HAIVISION

Makito X Decoder 2.2

User's Guide

HVS-ID-UG-MAKX-DEC-22

Edition Notice

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Contents

About This Document

Conventions

The following conventions are used to help clarify the content.

Typographic Conventions and Elements

Italics	Used for the introduction of new terminology, for words being used in a different context, and for placeholder or variable text.
bold	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, **File** > **New** 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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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

Version 2.2 of the Makito X introduces the following new feature:

Multi-Channel Synchronization

Multi-channel Sync (or MultiSync) allows multiple decoders to synchronize their video outputs so that multiple live content streams can be played to within one frame period across all channels. See Multi-channel Synchronization.

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.

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.

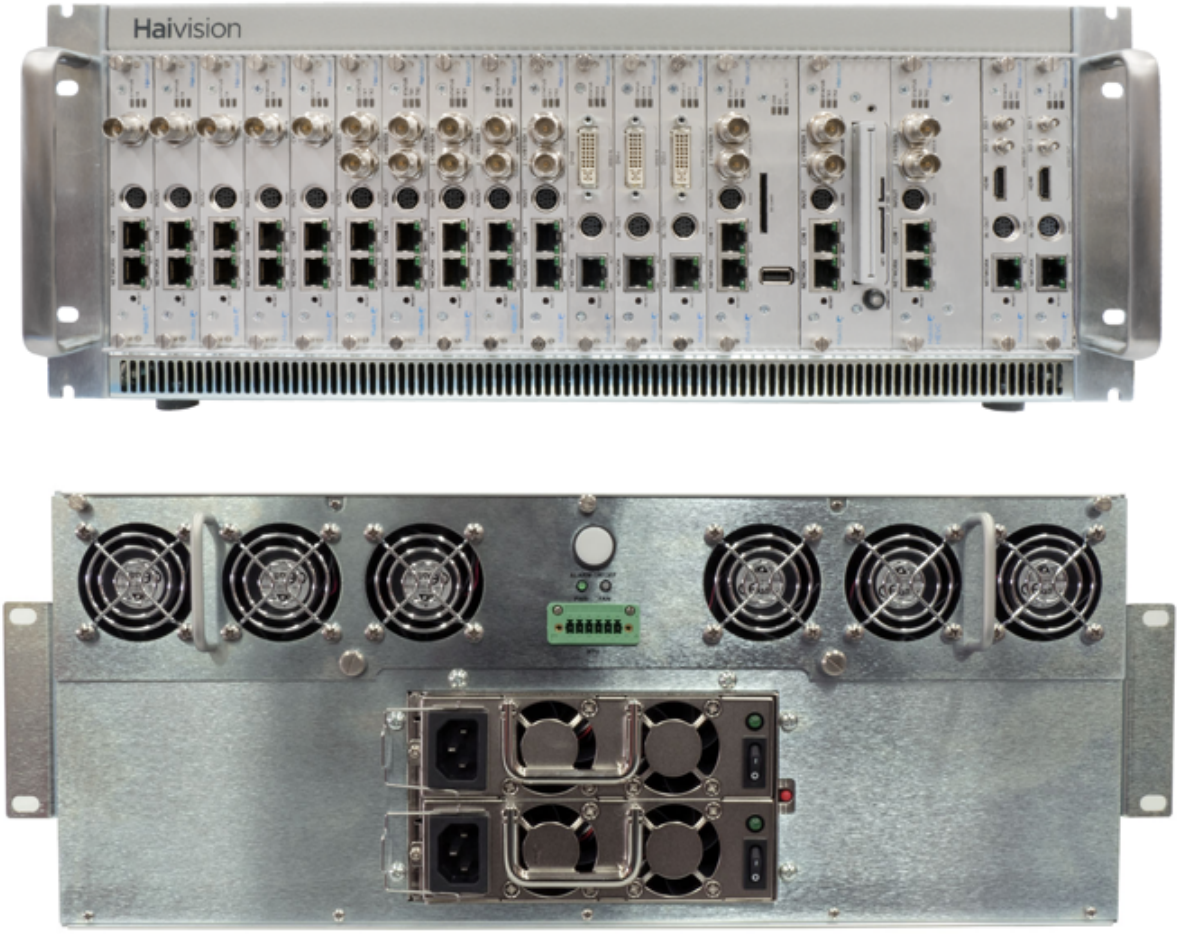
Makito X Decoder (Single-Height Chassis Front and Rear Views)

*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.

Related Topics

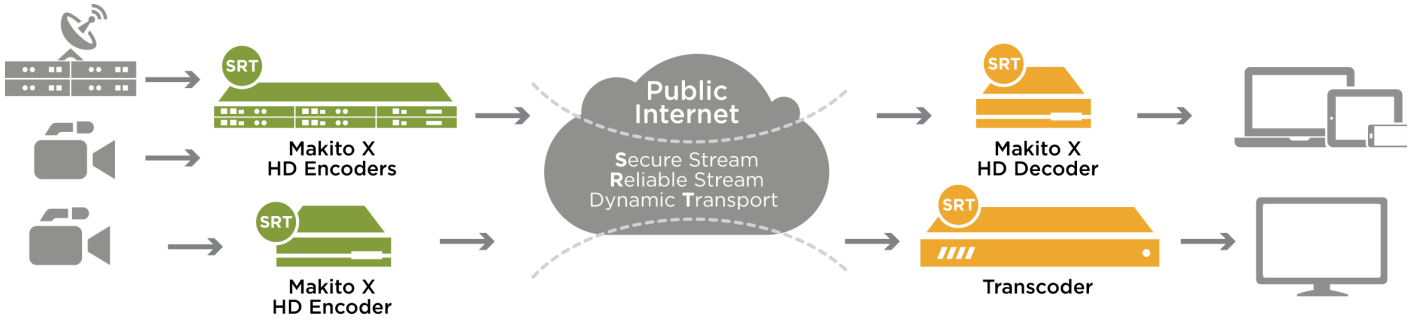
- Chassis Styles

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 a 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.

System Interfaces

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

- Connecting the Decoder to the Network

Audio/Video Interfaces

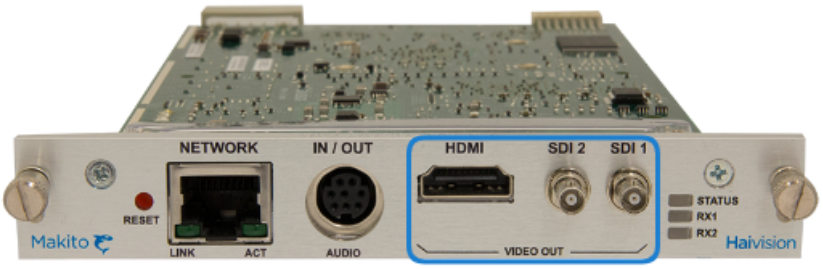
Note

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).

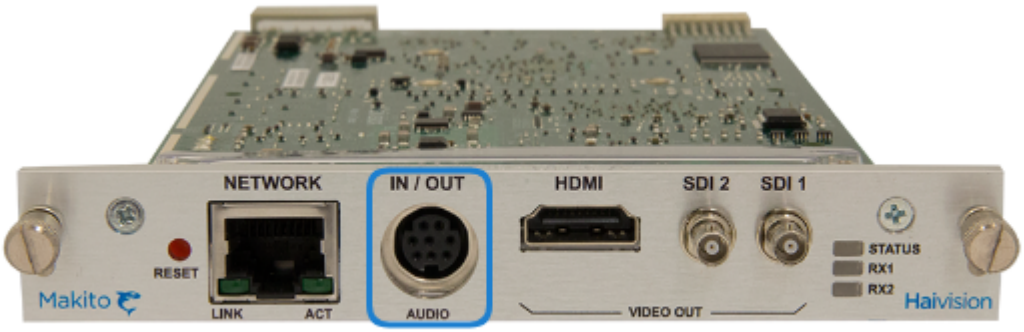
Related Topics

- 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: • Decoder booting • No video stream is being decoded • No audio stream is being decoded
		Green Solid	When all the conditions below are met: • A video stream is being decoded • An audio stream is being decoded

General | Network Port

Network Port

Function	Color	Description	Indication
LINK	Green	Off	Not connected
		Green Blinking once per second	Connected at 10 Mbps

Function	Color	Description	Indication
		Green Blinking twice per second	Connected at 100 Mbps
		Green Blinking three times per second	Connected at 1000 Mbps
ACT	Green	Off	No Acitvity
		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

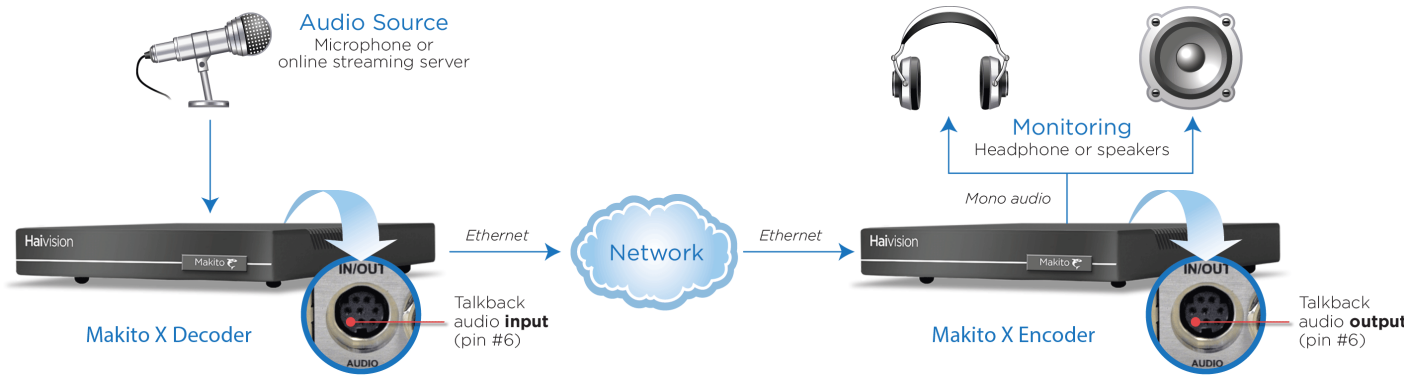
- Powering Up the Decoder

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 X Harsh decoder, please refer to the *Makito X Harsh Installation Guide* (available on the InfoCenter at http://doc.haivision.com).
For the steps to install the MB6 or MB21 chassis, please refer to the MB6 and MB21 Chassis Installation Guide.

Topics in This Chapter

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 *MB6 and MB21 Multichannel Chassis Installation Guide*.

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.

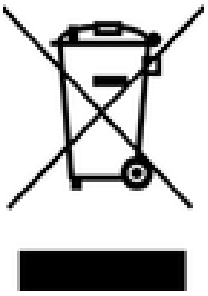
Safety instructions for Class A for CISPR32

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.

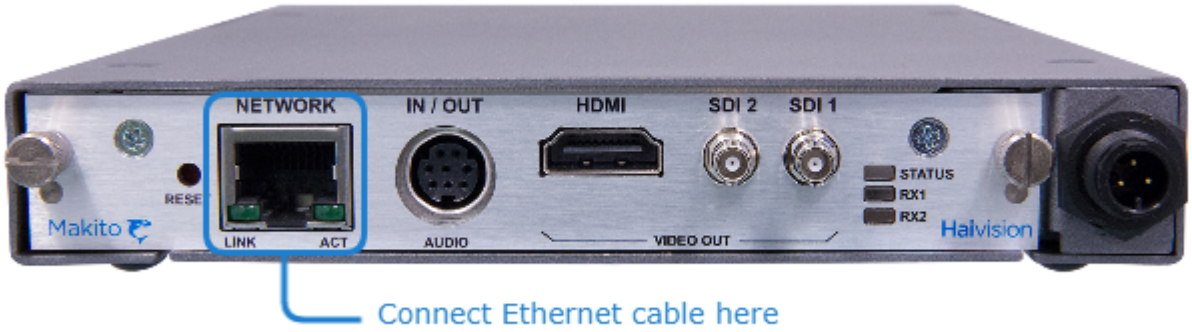
Waste Electrical and Electronic Equipment (WEEE) Disposal

	This symbol on Haivision products or packaging means that the product should not be disposed of with general waste. It is your responsibility to dispose of your waste equipment by handing it over to a designated recycling collection point. The correct disposal of your end-of-life equipment will help prevent potential negative consequences to the environment and human health. In accordance with the European Union (EU) WEEE Directive, Haivision products that fall within the scope of the WEEE, are labeled with the above symbol, and customers are encouraged to responsibly recycle their equipment at the time of disposal. Haivision also offers its customers the option of returning Haivision equipment to facilitate its environmentally sound disposal. For more information, please visit our website at: **https://www.haivision.com/environment**.

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.



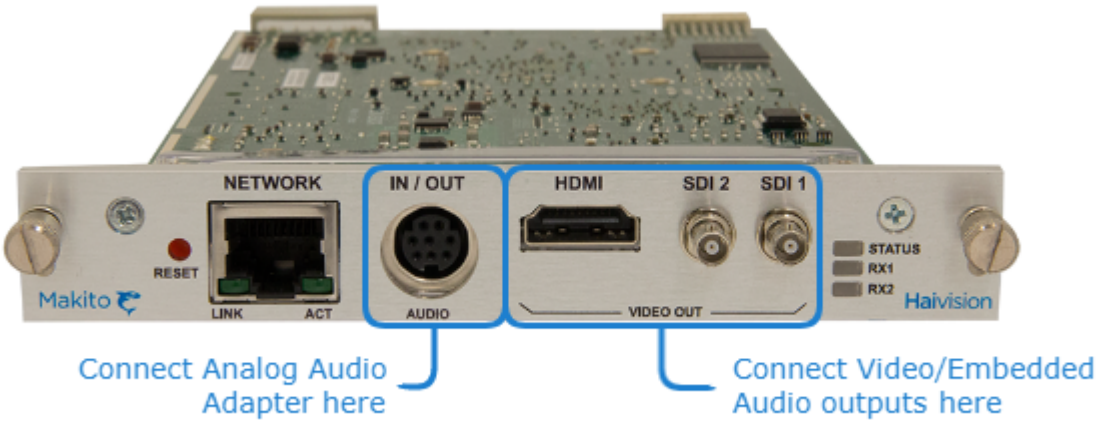
Related Topics

- System Interfaces

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

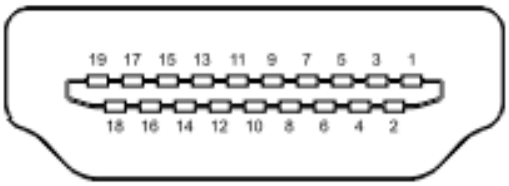
Refer to **Audio Connector Pinout** for the balanced/unbalanced audio pinout.

> **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



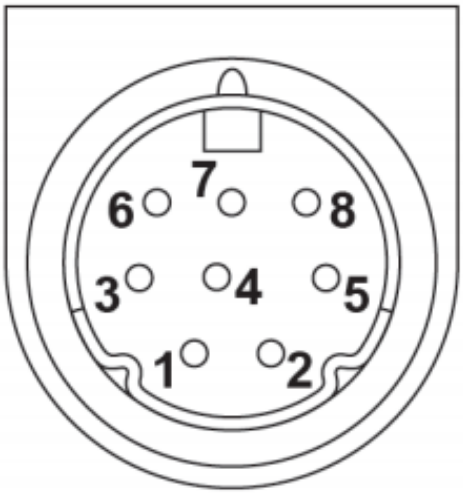
Related Topics

- Connecting the Decoder to A/V Displays
- Connecting the Decoder to A/V Displays

Audio Connector Pinout

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

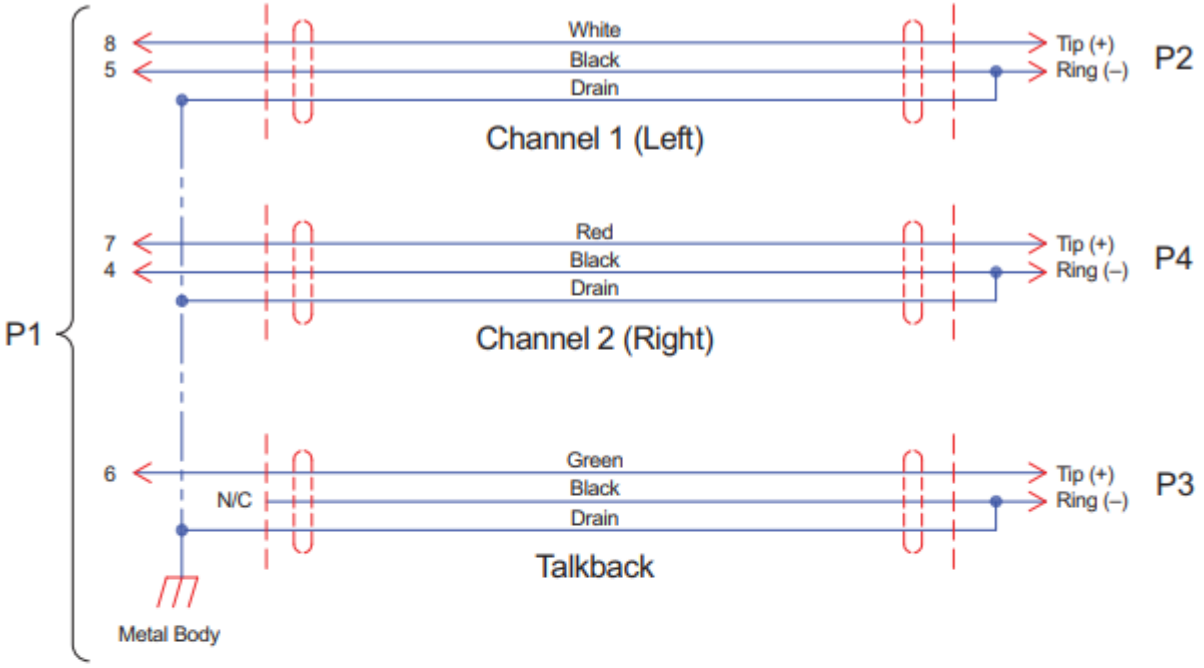
Pin #	Description
1	Reserved/Not Connected
2	Reserved/Not Connected
3	Reserved/Not Connected
4	Channel 2/Right Negative Signal
5	Channel 1/Left Negative Signal
6	Talkback Positive Signal
7	Channel 2/Right Positive Signal
8	Channel 1/Left Positive Signal

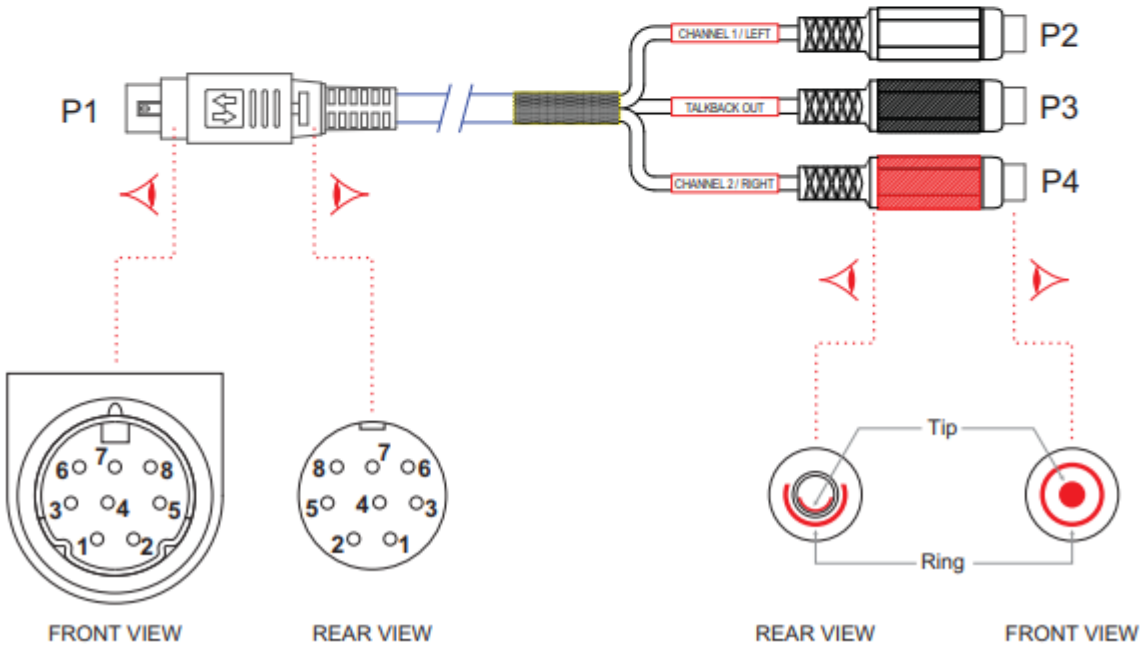


Related Topics

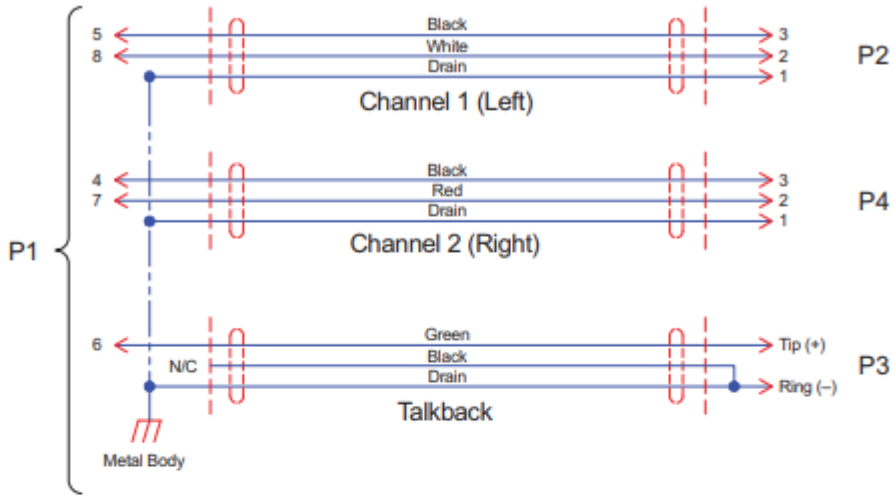
- Connecting the Decoder to A/V Displays
- Unbalanced Audio Connections
- Balanced Audio Connections

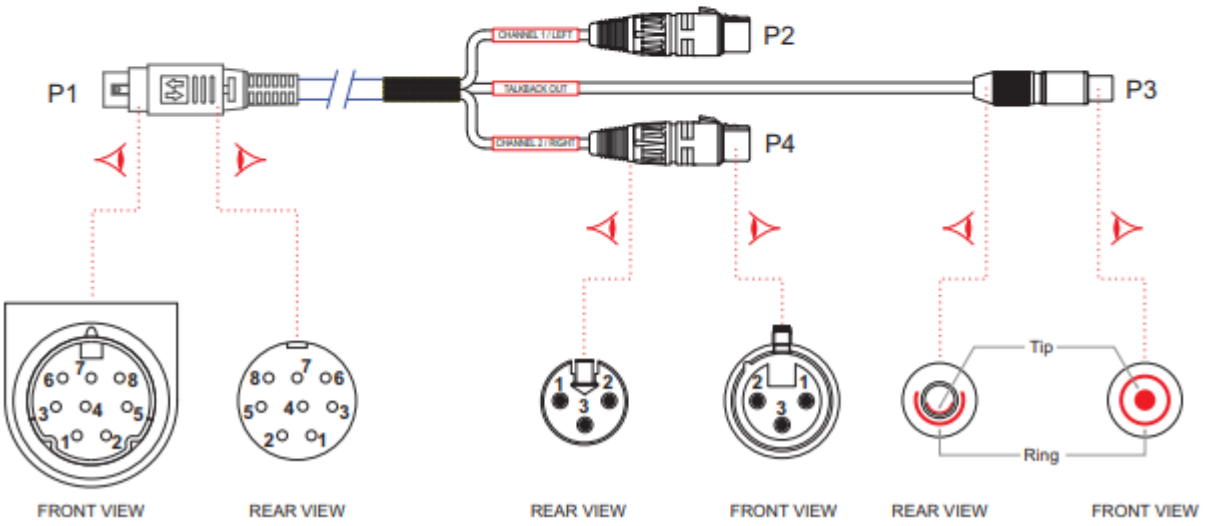
Unbalanced Audio Connections





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 • 2 channels output • 1 channel input for talkback support (future use) Included in the package (shown in **Connecting the Decoder to A/V Displays**).	CA-292-2RTB
Audio Breakout Cable, Balanced	Balanced mini-DIN 8 to XLR Female • 2 channels ouput • 1 RCA female channel input for talkback support (future use) May be ordered from Haivision. Please contact your sales representative or email Haivision at: **sales@haivision.com**	CA-292-2XFTB
Audio Breakout Cable, Balanced	Balanced mini-DIN 8 to XLR Male • 2 channels output • 1 RCA female channel input for talkback support (future use) May be ordered from Haivision. Please contact your sales representative or email Haivision at: **sales@haivision.com**	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

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

- A **Power Reset** is equivalent to simply powering the unit off and on.
- A **Factory Reset** powers the unit off and on, and returns the 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 configurations, modified passwords, and decoding settings), and all settings are returned to their factory preset conditions (including the IP address).

To reset the decoder:

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

2. **Power Reset:** For a power reset, press the micro switch (you will feel the button depress) for at least one second and release. Be sure to release the button in less than 5 seconds. This resets the unit.
   -or-
3. **Factory Reset:** To reset the decoder to its factory default settings, press the micro switch (you will feel the button depress) and hold for five (5) seconds.

   The decoder will reboot on its own. 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.

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

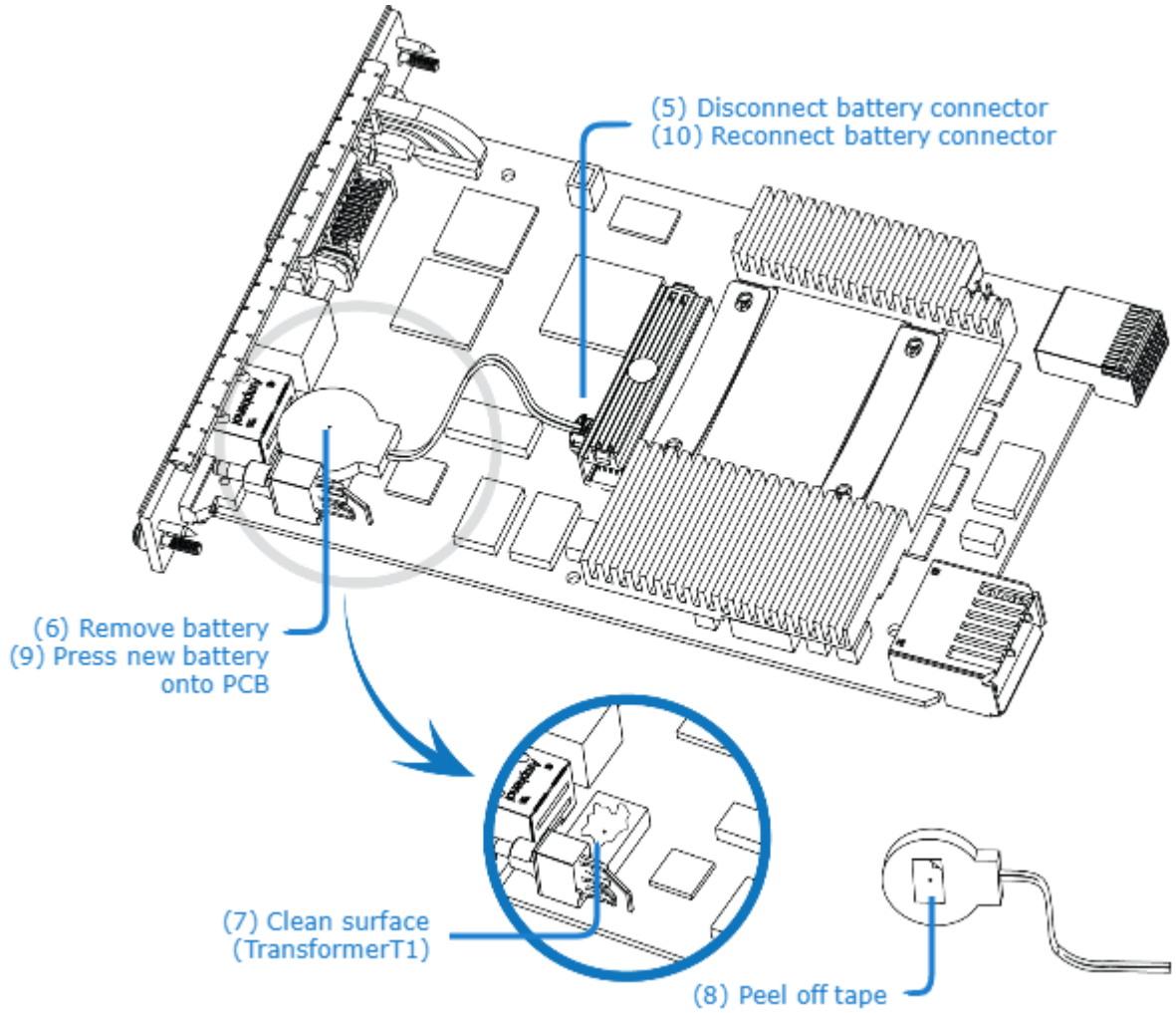
The RTC battery needs to be replaced if at a power-cycle event, the system time and date are reset to within 24 hours, depending on your time zone, of January 1, 1970 (Coordinated Universal Time, UTC).

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

Note

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.

Topics in This Chapter

Management Overview

Note

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

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.

Using the Web Interface

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.

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

Using the CLI

Management via the CLI is possible through a telnet session or SSH.

For a list and description of the CLI commands to configure and manage the Makito X decoder, see CLI Command Reference.

SNMP-based Management

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

For information on SNMP management of the Makito X decoder, see **Using SNMP to Configure A/V Sources**.

Accessing the Decoder

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 *not* 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
Operation			
Streams	Read-only	Yes	Yes
Video Decoder	Read-only	Yes	Yes
Audio Decoder	Read-only	Yes	Yes

Administration			
Network Configuration	-	-	Yes
System Status	Read-only	Yes	Yes
(Configuration) Presets	-	Yes	Yes
Firmware Upgrades	-	-	Yes
Services	-	-	Yes
Licensing	-	-	Yes
Still Images	-	-	Yes
Security			
My Account/Accounts	Yes[1]	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* document (available from the Download Center on the Haivision Support Portal) for the default login 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.

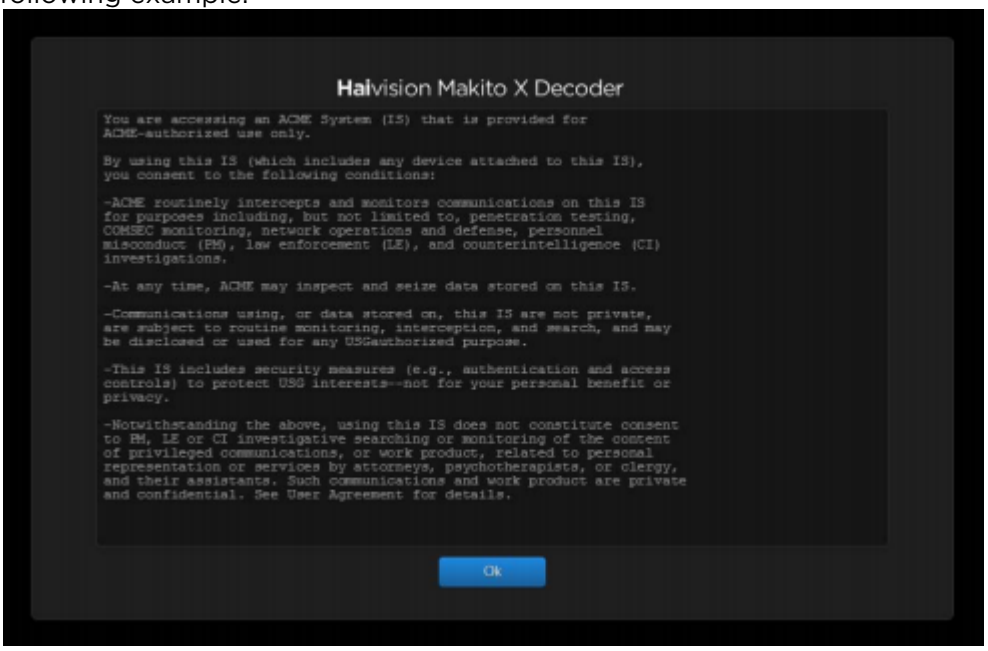
Related Topics

- CLI Access Control

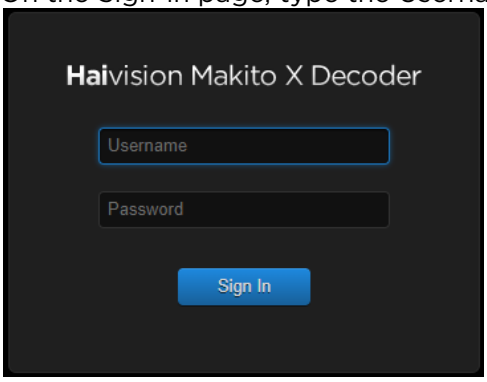
Signing In to the Web Interface

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* document (available from the **Download Center** on the Haivision Support Portal) for the default login credentials.
Makito X provides three pre-defined user accounts. For information, see **Role-based Authorization**.

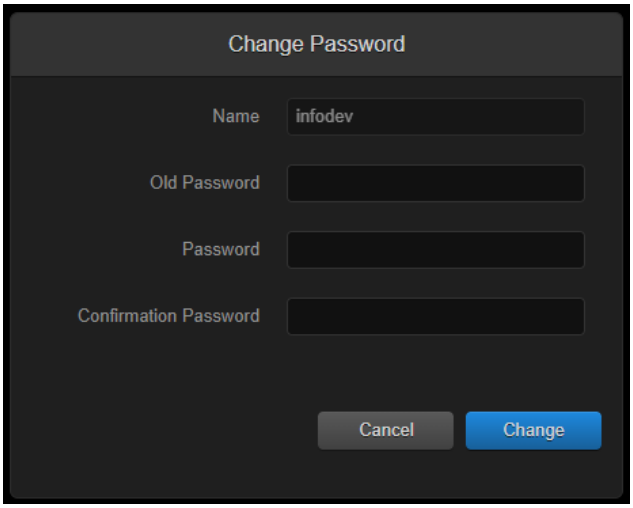
Exploring the Web Interface

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.

Changing Your Password

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).



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.

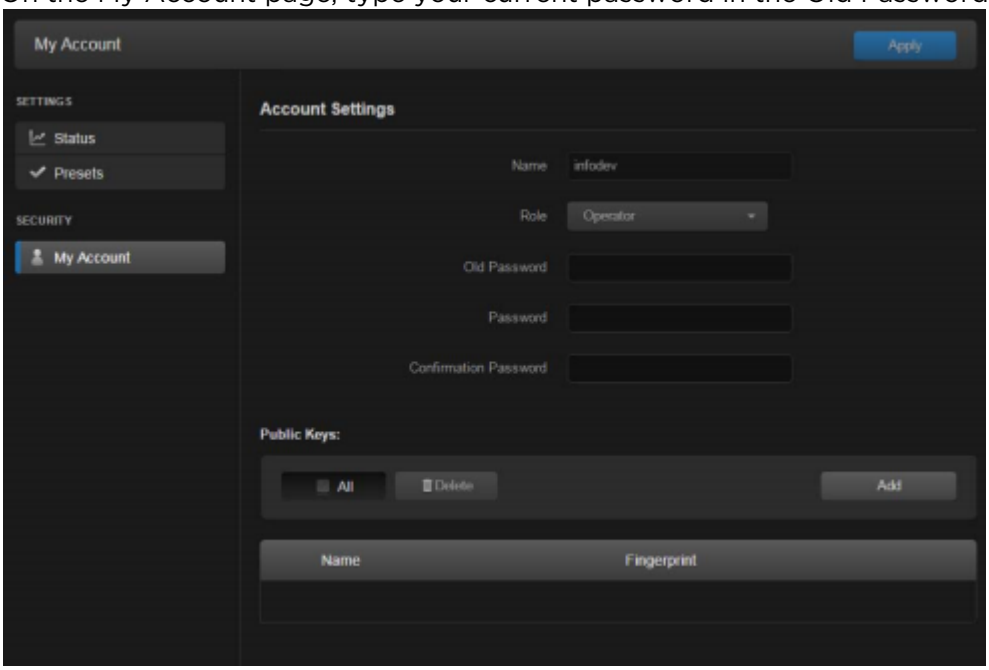
Note

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.



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

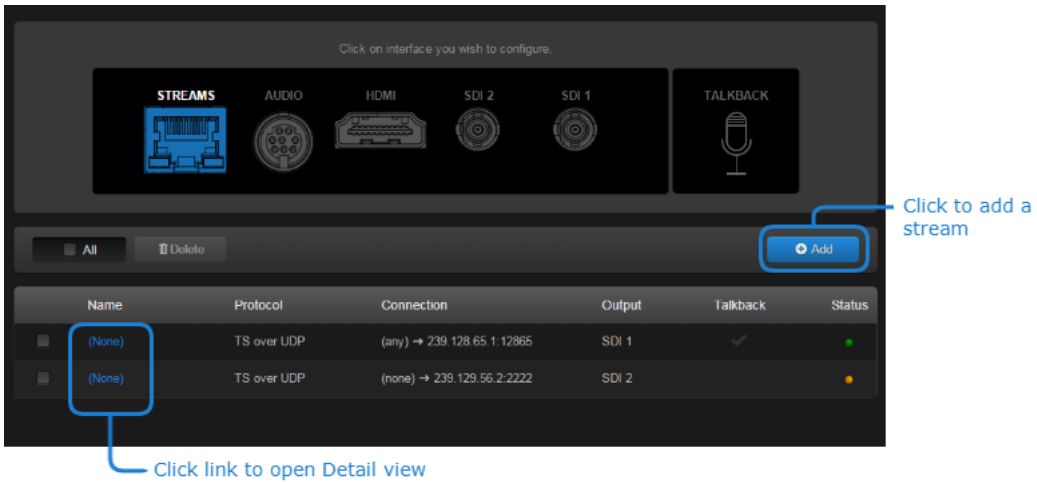
The Makito X decoder provides a Streams List View and separate Detail Views for creating and configuring streams to map the decoder inputs to output interfaces.

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

The following LEDs (gray, yellow and green) 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 Connection information is:

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

where:

`SenderIP`	Can be any, none, hostname, or a unicast IP 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.

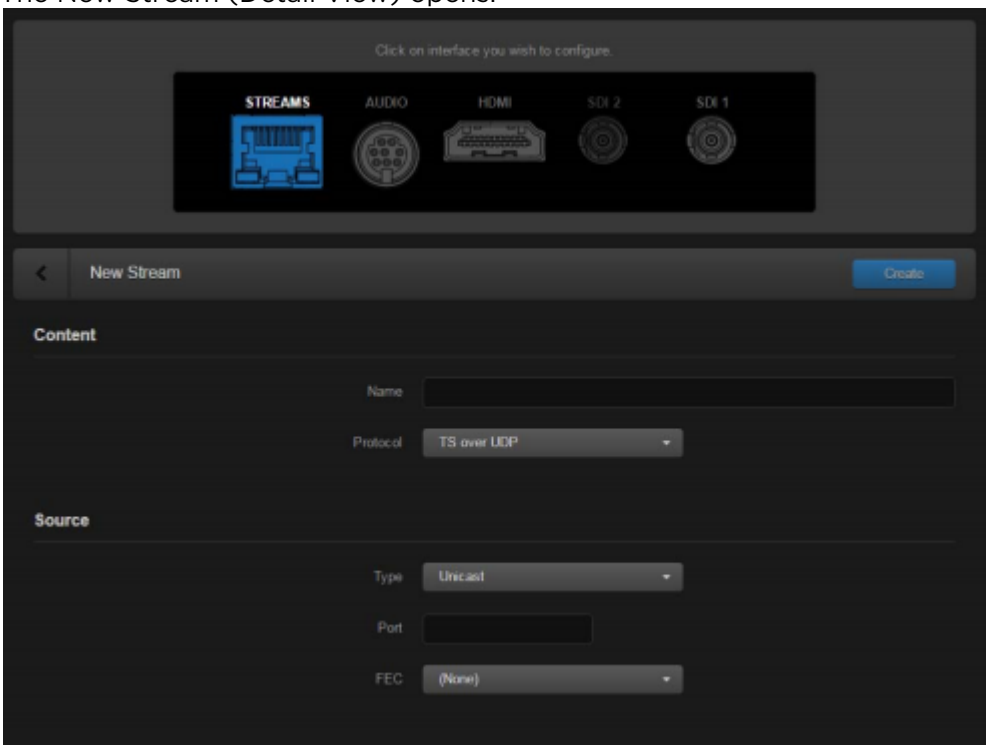
RecvPort	Is the UDP port on which the decoder is receiving the stream.

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.

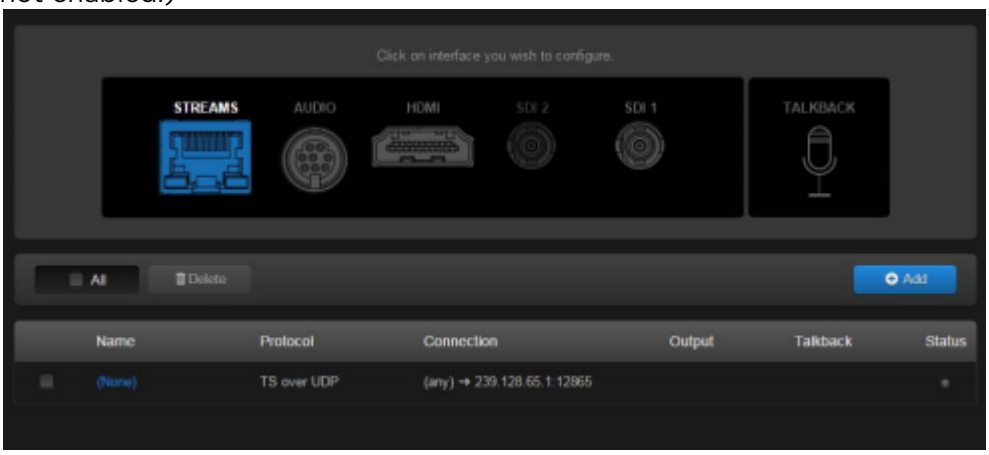
> **Note**
>
> The Multicast address range is from `224.0.0.0` to `239.255.255.255`. Multicast addresses from `224.0.0.0` to `224.0.0.255` are reserved for multicast maintenance protocols and should not be used by streaming sessions. We recommend that you use a multicast address from the Organization-Local scope (`239.192.0.0/14`).

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

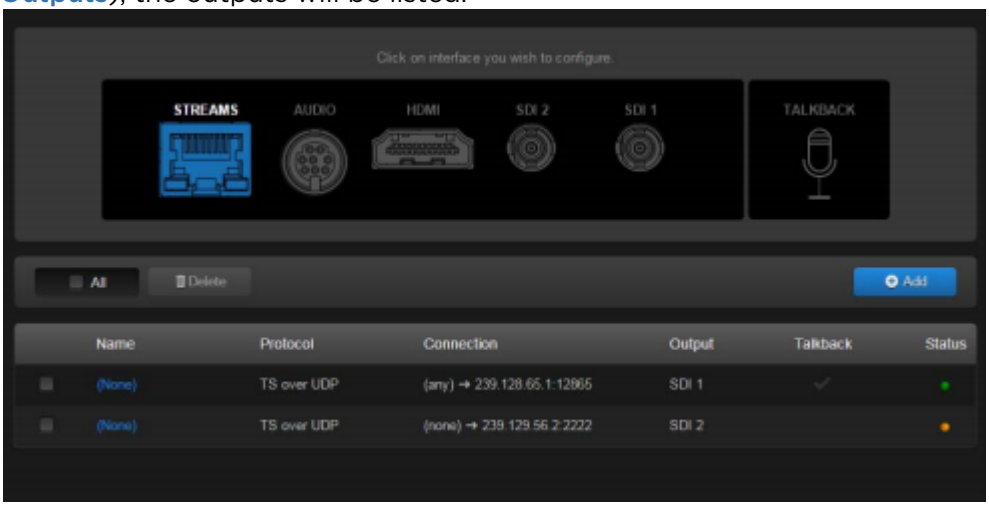
> **Tip**
>
> Intra-refresh (video encoding support) requires that the decoder and streams be started first.

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:

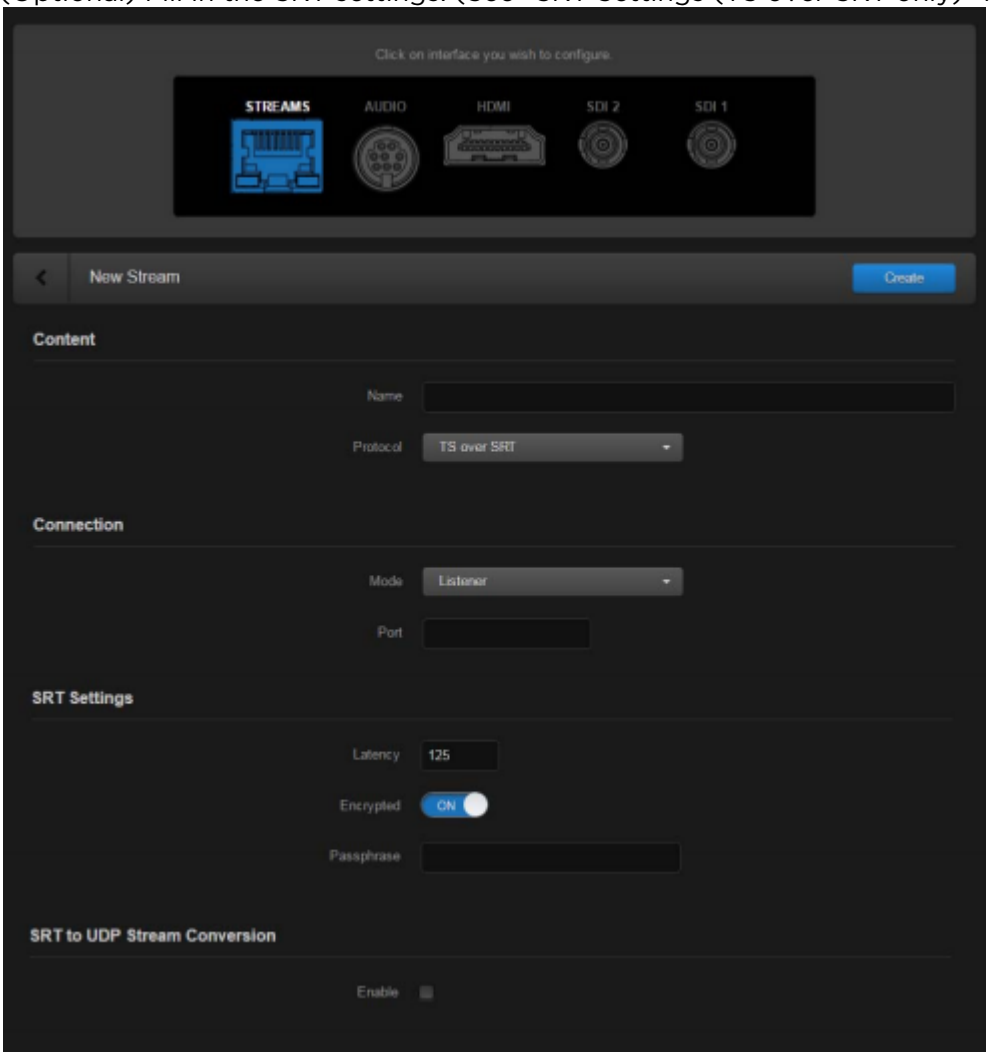
1. From the Streams List View, click a link in the table to open the Streams Detail View.
2. Select or enter the new value(s) in the appropriate field(s). For details see **Stream Settings**.
3. To apply your changes, click **Apply**.
4. To return to the Streams List View, click the ‹ (**Back**) button.

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)**.

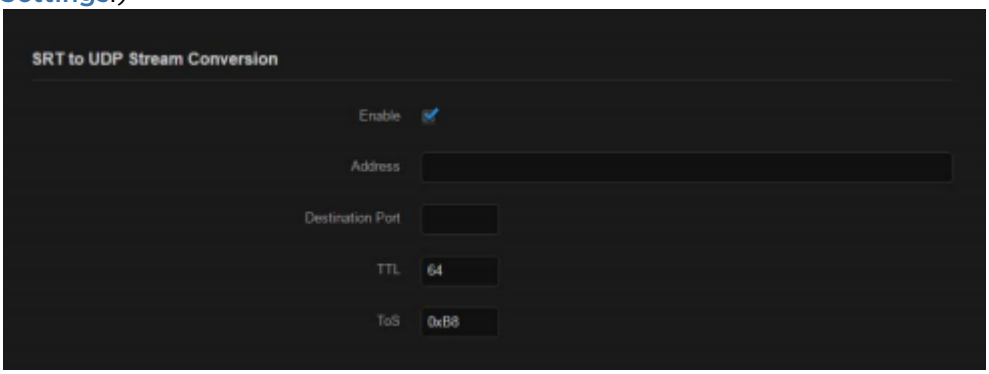
To create an SRT connection:

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.)



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**.

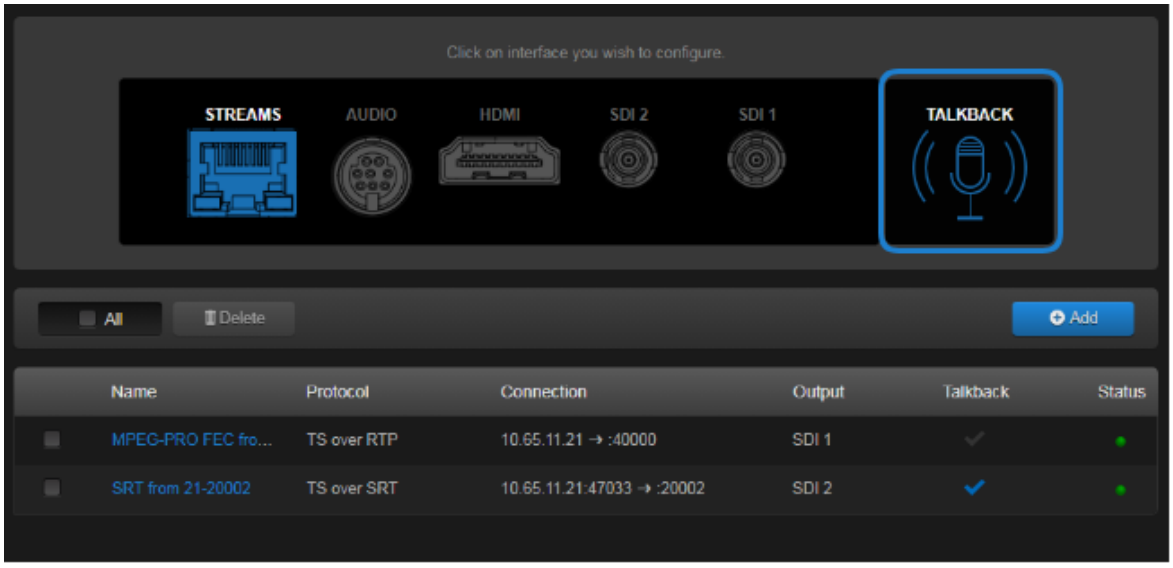
If Talkback is enabled on your system, you will see the **Talkback** button on the Streams List View (as shown in the following figure).

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.



3. 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
Protocol	TS over UDP	Select the Encapsulation Protocol type for the decoded stream. • TS over UDP: MPEG transport stream over UDP (no RTP header) • TS over RTP: MPEG2 transport stream over RTP • TS over SRT: Haivision's Secure Reliable Transport (see Secure Reliable Transport (SRT) • RTSP: Real Time Streaming Protocol (RFC2326) with control over RTSP. **Note** RTSP stream ingest is supported to provide interoperability with Makito Classic Encoders and Axis Cameras/ Encoders.
Statistics	N/A	Click to view statistics for the stream. See Stream Statistics.

Content Source

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

Setting	Default	Description/Values
Type	Unicast	Select the Stream Type for the decoded stream. • Unicast • Multicast
Multicast Address	N/A	(Multicast streams only) Enter the multicast IP address in dotted-decimal format.
Source Address	N/A	(Multicast streams only) The Source Address specifies where the multicast stream is coming from (i.e., what address is broadcasting). 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).

Setting	Default	Description/Values
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.
FEC	None	(Optional) Enable Forward Error Correction (FEC). Select either: • (None) • VF (TS over UDP only) • Pro-MPEG FEC (TS over RTP only) **Note** VF FEC is a proprietary FEC and is not interoperable with devices outside of the Haivision family. 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.

Setting	Default	Description/Values
RTSP URL	N/A	(RTSP streams only) Enter the RTSP address in the form: `addr=rtsp://user:password@ip.add.re.ss/path?var=value& var2=value2...` For example: rtsp://10.70.5.95/axis-media/media.amp?videocodec=h264&resolution=1280x720

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): • Caller: The decoder acts like an SRT caller and connects to a server listening and waiting for an incoming call. • Listener: The decoder acts like an SRT listener and listens for a server to connect to it. • 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.
Address	n/a	(Caller and Rendezvous Connection modes) Specifies the destination IP address for the SRT stream.
Source Port	Auto-Assign	**Note** This simplifies firewall configuration as the firewall/NAT rules can be precisely tailored to the SRT stream.
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	Specifies how long the decoder will buffer received packets. **Note** The SRT buffer, configured as "Latency"", is the time reserved in the decoder to recover missing packets. 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 *SRT Deployment Guide* (available from the **Download Center** on the Haivision Support Portal) for tuning guidance.
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

Connection SRT Settings SRT to UDP Stream Conversion

SRT to UDP Stream Conversion

Setting	Default	Description/Values
Enable	Disabled	**Note** 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.
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	(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. Range = `1..255`

Setting	Default	Description/Values
ToS	184 or 0xB8	(Type of Service) Specifies the desired quality of service (QoS). This value will be assigned to the Type of Service field of the IP Header for the outgoing streams. Range = `0..255` (decimal) or `0x00..0xFF` (hex) **Important** 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. **Note** 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.

Stream Statistics

The following table lists the Stream statistics:

General SRT SRT Graph Pro-MPEG FEC

General

Statistic	Description/Values
Stream	
ID	The stream number (in sequence on the list).
Name	The stream name.
Statistics	
Encapsulation	The active streaming protocol.
State	The current operating status of the stream, either: • STREAMING • STOPPED • PAUSED
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.
Errors	
MPEG2TS Lost Packets	Number of RTP or UDP lost packets.
Received Errors	Number of errors received for that stream.
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.
Reset	Click to reset the Stream statistics.

General SRT SRT Graph Pro-MPEG FEC

SRT

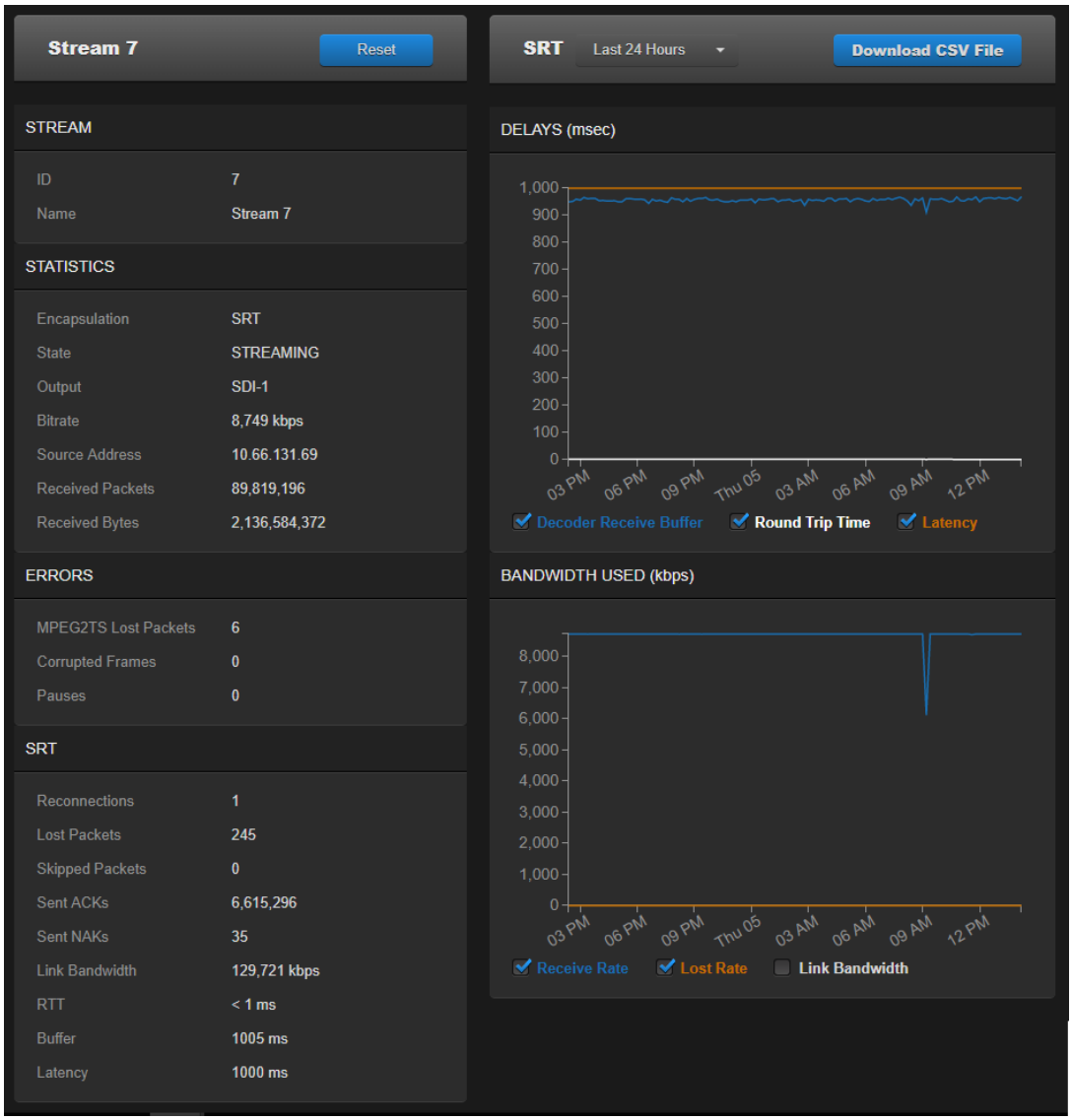
Statistic	Description/Values
Reconnections	Number of reconnections since the stream started. Severe network congestion may cause the connection to drop and automatically reconnect.

Statistic	Description/Values
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	**Note** 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.
Skipped Packets	**Note** 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). • If this statistic increments slowly, the best thing to do is increase the SRT Latency. • 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.
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	Decoder buffer in milliseconds. **Tip** 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. If the Buffer occasionally goes to 0, then the SRT Latency should be increased.
Latency	Maximum of the decoder and encoder configured Latency. For example: Encoder Configured SRT Latency = 750 ms Decoder Configured SRT Latency = 20 ms The SRT Stats Latency (which is the current SRT connection applied Buffering Latency) = 750 (largest of the two). At startup, handshake exchanges the value configured on both sides and the largest one is selected. The decoder default is set to the minimum (20ms) so it can be completely controlled from the encoder side.
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.

General SRT SRT Graph Pro-MPEG FEC

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-todate 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.

General SRT SRT Graph Pro-MPEG FEC

Pro-MPEG FEC

Statistic	Description/Values
Level	The level of FEC protection: • A (Column only): uses the column FEC stream. • B (Row and Column): uses both column and row FEC streams.
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: • Yes: Sequential columns within a group start on the same row. • No: Each column starts on the row below the row on which the previous column started.

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).

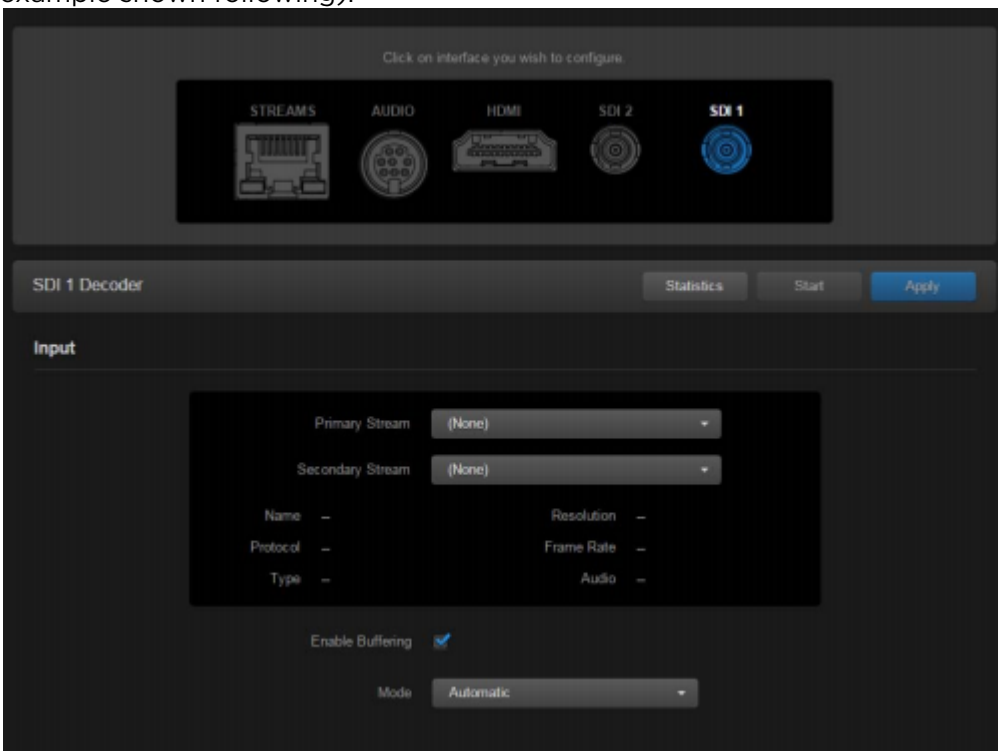
Note

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.

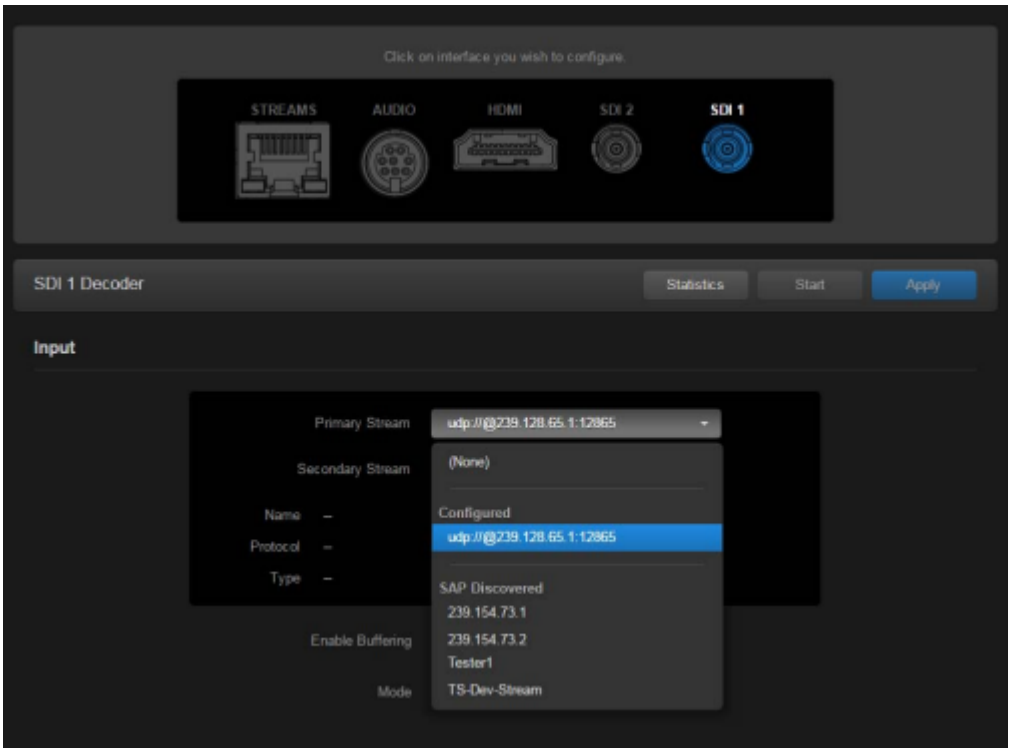
Configuring the SDI Decoder Output

To display the SDI Decoder Settings:

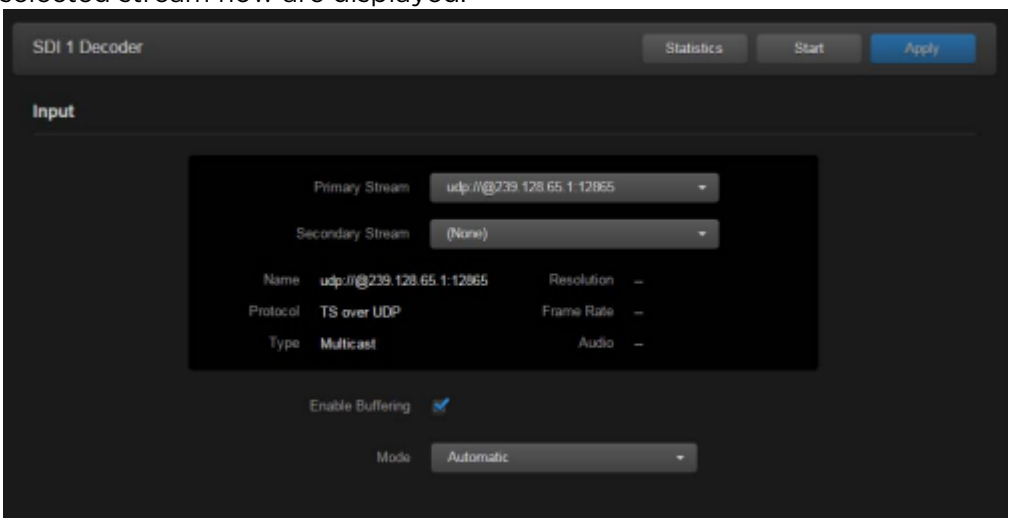
1. Click **SDI 1** or **SDI 2** from the output interface bar.
   The SDI 1 or SDI 2 Decoder page opens, displaying the current video decoding settings (SDI 1 example shown following).



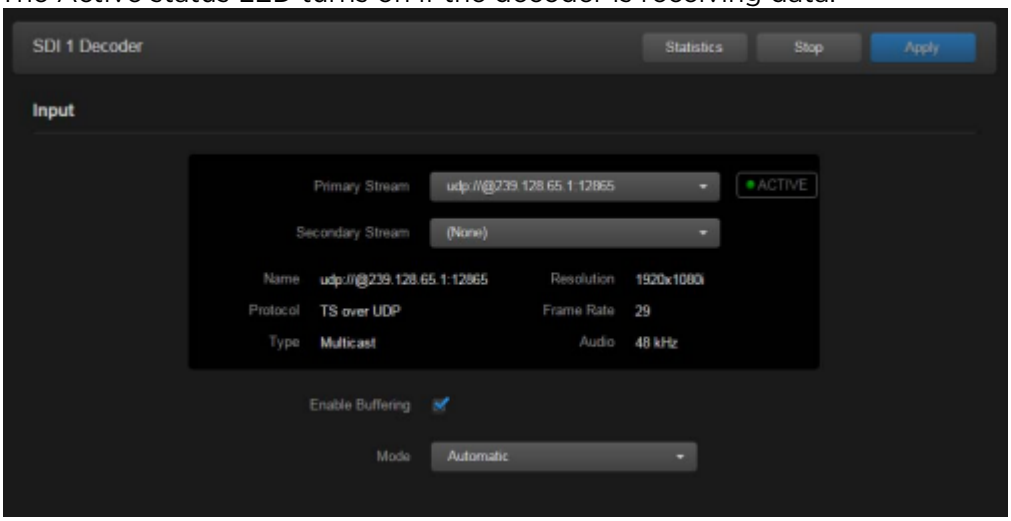
2. Under Input, select the Primary input stream from the drop-down list of the stream(s) you have created or “SAP Discovered” if SAP listening is enabled.



The Name, Protocol, Type, incoming Resolution, Frame Rate, and Audio Sampling Rate for the selected stream now are displayed.



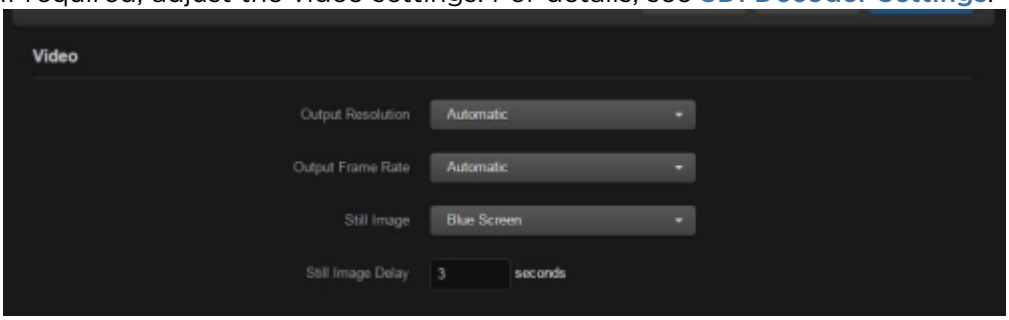
3. To start decoding, click **Start**.
   The Active status LED turns on if the decoder is receiving data.



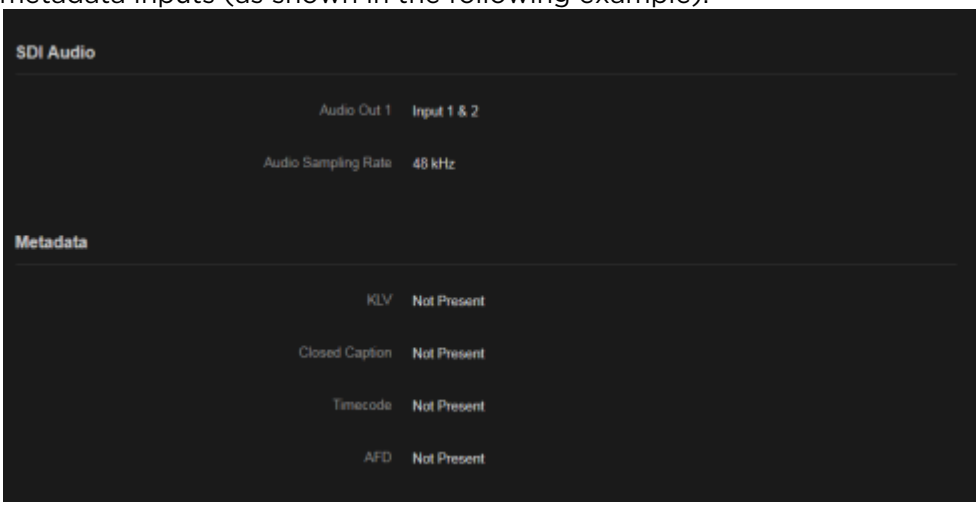
4. **Note**

   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.

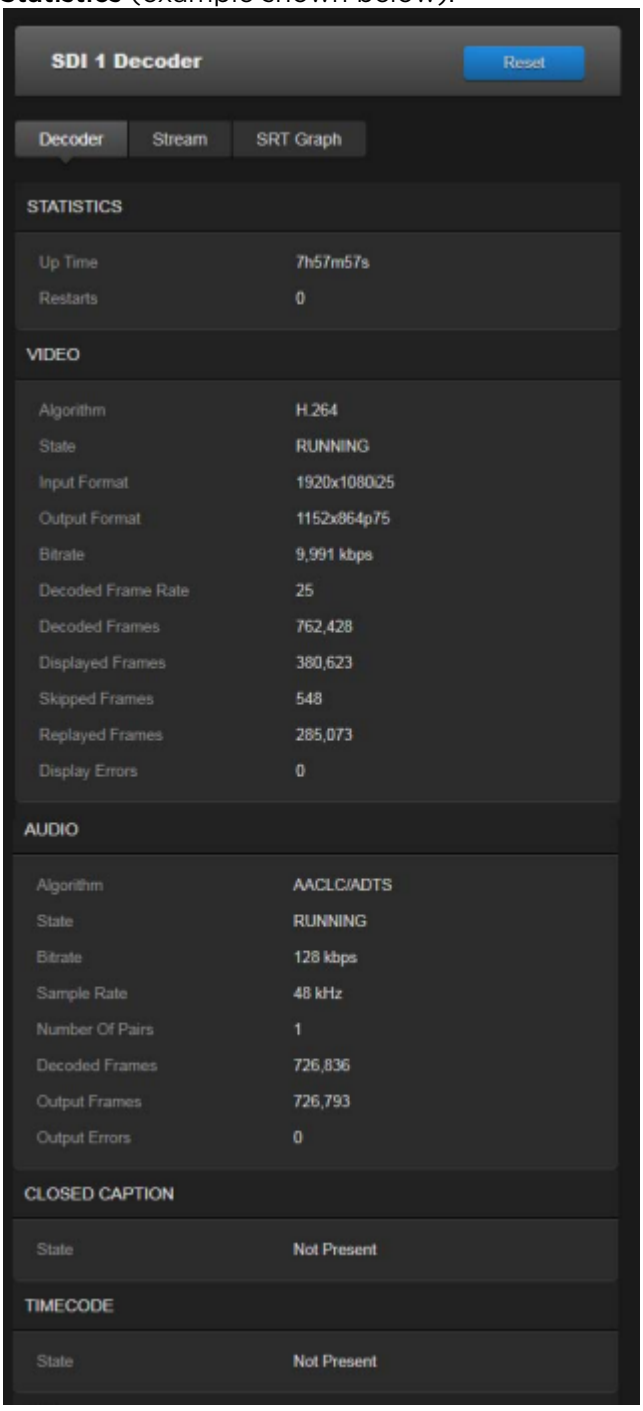
5. If required, adjust the video settings. For details, see SDI Decoder Settings.



6. 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).



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



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 are the basic 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)

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)

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)

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)

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=3,11 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)

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 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 **Setting Up Decoder Streams**.
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 `i` or `p`).
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	Check or clear this checkbox to enable or disable buffering (see **Mode** below). **Note** 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.

Setting	Default	Description/Values
Mode	Automatic	(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. • **Note** The added delay will not decrease with time even if the video jitter disappears. 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. • Fixed: 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. (See Delay below.) **Note** 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. • **Note** Audio artifacts may occur if audio is streamed after video when using Adaptive Low Latency. 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. • MultiSync: 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 Multi-channel Synchronization.

Setting	Default	Description/Values
Delay	`0` ms	(Enable Buffering must be checked and Mode must be Fixed) The delay in ms when using buffering in Fixed mode. Range = `0…2000` ms **Note** 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.
MultiSync Delay	`1000` ms	(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 **Note** The difference in the values between the decoder channels cannot exceed 2000 ms.

Input Video

Video

Setting	Default	Description/Values
Output Resolution	Automatic	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. • **Note** Attempts to up/down-scale incoming video that is not supported to a nearest or best matching supported resolution. • 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. • TV Resolutions: 1920x1080p…720x480i • Computer Resolutions: 1920x1200… 640x480

Setting	Default	Description/Values
Output Frame Rate	Automatic	The frame rate per second generated for the displays: • Automatic: The decoder will select the best display frame rate based on the stream parameters and the connected display's capabilities. • 75, 60, 59, 50, 30, 29, 25, 24 or 23 **Note** 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.
Still Image	Freeze	The type of static image to display when the decoder is not receiving a video stream. • Freeze: continues to display the last decoded video frame. • Black Screen: displays a black screen. • Blue Screen: displays a blue screen. • Color Bars: displays a series of vertical color bars across the width of the display. • Mute: disables the video output. • 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 Configuring Still Image Streaming. **Note** When the still image is substituted on the display outputs, the video frame rate and resolution will be maintained.
Still Image Delay	3	The delay in seconds before the still image is displayed. Range = `1…1000` seconds

Video Decoder Statistics

The following tables list the SDI1 and SDI2 Decoder statistics:

Statistics & Video Decoder | Video Output | Audio Decoder & Output

Statistics & Video Decoder

Statistic	Description/Values
Statistics	
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.
Video Decoder	
Algorithm	The compression algorithm detected in the decoded stream, either: • AVC/H.264 • HEVC/H.265 • MPEG2 • Invalid (the video compression algorithm is not recognized)
State	The current operating status of the decoder, either: • INACTIVE: Decoder has not been started • RUNNING: Decoder is currently running with signal • INVALID: Decoder is currently running with no signal
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)
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	**Tip** Video frames are complete pictures sent in a cascade for display at a distinct point in time. See Decoded Audio Frames.
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.

Statistic	Description/Values
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	**Tip** 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.
Display Errors	The number of display errors.

Statistics & Video Decoder | Video Output | Audio Decoder & Output

Audio Decoder & Output

Statistic	Description/Values
Algorithm	The audio compression algorithm, either: • AACLC / ADTS: decodes audio using the ISO/IEC 14496-3 MPEG-4 AAC-LC algorithm with ADTS headers. • AAC-LC / LATM: decodes audio using the 14496-3 MPEG4 AAC-LC algorithm with LOAS/LATM headers. • MPEG1 Layer 1/2/3 (ISO/IEC 11172-3) designated as MP1, MP2 and MP3, respectively.
State	The current operating status of the decoder, either: • RUNNNG • STOPPED
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 pairs played as surround sound over the HDMI interface.
Decoded Frames	**Tip** Audio frames are same-sized groups of audio samples to be played back. See Decoded Video Frames.
Audio Output	
Output Frames	The number of audio frames output.
Skipped Frames	The number of skipped audio frames.

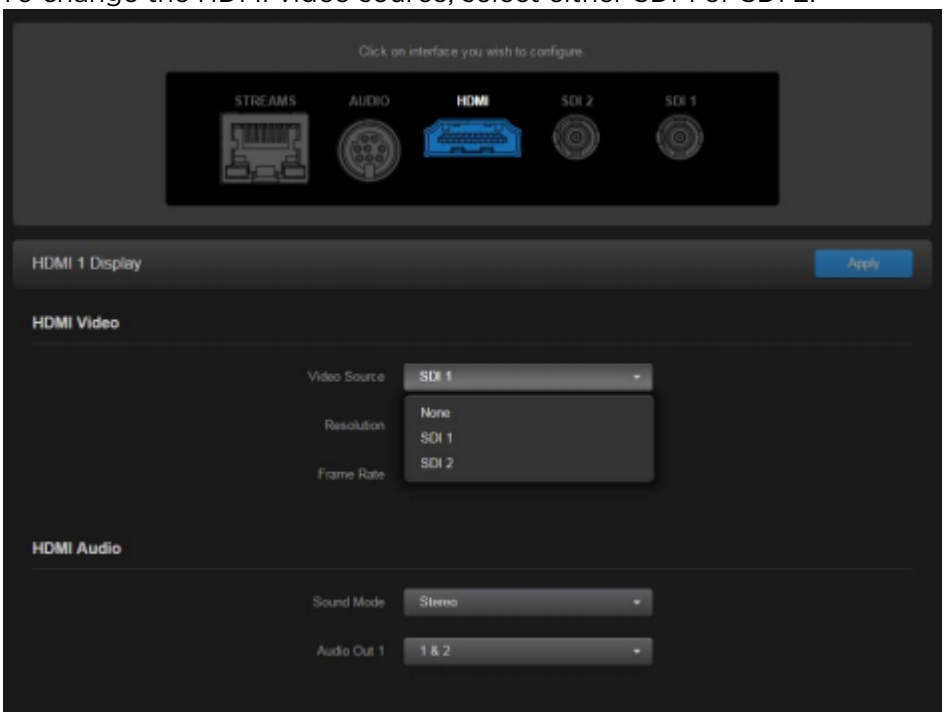
Configuring the HDMI Display

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**.

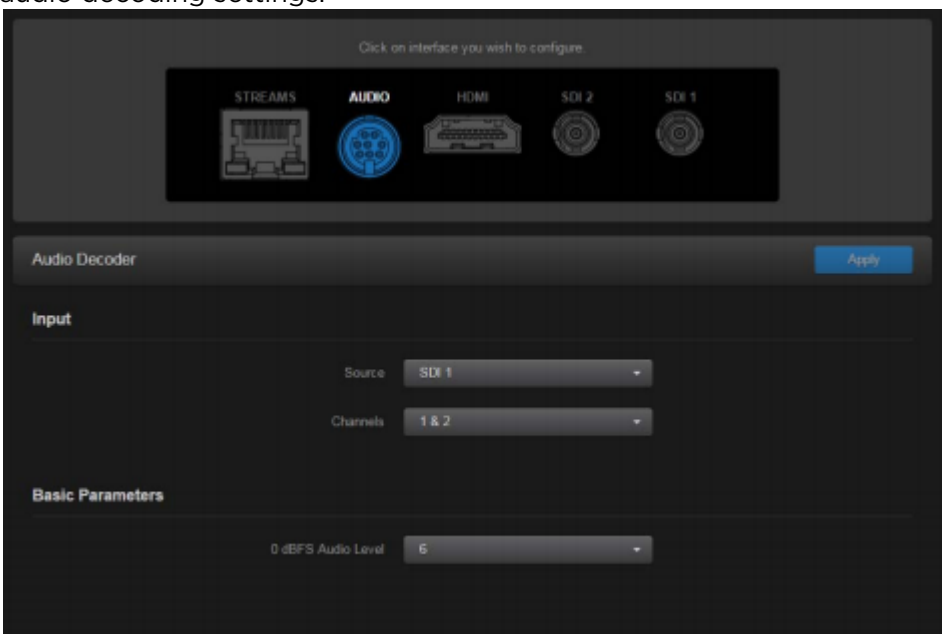
Configuring the Analog Audio Output

> **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	The input source for analog audio, either: • SDI 1 • SDI 2 **Note** 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.
Channels	1&2	The input channel for analog audio, either: • 1&2 • 3&4 • 5&6 • 7&8 **Note** When the decoder is licensed for one channel only, the channel pairs 9&10, 11&12, 13&14, and 15&16 are also available.

Input | Basic Parameters

Basic Parameters

Setting	Default	Description/Values
0 dBFS Audio Level (dBu)	+6 dbu	(Analog Input only) Adjusts the maximum analog Audio Output level (0 dBfs) from `+5dBu` up to `+20dBu`. **Note** This is useful in applications such as broadcast and streaming to allow higher audio headroom.

System Administration and Security

Note

Most of these pages/functions require Administrator privileges. The exceptions are as follows:
- Status and My Accounts are accessible to all users.
- Presets is accessible to Operators as well as Administrators.

Topics in This Chapter

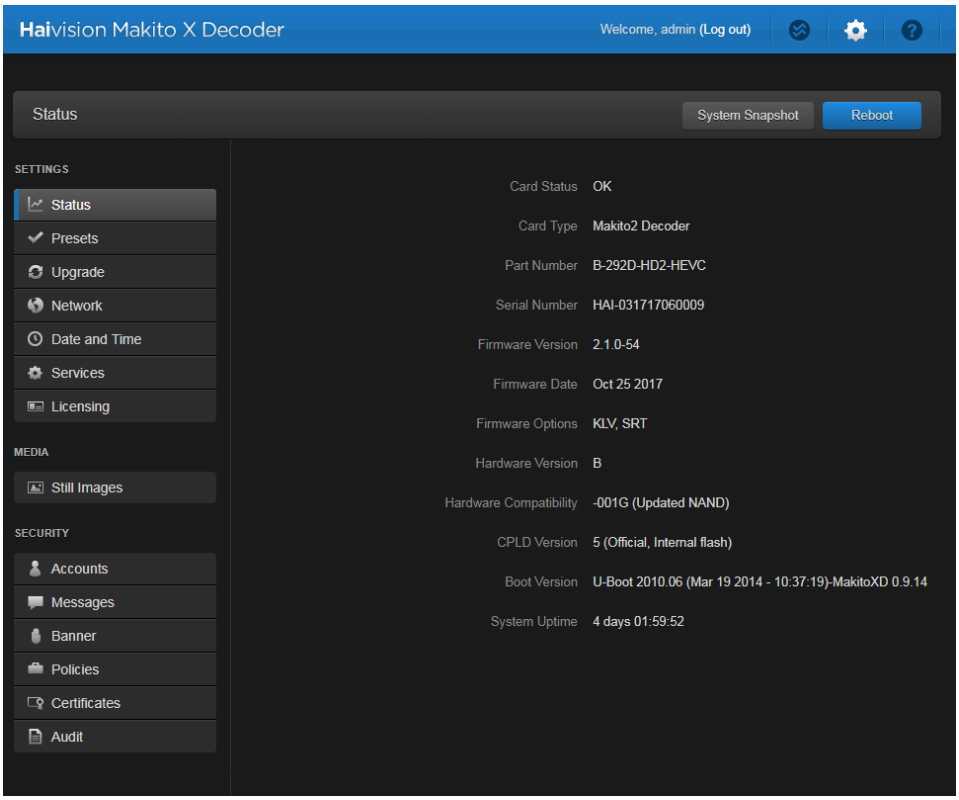
Viewing System Status Information

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

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

To view status information:

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



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

2. To reboot the decoder, see **Rebooting the Decoder**.
3. To display a snapshot of system information, see **Taking a System Snapshot**.

Status Settings

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

Status Settings	Description/Values
Card Status	OK (or error message if applicable).
Card Type	The type of decoder, e.g., Makito2 Decoder.
Part Number	The Haivision part number for the decoder, e.g., B-292D-HD2
Serial Number	The serial number for this decoder appliance or card.
Firmware Version	The firmware version of the decoder.
Firmware Date	The firmware release date.
Firmware Options	(If applicable) Firmware options installed, e.g., SRT. For more information, see Secure Reliable Transport (SRT).
Hardware Version	The hardware version of the decoder.
Hardware Compatibility	-001G (basic card assembly).
CPLD Version	The CPLD version of the decoder.
Boot Version	The Boot version of the decoder.
System Uptime	The length of time (mm:ss) the decoder has been "up" and running.

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.

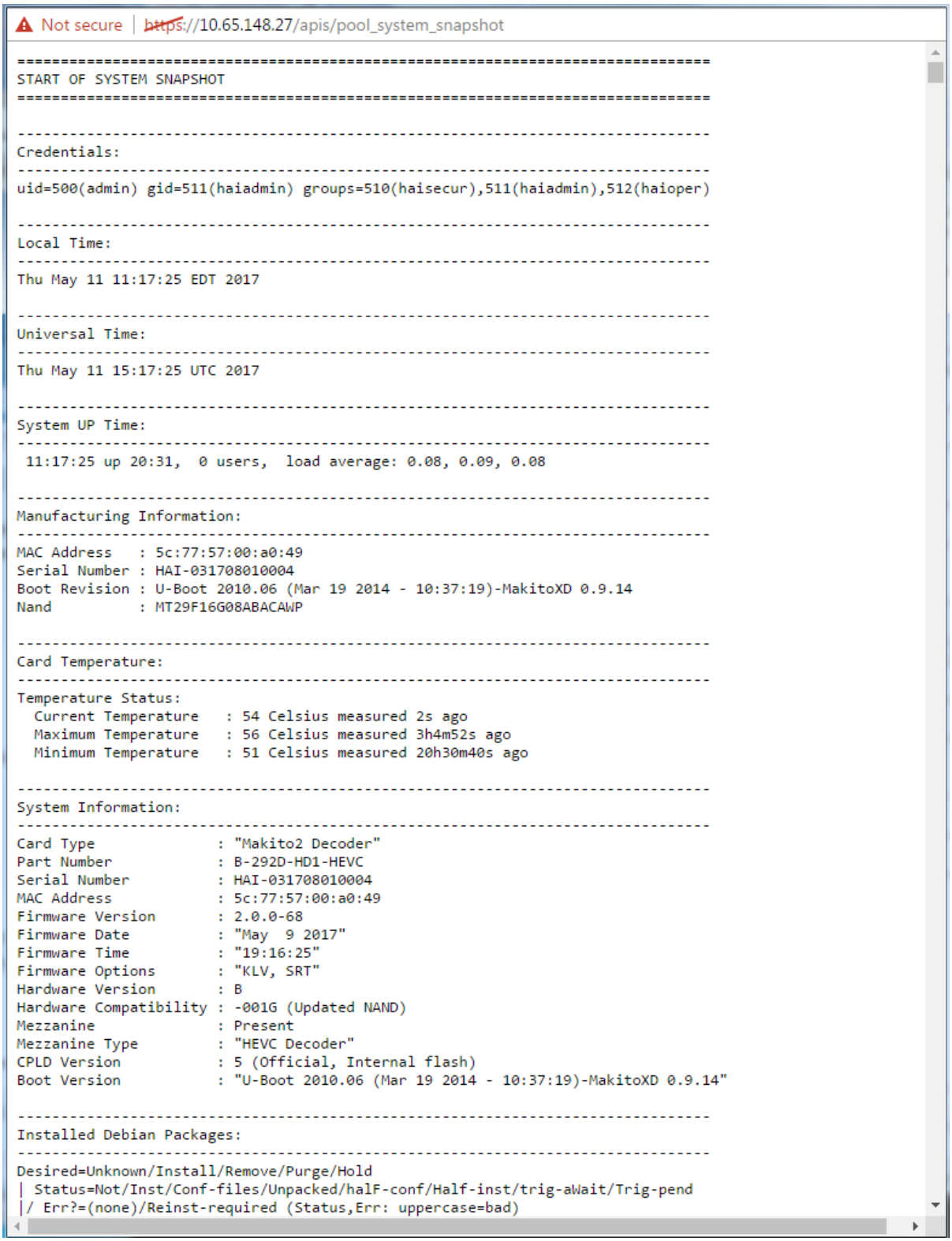
Taking a System Snapshot

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



2. Save the file.

Saving and Loading Presets

> **Note**
>
> The Presets page is only accessible to administrators and operators.

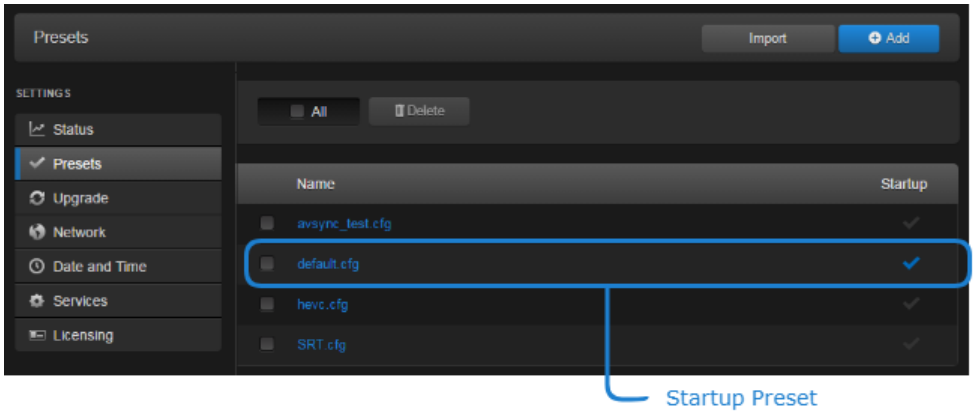
Each Makito X is configured by users' selecting and setting values of applicable system settings, such as decoder and stream settings and the stream destination. Although these configuration settings are not automatically saved, *presets* provide a way for you to save groups of settings and apply them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

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

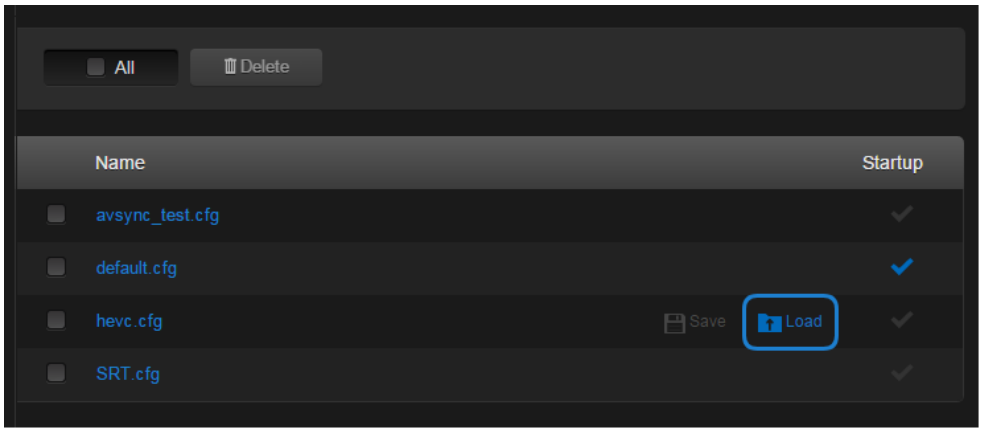
From the Presets page, you can view the list of saved presets, load a saved preset, and save the current settings as a preset. You can also view the contents of a preset file, delete a preset, and select the preset to load at startup.

To view and manage presets:

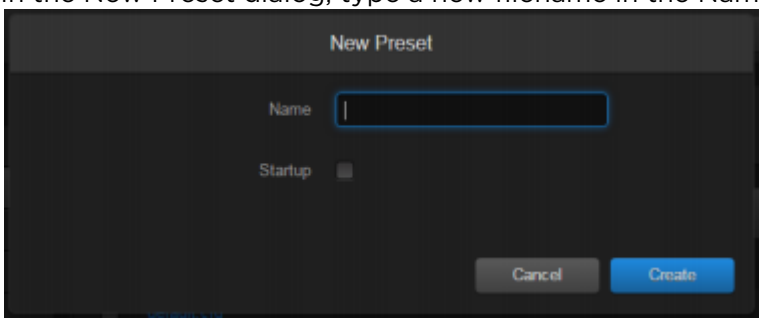
1. On the Administration page, click **Presets** on the sidebar (under **Settings**).
   The Presets List View opens displaying the list of saved presets for the decoder. The startup preset is indicated with a blue check.



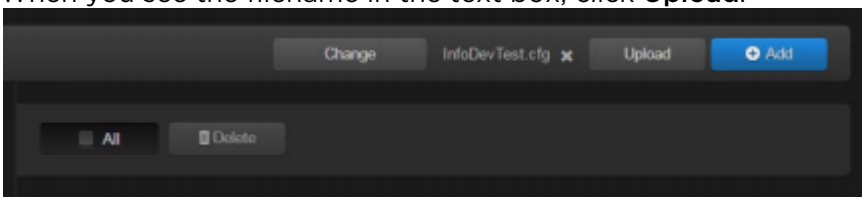
2. To load an existing preset into the current session, hover over the preset name or anywhere in the row and click **Load**.



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 the ✖ button.

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.

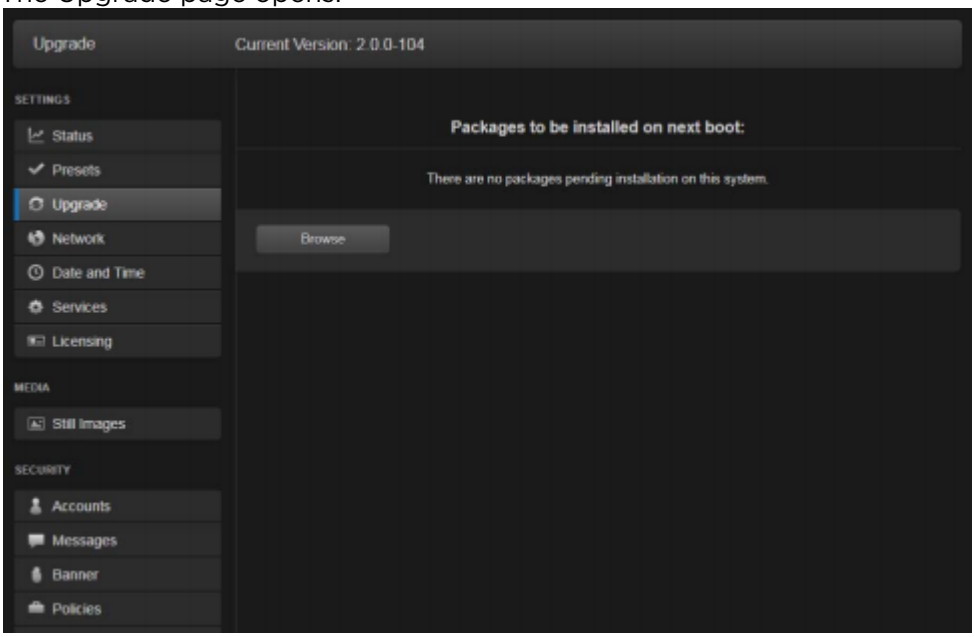
When a firmware upgrade becomes available, you can easily install it from the Web interface. You will first need to copy the upgrade file to your local computer or network.

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.

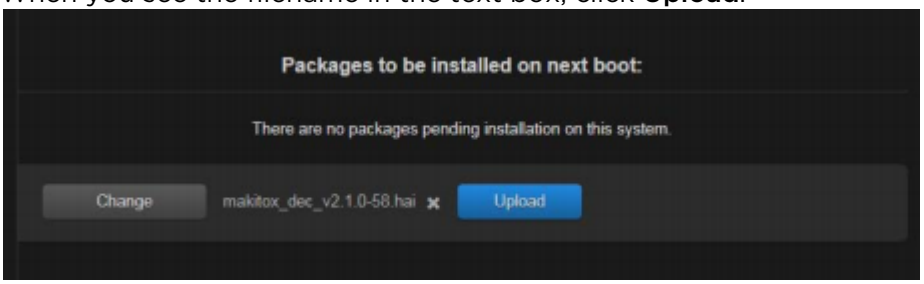
To install a firmware upgrade:

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



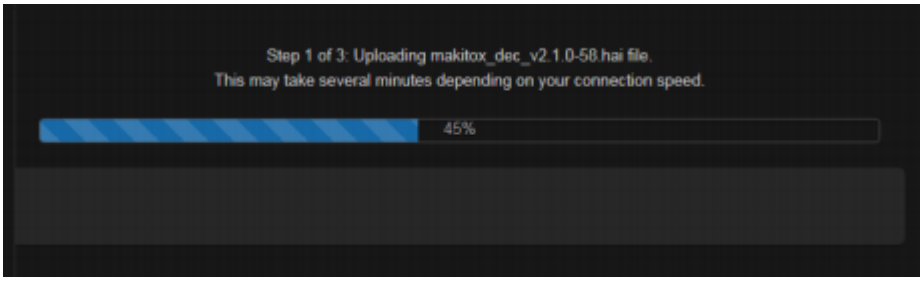
2. Click **Browse** and select the file in the Open File dialog box.

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

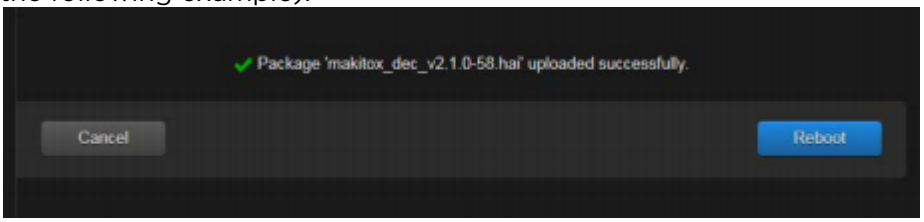


> **Tip**
>
> To select a different file, Click **Change**.

> **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.

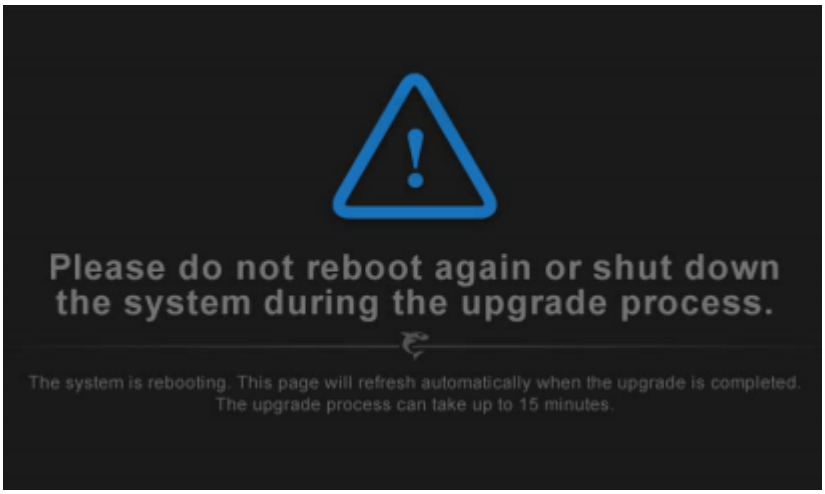


If any of the package components has been modified or is not signed by a valid certificate, the verification will fail and the downloaded package will be discarded.
When the file is uploaded and verified successfully, you will see a confirmation page (as shown in the following example).



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.

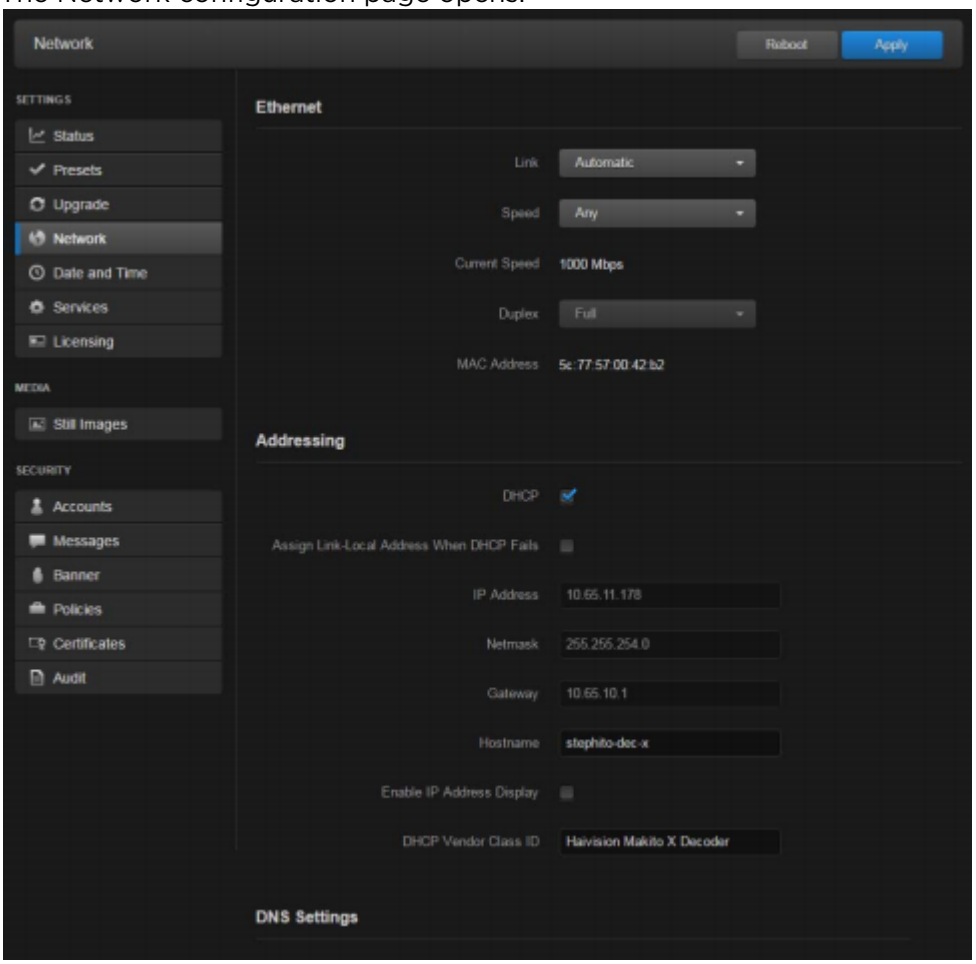
Configuring Network Settings

Caution

When you make changes to the Network settings, be sure to write down the new decoder 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 decoder.

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.
3. To apply your changes, click **Apply**.
4. Then click **Reboot**.

Note

You must reboot the system for the changes to take effect. After rebooting, please sIgn in again using the newly configured IP address.

Network Settings

The following table lists the Network settings:

Ethernet | Addressing | DNS Settings

Ethernet

Setting	Description/Values
Link	Determines whether the Ethernet link settings will be negotiated automatically or configured manually: • Automatic - The system will match the Ethernet Speed and Duplex Mode to the Ethernet hub to which it is connecting: • Manual - These values must be set manually. See following settings.
Speed	Select the Ethernet Speed (in Mbps): • Any (default) • 1000 • 100 • 10 **Note** 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.
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: • Full • Half
MAC Address	(Read-only) The Media Access Control address assigned to the Makito X.

Ethernet | Addressing | DNS Settings

Addressing

Setting	Description/Values
DHCP	**Note** When DHCP is enabled, the decoder will get an IP Address from a DHCP server on the network. When it is disabled, you must manually enter the decoder's IP Address, Netmask & Gateway Address.

Setting	Description/Values
Assign Link-Local Address When DHCP Fails	(DHCP must be enabled) When this checkbox is checked, and DHCP is used but no DHCP server is present to assign an IP address to the device, the device will automatically assign itself an IP address in the 169.254.0.0/16 range. 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.
IP Address	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 dotteddecimal format.
Netmask	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 dotteddecimal format.
Gateway	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.
Hostname	You may, optionally, enter a unique name for the Makito X.
Enable IP Address Display	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.
Duration	(Enable IP Address Display must be enabled) The duration for the display of the IP address: 15, 30, 45, or 60 seconds.
Resolution	(Enable IP Address Display must be enabled) The resolution for the display of the IP address (default = 720p60).
DHCP Vendor Class ID	(DHCP must be enabled) You may, optionally, specify the DHCP Vendor Class ID (option 60). This allows IT departments to identify Makito X devices on their networks. The default Device Identification value for the Makito X is "Haivision Makito X Decoder".

Ethernet Addressing DNS Settings

DNS Settings

Setting	Description/Values
Obtain DNS Settings Automatically	(DHCP must be enabled) 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	(Obtain DNS Settings Automatically must be disabled) Enter the primary DNS server address for your network.

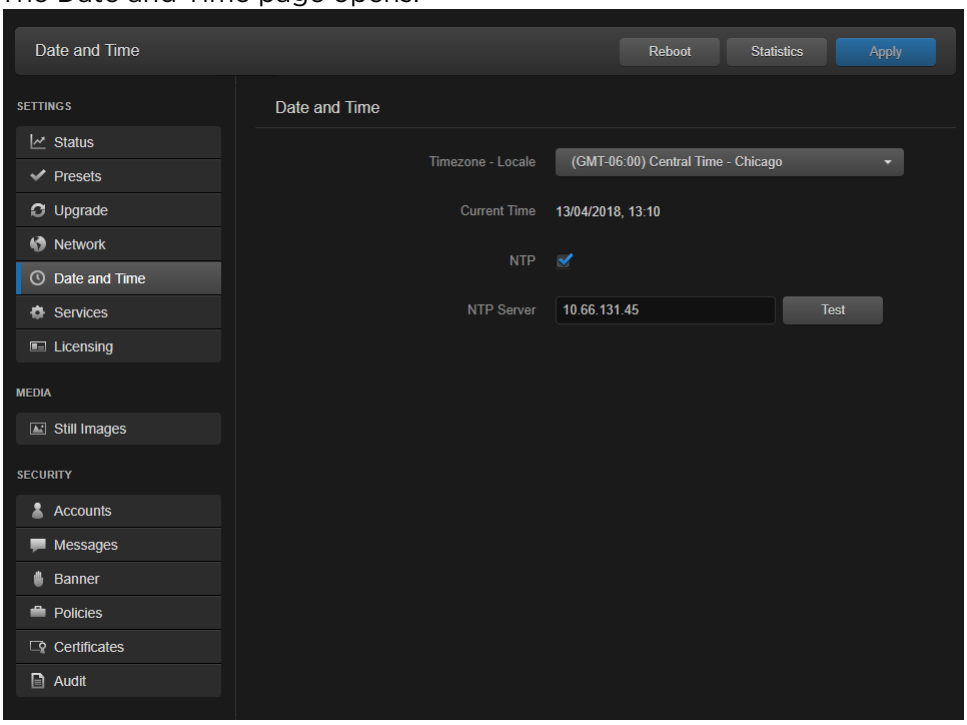
Setting	Description/Values
Alternate DNS Server Address	(Obtain DNS Settings Automatically must be disabled) Enter an alternate DNS server address for your network. The alternate DNS server is used only if the primary server is not responding.
Domain Name	(Obtain DNS Settings Automatically must be disabled) Enter the domain for the Makito X.
Enable mDNS	**Tip** Enabling mDNS allows an mDNS application to automatically find the decoder.
mDNS Identifier	(Optional) Enter a unique name for the decoder. 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.

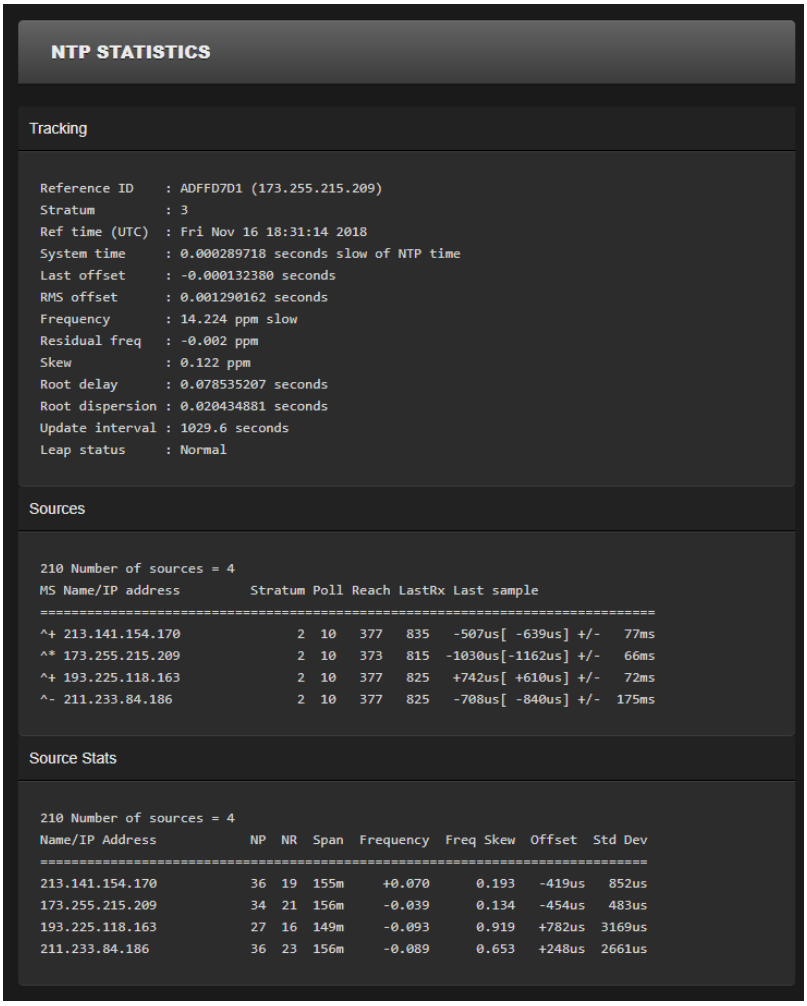
Date and Time Settings

The following table lists the Date and Time settings:

Setting	Description/Values
Timezone-Locale	**Note** The times are based on hours added to or subtracted from Greenwich Mean Time (GMT).
Current Time	(Read-only) The current local date and time.
NTP	Check this checkbox to connect to an NTP (Network Time Protocol) server to synchronize the 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.
Test	If NTP is enabled, click to validate that the NTP server is reachable.
Statistics	If NTP is enabled, click to display tracking and source information, and source statistics for the NTP server. See **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.

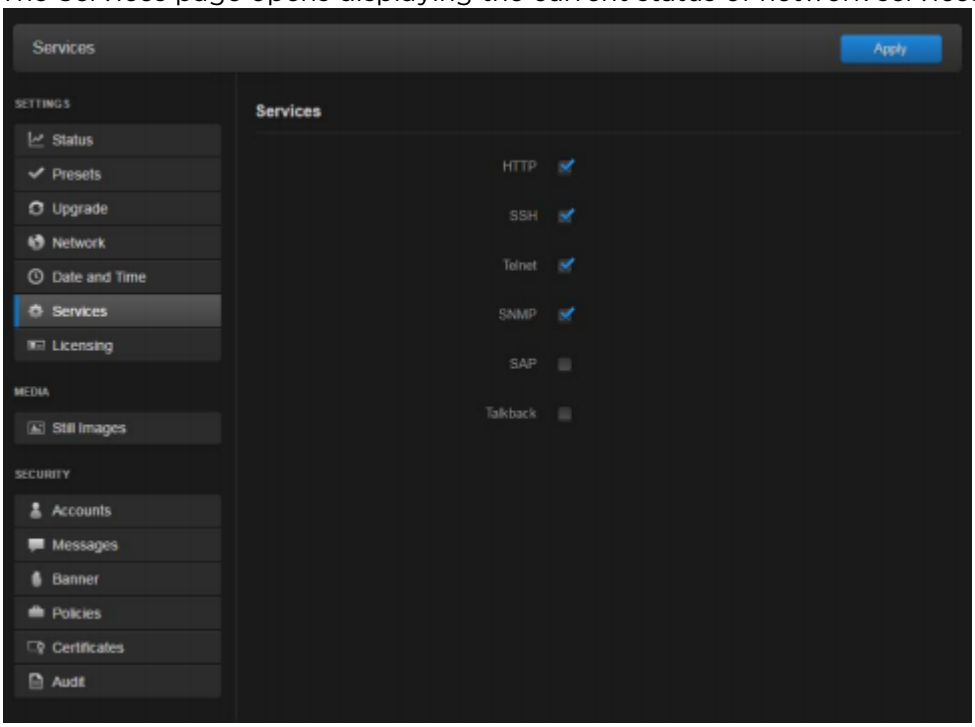
Important

In order to optimize your decoder's performance, it is recommended that only the required network services be enabled.

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.

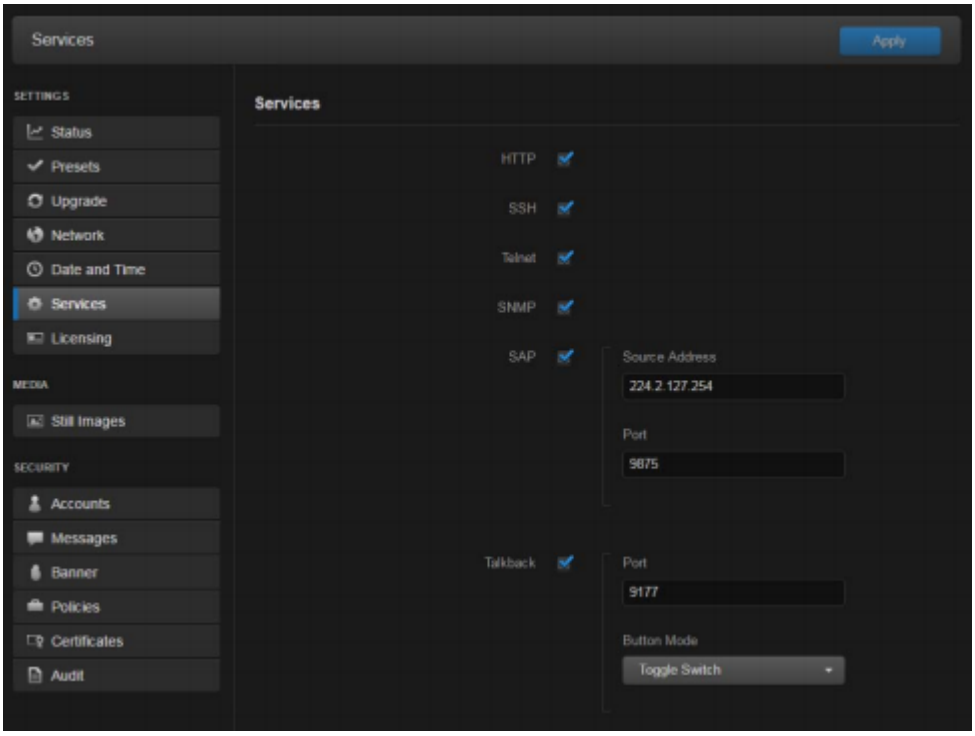
To enable or disable network services:

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.

3. To specify an IP address and port for the SAP service other than the defaults provided, fill in the Source Address and Port.



4.

> **Tip**
>
> The Button Mode determines how users activate talkback: either push button ("push-totalk") or toggle switch.

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

5. 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:

Service	Description
HTTP	Hypertext Transfer Protocol, used for Web browsers acting as a client. Only secured HTTP (HTTPS) is supported. See Managing Certificates to manage HTTP TLS certificates.
SSH	Secure Shell, a network protocol that allows data to be exchanged using a secure channel between two networked devices.
Telnet	Telnet, a network protocol used on the Internet or local area networks to provide a bidirectional communications via a virtual terminal connection.
SNMP	Simple Network Management Protocol, a network protocol used mostly in network management systems to monitor networkattached devices.
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 Audio Talkback.
SAP only	
Source Address	Specifies the multicast IP address on which the SAP service will listen.
Port	Specifies the UDP port on which the SAP service will listen.
Talkback only	
Port	Specifies the destination port used by the encoder. Default = 9177.
Button Mode	Specifies whether the Web interface provides a push button or toggle switch for users to activate talkback. • 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. • Toggle Switch stays active until the user pushes it again.

Managing Licenses

Feature licensing allows you to add new functionality to already deployed systems. As of Version 2.1, you may add the following features to a base Makito X.

Feature	SKU
SRT	SWO-292D-SRT
KLV	SWO-292D-KLV

Note

In the current release, the SRT and KLV licenses are included at no extra cost with each Makito X purchased.

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

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

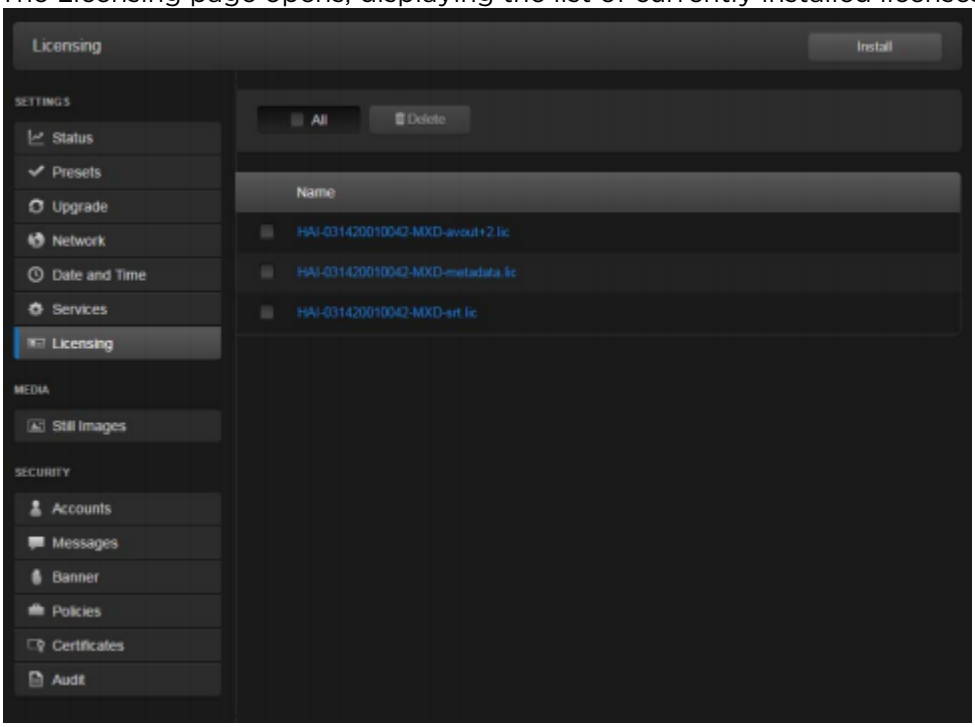
You may install and manage licenses from the Web interface or from the CLI using the license command. Both methods allow you to view the content and status (valid/invalid) of the license file to confirm the ordered features.

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

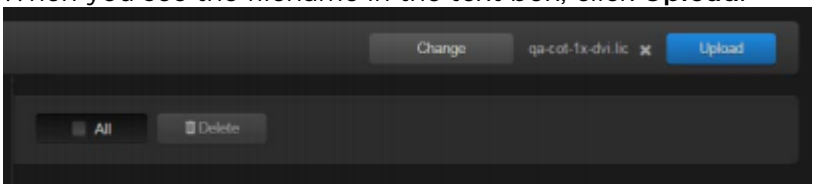
This section provides instructions to install a license from the Web interface as well as view current licenses on your system.

To install a license file:

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



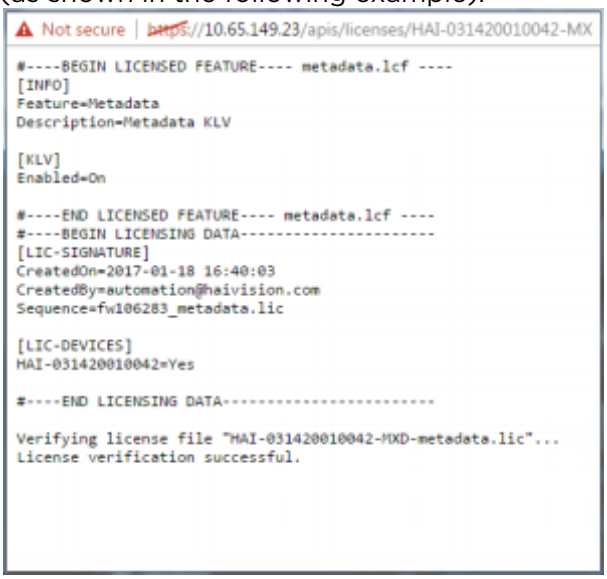
2. To select the license file, click **Install** and select the file in the Open File dialog box.
3. When you see the filename in the text box, click **Upload**.



> **Tip**
>
> To select a different license file, click **Change**. To remove the selection, click the ✖ button.

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

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



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

License File Errors

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

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

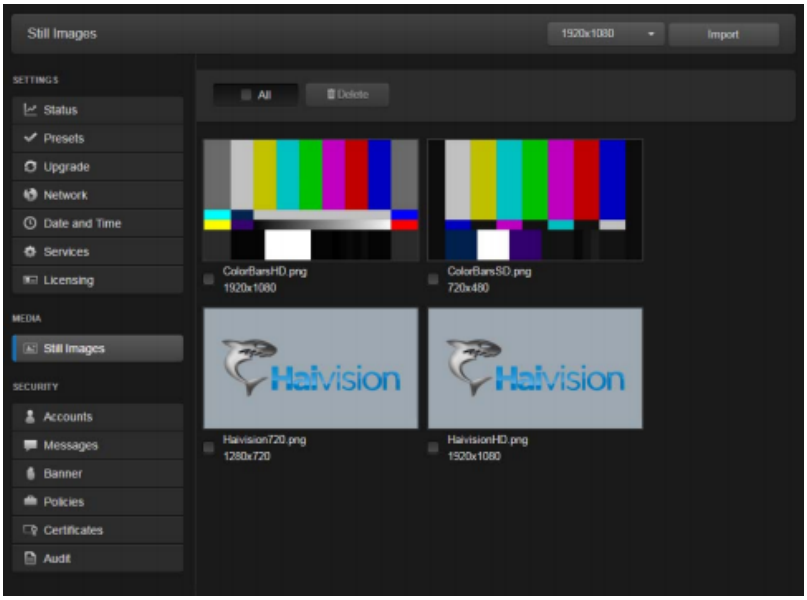
Configuring Still Image Streaming

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.

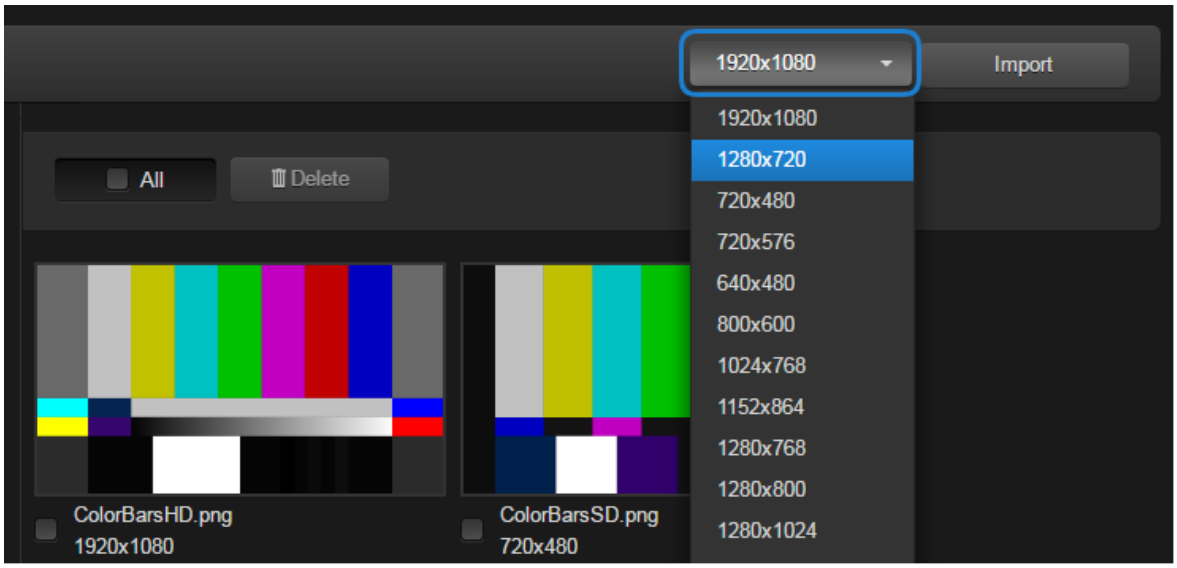
> **Note**
>
> It is not necessary to have a different version of the custom still image for every display format. The decoder automatically resizes the selected image for proper display

To upload a static image:

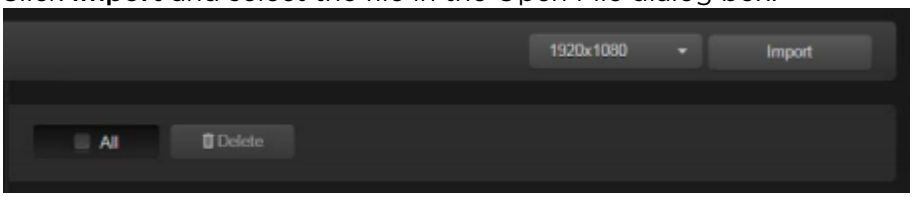
1. On the Administration page, click **Still Images** on the sidebar (under **Media**).
   The Still Images page opens, displaying the list of still images that have been uploaded for the decoder.



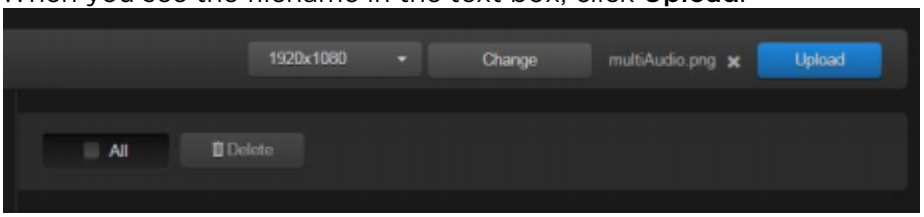
2. To upload a new image file, first select the Output Resolution for the image.



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 ✖ 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`.

Using SNMP to Configure A/V Sources

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 an IP network.

Audience

Tip

To develop new SNMP applications, see the list of Supported MIBs.

Topics in This Chapter

Supported MIBs

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

Supported MIBs	Standard	Description
RFC1213-MIB.txt SNMPv2-MIB.txt IP-MIB.txt IF-MIB.txt TCP-MIB.txt UDP-MIB.txt	MIB-II (RFC 1213)	Defines the general objects for use with a network management protocol in TCP/IP internets and provides general information about the unit.
SNMP-USER-BASED-SM-MIB.txt SNMP-USM-AES-MIB.txt SNMP-VIEW-BASED-ACM-MIB.txt	SNMPv3	Supports SNMPv3 User-based Security Model (USM) and Viewbased Access Control (VACM).
HAI-VISION-MIB.txt HAI-AVT-STREAM-MIB.txt HAI-HDC-MIB.txt	Haivision Enterprise	Supports configuration, status, and statistics.

Supported MIBs	Standard	Description
HAI-MAKITO-X-DEC-CAPS.txt	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.

SNMP Agent Components

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

SNMPv3

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

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

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

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

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

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

```
rwuser johndoe auth
```

To assign Makito 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`
To send an SNMP notification to a manager.	`snmptrap`
Note The retrieval of a complete subtree is referred to as "walking the MIB."	`snmpwalk`

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

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

SNMP Syntax for Setting Up Streams

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

Table	Index	Description
`haiAvtStreamNewID.0`	none	Next available stream ID.
`haiAvtStreamInverseTable`	IP address type IP address Port	Table to retrieve the stream ID from the IP address and port.
`haiAvtStreamTable`	Stream ID	Stream configuration and status.
`haiAvtStreamStatsTable`	Stream ID	Stream statistics.

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`).

The example below, 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 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 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. Note that `createAndWait` is used so the content table can be set after stream creation.

```
snmpget -v2c -c admin localhost haiAvtStreamNewID.0 HAI-AVT-STREAM-MIB::haiAvtStreamNewID.0 = HaiAvtStreamID: 5 snmpset -v2c -c admin -IS haiAvtStream -Is .5 localhost Addr d 233.252.0.106 Port u 2000 Encapsulation i tsUdp RowStatus i createAndWait snmpset -v2c -c admin -IS haiAvtStreamRowStatus.5 i active
```

CLI Command Reference

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

Syntax Conventions

The following syntax conventions are used in this appendix:

Convention	Description
`monospaced font`	Indicates command names and options, filenames and code samples.
italic font	Indicates variables that you replace with a user-defined value or name.
< >	Same as italics. Variables are enclosed in angle brackets in contexts that do not allow italics.
[ ]	Square brackets indicate optional items or parameters.
x | y	A vertical bar separates items in a list of options from which you must select one. If options are not separated by |, you may use combinations.
{ x | y | z }	Items separated by vertical bars and enclosed in braces indicate a choice of required elements.
[x { y | z }]	Vertical bars and braces within square brackets indicate a required choice within an optional element.

Tip

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

CLI 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 and the privileges for each group.

Operation Commands | Administration Commands | Access | Other/Utilities

Operation Commands

Command	Role			Description
	Admin	Operator	Guest	
viddec	Yes	Yes	"`get`" only	Manage video decoding for the SDI 1 and SDI 2 ports.
auddec	Yes	Yes	"`get`" only	Manage audio decoding settings.
hdmi	Yes	Yes	"`get`" only	Manage decoder HDMI settings.
stream	Yes	Yes	"`get`" only	Create and manage streams to map decoder inputs to output interfaces.
sap	Yes	Yes	"`get`" only	Manage SAP settings.
talkback	Yes	Yes	"`get`" only	Start and stop transmission of audio talkback and manage audio talkback settings.
temperature	Yes	Yes	"`get`" only	Display the current temperature of the unit.
mkstill	Yes	Yes	No	Generate still images from a picture.
still	Yes	Yes	"`list`" only	Manage still image files on the Makito X file system.

Operation Commands | Administration Commands | Access | Other/Utilities

Administration Commands

Command	Role			Description
	Admin	Operator	Guest	
Network and Management				

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

Operation Commands Administration Commands Access Other/Utilities

Access

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

Operation Commands Administration Commands Access Other/Utilities

Other Commands and Utilities

Command	Role			Description
	Admin	Operator	Guest	
iperf	Y	Y	Y	Measure and tune network performance.
ping	Y	Y	Y	Send packets to network hosts to test a network connection.
tcpdump	Y	—	—	Display TCP/IP and other packets being transmitted or received over a network interface.
traceroute	Y	Y	Y	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

Commands include:

- auddec
- hdmi
- 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 `parameter=value` pairs can be specified at once. See Parameters 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: • SDI1CH12, SDI1CH34, SDI1CH56, SDI1CH78 • SDI2CH12, SDI2CH34, SDI2CH56, SDI2CH78
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 Parameters 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

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: • 1080 for 1920x1080 • 720 for 1280x720 • 480, NTSC for 720x480 • 576, PAL for 720x576 • VGA for 640x480 • SVGA for 800x600 • XGA for 1024x768 • XGA+ for 1152x864 • WXGA for 1280x768 • WXGA2 for 1280x800 • SXGA for 1280x1024 • WXGA3 for 1360x768 • WXGA4 for 1366x768 • WXGA+ for 1440x900 • SXGA+ for 1400x1050 • HD+ for 1600x900 • UXGA for 1600x1200 • WSXGA+ for 1680x1050 • WUXGA for 1920x1200
-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

The `sap` command is used to manage SAP settings.

> **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 **Parameters** below. A series of one or more `parameter=value` pairs can be specified at once.

Parameters

Parameter	Default	Description/Values
address	n/a	The multicast address to listen on for SAP messages.
port	n/a	The UDP port to listen on for SAP messages.

Example

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

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 `/usr/share/haivision/still_images`
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.

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/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]
  [mode=listener | caller | rendezvous] [sourceport=udpport]
  [flipaddr=ipaddr] [flipport=udpport] [flipttl=ipttl]
  [fliptos=iptos]
rtsp: Real-time Transport Protocol (RFC3984) with control over RTSP.
   For rtsp streams, you can specify the address as
   addr=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 `parameter=value` pairs can be specified at once.
delete	Deletes the specified stream.

Action	Description
get	Displays stream information. See Parameters below. You can specify to display the stream configuration, statistics, or `all`. `stream all get table` displays a summary of all the streams in a table format. **Note** If `sap` is enabled, `stream get all` displays the list of advertised sessions. See sap.
clear	Clears the stream's statistics.
help	Displays usage information for the `stream` command.

Parameters

Parameter	Default	Description/Values
port	n/a	The UDP port for the Decoder. Enter a number in the range `1025..65,535`. Note that RTP streams use even numbers only within this range.
addr	n/a	(Optional, only required for multicast) Enter a Multicast IP address in dotted-decimal format. **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`).
Optional stream Parameters		
id	n/a	**Note** When creating a stream, you can specify a unique id to assign to it or let the system assign one (a sequential number) for you. Most commands will accept the stream id or name (see below) in order to select the proper stream to manage. **Tip** The active stream ID may change due to a stream failover event.
name	n/a	(Optional) When creating a stream, you can also specify a name for the stream. `1` to `32` characters

encapsulation	ts-rtp	(Optional) The Encapsulation Type for the stream. • `ts-rtp` - MPEG2 transport stream over RTP • `ts-udp` - MPEG2 transport stream over UDP (no RTP header) • `ts-srt` - MPEG2 transport stream over SRT (Secure Reliable Transport) • rtsp - Real Time Streaming Protocol (RFC2326) with control over RTSP. For RTSP streams, you can specify the address as `addr= rtsp://user:password@ip.add.re.ss/ path?var=value&var2=value2...` **Note** RTSP stream ingest is supported to provide interoperability with Makito Classic Encoders and Axis Cameras/Encoders.
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 Stream Settings.
ts-rtp and ts-udp only		
FEC	None	(Optional) To enable Forward Error Correction (FEC), specify `fec=yes`. FEC varies with the protocol (encapsulation): • TS over UDP = VF FEC • TS over RTP = Pro-MPEG FEC NOTE: VF FEC is a proprietary FEC and is not interoperable with devices outside of the Haivision family. The FEC level is read from the encoded stream.
ts-srt only		
latency	125	Specifies how long the decoder will buffer received packets, from 20-8000 ms. See "Latency" under SRT Stream Settings.
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.
mode	listener	Specifies the SRT Connection Mode (to simplify firewall traversal): • `caller`: The SRT stream acts like a client and connects to a server listening and waiting for an incoming call. • `listener`: The SRT stream acts like a server and listens and waits for clients to connect to it. • `rendezvous`: 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.
SRT to UDP Stream Conversion (ts-srt only)		

flipaddr	n/a	Specifies the destination IP address for the stream. See "SRT to UDP Stream Conversion (TS over SRT only)" under SRT Stream Settings.
flipport	n/a	Specifies the UDP source port for the stream.
fliptt l	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`	Creates a streaming session from IP Address 10.6.230.106 at port 2000.
`# stream create encap=rtsp addr="rtsp://10.66.131.64/high"`	Creates an RTMP stream.

`# 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-1`
	`  Bitrate : 6,781 kbps`
	`  Received Packets : 20,135,282`
	`  Received Bytes : 1,745,649,664`
	`  Lost Packets : 0`

`# stream 10 get all`
 	
`# stream 10 get all [cont]`
	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`
	`Bitrate : 6,543 kbps`
	`Received Packets : 20,231,121`
	`Received Bytes : 1,973,649,408`
	`Lost Packets : 0`

`# 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). `timeout=0` means infinity
stop	Stops transmission of talkback audio.
set	Configures talkback settings. A series of one or more `parameter=value` 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.

Synopsis

```
temperature get
```

Actions

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

Response

`# temperature get`	Displays the current temperature for the unit, see example below:
	`Temperature Status:`
	`  Current Temperature     : 35 Celsius measured 2s ago`
	`  Maximum Temperature     : 36 Celsius measured 5d2h9m2s ago`
	`  Minimum Temperature     : 32 Celsius measured 5d5h34m2s ago`

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 `parameter=value` pairs can be specified at once. See Parameters below.
get	Displays decoder video status information. You can specify to display the configuration (`config`), `stats` , or `all` .
clear	Clears the decoder's statistics.
help	Displays usage information for the `viddec` command.

Parameters

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

Parameter	Default	Description/Values
frameRate	`Auto`	The output frame rate for the displays. `Auto, 23, 24, 25, 29, 30, 50, 59, 60, 75` 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”.
stillImage	`freeze`	The type of static image to display when the decoder is not receiving a video stream. • `freeze`: continues to display the last decoded video frame. • `black`: displays a black screen. • `blue`: displays a blue screen. • `bars`: displays a series of vertical color bars across the width of the display. • `mute`: disables the video output. • `custom`: displays a custom static image. See **mkstill**. 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.
stillDelay	`3`	The delay in seconds before the still image is displayed. `1...1000`
stillFile	n/a	File name of custom still image.
resolution	n/a	The output resolution: • `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. • `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 **SDI Decoder Settings**. • `1080p, 720p, 1080i, 480i, 576i, 480p, 576p, Xga, Sxga, Vga, Svga, 1152x864p, 1280x768p, 1280x800p, 1360x768p, 1366x768p, 1400x1050p, 1440x900p, 1600x900p, 1600x1200p, 1680x1050p, 1920x1200p`

Parameter	Default	Description/Values
syncmode	`stc`	The mode of synchronization of sound and picture for the decoded stream: • `stc` : Synchronizes with the encoder system clock by comparing the packet timestamp with the reference clock. • `passthrough` : 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 **Video Decoder Buffering Passthrough**.
buffering	`automatic`	(**syncmode** must be `stc`) 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. • `Automatic` : 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 **SDI Decoder Settings**. • `Fixed` : 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. **Note** 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 `delay` below.) • `Adaptive (Low-Latency)` : 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. **Note** Audio artifacts may occur if audio is streamed after video when using Adaptive Low Latency. • `multisync:` 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. See **Multi-channel Sync** for the steps to configure multi-channel sync on the Makito X encoder and decoder.

Parameter	Default	Description/Values
delay	`0` ms	The delay in ms when using `stc` **syncmode** with `fixed` **buffering**. `0..2000` ms **Note** 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.
multiSyncDelay	`1000` ms	The delay in ms required to ensure that two or more decoder channels are synchronized when using `stc` **syncmode** and `multisync buffering`. `0...10000 ms` **Note** The difference in the values between the decoders cannot exceed 2000 ms.

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 : 6`
	`State : STARTED`
	`Resolution : Auto`
	`Frame Rate : Auto`
	`Still Image : Custom`
	`Still Delay : 3 (s)`
	`Still File : Shield.jpg`
	`Sync Mode : Stc`
	`Buffering : Automatic`
	
	`Statistics:`
	`State : Running`
	`Active Stream ID : 1`
	`Hdmi Output : Yes`
	`Up Time : 0 days 16 hours 11 minutes 31 seconds`
	`Number of Restarts : 0`
	`Audio vs Video delay : ~ 49 ms (Video late)`
	`Global jitter : 50 ms (Added Video and Audio delay due to important video/audio frame jitter)`
	`Est Video jitter : 27 ms`
	`Est Audio jitter : 18 ms (max value 24 ms)`
	
	`Video:`
	
	`Algorithm : H.264`
	`State : Running`
	`Sync Mode : Stc`
	`Buffering : Adaptive`
	`Buffering Delay : 93 ms`
	`Input Format : 1920x1080 Progressive`
	`Output Format : 1080p59`
	`Still Image : Custom (Not Active) [Count=0]`
	`Bitrate : 8,992 kbps`
	`Framerate : 59.94`
	`Decoded Frames : 85,445`
	`Discarded Frames : 0`
	`Displayed Frames : 85,231`
	`Skipped Frames : 33`
	`Replayed Frames : 75`
	
	`Audio:`
	`Algorithm : AACLC/ADTS`
	`Implementation : Software`
	`State : Running`
	`Bitrate : 127 kbps`
	`Sample Rate : 48 kHz|`
	`Number of Pairs : 1`
	`Decoded Frames : 66,855`
	`Output Frames : 66,743`
	`Skipped Frames : 112`

	KLV : Not Present CC : Not Present TC : Present Displayed Frames : 85,438 Processed Bytes : 1,965,074 Current Timecode : 17:30:25:37 Dropped Frames : 3 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 : 1`
	`Hdmi Output : Yes`
	`Up Time : 0 days 20 hours 20 minutes 53 seconds`
	`Number of Restarts : 0`
	`Audio vs Video delay: ~ 35 ms (Video late)`
	`Add A/V latency : 0 ms (Added Video and Audio delay due to important video frame jitter)`
	`Est Video jitter : 5 ms`
	
	`Video:`
	`Algorithm : H.264`
	`State : Running`
	`Sync Mode : Stc`
	`Buffering : Automatic`
	`Buffering Delay : 420 ms`
	`Input Format : 1920x1080 Progressive`
	`Output Format : 1080p59`
	`Still Image : Custom (Not Active) [Count=0]`
	`Bitrate : 8,970 kbps`
	`Framerate : 59.94`
	`Decoded Frames : 6,033`
	`Discarded Frames : 0`
	`Displayed Frames : 5,723`
	`Skipped Frames : 70`
	`Replayed Frames : 92`
	
	`Audio:`
	`Algorithm : AACLC/ADTS`
	`Implementation : Software`
	`State : Running`
	`Bitrate : 127 kbps`
	`Sample Rate : 48 kHz`
	`Number of Pairs : 1`
	`Decoded Frames : 3,433,632`
	`Output Frames : 3,433,630`
	`Skipped Frames : 98`
	
	`KLV: Not Present`
	
	`CC: Not Present`
	
	`TC: Present`
	`Displayed Frames : 5,993`
	`Processed Bytes : 137,839`
	`Current Timecode : 18:00:05:53`
	`Dropped Frames : 36`
	
	`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
- Video Decoder Statistics

Network and Management Commands

Commands include:

- config
- date
- ethercfg
- haiversion
- ipconfig
- 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 `/usr/share/haivision/config`. See NOTE regarding `cfgname`.
load	Loads a previously saved configuration identified by `<cfgname>`. 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 `<cfgname>`. If no filename is specified, the system deletes the default configuration (haistartupcfg.ini).
list	Displays a list of the available configuration files.
help	Displays usage information for the `config` command.

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 view the current date.

Synopsis

```
date
```

Example

`# date`	Displays the current date, e.g.: `Fri Jun 9 13:02:48EDT 2017`

Related Topics

- Configuring Date and Time

ethercfg

The `ethercfg` 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.

```
# ethercfg
  Speed : 1000mbps
  Duplex : Full
  Auto-Negociation : On
  Advertised Mode : All
  Link Detected : Yes
  Ceiling : 100Mbit
```

Synopsis

```
ethercfg [-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-Negociation : 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 configures 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

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 `/usr/share/haivision/licenses`.
view	Displays the content of the specified license file.
install	**Important** 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.
verify	Verifies the specified license (either installed or uploaded).
delete	Deletes a previously installed license file from the system.

license Examples

`# license list`	Displays a list of licenses currently installed on the system:
	`License Files (in /usr/share/haivision/licenses):`
	`  metadata-PO123456.lic`

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.
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 `delete` an existing object to change its settings. All required settings of an object are specified when defining/changing an object. It is not possible to set settings individually.
permit	**Note** Access permissions may be additive. For example, permitting a new source for an existing community adds to the existing one if it complements it.
delete	Deletes the specified object.
help	Displays usage information for the command, or if specified, the option.

Note

`nmcfg` settings persist after reboots, unlike other Makito 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

- SNMP Agent Components

package

The `package` command is used to view and manage software packages.

> **Note**
>
> The `package` command can only be used by the Administrator.

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

Package files are digitally signed to ensure integrity and authenticity. Package component signatures and their certificate validity are verified when downloading, manually with the verify action, and when actually performing the installation upon reboot.

If the verification fails after downloading, an error message is reported by the download command and the downloaded package is discarded. If verification fails while actually installing upon reboot, installation is 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 <tftpipaddr>
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 `all`.

Action	Description
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) Temporarly 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) Temporarly 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 the Administrator.

Synopsis

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

Actions

Action	Description
`add`	Uploads a new public key file (`.pub` 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 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

Commands include:

- 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 the Administrator.

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 Parameters below for roles. You will be prompted to enter and confirm the initial password.
get	Displays the account information for the user or the 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.
pubkey add|remove keyfile	Adds or removes a public key to the user account. See Managing Public Key Authentication for more information.
pubkey list	Lists any public key files that have been uploaded for this account.
lock	Locks the user account (if Enabled).
unlock	Unlocks the user account (if Locked).
delete	Deletes the user account.

Parameters

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

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 the 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 decoder to a remote audit server and enables logging to it.
stop	Disables the connection to the remote audit server.
set	Modifies the audit parameters. A series of one or more `parameter=value` pairs can be specified at once. See Parameters below.
get	Displays audit configuration and connection status information.
verify	**Tip** Connect to the audit server in verbose mode to help diagnose connection or certificate problems.

Parameters

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

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

Example

```
# audit get
```

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

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

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 Parameters below.
delete	Deletes the selected certificate. **Note** The type specification may be added to specify the deletion of the Identity certificate, the chain associated with it, or the CA certificate with the given name.
import	Imports a certificate to be installed on the device. The infile, i.e., the file to import the certificate from, must be provided. The file's type and format can also be specified. See certificate Parameters below.
select	Selects the certificate used when establishing a TLS connection with the audit server or starting an HTTPS session.n.
verify	Verifies the validity of the specified certificate.

Parameters

Parameter	Default	Description/Values
sing	self	The signature type for the certificate: • `self` : Creates a self-signed identity certificate. • `Request` : Creates an identity Certificate Signing Request (CSR)
subject	query	Sets the certificate's distinguished name parameters: • `auto` : Automatically gets the subject Common Name which is `HOSTNAME.DOMAIN` if DNS is configured, or IPADDR otherwise. The subject Alt Name is set to `DNS:HOSTNAME.DOMAIN, DNS:HOSTNAME,IPAddress:IPADDR` • `query` : Prompts the user for Distinguished Name (DN) attributes • `DN` : Distinguished Name in the form: `"/C=US/ST=Maine..."` where the most common attributes are: /C Two Letter Country Name /ST State or Province Name /L Locality Name /O Organization Name /OU Organizational Unit Name /CN Common Name
type	id	**Note** Only ID certificates can be generated. Chain and CA certificates can only be imported. • `id` : Identity certificate (for HTTPS service and audit) • `chain` : Identity certificate CA chain (Import only) • `ca` : Certificate Authority Certificate (for peer certificate validation, Import only)
fmt	auto	The format in which the certificate is encrypted: • `auto` : Detects the certificate format based on file extension when importing. • `pem` : Privacy Enhanced Mail Base64 encoded DER certificate • `p7` : PKCS#7 • `p12` : PKCS#12 • `pfx` : PKCS#12 • `der` : Distinguish Encoding Rules
infile	n/a	**Note** The administrator has previously downloaded/uploaded the certificate file to import in its home directory (using SCP, for example).

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

Parameters

Parameter	Default	Description/Values
crypto		

compliance	None	Specifies the required cryptographic compliance, either: • None • FIPS140: All management cryptography is operated in the FIPS 140-2 mode. • NDPP11: Activates cryptographic security to a level compliant with the Network Device Protection Profile v1.1. • SP800-52 Revision 1: Applies cryptographic modules accredited under the National Institute of Standards and Technology (NIST) Special Publication 800-52, Revision 1. **Note** 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.
password		
quality	Basic	The required password strength, either: • Basic • Strong
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	Enables or disables password expiration: • Yes, No
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
session		
autologout	No	Enables or disables Auto Logout: • Yes, No
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 Outputs:
• HDMI 1.4 • SD-SDI SMPTE 259M-C • HD-SDI SMPTE 292M & 296M & 274M • 3G-SDI SMPTE 424M (Level A only) & 425M
Audio Outputs:
Two analog audio channels per blade
Up to 8 channels of embedded audio per blade, in channel pair groups. The channel pair sources are: • SDI1ch1&2, SDI1ch3&4, SDI1ch5&6, SDI1ch7&8 • SDI2ch1&2, SDI2ch3&4, SDI2ch5&6, SDI2ch7&8
Available through a mini-DIN-8 locking connector: • Balanced / Unbalanced stereo analog audio
Digital Embedded Audio • SD-SDI SMPTE 272M • HD/3G-SDI SMPTE 299M • HDMI 1.4
Talkback:
Analog Audio Input • Level: 2.2 dBu (1Vrms) • Impedance: 100 Ohms

Video Decoding

Video Output (TV) Resolutions:	
Supported by SDI	
• 1920x1080p 60/59.94/50/30/29.97/25/24/23.98 Hz • 1920x1080i 60/59.94/50 Hz • 1280x720p 60/59.94/50/30/29.97/25 Hz	• 720x576i 50 Hz • 720x480i 60/59.94 Hz
(interlaced shown in fields per second) See Supported Decoding TV/Computer Resolutions.	
Supported by HDMI	
• 1920x1080p 60/59.94/50/30/29.97/25/24/23.98 Hz • 1920x1080i 60/59.94/50 Hz • 1280x720p 60/59.94/50 Hz	• 720x576p 50 Hz • 720x576i 50 Hz • 720x480p 60/59.94 Hz • 720x480i 60/59.94 Hz
(interlaced shown in fields per second)	

Computer Output Resolutions: (supported only by HDMI)	
• 1920x1200 60 Hz • 1680x1050 60 Hz • 1600x1200 60 Hz • 1600x900 60 Hz • 1440x900 60 Hz • 1400x1050 60 Hz • 1366x768 60 Hz • 1360x768 60 Hz	• 1280x1024 60 Hz • 1280x800 60 Hz • 1280x768 60 Hz • 1152x864 75 Hz • 1024x768 60 Hz • 800x600 60 Hz • 640x480 60 Hz

Note

All computer output resolutions are progressive. See Supported Decoding TV/Computer Resolutions.

Video Bit Rates:
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)

Compression Standards:	
H.264 (MPEG-4 AVC part 10) • ISO/IEC 14496-10 • Baseline, Main, and High Profiles • Up to Level 4.2 (1080p60) and lower intermediate levels • I, IP, IBP, IBBP framing	H.265/HEVC • ISO/IEC 23008-2 • Main Profile • Up to Level 4 (1080p60) • IP framing

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	• 2 Analog audio per blade • SDI Embedded audio (4 or 8 audio pairs) per output port • HDMI Embedded audio pairs per blade **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. See “Audio Channel Details/Breakout” below.
Audio Bit Rates	• Mono: From 56 to 160 kbps per audio pair • Stereo: From 80 to 320 kbps per audio pair
Frequency Response	From 20 Hz to 22 kHz
Sampling Rate	48kHz

Audio Decoding	
Maximum Analog Audio Output Level	From +5dBu to +20dBu (balanced or unbalanced) (+6dBu = default)
Compression Standards	• MPEG-2 AAC-LC ISO/IEC 13818-7 • MPEG-4 AAC-LC ISO/IEC 14496-3

Audio Channel Details/Breakout	
Analog Audio	
Single Channel	Analog audio can select any channel pair in a stream up to the eighth pair: • SDI1ch1&2, SDI1ch3&4, SDI1ch5&6, SDI1ch7&8, SDI1ch9&10, SDI1ch11&12, SDI1ch13&14, SDI1ch15&16
Dual Channel	Analog audio can select from the first 4 channel pairs of either SDI interface: • SDI1ch1&2, SDI1ch3&4, SDI1ch5&6, SDI1ch7&8 • SDI2ch1&2, SDI2ch3&4, SDI2ch5&6, SDI2ch7&8
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: Single Pair: • SDI1ch1&2, SDI1ch3&4, ... SDI2ch15&16 Surround Sound uses up to 4 channel pairs from: • SDI1
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
SDI Embedded Audio	
Single Channel	Supports up to 16 channels (8 channel pairs) of embedded audio on the SDI interface: • SDI1ch1&2, SDI1ch3&4, ... SDI2ch15&16
Dual Channel	Supports up to 8 channels (4 channel pairs) of embedded audio per SDI interface: • SDI1ch1&2, SDI1ch3&4, SDI1ch5&6, SDI1ch7&8 • SDI2ch1&2, SDI2ch3&4, SDI2ch5&6, SDI2ch7&8

Advanced Features

Advanced Features
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

Advanced Features
Still image insertion on loss of input stream

Metadata (Optional)

Output Metadata Features
KLV over SD-SDI/HD-SDI/3G-SDI
Metadata Processing:
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

Single Height Appliance (#S/B-292D-HD2)	
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) **Note** 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)

Dual Height Appliance (#S/B-292D-HD1-HEVC OR S/B-292D-HD2-HEVC)	
Dimensions (H x W x D)	44mm H x 149mm W x 202mm D (1.74" H x 5.85" W x 8.0" D)
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

Dual Height Appliance (#S/B-292D-HD1-HEVC OR S/B-292D-HD2-HEVC)	
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

MB6X - 6-Blade Chassis (#F-MB6X-RAC, #F-MB6X-MED, #F-MB6X-DC)	
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: • F-MB6X-RAC (Redundant AC type): 90-264VAC 47Hz-63Hz • F-MB6X-MED (Medical Grade): 90-264VAC 47Hz-63Hz • F-MB6X-DC (DC type): 20-36 VDC 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	• Room temperature: 57.0 dB(A) L'p(AVG) • 50°C Ambient: 65.9 dB(A) L'p(AVG)

MB21B (#F-MB21B-R)

MB21B - 21-Blade Chassis (#F-MB21B-R)	
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: • 90-132V and 180-240VAC 47Hz-63Hz • 400 watt maximum per PSU
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	• Room temperature: 56.4 dB(A) L'p(AVG) • 50°C Ambient: 63.3 dB(A) L'p(AVG)

MB21X (#F-MB21X-R)

MB21X - 21-Blade Chassis (#F-MB21X-R)[1]	
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: • 100-240VAC 47Hz-63Hz • 600 watt maximum per PSU
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	• Room temperature: 56.4 dB(A) L'p(AVG) • 50°C Ambient: 63.3 dB(A) L'p(AVG)
Advanced Features	• Removable fan trays • Station Alarm Interface

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

Makito X Harsh Decoder Environment Chassis

Makito X Harsh Environment Chassis Option (#S-292E-X1H, #S-292E-X2H or #S-292D-X2H)	
Fanless operation for high temperature applications	
Dimensions	44mm H x 137mm W x 203mm D (1.73" H x 5.4" W x 8.0" D)
Weight	1.8 kg (4lbs.)
Power	12VDC, 20W 100-240VAC 30W external locking power supply
Temperature	Operating: 0ºC to 70ºC (32ºF to 158ºF) Non-operating: -40ºC to 85ºC (-40ºF to 185ºF)
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

BSD type licenses, or those describe by Regents of the University of California identifier are typically described by the following: BSD-2-Clause and BSD-3-Clause (revised BSD license).

Permissive Free Software License: Rights are owned by an individual, group of individuals, institution or consortium but is generally free provided minimal conditions are met. S ee: Permissive free software licence wikipedia entry for more information.

Topics in This Chapter

Open Source Software Credits

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
`chrony`	3.2.1	Alternate Network Time Protocol (NTP) alternative	GPL v2, June 1991

Package	Version	Description	License
coreutils	8.9	Basic shell, file and text manipulation	GPL v3, June 2007
cracklib	2.8.18	Password checking library	LGPL v2.1 - June 1999
cron	3.0p11	Time base job scheduler	permissive free software license
db	5.1.19	Berkeley Relational Database Library	Oracle 2010 (redistribute as-is) + Berkeley type license
dpkg	1.16.0	Debian Package Manager System	GPL v2 - June 1991
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
openssh	7.3p1	Open SSH	Multiple BSD style licenses.
openssl	1.0.2n	Open Secure Socket Layer	Dual OpenSSL / SSLeahy

Package	Version	Description	License
openssl-fipsalgvs	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.

expat Custom License

libuuid Modified Licensed (Modified BSD)

Warranties

1-Year Limited Hardware Warranty

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

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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

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If you have questions, please contact **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	• Access to all functions through the administrative user interface. • Ability to add or modify objects and metadata through the application programming interface ("API") • Ability of ingest service to check for new or updated files or feeds	99.999%
Read-Only Functions	• Ability to retrieve data through the API • Ability for Audience Members to authenticate through the Access Service • Ability for Audience Members to play Published Media Objects • Ability for Audience Members to play Haivision VCMS-authenticated or entitled Published Media Objects • Ability to complete Transactions	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	• Preventive maintenance on the software/ hardware components of Haivision VCMS • Addition of new features/functions • Repair errors that are not immediately affecting Your use of Haivision VCMS	No	Yes	10 Hours	6 Hours	10:00pm - 5:00am	48 Hours
Urgent	• Repair errors that are immediately affecting Your use of Haivision VCMS	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	• 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	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 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

General Support	North America (Toll-Free) **1 (877) 224-5445** International **1 (514) 334-5445** *and choose from the following:* Sales - 1, Cloud Services - 3, Support - 4
Managed Services	U.S. and International 1 (512) 220-3463
Fax	1 (514) 334-0088
Support Portal	https://support.haivision.com
Product Information	info@haivision.com

info@haivision.com
www.haivision.com

North America: 1.877.224.5445
International: +1.514.334.5445

HAIVISION