video Cloud, the Downtime as measured by Haivision Video Cloud shall be used to calculate any credit allowance set forth in this section. Such credit allowance shall be equal to the pro-rated charges of one-half day of Fees for each hour of Downtime or fraction thereof. The term “Downtime” shall mean the number of minutes that Standard Hosted Components are unavailable to You during a given calendar month below the availability levels thresholds in [Section 3](#), but shall not include any unavailability resulting from any of the exceptions noted in [Section 4](#). Within thirty (30) days after the end of any calendar month in which Downtime occurred below the availability levels thresholds in [Section 3](#), Haivision Video Cloud shall provide You with a written report detailing all instances of Downtime during the previous month. Any credit allowances accrued by You may be offset against any and all Fees owed to Haivision Video Cloud pursuant to the Agreement, provided that a maximum of one month of credit may be accrued per month.

## 6. Support Services for the VCMS

Support for Haivision Video Cloud Services as well as the Application Software (defined as the VCMS application software components that Haivision licenses for use in conjunction with the Video Cloud Services) can be reached at [hvc-techsupport@haivision.com](mailto:hvc-techsupport@haivision.com) and shall be available for all Your support requests. Haivision Video Cloud will provide 24x7 monitoring of the Standard Hosted Components.

Cases will be opened upon receipt of request or identification of issue, and incidents will be routed and addressed according to the following:

Severity Level	Error State Description	Status Response Within	Incident Resolution within
1 - Critical Priority	Renders Haivision VCMS inoperative or causes Haivision VCMS to fail catastrophically.	15 minutes	4 hours
2 - High Priority	Affects the operation of Haivision VCMS and materially degrades Your use of Haivision VCMS.	30 minutes	6 hours
3 - Medium Priority	Affects the operation of Haivision VCMS, but does not materially degrade Your use of Haivision VCMS.	2 hours	12 hours

Severity Level	Error State Description	Status Response Within	Incident Resolution within
4 - Low Priority	Causes only a minor impact on the operation of Haivision VCMS.	1 business day	3 business days

## 7. Service Levels for Haivision Streaming Media Service

Haivision agrees to provide a level of service demonstrating 99.9% Uptime. The Haivision Streaming Media Service will have no network Outages.

The following methodology will be employed to measure Streaming Media Service availability:

### Agents and Polling Frequency

- a. From six (6) geographically and network-diverse locations in major metropolitan areas, Haivision’s Streaming Media will simultaneously poll the domain identified on the Haivision Streaming Media network.
- b. The polling mechanism will perform a PING operation, sending a packet of data and waiting for a reply. Success of the PING operation is defined as a reply being received.
- c. Polling will occur at approximately 6-minute intervals.
- d. Based on the PING operation described in (b) above, the response will be assessed for the purpose of measuring Outages.

If an Outage is identified by this method, the customer will receive (as its sole remedy) a credit equivalent to the fees for the day in which the failure occurred.

Haivision reserves the right to limit Your use of the Haivision Streaming Media network in excess of Your committed usage in the event that Force Majeure events, defined in the Agreement, such as war, natural disaster or terrorist attack, result in extraordinary levels of traffic on the Haivision Streaming Media network.

## 8. Credits for Outages of Haivision Streaming Media Service

If the Haivision Streaming Media network fails to meet the above service level, You will receive (as your sole remedy) a credit equal to Your or such domain’s committed monthly service fee for the day in which the failure occurs, not to exceed 30 days of fees.

## 9. No Secondary End User Support

UNDER NO CIRCUMSTANCES MAY YOU PROVIDE CONTACT INFORMATION FOR HAIVISION SERVICES TO CUSTOMERS OR AUDIENCE MEMBERS OR OTHER THIRD PARTIES WITHOUT HAIVISION’S EXPRESS PRIOR WRITTEN CONSENT.

## Getting Help

<p><b>General Support</b></p>	<p>North America (Toll-Free)  <b>1 (877) 224-5445</b></p> <p>International  <b>1 (514) 334-5445</b></p> <p><i>and choose from the following:</i>  Sales - 1, Cloud Services - 3, Support - 4</p>
<p><b>Managed Services</b></p>	<p>U.S. and International  1 (512) 220-3463</p>
<p><b>Fax</b></p>	<p>1 (514) 334-0088</p>
<p><b>Support Portal</b></p>	<p><a href="https://support.haivision.com">https://support.haivision.com</a></p>
<p><b>Product Information</b></p>	<p><a href="mailto:info@haivision.com">info@haivision.com</a></p>

