Haivision

Kraken™

Advanced Real-Time Video Transcoder

User's Guide Version 2.0

HVS-ID-UG-KRAK-20
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Copyright

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Trademarks

Safety Guidelines

Use the following guidelines when unsafe conditions exist or when potentially hazardous voltages are present:

- Always use caution and common sense.
- To reduce the risk of electrical shock, do not operate equipment with the cover removed.
- Repairs must be performed by qualified service personnel only.

Antistatic Precautions

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. Electrostatic discharge occurs when a person whose body contains a static buildup touches a computer component.

The equipment contains static-sensitive devices that may be easily damaged, and proper handling and grounding is essential. Use ESD precautionary measures when installing systems or cards, and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic floorpads and workbench pads.

Improper handling and/or installation practices may VOID the warranty.

CAUTION When handling components, or when setting switch options, always use an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, such as a screwdriver or a paper clip, to set switches.

Table of Contents

Appendix B: Glossary of Terms

Appendix C: Warranty Information

About This Guide

Welcome to the user's guide for the Kraken™ Advanced Real-Time Video Transcoder, Version 2.0. This user's guide describes how to install, configure, and manage the Kraken to transcode live HD video.

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

To install and license the Kraken software-only module on your system, please refer to the Software-Only Installation Guide.

Topics In This Section

About Haivision

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

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

Audience

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

Reliability of Information

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

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

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

Obtaining Documentation

You may download the latest software, Release Notes, Quick Start Guide, and other relevant documentation from our Download Center at:
http://www.haivision.com/download-center/

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

Related Documents

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

- Kraken Quick Start Guide
- Kraken Software-Only Installation Guide
- Kraken API Integrator's Guide
- Makito User's Guide
- Barracuda User's Guide
- Hai1000 (Piranha) User's Guide

Service Support

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

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

Document Conventions

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

TIP The light bulb symbol highlights suggestions or helpful hints.

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

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

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

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

Safety Information

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

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

CHAPTER 1: Introduction

This chapter provides a brief overview of Haivision's Kraken Video Transcoder, along with a description of the main hardware components for the appliance.

Topics In This Chapter

Product Overview

NOTE Transcoding is defined as the process of converting a media stream or object from one format to another. This may be done in cases where a target device (or workflow) does not support the format, has limited storage capacity or limited network bandwidth that mandates a reduced stream size, or to convert incompatible or obsolete data to a better supported or modern format.

Haivision's Kraken Video Transcoder delivers performance IP video transcoding. The Kraken is designed for Transport Stream to Transport Stream in enterprise or satellite video distribution applications. The base model redistributes digital video broadcasts over enterprise networks. The Kraken ISR (with ISR firmware option) provides low latency transcoding for metadata-rich applications, such as within military Intelligence, Surveillance, and Reconnaissance (ISR) full motion video applications.

The Kraken is available either as a stand-alone appliance (shown below) or as a software package which customers may install on their own servers.

The Kraken appliance is available in Base, Premium, and Ultra System appliance options.

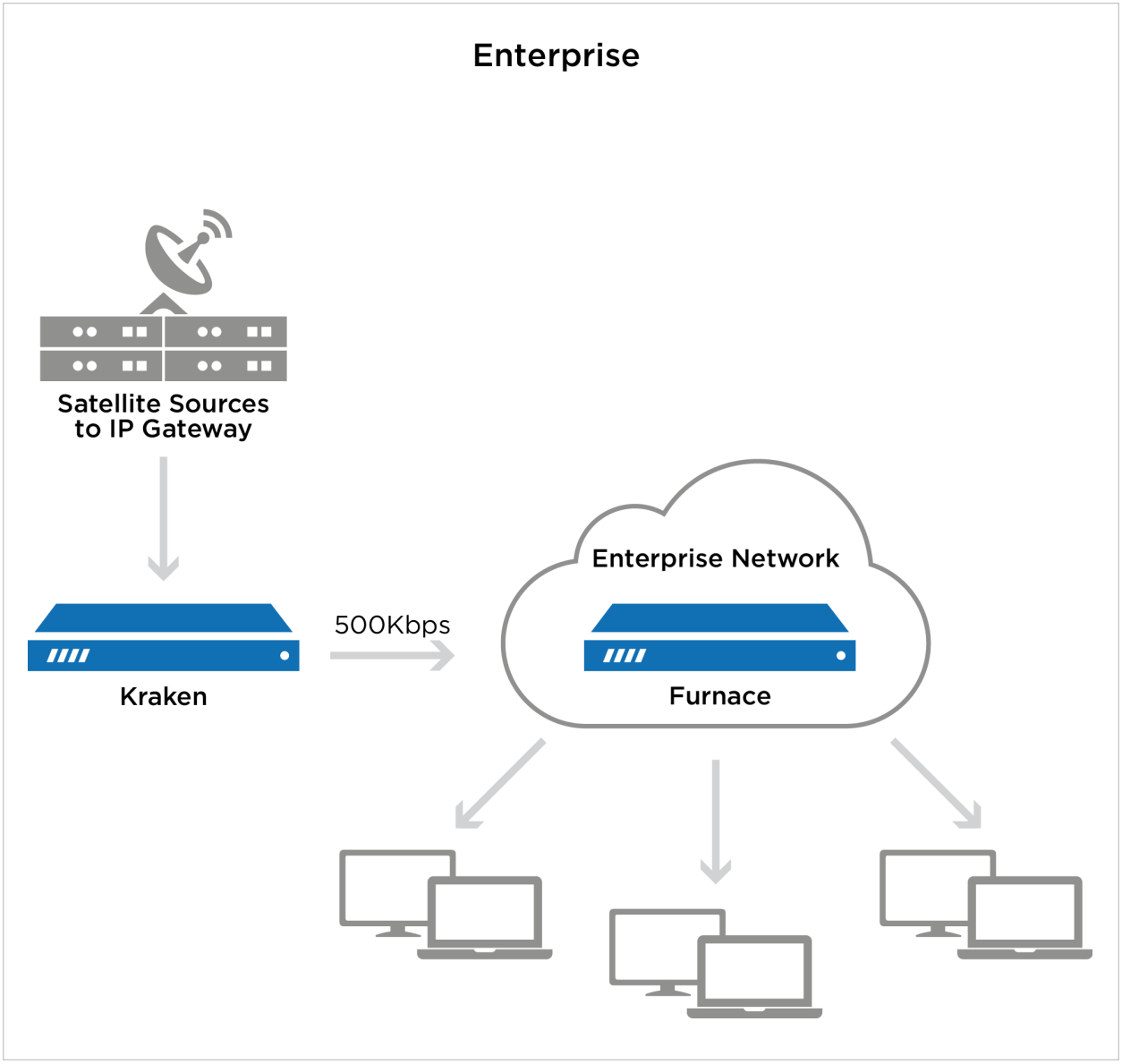
Figure 1-1 Kraken Appliance Front view

Figure 1-2 Kraken Appliance (Base System) Rear view

Kraken Enterprise – Distributing Streams for Enterprise

The Kraken is used to groom high bandwidth broadcast streams for various destinations on the network. It provides a solution to IP video deployments that capture digital video broadcasts for redistribution over the LAN to enterprise viewers. For example, a set-top box such as Haivision's Stingray may consume 6 Mbps HD H.264 multicast streams, whereas a desktop computer only 1 Mbps H.264 streams at a lower resolution.

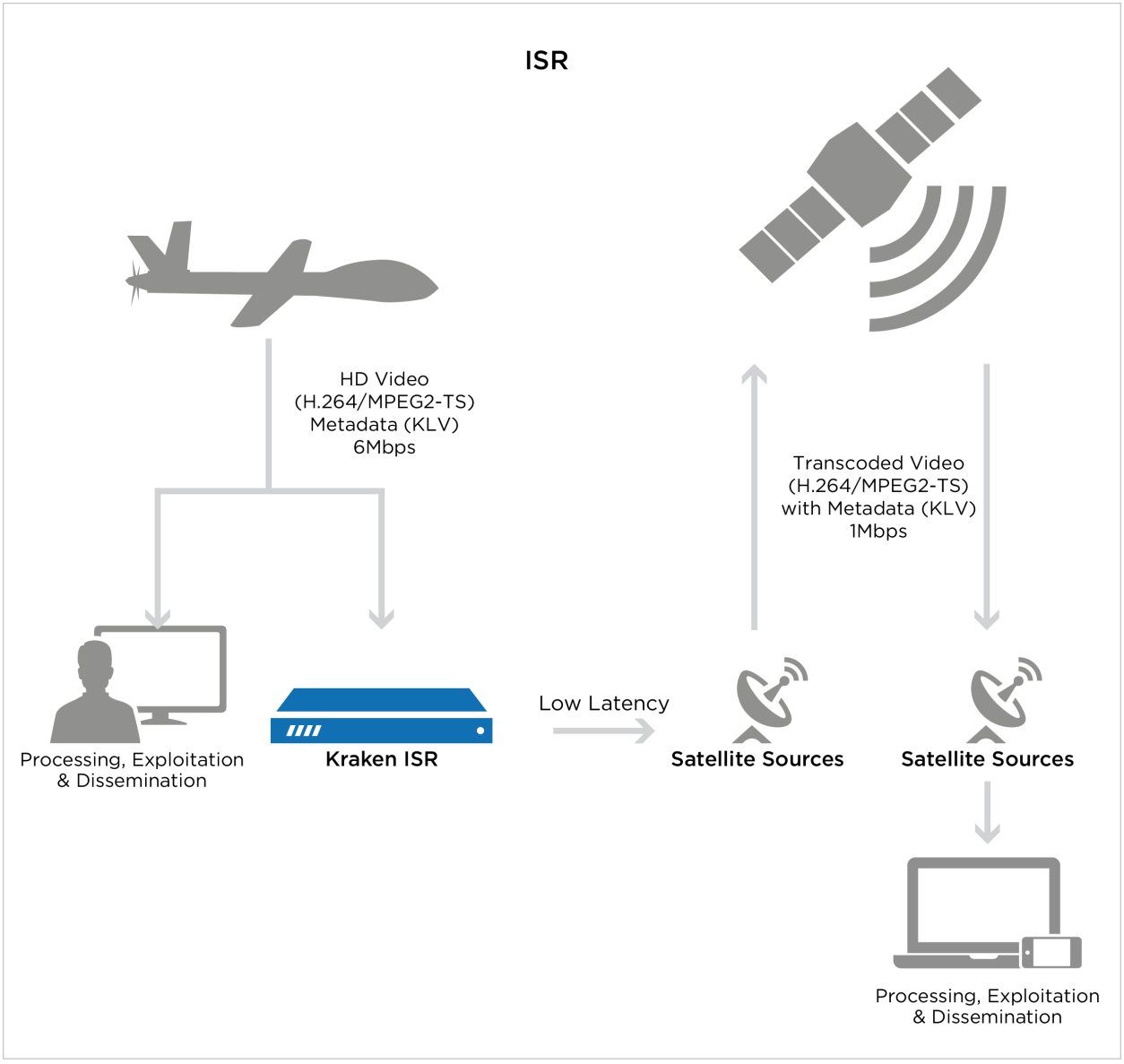
Figure 1-3 Example Kraken Enterprise Scenario



Kraken ISR – Intelligence, Surveillance, and Reconnaissance

The Kraken ISR is designed to collect, process, and disseminate information for full motion video applications. This includes passing through MISP-compliant metadata, typically in KLV (Key-Length-Value) format. The Kraken ISR is optimized to disseminate information in the formats required by downstream systems, networks, and viewers, while preserving any required metadata with frame accurate synchronization.

Figure 1-4 Example Kraken ISR Scenario



Kraken Features

The Kraken is designed to be used by consumers of HD video who are contending with high bitrate / high quality streams that are either too big to transport over some network segments or too costly for users' end points to render the video smoothly.

The Kraken takes the stream from a source URL, re-encodes the audio/video, and sends it out as a new stream with different encoding characteristics. The characteristics that may be changed include Audio Bitrate, Video Bitrate, Video Resolution, Frame Rate, Group of Pictures (GOP) size, and Maximum Transmission Unit (MTU).

The Kraken may be controlled and managed either through a Web interface or a Representational State Transfer (REST) Application Programming Interface (API). For details on the API, please refer to the Kraken API Integrator's Guide.

Audio/Video Characteristics

Kraken input streams are MPEG Transport Streams with the following characteristics:

- Video Codecs: MPEG-1, MPEG-2, MPEG-4, H.264 or H.265 (HEVC)
- Audio Codecs: AAC 2 channel, AAC 5.1 channel, AC3 2 channel, AC3 5.1 channel, or MPEG 1 Layer 2

Output streams are MPEG Transport Streams with H.264 or H.265 (HEVC) video (Main Profile 4.2 level maximum) and AAC 2 channel stereo audio. Any input stream that had a mono audio source will have that source replicated into Left and Right stereo channels) Audio may be disabled, which will remove any audio tracks on the output stream.

Transport Characteristics

Kraken input streams may be unicast UDP (the stream is sent to the Kraken), UDP multicast, TCP unicast (the stream is sent to the Kraken), or TCP unicast (the Kraken obtains the stream). Input streams may be CBR, VBR or Constant Quantizer (ConstQ). The maximum bandwidth of a single input stream is 20 Mbps. Note that the Kraken requires a connection to a Haivision Furnace server to integrate each TCP stream.

Output streams may be Unicast UDP (the stream is sent to a third party device), TCP Unicast (the Kraken listens for a request), TCP Unicast (the Kraken sends a stream to a third party device), or UDP multicast. Output streams are VBR. The maximum single bandwidth for an output stream is 20 Mbps. Note that the Kraken requires a connection to a Haivision Furnace server to integrate each TCP stream.

The Kraken supports downscaling, de-interlacing, and selection of the frame rate in frames per second to allow users to select the exact output frame rate for a transcoder session. Note that "Auto" uses the same frame rate as the source stream.

NOTE The presence of Referenced B-Frames, streams without a “low-delay” bit set in the stream, and/or streams where the audio and video are not interleaved can cause an increase in latency.

Software-Only Version

The Kraken is available either as an appliance or as a software-only product to be installed on a Red Hat Enterprise Linux v6.x system.

- With the appliance, customers will continue to receive a turn-key Haivision Kraken appliance.
- With the software-only product, Haivision will provide administrators with a list of dependencies which are required for the Kraken software to function, as well as a package to install the Kraken software on Red Hat Enterprise Linux (RHEL) v6.x in 32 or 64 bit configurations. The local administrator is responsible for all operating system configuration, updates and security.

For more information, see the Software-Only Installation Guide.

Console User Interface (Appliance Only)

A Console UI is available for Kraken appliances which may be accessed directly using a keyboard and monitor attached to the Kraken, or through SSH. The Console UI allows administrators to perform basic system administration tasks and network tests, as follows:

- Set basic network settings such as the IP address, netmask and default gateway.
- View statistics about the appliance’s health, including current IP address, Kraken Version, CPU use, Memory use, and System uptime.

The Console UI requires a username and password. Console UI users will be able to change their password.

For more information, see “Connecting the Kraken Console UI” on page 27.

Appliance Options

The Kraken appliance is available in Base, Premium, and Ultra System appliance options.

- The Base System appliance contains only one power supply and will therefore be affected by power interruptions as a single point of failure. It supports up to 2x HD H.264/AVC encoding channels only (no H.265/HEVC encoding), so is typically used where fewer channels need to be transcoded. Its short-depth form factor makes it suitable for applications and installations where space is limited.

- The Premium System appliance provides redundant power supplies, so it can be plugged into redundant power sources, ensuring higher availability. It supports up to either 8x HD H.264/AVC encoding channels or 2x HD H.265/HEVC encoding channels, thereby providing more transcoding channel density, enabling users to transcode more streams and more outputs. It also features a short-depth form factor.
- The Ultra System appliance also provides redundant power supplies. It supports up to either 16x HD H.264/AVC encoding channels or 4x HD H.265/HEVC encoding channels, thereby providing the most transcoding channel density. It is full depth.

  The Ultra System appliance also provides redundant Hot Swap Hard drives (RAID 1) and power supplies.

All appliances are 1RU tall.

For more information, see "Setting Up the Kraken Appliance" on page 24.

Physical Description (Appliance only)

The Kraken appliance comes delivered as an enterprise-ready, ultra-compact appliance made for single-tier architectures. Following is a description of the Kraken appliance interfaces and LED status indicators:

System Interface

The Kraken appliance provides two 10/100/1000 Gigabit Ethernet ports for both traffic and management. The two RJ-45 connectors are located on the rear of the appliance.

Figure 1-5 Ethernet Connections (Base System Appliance)

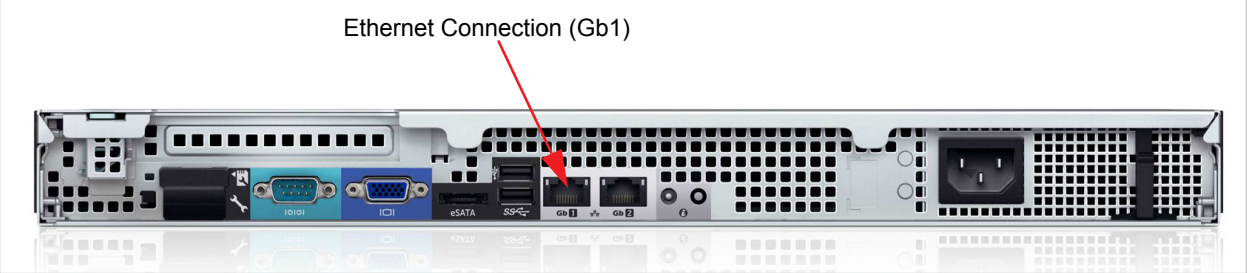


Figure 1-6 Ethernet Connections (Premium System Appliance)

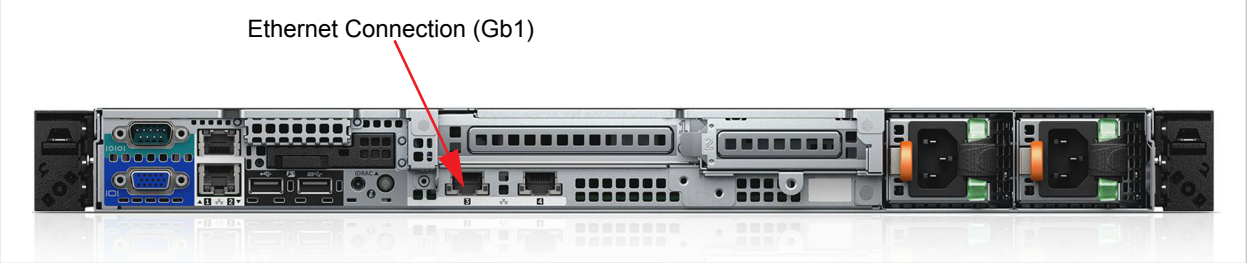
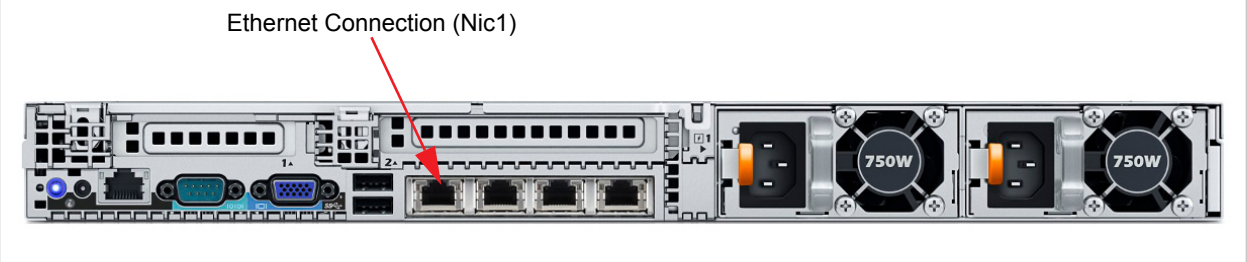


Figure 1-7 Ethernet Connections (Ultra System Appliance)



Related Topics

- "Connecting Kraken to the Network" on page 26

LED Status Indicators

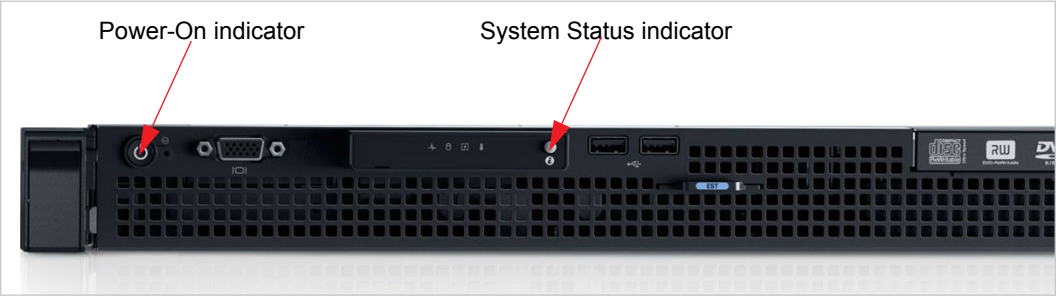
The LED colors and flashing (blinking) speed indicate the status (operational state) of the appliance.

Base System Appliance LEDs

Table 1-1 LED Status Indicators - Base System Appliance

Indicator	Color	Description
	Front Panel	
Power-On	Green	Green LED integrated in the Power button indicates when the appliance power is On. The Power button controls the DC power supply output to the system.
System Status	Blue / Amber	Two LEDs, one on front panel and one on back panel.
		• Lights blue during normal system operation
		• Lights amber when the system needs attention due to a problem
	Back View	
System Status	Blue	See Front Panel description (above).

Figure 1-8 LED Status Indicators - Base System Appliance (Front panel TOP/Rear view BOTTOM)



Related Topics

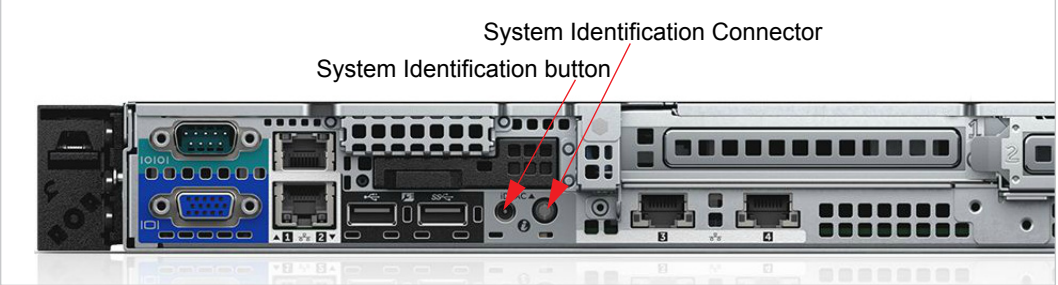
- "Powering Up the Kraken" on page 30

Premium System Appliance LEDs

Table 1-2 LED Status Indicators - Premium System Appliance

Indicator	Color	Description
		Front Panel
Power-On	Green	Green LED integrated in the Power button indicates when the appliance power is On. The Power button controls the DC power supply output to the system.
LCD Panel	Blue / Amber	Provides system ID, status information, and system error messages. NOTE: If the system is connected to AC power and an error has been detected, the LCD lights amber regardless of whether the system has been powered on.
		• Lights blue during normal system operation
		• Lights amber when the system needs attention. The LCD panel displays an error code followed by descriptive text

Figure 1-9 LED Status Indicators - Premium System Appliance (Front panel TOP/Rear view BOTTOM)



Related Topics

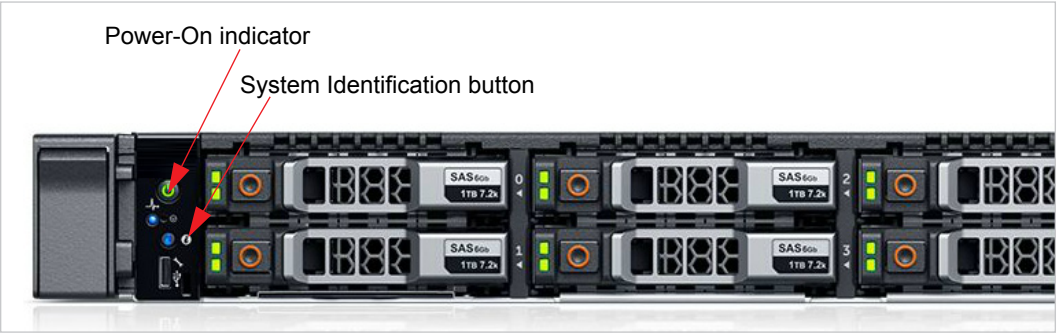
- "Powering Up the Kraken" on page 30

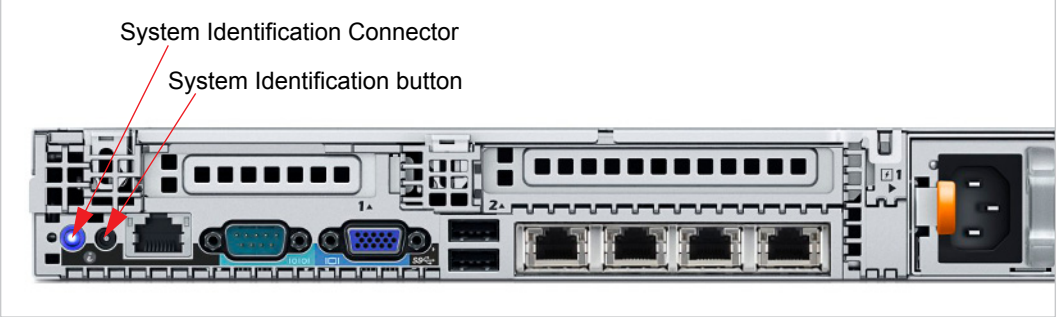
Ultra System Appliance LEDs

Table 1-3 LED Status Indicators - Ultra System Appliance

Indicator	Color	Description
Front Panel		
Power-On	Green	Green LED integrated in the Power button indicates when the appliance power is On. The Power button controls the DC power supply output to the system.
LCD Panel	Blue / Amber	Provides system ID, status information, and system error messages. NOTE: If the system is connected to AC power and an error has been detected, the LCD lights amber regardless of whether the system has been powered on.
		• Lights blue during normal system operation
		• Lights amber when the system needs attention. The LCD panel displays an error code followed by descriptive text

Figure 1-10 LED Status Indicators - Ultra System Appliance (Front panel TOP/Rear view BOTTOM)





Related Topics

- "Powering Up the Kraken" on page 30

CHAPTER 2: Setting Up the Kraken Appliance

This chapter explains how to set up and connect the Kraken appliances.

Topics In This Chapter

Setting Up the Appliance

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

Please choose a suitable location for operating the appliance. By doing so you will preserve the operational lifetime and stability of the unit(s).

Set up the unit on a reliable and flat surface, or mount in a rack.

Safety First

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

- Refer to "Safety Guidelines" on page 3.
- The Kraken is an indoor appliance and should be kept in a dry, dust free environment.
- There are no user-serviceable parts inside the unit. Making unauthorized changes will void the warranty.
- Only connect the unit to a compatible power source.
- If an electrical fault occurs, disconnect the unit and contact Haivision Technical Support.
- Never try to force the connections when setting up the system as this may damage the unit.

Connecting Kraken to the Network

To connect the Network Interface:

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

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

Figure 2-1 Network Connection - Base System Appliance (Rear view)

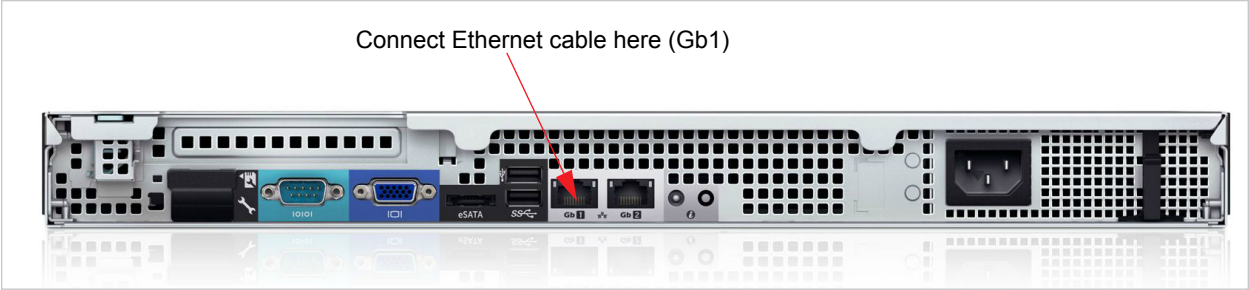


Figure 2-2 Network Connection - Premium System Appliance (Rear view)

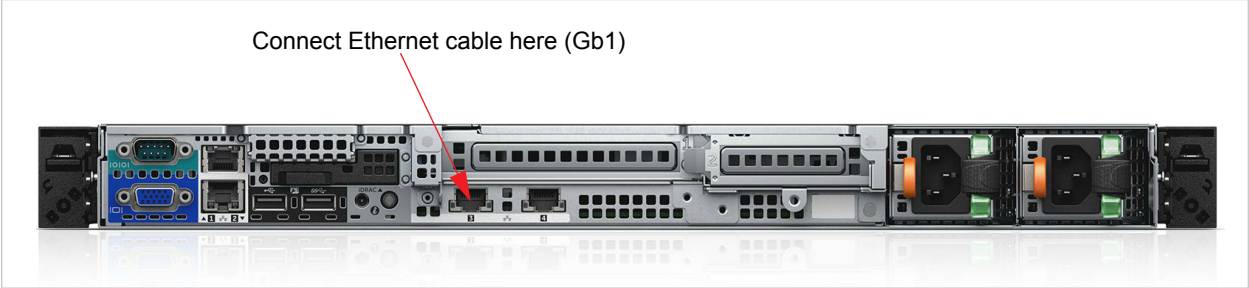
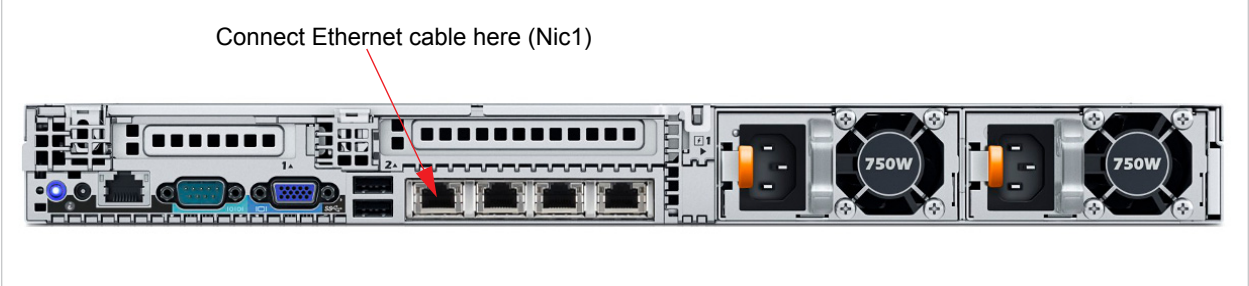


Figure 2-3 Network Connection - Ultra System Appliance (Rear view)



Connecting the Kraken Console UI

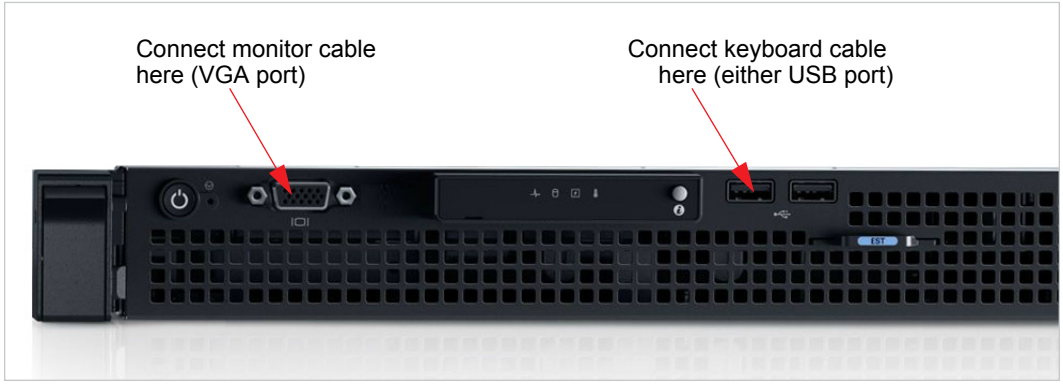
You can directly access the Kraken Console user interface by connecting a keyboard and monitor to the appliance (either from the front or the back of the appliance).

NOTE You can also access the Console UI via SSH (through the Ethernet connection).

To connect the Console UI:

1. Connect a monitor to one of the Kraken's VGA ports.
2. Connect a keyboard to one of the Kraken's USB ports.

Figure 2-4 Console UI Connection - Base System Appliance (Front panel TOP/Rear view BOTTOM)



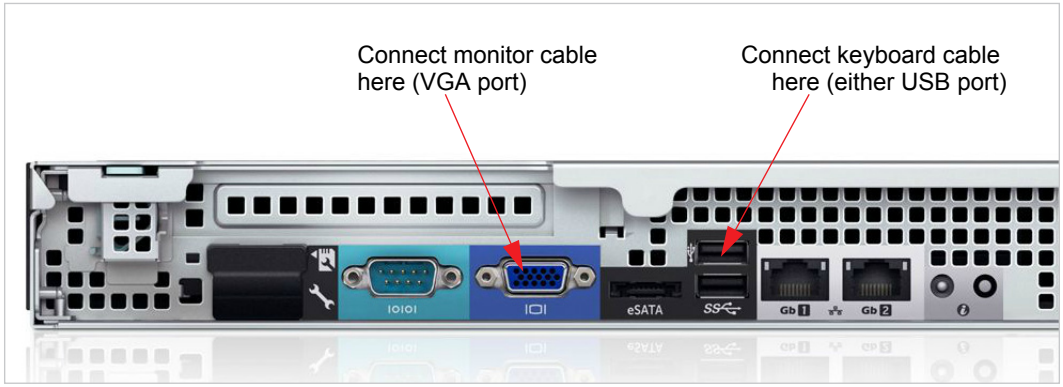


Figure 2-5 Console UI Connection - Premium System Appliance (Front panel TOP/Rear view BOTTOM)

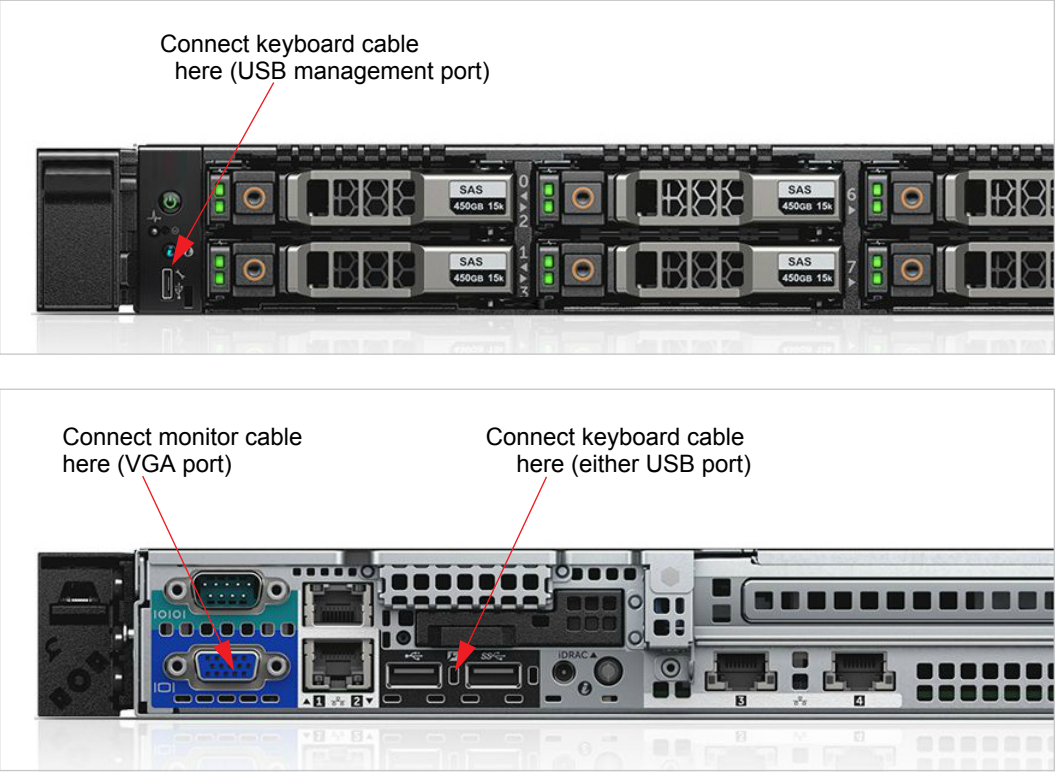
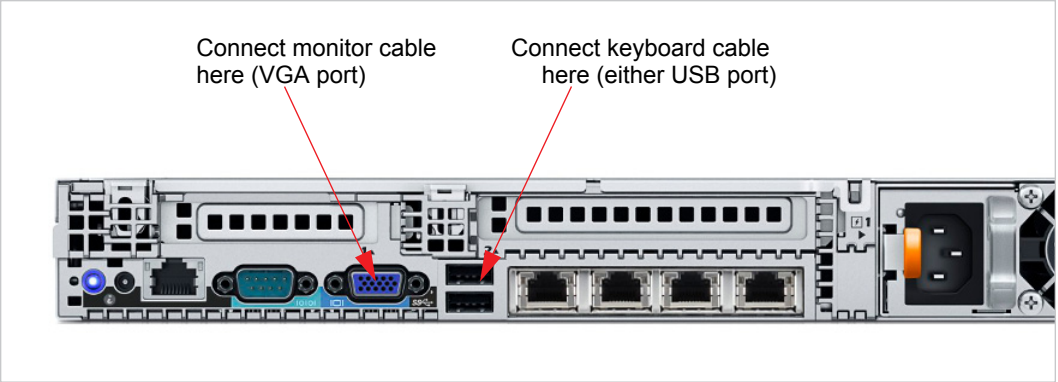


Figure 2-6 Console UI Connection - High Density (Front panel TOP/Rear view BOTTOM)



For information on using the Console UI, see "Accessing the Console UI" on page 71.

Powering Up the Kraken

To power up the Kraken:

1. Connect the appliance's power cable to the appliance.

Figure 2-7 Power Connection - Base System Appliance (Rear view)

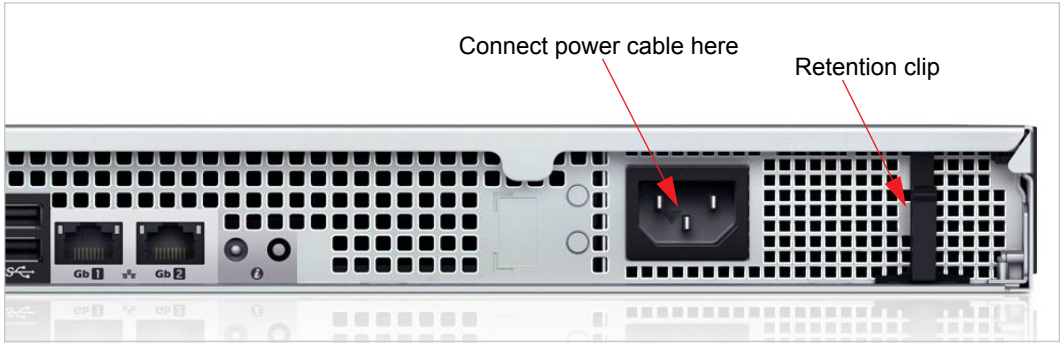


Figure 2-8 Power Connection - Premium System Appliance (Rear view)

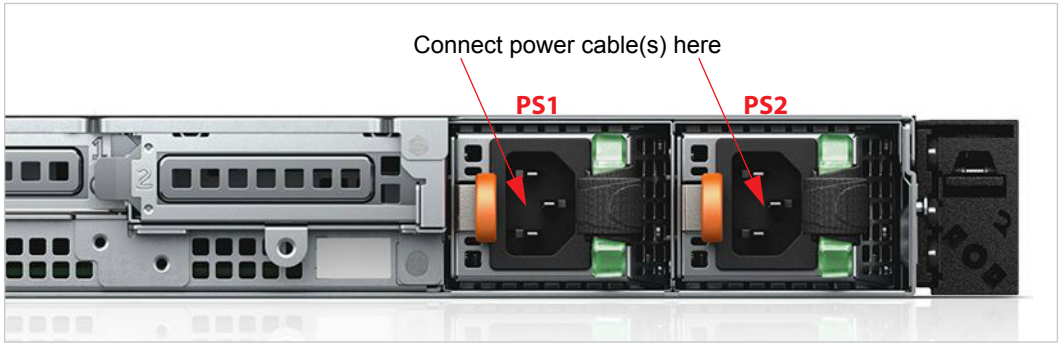
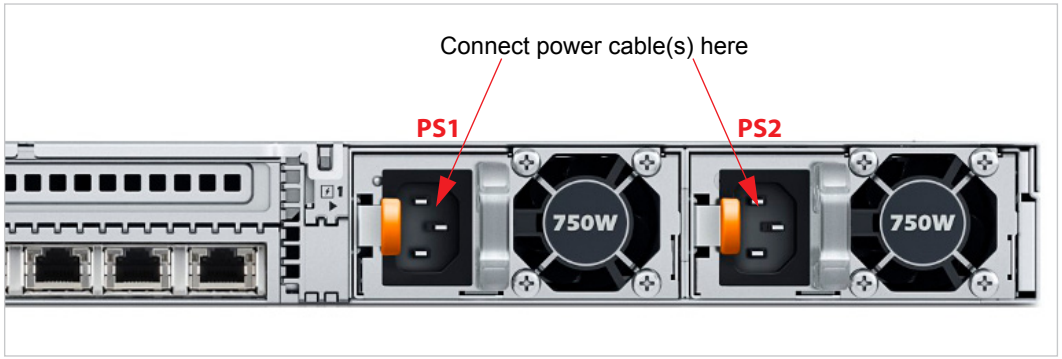


Figure 2-9 Power Connection - Ultra System Appliance (Rear view)



2. (Standard Density Appliance Only) Fold the power cable and secure the cable in the retention clip.
3. Plug the other end of the power cable into a grounded electrical outlet or a separate power source such as an uninterrupted power supply (UPS) or a power distribution unit (PDU).
4. Press the Power button on the front of the appliance. The power indicator should light.

Figure 2-10 Power Switch - Base System Appliance

Figure 2-11 Power Switch - Premium System Appliance

Figure 2-12 Power Switch - Ultra System Appliance

CHAPTER 3: Managing Kraken from the Web Interface

This chapter explains how to set up real-time stream-based transcoding, as well as manage the Kraken using the Web interface.

NOTE Before proceeding, make sure that the appliance is set up correctly and the network connection is established. See Chapter 2: "Setting Up the Kraken Appliance".

If you are using the software-only module, make sure it is properly installed on your system. For details, refer to the Software-Only Installation Guide.

Topics In This Chapter

Administration

Logging in to Kraken

Web Interface

TIP Make sure that your browser is configured to accept cookies.

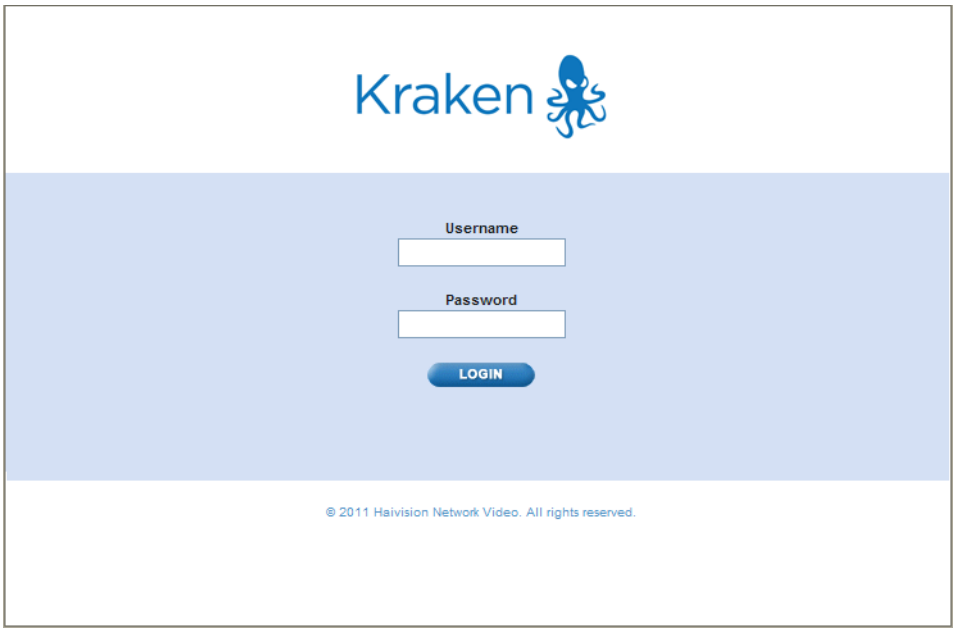
To log in to the Kraken configuration Web page:

1. From your computer, open a Web browser.
2. Type the Kraken's IP Address in the browser's address bar and press Enter.

NOTE The appliance's IP address will be set by Haivision prior to delivery. Please refer to the Important Notice included in the packaging of your Kraken for the IP address and administrative user information. For the software-only Kraken, you will need to append the port to the IP address. For example, https://IpAddress:4043/

The Web Interface is available over HTTPS only, port 443 TCP. HTTP traffic will be redirected to HTTPS.

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



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

   The default Web interface Username and Password are:

Username: haiadmin
Password: manager

There is only one user account; however, you may change the default password. For information, see "Changing the Web Interface Password" on page 61.

NOTE Selecting Help from the menu bar will launch the online help. For more information, see "Online Help" on page 38.

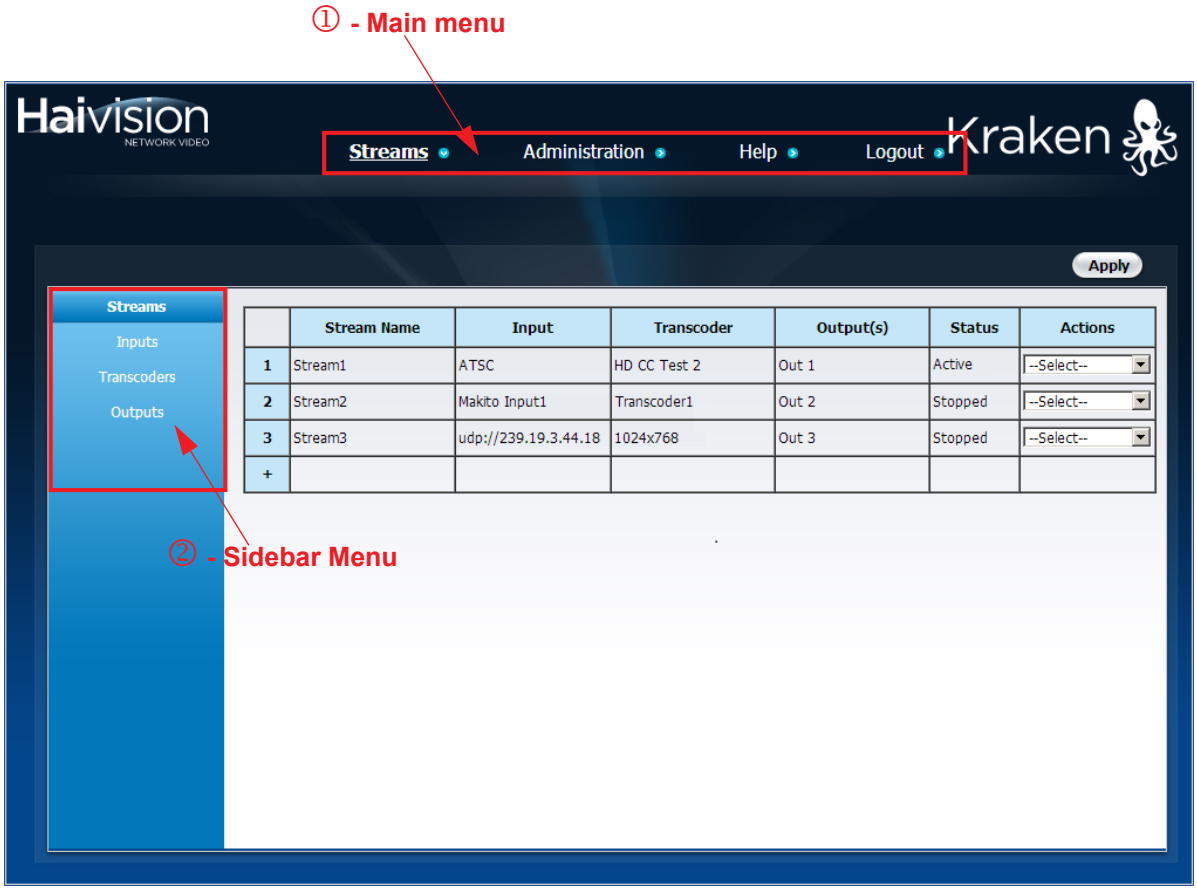
Exploring the Web Interface

After logging in to the Web configuration interface, you will have access to the appliance configuration settings.

Navigational Menus

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

1. Either STREAMS or ADMINISTRATION from the Main Menu (along the top bar, see example below), or
2. The configuration area from the sidebar menu (for example, STREAMS, INPUTS, TRANSCODERS or OUTPUTS).

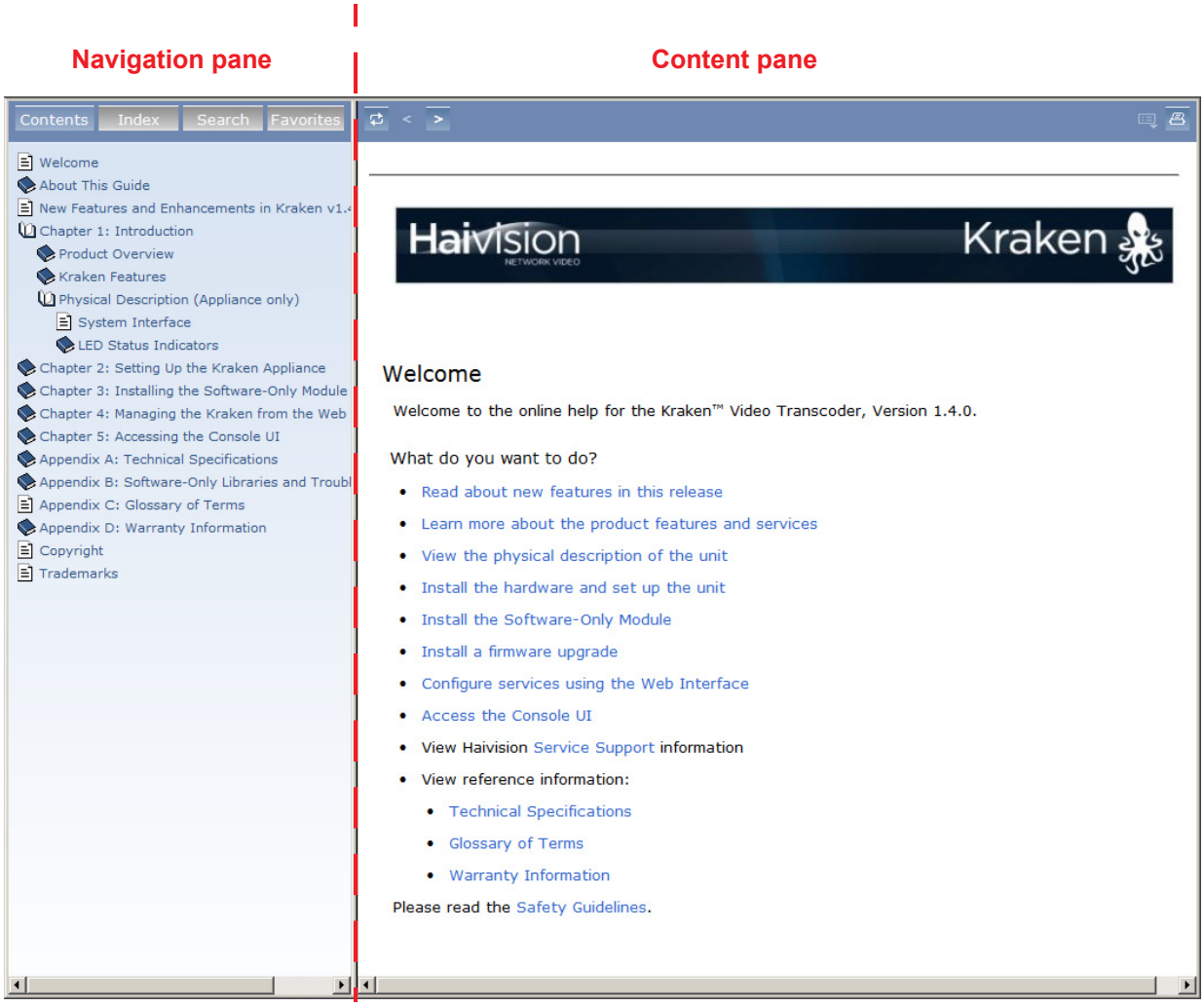


NOTE You must click the Apply button in order for your changes to take effect. However, your changes will not be saved and will be lost after a reboot.

To save the current settings, open the ADMINISTRATION>CONFIGURATION page. See "Saving and Loading Configurations" on page 63.

Online Help

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



Configuring Streams

The Kraken provides a STREAM OVERVIEW page and individual STREAM SETTINGS pages. You can define an unlimited number of streams from these pages. However, the number of active streams supported by the Kraken will depend on your Kraken hardware and Haivision licensing applied to that hardware.

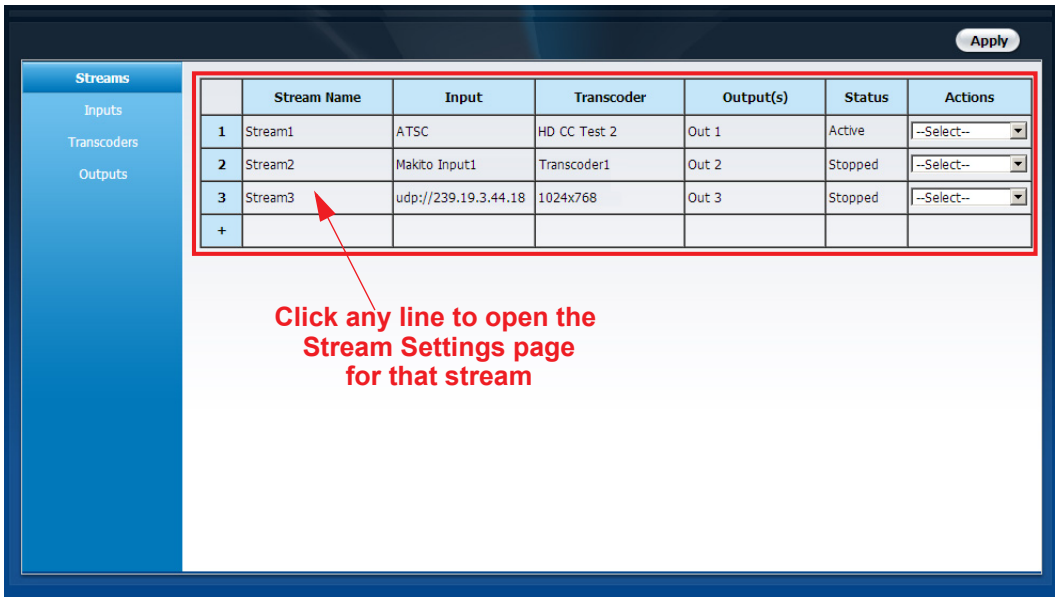
Stream Overview Page

Each Kraken stream consists of a user-defined Stream Name, Input, Transcoder, and Output(s). The STREAM OVERVIEW page displays a summary of defined streams, along with the Status for each stream. It also provides options for you to Start, Stop or Remove a stream.

To open the Stream Overview:

1. Click STREAMS from the main menu.

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



2. To view stream details or add a stream, click a line in the table to open the STREAM SETTINGS page.
3. To change the Action status for an existing stream, click -Select- (under Actions) and select either Start / Stop or Remove.
4. To apply your changes, click Apply.

Stream Settings Page

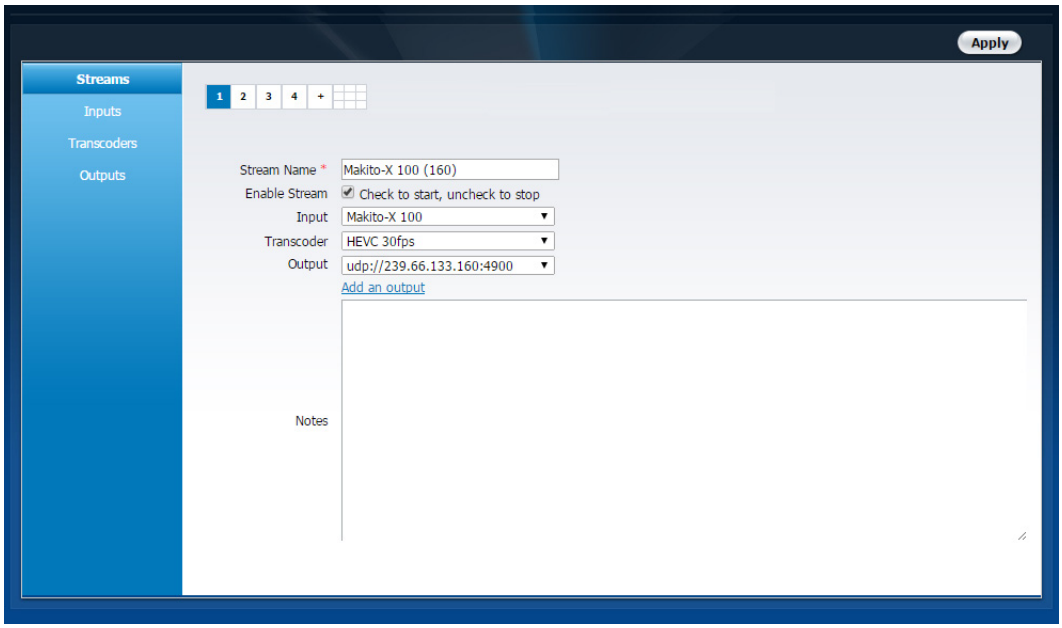
NOTE You must first define the Inputs, Transcoders, and Outputs before you can define a Stream.

The Inputs, Transcoders, and Outputs that you have previously defined will be selectable when you define a stream.

To configure Streams:

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

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



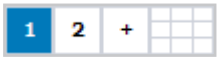
2. Type in a unique name for the stream.
3. To start the stream, check the Enable Stream checkbox.
4. Select an Input, Transcoder, and one or more Outputs to define the stream. See the following section, "Stream Settings".
5. To apply your changes to the current session only, click Apply.

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

TIP To save the current settings, open the ADMINISTRATION>CONFIGURATION page. See "Saving and Loading Configurations" on page 63.

Stream Settings

The following table lists the Kraken Stream settings:

Stream Setting	Description/Values
	Click a number to display the STREAM SETTINGS page for an existing stream, or to add a new stream. Click the grid to display the STREAM OVERVIEW page.
Stream Name	Enter a unique name for the stream.
Enable Stream (checkbox)	Check or clear this checkbox to start or stop the stream.
Input	Select the Input for the transcoded stream.
Transcoder	Select the Transcoder to apply to the stream.
Output	Select the Output for the transcoded stream. NOTE: To specify multiple outputs, click Add an output and select from the list.
Notes	(Optional) Type in any related information or comments.

NOTE An asterisk (*) next to a field indicates that it is required.

Configuring Inputs

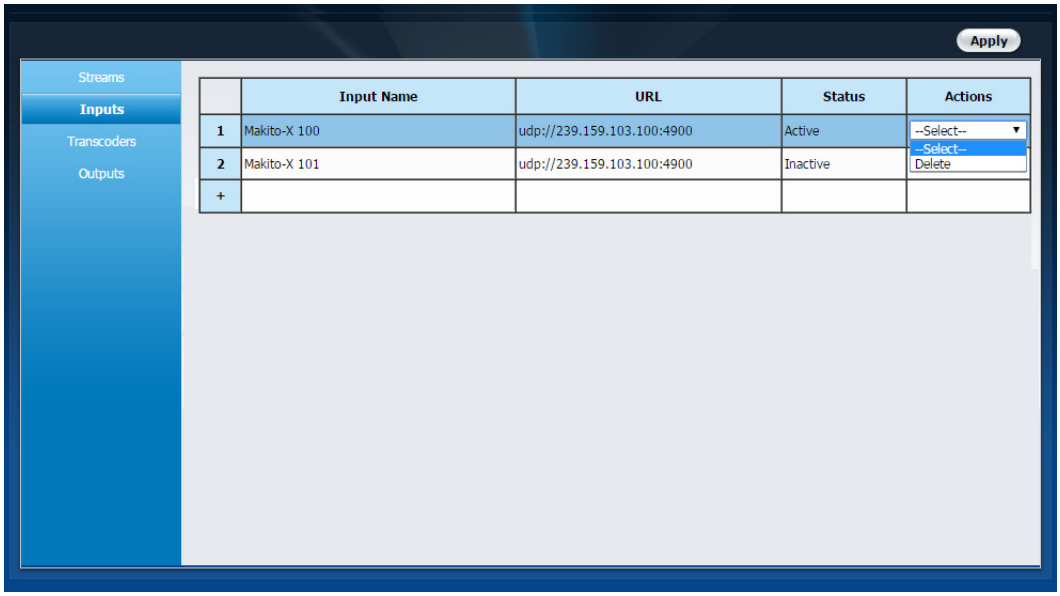
Input Overview Page

The INPUT OVERVIEW page displays a summary of defined inputs for the Kraken. The INPUT OVERVIEW page displays the Input Name, source URL, and Status for each input. It also provides an option for you to delete an input.

To open the Input Overview:

1. Click STREAMS from the main menu, and then click INPUTS from the sidebar menu.

   The INPUT OVERVIEW page opens, as shown in the following example, displaying the defined inputs.



2. To view input details or add an input, click a line in the table to open the INPUT SETTINGS page.
3. To delete an existing input, click -Select- (under Actions) and select Delete.
4. To apply your changes, click Apply.

Input Settings Page

You must first define one or more Inputs before you can define a Stream. Each Input consists of a valid source URL with an optional name and notes.

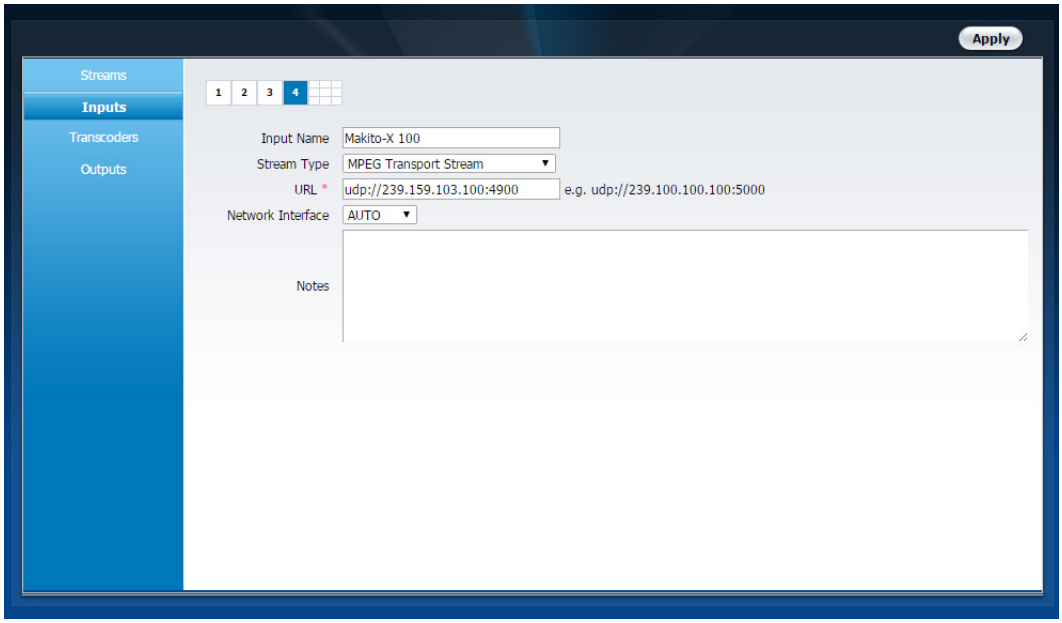
In addition, you can select the network interface for the Input. The Kraken may be configured to input streams from any of the available Network Interface Cards (NICs).

The default stream type for the Input is MPEG2 Transport Stream. You may also select Raw Motion JPEG (MJPEG), which the Kraken will transcode into a standard H.264 or HEVC MPEG Transport Stream.

To configure Inputs:

1. From the INPUT OVERVIEW page, click any line in the table.

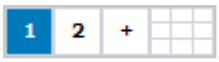
   The INPUT SETTINGS page opens, as shown in the following example.



2. Select or enter values in the fields to define the input. See the following section, "Input Settings".
3. To apply your changes, click Apply.

Input Settings

The following table lists the Kraken Input settings:

Input Setting	Description/Values
	Click a number to display the INPUT SETTINGS page for an existing input, or to add a new input. Click the grid to display the INPUT OVERVIEW page.
Input Name	Enter a unique name for the input. This name will be selectable from the list of Inputs when you define a stream. NOTE: The Input name is not required. The Kraken will use the Input URL as the name if none is provided.
Stream Type	Select the Stream Type for the Input, either: • MPEG Transport Stream (default) • Raw Motion JPEG: Allows you to input a Motion JPEG (MJPEG) live stream and transcode the payload into a standard H.264 video within an MPEG Transport Stream.
URL	Type in the source URL for the Input, for example, udp://239.100.100.100:5000 Examples of supported input formats: • udp://239.100.100.100:5000 = multicast UDP to 239.100.100.100 port 5000 • udp://:5000 = unicast UDP. Allows an inbound stream to be sent to this server's IP address on port 5000.
Network Interface	Select the network (Ethernet) interface for the Input, either: • Auto (default): Uses static route, if defined; otherwise uses the default • lo (Loopback) • Eth0 • Eth1 NOTE: Network Interface names for Ethernet interfaces may vary, such as eth0/eth1/…, pNp1/pNp2/…, or em1/em2/…. CAUTION: Because input multicast listening routes are based on IP addresses, do not reuse the same address even if they are assigned to different NICs. Doing so would produce corrupted output in all associated sessions.
Notes	(Optional) Type in any related information or comments.

NOTE An asterisk (*) next to a field indicates that it is required.

Configuring Transcoders

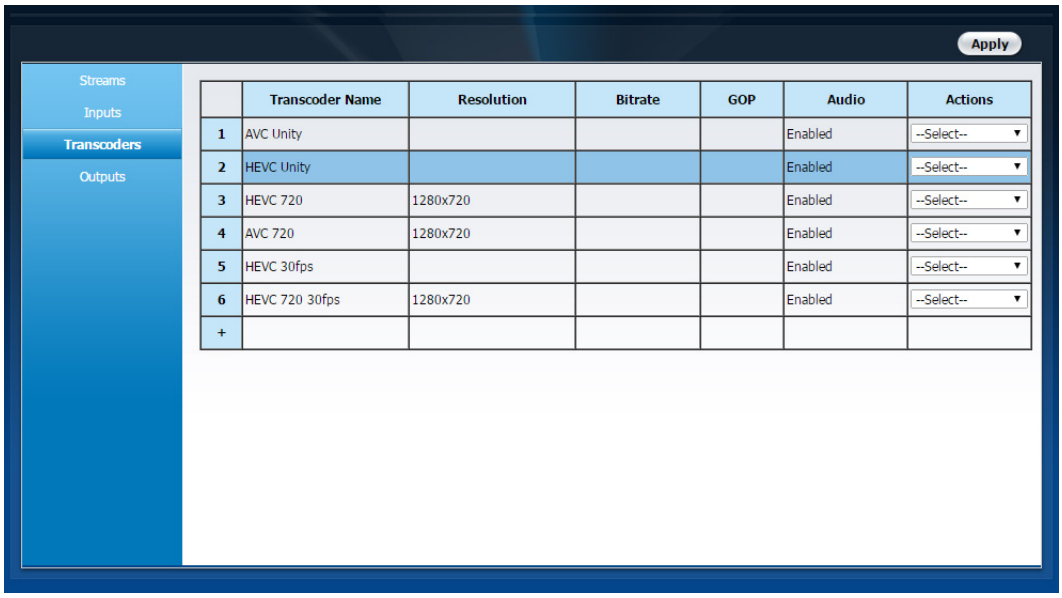
Transcoder Overview Page

The TRANSCODER OVERVIEW page displays a summary of defined transcoders for the Kraken. The TRANSCODER OVERVIEW page displays the Transcoder Name, Resolution, Video Bitrate, Group of Pictures (GOP) size, and enable Audio settings for each transcoder. It also provides an option for you to delete a transcoder.

To open the Transcoder Overview:

1. Click STREAMS from the main menu, and then click TRANSCODERS from the sidebar menu.

   The TRANSCODER OVERVIEW page opens, as shown in the following example, displaying the defined transcoders.



2. To view transcoder details or add a transcoder, click a line in the table to open the TRANSCODER SETTINGS page.
3. To delete an existing transcoder, click -Select- (under Actions) and select Delete.
4. To apply your changes, click Apply.

Transcoder Settings Page

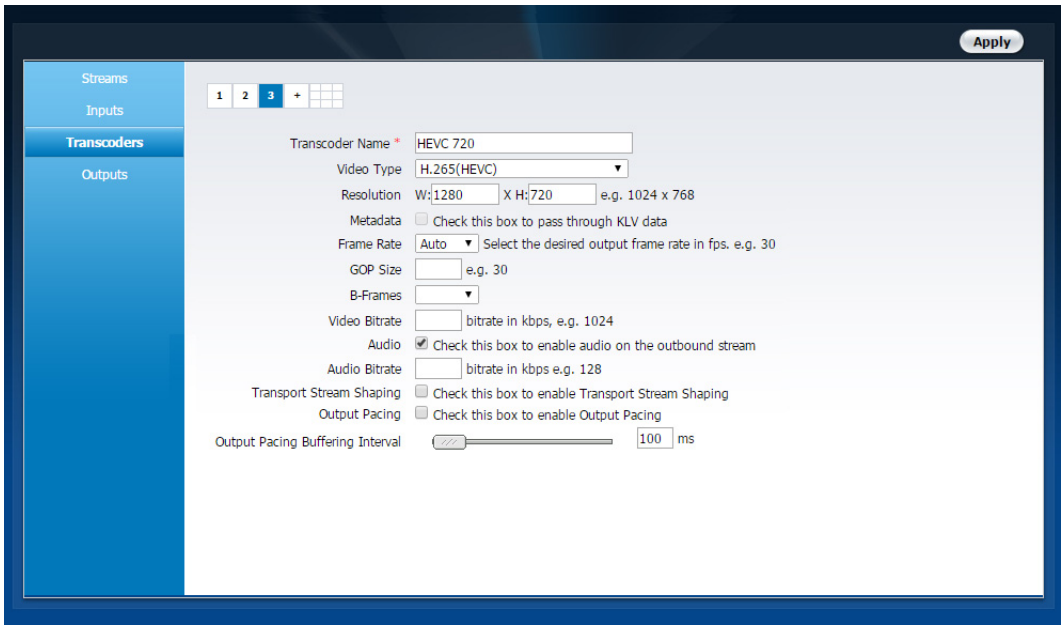
You must first define one or more Transcoders before you can define a Stream. Each Transcoder is a user-defined set of parameters to apply when re-encoding the audio/video. Transcoder Settings include the Video Resolution, Frame Rate, GOP size, Video Bitrate, Audio Bitrate, Stream Shaping, and Output Pacing. Optional advanced settings are available to fine-tune Stream Shaping.

NOTE If the Resolution fields are left blank or unchanged in the Transcoders section, the resolution of the source stream will remain intact in the outbound stream. However, the GOP Size and Bitrate are set to a default value based on the resolution.

To configure Transcoders:

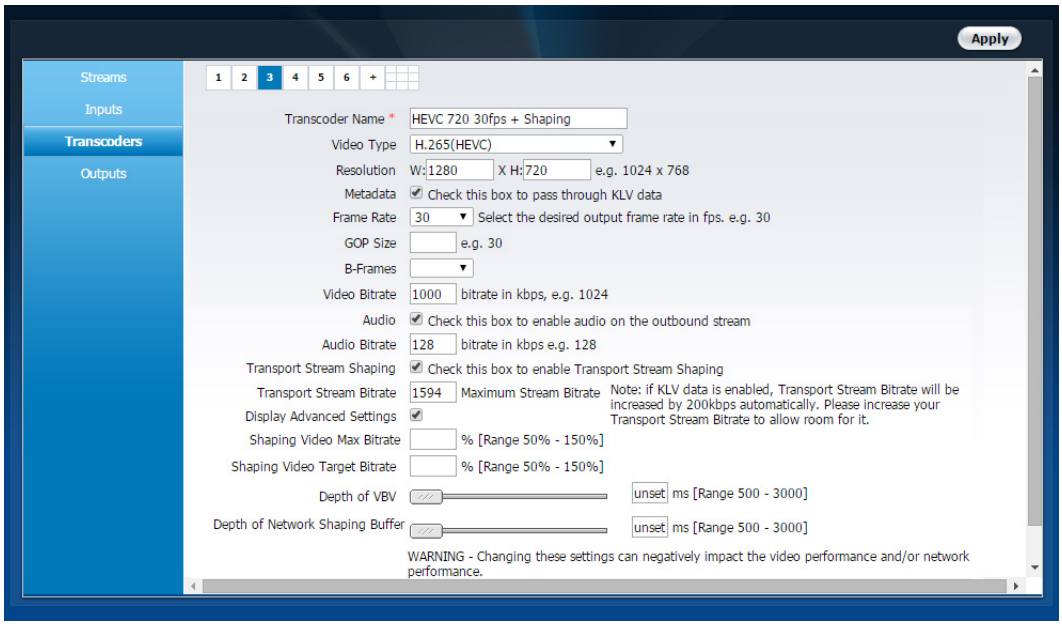
1. From the TRANSCODER OVERVIEW page, click any line in the table.

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



2. Select or enter values in the fields to define the transcoder. See the following section, "Transcoder Settings".

3. (Optional) If Stream Shaping is enabled, you can check the Display Advanced Settings checkbox to access additional settings, as shown in the following example.

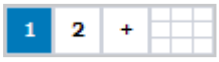


For details, see "Advanced Shaping Settings" on page 52.

4. To apply your changes, click Apply.

Transcoder Settings

The following table lists the Kraken Transcoder settings:

Transcoder Setting	Description/Values
	Click a number to display the TRANSCODER SETTINGS page for an existing transcoder, or to add a new transcoder. Click the grid to display the TRANSCODER OVERVIEW page.
Transcoder Name	Enter a unique name for the transcoder. This name will be selectable from the list of Transcoders when you define a stream.
Video Type	Select the video type for the outbound stream, either: • H.264 (AVC) (default) • H.265 (HEVC)
Resolution	Type in the resolution for the outbound stream (W x H), for example, 1024x768. TIP: If the Resolution fields are left blank or unchanged, the resolution of the source stream will remain intact in the outbound stream. NOTE: 720x576 or lower is considered SD resolution.

Transcoder Setting (Cont.)	Description/Values (Cont.)
Metadata	Check this checkbox to enable KLV metadata pass-through.
Frame Rate	Select the coded picture frame rate per second (fps): • Auto (default): Encodes at the same frame rate as the input • 1..60
GOP Size	Type in the GOP (Group of Pictures) Size for the outbound stream, for example, 30. Range = 0..1000 NOTE: You may choose to adjust the GOP to get different video quality on the outbound stream or to make the stream compatible with a different system than the original stream was intended for. TIP: Increasing the GOP size can increase the time required for a player to tune into the stream. Reasonable GOP sizes tend to range from half the frame rate to up to 5 times the frame rate. A GOP size equal to the output frame rate is a good rule of thumb.
B-Frames	Select the number of B-frames and B reference frames to allow in the outbound stream: • Unset (default): The output stream framing is not the same as the input. In default mode, the Kraken software decides how many B-Frames and B reference frames to allow. This option allows you to set the desired number of B-Frames per P-Frames to use in the output stream. • 0 = No B-Frames and B reference frames, up to a maximum of 3 B-frames and B reference frames in sequence NOTE: B-Frames improve the quality by increasing the efficiency of the encoding, thus allowing higher quality at the same bitrate. But B-Frames increase the encoder processing overhead, e.g., higher CPU utilization of the encoder.
Video Bitrate	Type in the Video Bitrate in kbps for the outbound stream, for example, 1024. Range = 150..15000

Transcoder Setting (Cont.)	Description/Values (Cont.)
Audio	Check this checkbox to enable audio on the outbound stream. Kraken will automatically insert a silent audio stream into the output when the input source has no audio (see "Silent Audio Insertion" on page 54). NOTE: When audio is removed on the outbound stream, the PID for the audio track is removed, as is the reference to it in the PMT.
Audio Bitrate	Type in the Audio Bitrate in kbps for the outbound stream, for example, 128. • Range = 14..576 Kbps
Transport Stream Shaping	Check this checkbox to enable Shaping on the outbound stream. NOTE: Traffic Shaping is used on some networks to smooth the traffic and respect the absolute upper limit configured. When Shaping is enabled, you can set the Maximum Bitrate for the Transcoder Stream (see Transport Stream Bitrate below). TIP: When Shaping is enabled, the Video Bitrate becomes the ceiling video bitrate target. When Shaping is disabled, this parameter represents the average video bitrate.
Transport Stream Bitrate	(Only available when Transport Stream Shaping is enabled) Type in the Maximum Transport Stream (TS) Bitrate in kbps for the outbound stream, for example, 3000. NOTE: The Kraken automatically generates a minimum value based on the Video Bitrate, Audio Bitrate and whether or not there is KLV metadata. This minimum value may be used by default, or you may set the Maximum TS Bitrate to a higher value (but not lower). TIP: If KLV metadata pass-through is enabled, 200 kbps will be added to the Maximum TS Bitrate value by default. If your site is utilizing KLV streams that are higher than 200 kbps, you should increase the Maximum TS Bitrate value to make room for the KLV stream. For example, to use a 1 Mbps KLV stream, you should increase the Maximum TS Bitrate by 800 kbps to allocate enough room in the Kraken output stream for the KLV, Audio and Video.

Transcoder Setting (Cont.)	Description/Values (Cont.)
	TIP: If the encoder is overrunning the ceiling bitrate and you have room in the channel to spare, you can increase this value, which allows more room in the channel for higher spikes in the encoder. By default, the Web Interface tries to set this to 20% above the expected aggregate bitrate of the elementary streams. For instance, it adds the Video Bitrate, Audio Bitrate, and expected KLV bitrate and adds 20%. This can be increased, but should probably not drop below 12%. You need at least 3% and sometimes more for the TS packetization and PSI tables, etc.
Output Pacing	(Kraken appliances only. Transport Stream Shaping must be disabled.) Check this checkbox to enable Output Pacing on the outbound stream. NOTE: Output Pacing is used to make the traffic more or less smooth on the network, to allow the stream traffic to leave the Kraken in a more even manner. When pacing is enabled, you can set the Output Pacing Buffering Interval (see below).
Output Pacing Buffering Interval	(Output Pacing must be enabled) This Buffering Interval defines the depth of the Output Pacing in milliseconds (ranging from 0 to 1000ms). It is used to define the latency and smoothness added by the output pacing. You can either type in a value between 0 and 1000 ms. in the text box, or move the slider to the desired value. NOTE: The higher the buffer is set, the more smooth the traffic is on the network. However, the optimal buffer setting will depend on the “spikiness” of the source stream.
Display Advanced Settings	(Only available when Transport Stream Shaping is enabled) Check this checkbox to enable display of advanced settings (see following section “Advanced Shaping Settings”). CAUTION: Changing these settings can have a negative impact on the video performance and/or network performance.

NOTE An asterisk (*) next to a field indicates that it is required.

Advanced Shaping Settings

The following table lists the advanced tuning settings for Transport Stream Shaping. These settings are only available when Transport Stream Shaping is enabled and the Display Advanced Settings checkbox is checked.

TIP See "Recommended Start Settings for Advanced Shaper Settings" on page 53.

Advanced Setting	Description/Values
Shaping Video Max Bitrate	Type in the maximum video bitrate for shaping the outbound stream, as a percentage. Range = 50% - 150% NOTE: Increasing this above 80% will increase the quality, but also increases the probability that the encoder will overrun the ceiling. At higher bitrates, it should be possible to increase this to 85%. TIP: You can try setting this to 90% or higher to see where you start observing problems due to overrunning the network buffers. In most situations, you should not exceed 100%. The optimal setting is reached when this value is as close to 100% as possible without overrunning the buffers. This depends on a large number of factors, including Bitrate, Frame Rate, GOP size, Resolution, scene complexity, and VBV size.
Shaping Video Target Bitrate	Type in the target video bitrate for shaping the outbound stream, as a percentage. Range = 50% - 150% TIP: As a general rule, keep this at 70% for all operating points. It should be lower than the Shaping Video Max Bitrate and lower than 100%. 70% is fairly optimal for the Kraken's encoder.
Depth of VBV	Type in or adjust the slider to specify the value in milliseconds for the Video Buffering Verifier (VBV) depth. Range = 500 - 3000ms NOTE: The VBV is a theoretical MPEG video buffer model used to ensure that an encoded video stream can be correctly buffered and played back at the decoder device. By definition, the VBV will not overflow nor underflow when its input is a compliant MPEG stream.

Advanced Setting (Cont.)	Description/Values (Cont.)
Depth of VBV (Cont.)	TIP: This is the depth of the CBR buffer in the decoder VBV model in milliseconds. A value that you should strive for is 1000ms; lower values may decrease the rate at which the encoder overruns the network buffers at lower bitrates. Increasing this parameter increases latency and also increases quality. It should not be lowered below 1000ms. A good quality encoder will make intra frames 12- 15 times larger than non-intra frames. At 30fps, this means half of the stream bitrate is consumed for a single video frame. Since it must fit inside the VBV, the optimal point for our low delay application is 1000ms.
Depth of Network Shaping Buffer	Type in or adjust the slider to specify the value in milliseconds for the network shaping buffer depth. Range = 500 - 5000ms NOTE: This is the depth in milliseconds of the network traffic shaper's buffers. Since a good quality encoder will generate an intra frame consuming approximately 50% of the available bitrate in one frame, this is the interval over which the bitrate spike of the intra frame is sent out over the network to keep it inside the channel bitrate. If the encoder overshoots this buffer, because the bitrate is too low for the resolution, frame rate, and/or scene complexity, the encoder will overrun this buffer. As a result, a decoder will receive a corrupt stream.

Recommended Start Settings for Advanced Shaper Settings

Following are the recommended start settings when using the Advanced Shaping settings:

Shaping Video Max Bitrate	100%
Shaping Target Bitrate	70%
VBV Size	1000ms
Network Shaping Buffer	1000ms

The goal should be to try and maximize the channel utilization (and thus the quality) while minimizing the shaping buffer overruns and minimizing the latency. Starting with the above values, you may try the following:

- Increase the bitrate percentages to improve quality.
- Increase the VBV and network shaping size to decrease bitstream drop based on shaping buffer overrun.

We do *not* recommend dropping the VBV and/or network shaping buffer much below 1000ms.

Silent Audio Insertion

The Kraken provides a valid silent (blank) audio track, which may be inserted within streams that did not originally contain any audio, in order to achieve Furnace interoperability with these specific streams.

The Kraken will automatically:

- Insert a silent audio stream into the Kraken output when the input source has no audio.
- Utilize an audio stream from the source, should one become available after the transcoder session has started.
- Start silence injection should the audio stream become unavailable in the source after the transcoder session has started.
- Adapt to streams where the source audio stream becomes intermittently available and unavailable unexpectedly within the source (assuming the availability/non-availability of audio in the source stream does not change more rapidly than 30 second intervals).

NOTE There may be some transition artifacts. If you disable audio in the Transcoder session configuration, no silence injection will be performed.

Configuring Outputs

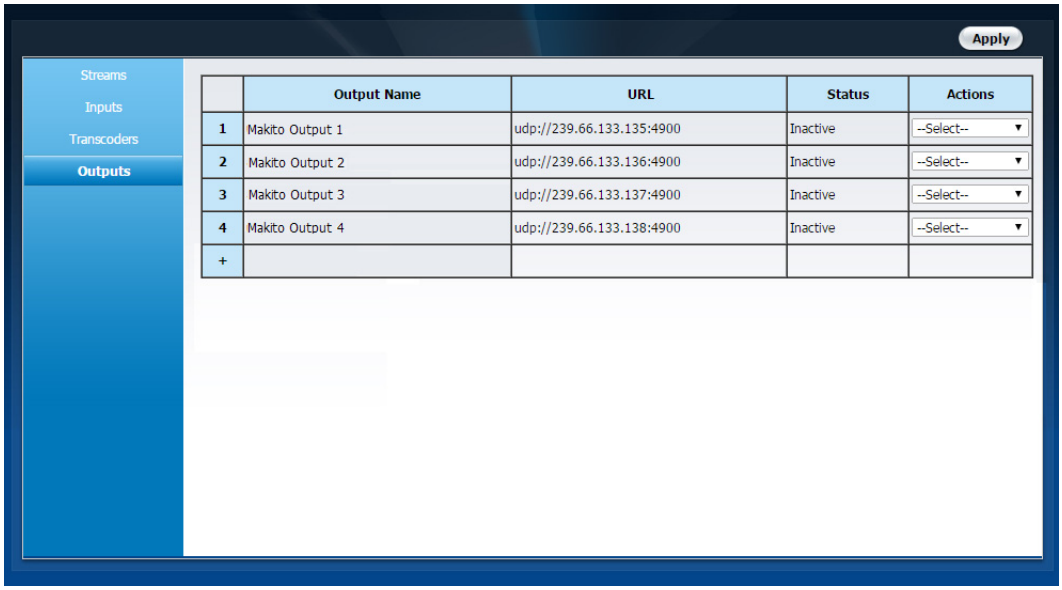
Output Overview Page

The OUTPUT OVERVIEW page displays a summary of defined outputs for the Kraken. The OUTPUT OVERVIEW page displays the Output Name, output URL, and Status for each output. It also provides an option for you to delete an output.

To open the Output Overview:

1. Click STREAMS from the main menu, and then click OUTPUTS from the sidebar menu.

   The OUTPUT OVERVIEW page opens, as shown in the following example, displaying the defined outputs.



2. To view output details or add an output, click a line in the table to open the OUTPUT SETTINGS page.
3. To delete an existing output, click -Select- (under Actions) and select Delete.
4. To apply your changes, click Apply.

Output Settings Page

You must first define one or more Outputs before you can define a Stream. Each Output consists of a valid destination URL with an optional name and notes. The Output can also include settings such as the MTU (Maximum Transmission Unit), TTL (Time-to-Live), and ToS (Type of Service).

NOTE In addition, you can select the network interface for the Output. The Kraken may be configured to output streams to any of the available Network Interface Cards (NICs).

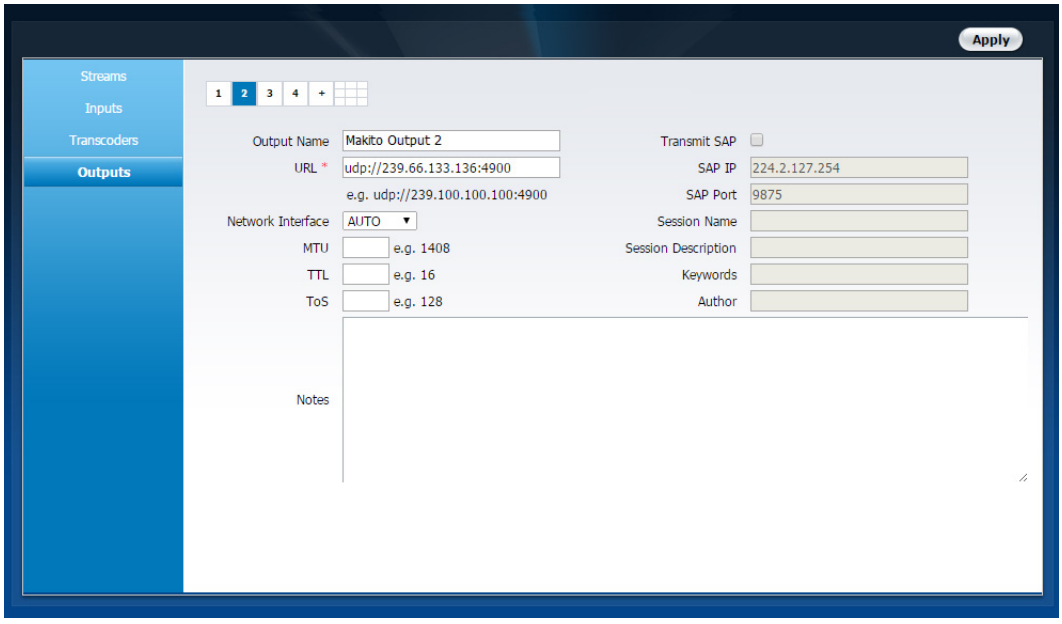
You can also enable Session Announcement Protocol (SAP) transmission for the stream to provide a playlist to viewers. SAP is a protocol for broadcasting multicast session information. An SAP announcer periodically multicasts an announcement packet to a well known multicast address and port. SAP listeners will listen on the well known SAP address and learn of all the sessions being announced.

When SAP is enabled, the Kraken sends an SAP signal out to the player when it starts streaming. Any player that supports the SAP protocol will provide the end user an automatic playlist when the Kraken is streaming.

To configure Outputs:

1. From the OUTPUT OVERVIEW page, click any line in the table.

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

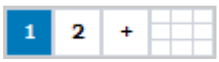


2. Select or enter values in the fields to define the output. See the following section, "Output Settings".

3. To apply your changes, click Apply.

Output Settings

The following table lists the Kraken Output settings:

Output Setting	Description/Values
	Click a number to display the OUTPUT SETTINGS page for an existing output, or to add a new output. Click the grid to display the OUTPUT OVERVIEW page.
Output Name	Enter a unique name for the output. This name will be selectable from the list of Outputs when you define a stream. NOTE: The Output name is not required. The Kraken will use the Output URL as the name if none is provided.
URL	Type in the URL for the Output, for example, udp://239.100.100.100:4900 Examples of supported output formats: • udp://239.100.100.100:4900 = multicast UDP on 239.100.100.100 port 4900 • udp://10.1.10.10:4900 will send unicast UDP to host 10.1.10.10 on port 4900
Network Interface	Select the network (Ethernet) interface for the Output, either: • Auto (uses static route, if defined; otherwise uses the default) • lo (Loopback) • Eth0 (default) • Eth1 NOTE: Network Interface names for Ethernet interfaces may vary, such as eth0/eth1/…, pNp1/pNp2/…, or em1/em2/….
MTU	(Maximum Transmission Unit Size) Specifies the maximum allowed size of IP packets for the outgoing data stream. Range = 228..1500 TIP: You may want to change the MTU on the outbound Kraken stream in order to be compatible with network segments or other systems/devices.

Output Setting (Cont.)	Description/Values (Cont.)
TTL	(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. Range = 1..255
ToS	(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)
Notes	(Optional) Type in any related information or comments.
Transmit SAP	Check this checkbox to enable SAP announcements.
SAP IP	Type in the IP address for the SAP announcement. NOTE: Leave this blank to use the standard SAP address.
SAP Port	Type in the IP port for the SAP announcement. NOTE: Leave this blank to use the standard SAP port.
Session Name	If SAP is enabled, enter a unique name for the Session.
Session Description	(Optional) Enter an expanded description of the Session.
Keywords	(Optional) Enter one or more keywords to associate with the Session. Keywords can serve as filters.
Author	(Optional) Enter the name of the program's author.

NOTE An asterisk (*) next to a field indicates that it is required.

Monitoring the System Status

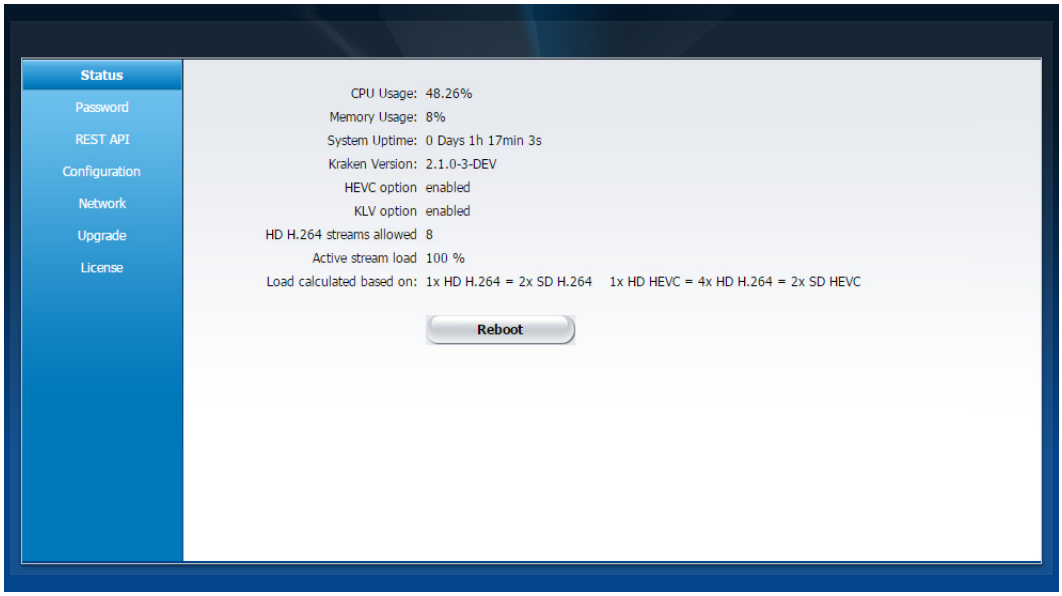
The STATUS page displays system status information about the Kraken such as the version, system load, system uptime, and licensed capacity.

You can also reboot the Kraken from the STATUS page.

To view status information:

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

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



   The STATUS settings are read-only.

Status Setting	Description/Values
CPU Usage	(Read-only) The combined CPU usage (across all cores). [100% minus the percentage of time the CPU remains idle.]
Memory Usage	(Read-only) The total RAM usage in percentage% (does not include swap space = 0).
System Uptime	(Read-only) The length of time (dd:hh:mm:ss) the appliance has been “up” and running.
Kraken Version	(Read-only) The firmware version of the Kraken, e.g., v2.0-XXXXX
HEVC option	(Read-only) Whether the HEVC Encoding license is enabled or disabled.

Status Setting (Cont.)	Description/Values (Cont.)
KLV option	(Read-only) Whether the KLV pass-through license is enabled or disabled.
HD H.264 streams allowed	(Read-only) The number of HD/SD H.264 channels licensed.
Active stream load	(Read-only) The system load based on the stream license. When the system is licensed for 8 HD H.264 streams, it will show 50% when 4 HD H.264 streams are active or 100% when 2 HD HEVC streams are active.
Load calculated based on	The rules that describe the load calculation.

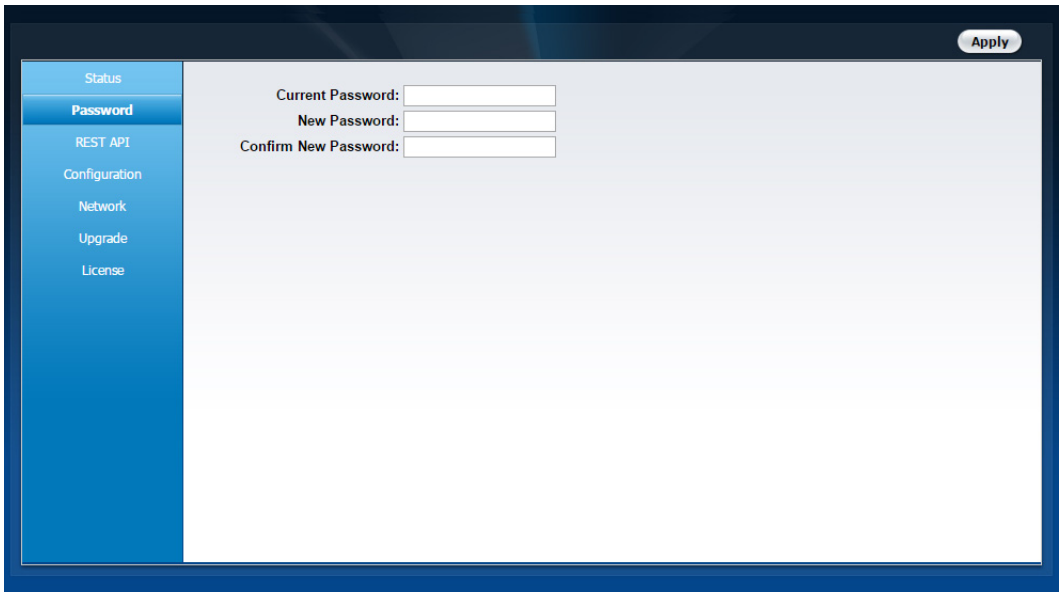
Changing the Web Interface Password

From the PASSWORD page, you can change the password for the Kraken Web interface.

To change the password:

1. Click ADMINISTRATION from the main menu and then click PASSWORD.

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



2. Type in your current password in the Current Password field.
3. Type the new password twice, in the New Password and Confirm New Password fields.
4. Click Apply.

Setting Up the REST API

The Kraken API (Application Programming Interface) is a REST (Representational State Transfer) API. The Kraken API uses the OAuth standard for authorization when a third party application requests access. For details on the API, please see the Kraken API Integrator's Guide.

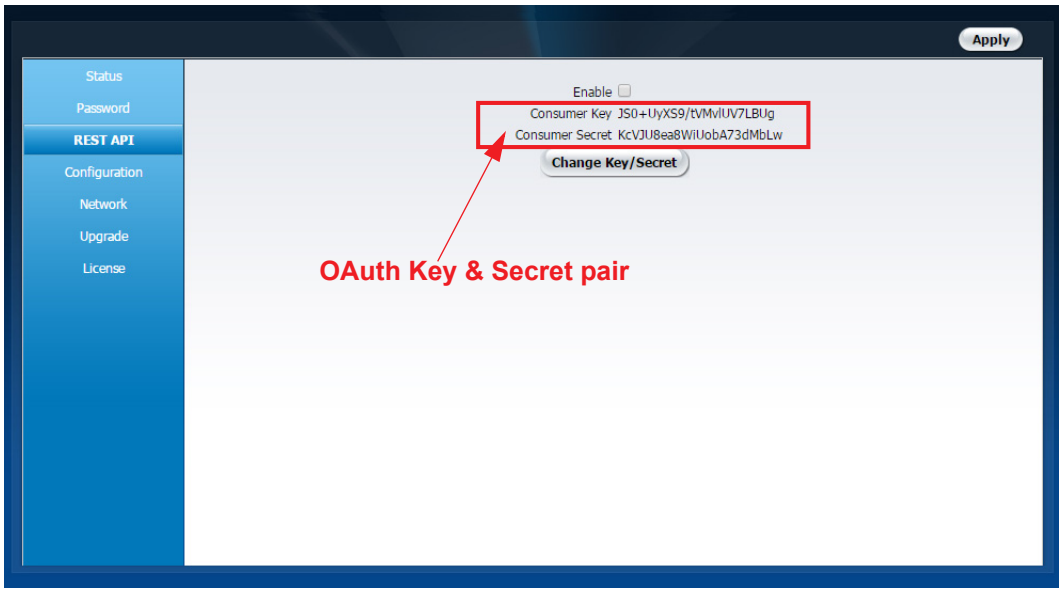
From the REST API page, you perform two steps required to use the Kraken API. First, you must enable API access. Second, because OAuth uses a key pair authentication mechanism, you need to generate the credential (i.e., a key and secret pair).

IMPORTANT Because there is only one user account on the Kraken, only one key pair is supported at a time. Therefore, each time you generate a new key, this will overwrite and invalidate the previous key.

To generate the API Credential:

1. Click ADMINISTRATION from the main menu and then click REST API.

   The REST API page opens, as shown in the following example. The current key pair, – if previously generated – is displayed in the main pane.



2. To enable API access for the Kraken, check the Enable checkbox.
3. To generate a key pair, click Change Key/Secret.

   The key and secret pair are now displayed/updated and may be shared with developers of third party applications.
4. If you checked or cleared the Enable REST API checkbox, click Apply.

Saving and Loading Configurations

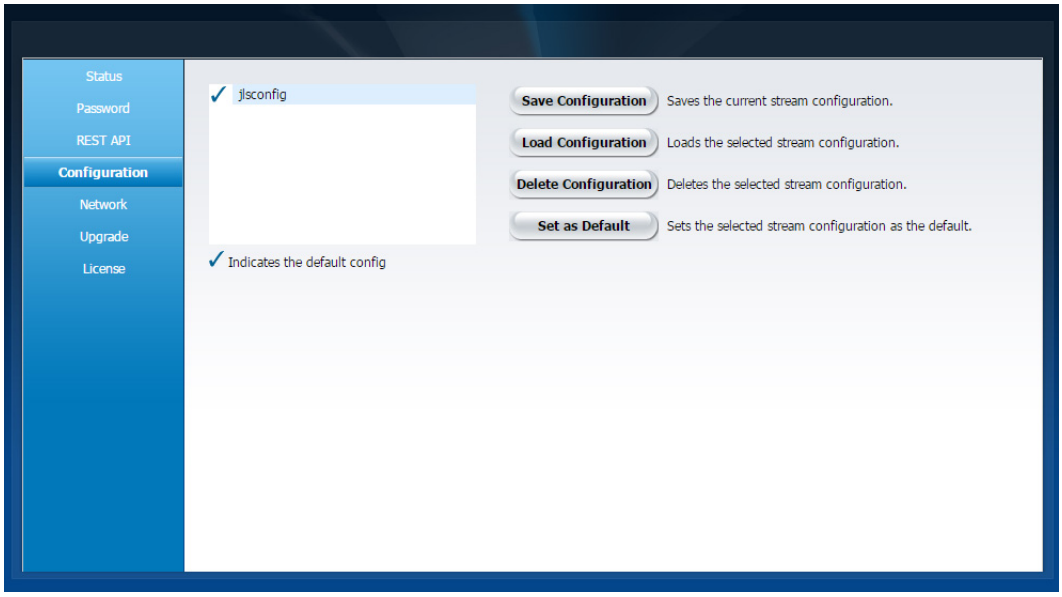
From the CONFIGURATION page, you can save a snapshot of your Input, Output, Transcoder, and Stream settings to load later. Saving configurations allows you to quickly switch between pre-defined setups for streams.

You can save your current configuration, load saved configurations, delete saved configurations, and set the default configuration to load on startup.

To view and manage configurations:

1. Click ADMINISTRATION from the main menu and then click CONFIGURATION.

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



2. To save the current settings as a stream configuration, click Save Configuration. Type the configuration name in the text box and click Save.
3. To set a previously saved configuration as the default to load on boot up, click Set as Default.
4. To load a saved configuration, select a configuration from the list and click Load Configuration.
5. To delete a saved configuration, select a configuration from the list and click Delete Configuration.

Configuring Network Settings

NOTE Network settings are not configurable through the Web Interface on the software-only Kraken. The NETWORK SETTINGS page is only available for Kraken appliances.

From the NETWORK SETTINGS page, you can modify the network interface settings for the Kraken, including the unit's IP Address.

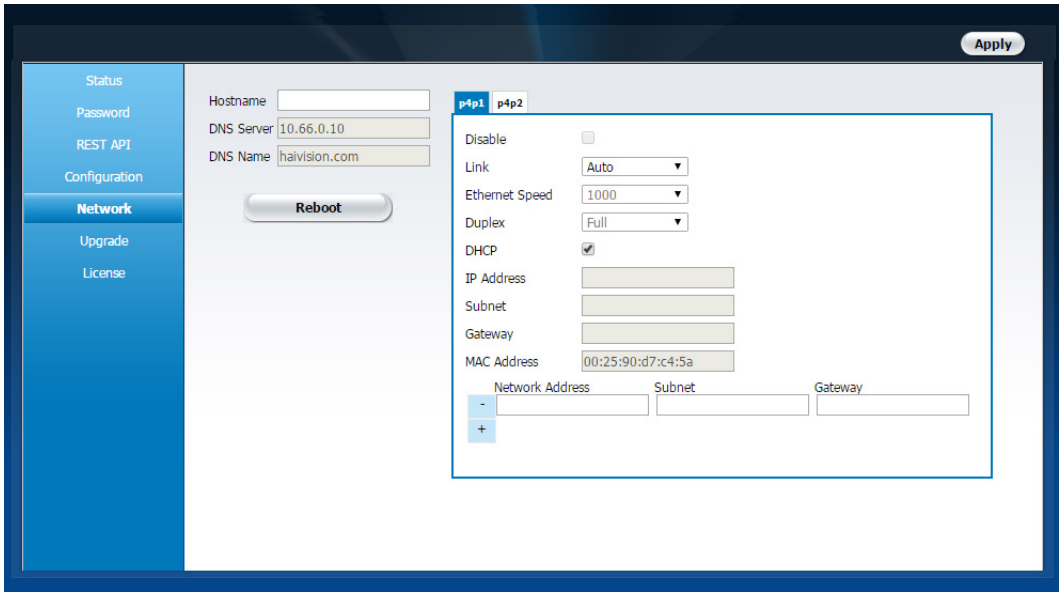
You can also configure additional Network Interface Cards (NICs) for the server. The NETWORK SETTINGS page will show the number of the available NICs depending on whether you have the High Density or Standard Density Kraken appliance. The Kraken can then be configured to input streams from and/or send streams out on any of the available NICs.

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

To view and configure the Network Settings:

1. Click ADMINISTRATION from the main menu and then click NETWORK.

   The NETWORK SETTINGS page opens, as shown in the following example from a Standard Density Kraken appliance.



2. Select or enter the new value(s) in the appropriate field(s). See "Network Settings Page" on page 65.
3. To add a static route, fill in the Network Address, Subnet, and Gateway in the routing table below the MAC Address field. Click + to add additional static routes.

TIP All entries in the routing table must be in dotted-decimal format.

4. To configure additional NICs (Network Interface Cards) for the server, click the next available interface tab and configure the required settings.
5. Click Apply.

   You must reboot the system for the changes to take effect. The Reboot button appears after you click Apply.
6. To apply your saved changes, click Reboot.

   The Kraken will reboot. You need to refresh the page after approximately five minutes to see the Login page again.

Network Settings Page

The following table lists the Kraken Network settings:

Network Setting	Description/Values
Hostname	You may, optionally, enter a unique name for the Kraken.
DNS Server	(Optional) Enter the DNS server address for your network.
DNS Name	(Optional) Enter the domain for the Kraken.
Disable	Check this checkbox to enable this interface.
Link	Determines whether the Ethernet parameters are set automatically or manually (i.e., enables or disables autonegotiation): • Auto - The system will match the Ethernet Speed and Duplex Mode to the Ethernet hub to which it is connecting: • Manual - These values must be set manually. See following settings. NOTE: Always use Auto with Gigabit Ethernet (GigE) speed (1000 Mbps).

Network Setting	Description/Values (Cont.)
Ethernet Speed	If Link is set to Auto, the actual value for the Ethernet Speed (read-only). If Link is set to Manual, select the Ethernet Speed (in Mbps): • 100 • 10
Duplex	If Link is set to Auto, the actual value for the Duplex Mode (read-only). If Link is set to Manual, select the Duplex Mode: • Full • Half
DHCP	Check this checkbox to enable the Dynamic Host Configuration Protocol. NOTE: When DHCP is enabled, the Kraken will get an IP Address from a DHCP server on the network. When it is disabled, you must manually enter the appliance's IP Address, Netmask & Gateway Address.
IP Address	Displays the IP Address for the Kraken. This is a unique address that identifies the unit in the IP network. NOTE: If DHCP is disabled, you may enter an IP address in dotted-decimal format.
Subnet	Displays the Subnet Mask (Netmask) for the Kraken. This is a 32-bitmask used to divide an IP address into subnets and specify the network's available hosts. NOTE: If DHCP is disabled, you may enter a Netmask in dotted-decimal format.
Gateway	Displays the gateway address of the network (typically the address of the network router). NOTE: If DHCP is disabled, you may enter a gateway address in dotted-decimal format.
MAC Address	(Read-only) The Media Access Control address assigned to the Kraken.
[Static routes]	Fill in first row to add a static route. Click + to add routes.
Network Address	Type in the IP address for the route in dotted-decimal format.
Subnet	Type in the Subnet Mask (Netmask) for the route.
Gateway	Type in the gateway address for the route.

Installing Firmware Upgrades

NOTE Firmware upgrades are not available through the Web Interface on the software-only Kraken. The UPGRADE page is only available for Kraken appliances.

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

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

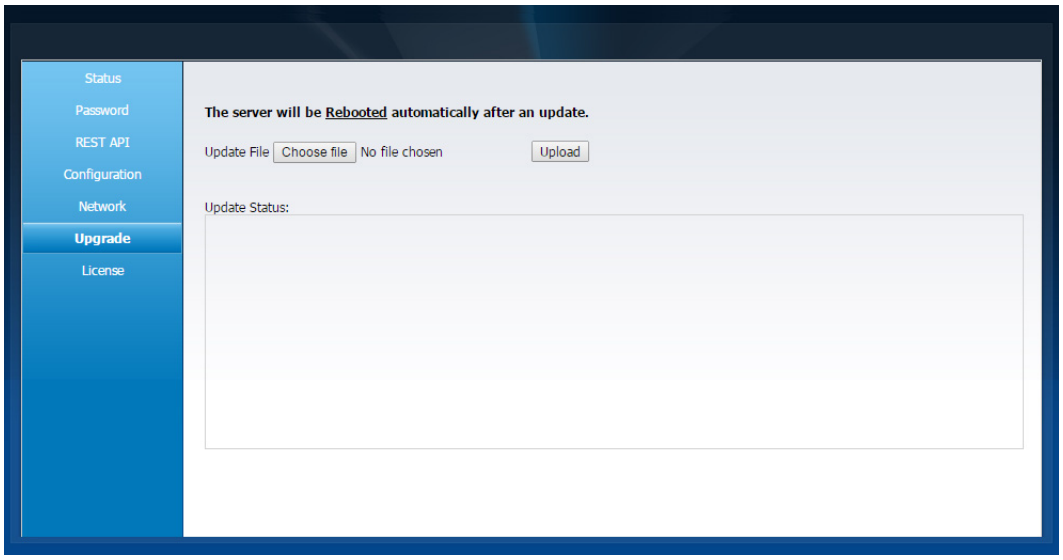
When a firmware upgrade becomes available, you can easily install it from the Web interface. You will first need to copy the upgrade file to your local computer or network.

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

To install a firmware upgrade:

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

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



2. Click Browse (or Choose File, depending on your browser) to select the .hai file to upload.
3. Click Upload.

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

When the file is uploaded, the upgrade will start automatically.

CAUTION You must remain on this page until the system completes the process of unpacking the firmware. Failure to do so could result in damage to your system.

4. Once the unit has rebooted, reload the Login page.

TIP After upgrading, clear your browser's cache to ensure that all new screens display correctly.

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

Updating the System License

You can update your Kraken license directly from the Web Interface. Updating a license is typically required to expand the feature set or capabilities of the system, for example, to upgrade from SD to HD, enable KLV data, or obtain more input streams or unique transcodes.

Once you have obtained the new license file from Haivision Technical Support, you simply need to copy and paste the new license string into the LICENSE page and submit it. Only a valid license will be accepted; if an invalid license is entered, it will be rejected and not replace the current license being used.

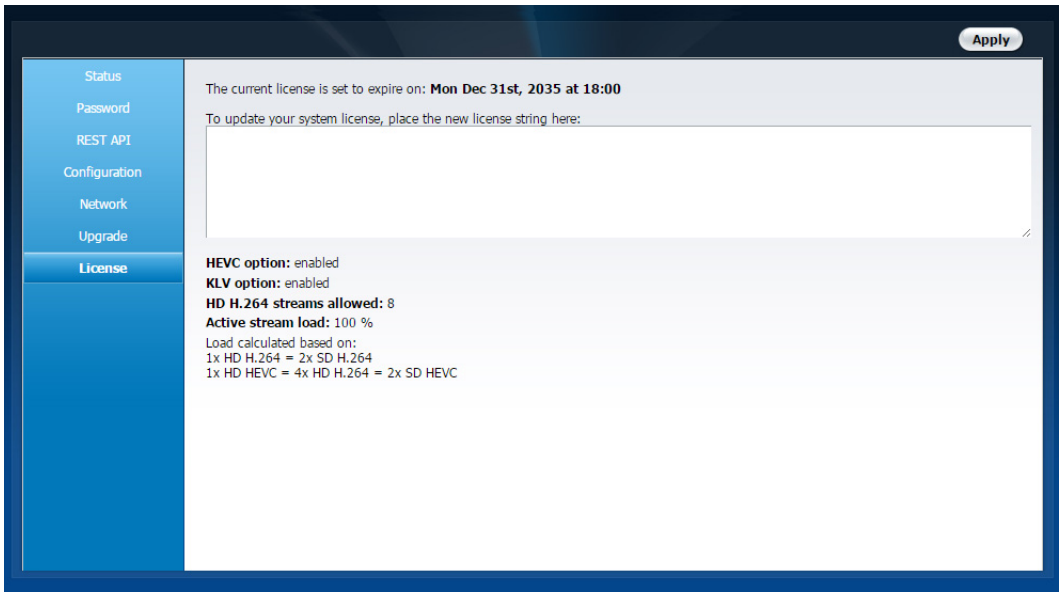
Capacity Licensing Introduction

Kraken v2.0 introduces licensable options (perpetual licenses) for KLV pass-through, HEVC Encoding, as well as the number of H.264 encoding channels. Note that HEVC Decoding does not require a license.

To update your system license:

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

   The LICENSE page opens displaying the current license expiration date, as shown in the following example.



2. To update your license, copy the new license string in the text box.
3. Click Apply.

Logging Out

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

Logging out prevents misuse and unauthorized access to the appliance.

CHAPTER 4: Accessing the Console UI

This chapter provides the information you need to know to use the Console UI on Kraken appliances. The Console UI provides a non-Web interface to perform basic system administration tasks and network tests.

NOTE To connect to the Console UI directly, make sure the keyboard and monitor are correctly connected to the Kraken. See "Connecting the Kraken Console UI" on page 27. You can also access the Console UI using SSH.

Topics In This Chapter

Logging in to the Console UI

To log in to the Console UI:

1. If you have connected with a keyboard and monitor to the Kraken, you will see the Login screen for the Console UI.

   Initiate a Secure Shell (SSH) connection to the server with the User "hvroot".

   The Kraken will display the Login screen for the Console UI.

2. Log in using the default Console UI Username and Password:

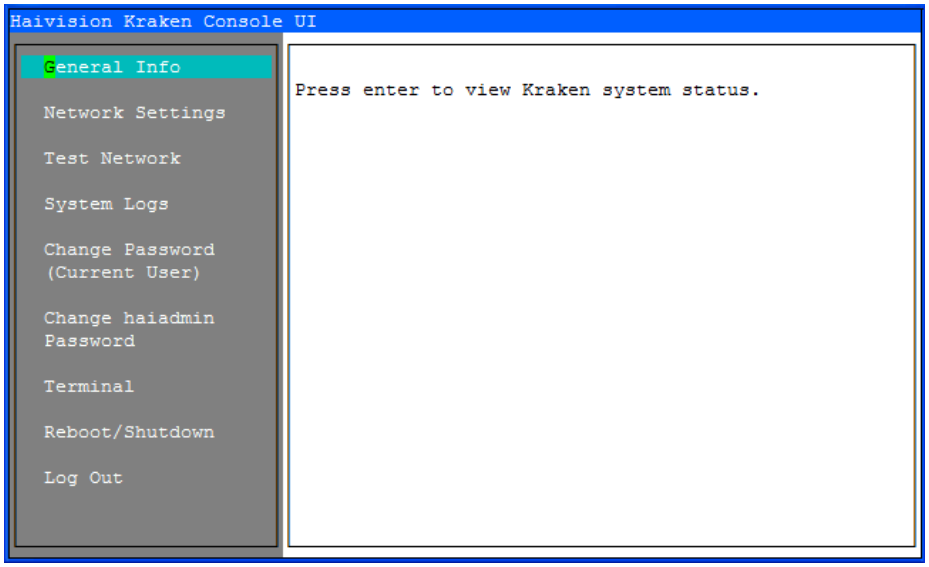
   Username: hvroot
   Password: hairoot

   There is only one user account; however, you may change the password. See "Change Password" on page 80.

NOTE Use the arrow keys on the keyboard to navigate in the Console UI. There is no mouse support. For details, see the following section, "Console UI Menus".

Console UI Menus

After logging in, you will have access to the Console UI starting with General Information screen (shown in the figure below).



The left pane is the list of menu items. The right pane is a detailed view of the selected item.

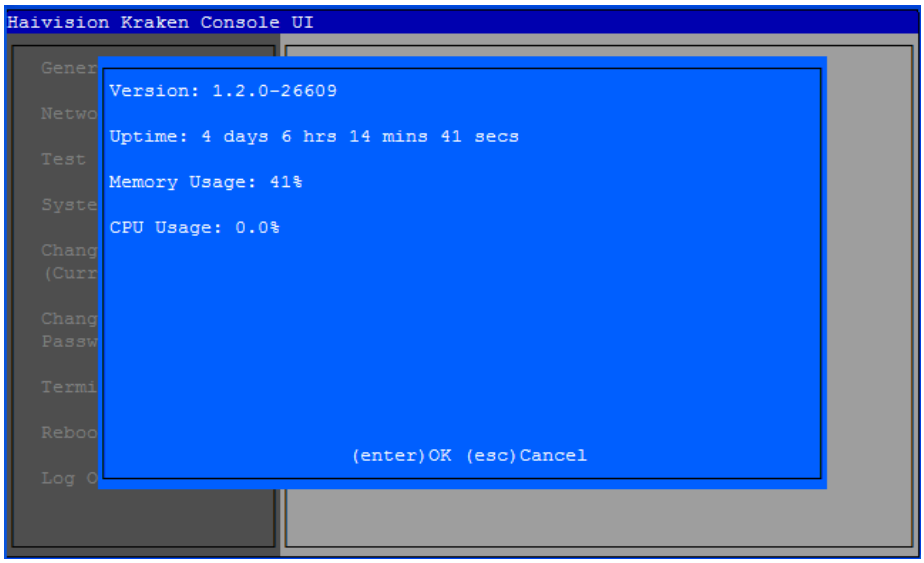
Unlike the Web Interface, the Console UI is operated via keyboard input: (There is no mouse support.)

- Use the Up and Down Arrow keys to scroll through the menu items. Press Enter to select the current item.
- To modify settings, scroll down to the line to change, (if necessary) backspace to delete existing settings, and then type in your modifications.
- Press Enter to save your changes or Escape to cancel and close the screen.

To display system status information about the Kraken appliance, press Enter while the General Info menu line is highlighted (as shown in the figure above).

System Status

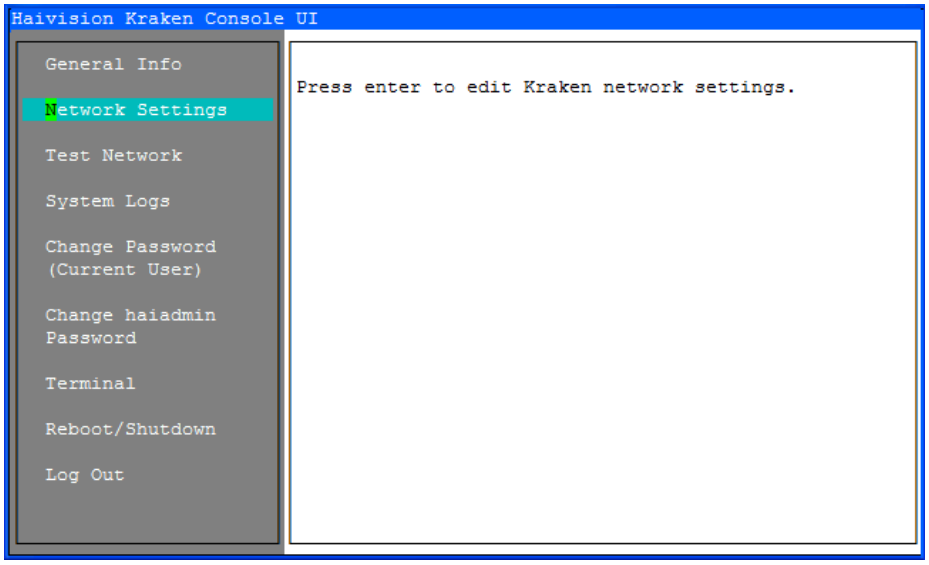
The General Info screen displays system status information about the Kraken appliance, such as the firmware Version, system Uptime, Memory Usage, and CPU Usage (as shown in the following example). This is a read-only screen.



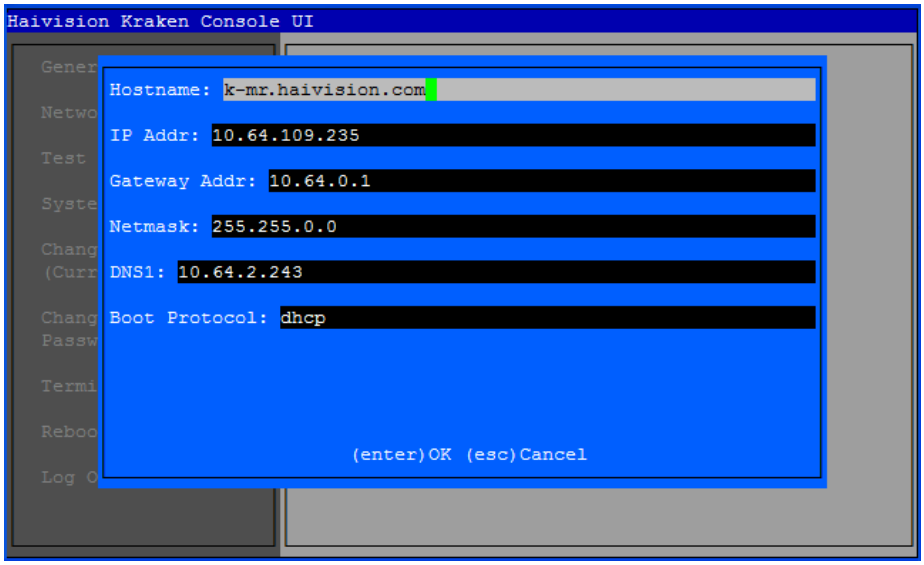
When you are finished viewing this information, press Escape to close this screen.

Network Settings

To display the network interface settings for the Kraken appliance, scroll down to the Network Settings menu line (as shown in the figure below).



To display and edit the network settings, press Enter.



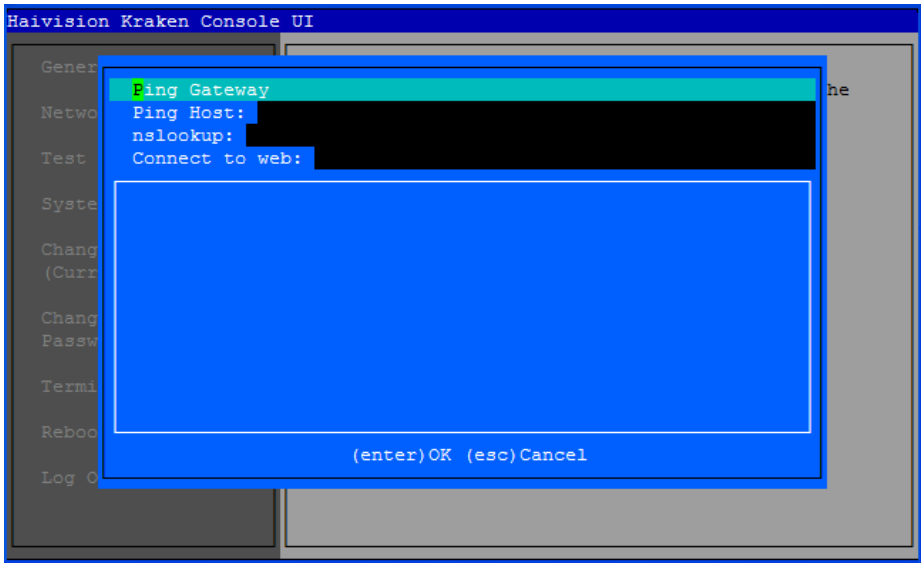
The Network Settings screen displays the unit's Hostname, IP address, default gateway address, netmask, DNS server address, and Boot protocol (DHCP or static).

TIP For descriptions of the network settings, please see "Network Settings Page" on page 65.

1. Use the Up and Down Arrow keys to scroll through the lines.
2. For each setting to change, backspace to delete existing settings and then type in your modifications.
3. Press Enter to save your changes and close the screen.

Test Network

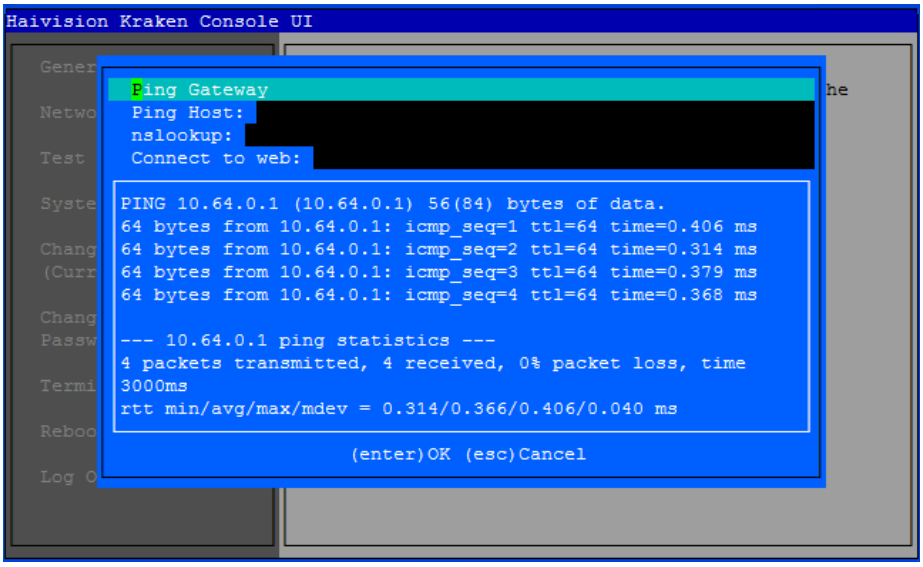
To test the network connectivity for the Kraken, scroll down to the Test Network menu line and press Enter.



Use the Up and Down Arrow keys to scroll through the lines. The Test Network screen provides four possible network tests (described in the following table).

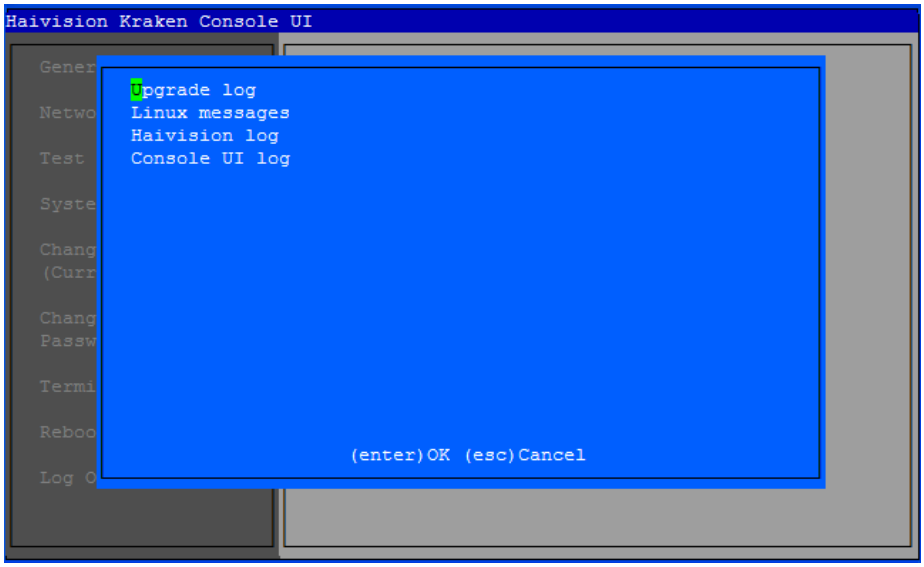
Test	Description
Ping Gateway	Press Enter to ping (i.e., send echo request packets to) the defined gateway IP.
Ping Host	Type in the host IP address and press Enter.
nslookup	(Name Server Lookup) Type in a Fully Qualified Domain Name (FQDN) and press Enter.
Connect to web	Type in a valid URL and press Enter.

The ping results will be displayed on the screen (as shown on the following example):



System Logs

To view the system logs for the Kraken appliance, scroll down to the System Logs menu line and press Enter.

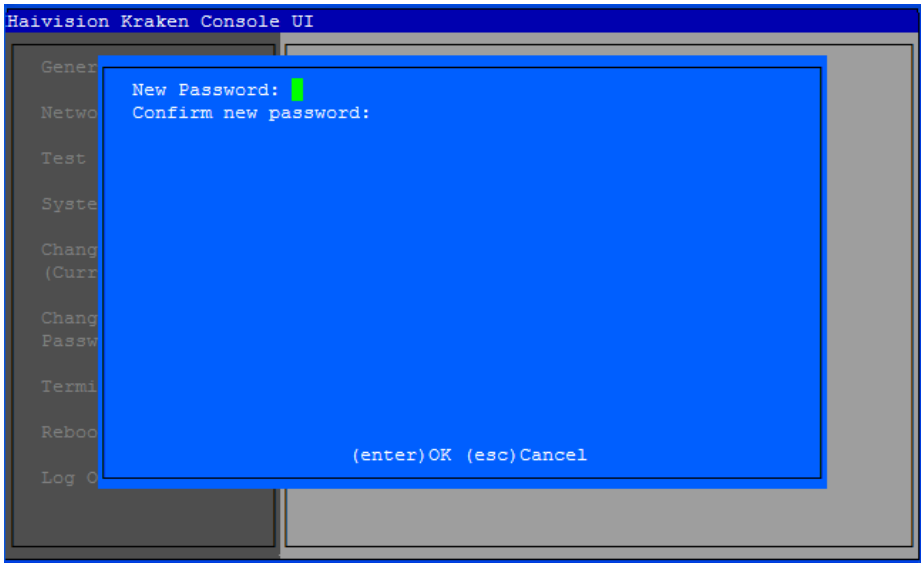


The available System Logs include the Upgrade log, Linux messages, Haivision log, and Console UI log.

1. Use the Up and Down Arrow keys to scroll through the lines.
2. Press Enter to display the selected log.
3. Press Escape to close the log.

Change Password

To change the password for the Kraken Console UI current user, scroll down to the Change Password (Current User) menu line and press Enter.



1. Type in the new password.
2. Press Tab or the Down Arrow and type the password again in the Confirm new password line.
3. Press Enter.

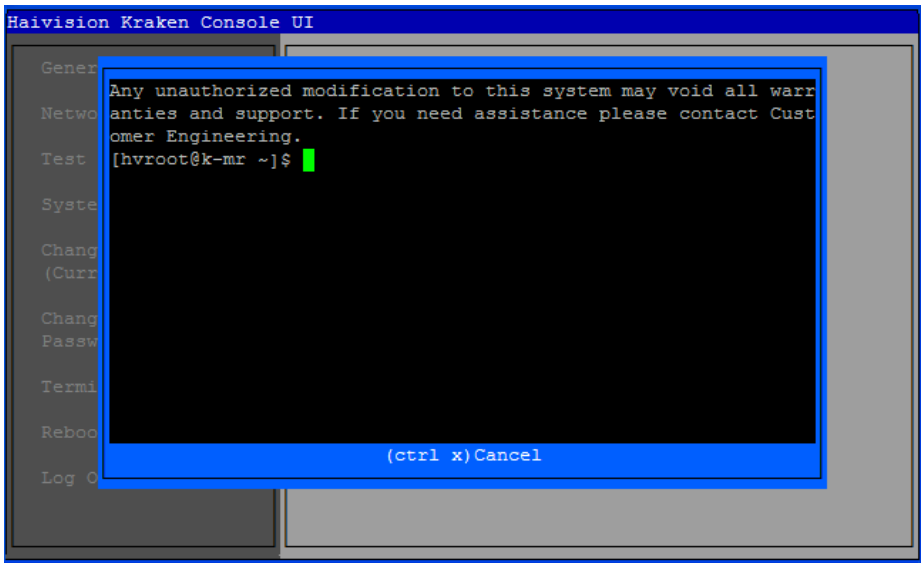
TIP To change the haiadmin password, scroll down to the Change haiadmin Password menu line and press Enter.

The default admin username/password is haiadmin/manager. For information, see "Logging in to Kraken" on page 35.

Terminal

To launch a terminal session from the Kraken Console UI, scroll down to the Terminal menu line and press Enter.

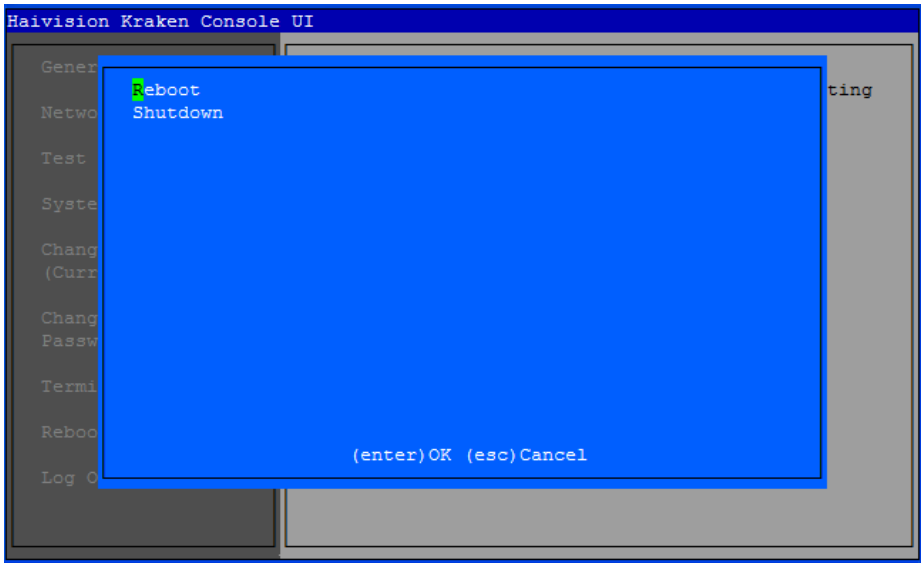
To cancel the session or close the active session, type ctrl x.



IMPORTANT Any unauthorized modification to this system may void all warranties and support. If you need assistance, please contact Haivision Customer Engineering / Technical Support.

Reboot/Shutdown

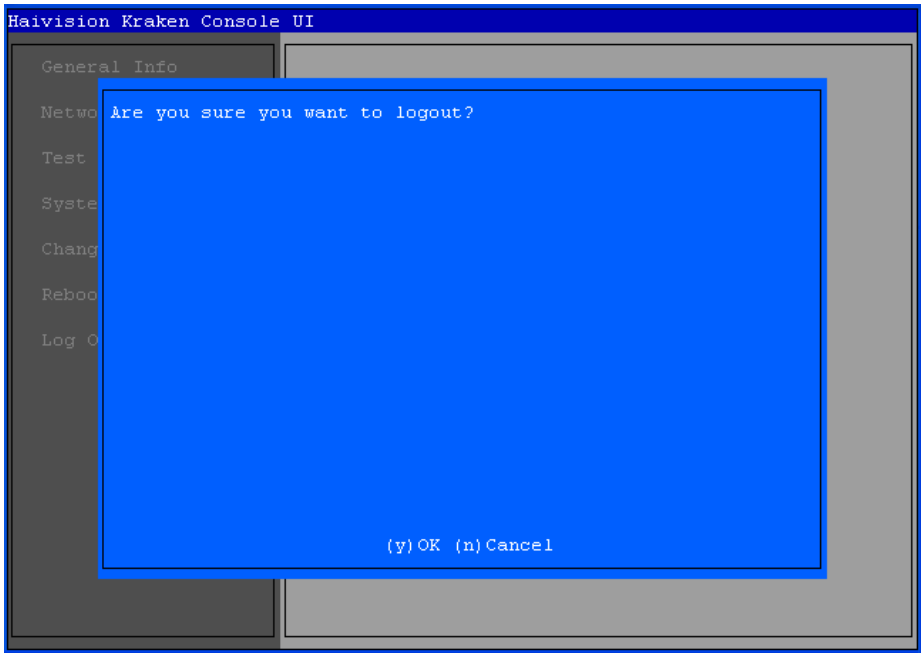
To reboot or shut down the Kraken appliance, scroll down to the Reboot/Shutdown menu line and press Enter.



- To reboot the appliance, press Enter while the Reboot menu line is highlighted.
- To shut down the appliance, scroll down to the Shutdown line and press Enter.

Log Out

To log out of the Console UI, scroll down to the Log Out menu line and press Enter.



To confirm that you want to log out, type y. Or type n to cancel.

APPENDIX A: Technical Specifications

This appendix lists the technical specifications for the Kraken.

Topics In This Appendix

Transcoding Specifications

Transcoding Specifications	
Sources	
	Makito, Piranha Encoders
	3rd Party Encoders
	MJPEG from L-3 Vortex
	Digital Video Broadcast
Input H.265/HEVC	
	Main Profile
	Up to Level 4 (1080p30)
	Transport Stream
	Up to 10 Mbps
	CBR, VBR
Input H.264/AVC	
	Baseline, Main, High Profile
	Up to Level 4.2 (1080p60)
	Transport Stream
	0 kbps - 20 Mbps
	CBR, VBR
Input MPEG-2	
	MainProfile@MainLevel (SD)
	MainProfile@HighLevel (HD)
	Transport Stream
	Up to 20 Mbps
	CBR, VBR
Input Audio	
	MPEG1 layer 2
	AAC 2 channel and 5.1

Transcoding Specifications (Cont.)	
Output H.265/HEVC	
	Main Profile
	Up to Level 4 (1080p30)
	Transport Stream
	Up to 10 Mbps
	Transport Stream Shaping, VBR
Output H.264	
	Baseline, Main, High Profile
	Up to Level 4.2 (1080p60)
	Transport Stream
	Up to 20 Mbps
	Transport Stream Shaping, VBR
Output Audio	
	AAC 2 channel
	Audio Sync Preserved
Metadata Pass-through (Supported Standards)	
	Closed Captioning (EIA-608 & EIA-708)
	KLV with support of both Asynchronous and Synchronous KLV
	Support of MISB Standard 0601
	Support of MISB Standard 0604
	SMPTE 336M-2007 Data Encoding Protocol

Video Processing

Video Processing	
	De-interlacing
	Down Scaling
	Aspect Ratio Preserved
	Configurable Frame Rate

Networking

Networking Interfaces	
	Single Program Transport Stream (SPTS)
	Unicast/Multicast
	TS over UDP
	Session Announcement (SAP)

Management

Management Interfaces	
	Web User Interface (HTTPS only)
	REST API
	Console UI

Physical

Kraken Base System (S-KR-BASE)

Physical Specifications	
Capacity:	
	Up to 2x HD H.264/AVC encoding channels only (no H.265/HEVC encoding)
Dimensions (H x W x D):	
	Dimensions without faceplate (1RU): 1.66” x 17.09” x 15.52” (in) 42.4 mm x 434.0 x 394.3 (mm)
Weight:	
	17.76 lbs. (8.06 kg)
Power:	
	1x Non-Redundant 100-240 VAC 250 W Power Supply

Kraken Premium System (S-KR-PREMIUM)

Physical Specifications	
Capacity:	
	• Up to 8x HD H.264/AVC encoding channels • Up to 2x HD H.265/HEVC encoding channels
Dimensions (H x W x D):	
	Dimensions without faceplate (1RU): 1.68” x 17.09” x 23.9” (in) 42.8 mm x 434.0 x 607 (mm)
Weight:	
	43.87 lbs. (19.9 kg)
Power:	
	2x Redundant 100-240 VAC 550 W Power Supplies

Kraken Ultra System (S-KR-ULTRA)

Physical Specifications	
Capacity:	
	• Up to 16x HD H.264/AVC encoding channels • Up to 4x HD H.265/HEVC encoding channels
Dimensions (H x W x D):	
	Dimensions without faceplate (1RU): 1.68” x 18.98” x 27.6” (in) 42.8 mm x 482.3 x 700.5 (mm)
Weight:	
	59 lbs. (26.76 kg)
Power:	
	2x Redundant 100-240 VAC 750 W Power Supplies

APPENDIX B: Glossary of Terms

AES	Advanced Encryption Standard
API	Application Programming Interface. For the purposes of this document, API refers to the collection of entities, operations and supporting materials provided with the Kraken API.
Audio Bitrate	The number of bits used per unit of time to represent an audio stream. Measured in kilobits per second (kbps).
AVC	Advanced Video Coding. A standard for video compression, used for the recording, compression, and distribution of high definition video.
CBR	Constant Bit Rate. The transcoder will generate a constant number of bits over a period of time.
CDN	Content Delivery Network.
CLI	Command Line Interface.
CRADA	Cooperative Research and Development Agreement.
FEC	Forward Error Correction.
Frame Rate	The video frame rate per second.
Furnace	Haivision's IP video management server.
GOP	Group of Pictures. In relation to the Kraken, the GOP size specifies how often an I-Frame is sent.
HEVC	High Efficiency Video Coding. Also known as H.265 and MPEG-H Part 2. HEVC is a draft video compression standard, currently under development as a successor to H.264/MPEG-4 AVC (Advanced Video Coding).
Hi	Term use to refer to a high quality video encoding characterization of a given video input.
HLS	HTTP Live Streaming. An HTTP-based media streaming communications protocol created by Apple® Inc. as part of their QuickTime® and iPhone® software systems.
I-Frame	Intra Coded Picture, usually referred to as a reference frame. An I-Frame contains the full image of the picture (i.e., it is not a delta).

Input Presets	New set of input settings grouped under a central theme, which can be saved and recalled for later use.
JITC	Joint Interoperability Test Command.
JMIT	JITC Motion Imagery Tool.
Kraken	Haivision's real-time stream-based video transcoder.
KLV	Key Length Value. Refers to metadata packets.
Lo	Term use to refer to a low quality video encoding characterization of a given video input.
MAC Address	Media Access Control address. A unique identifier assigned to a network interface card, usually assigned by the network card manufacturer.
Macroblock	An image compression component used on still images and video frames. The size of a block depends on the codec and is usually a multiple of 4. (In modern codecs such as H.264, the macroblock size is fixed at 16x16 pixels.) Each picture of a video – either a frame or a field – is partitioned into as many macroblocks as necessary to cover the picture area. These macroblocks serve as the basic element for operations such as spatial/temporal compression, motion compensation, and re-encoding.
MPEG TS	MPEG Transport Stream.
MTU	Maximum Transmission Unit. Specifies the maximum allowed size of IP packets for the encoded or transcoded stream.
NDPP	Network Device Protection Profile.
NIC	Network Interface Card.
OAuth	Open Authorization. An open standard for authorization.
PID	Packet Identification Number.
PIN	Personal Identification Number.
PMT	Program Map Table, a collection of PIDs available in a transport stream.
Resolution	The stream output resolution, i.e., the number of lines per frame and pixels per line to be transcoded.
REST	Representational State Transfer. A style of software architecture for distributed hypermedia systems.
RTMP	Real Time Messaging Protocol. A protocol for streaming audio, video and data over the Internet, used primarily between an Adobe® Flash player and a server.

Session	New set of recording attributes grouped under a central theme, which can be saved and recalled for later use.
ST	Security Target.
SVC	Scalable Video Coding. An extension of the video compression standard H.264/MPEG-4 AVC.
ToS	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.
Transcode	A digital-to-digital conversion; encoded input is usually changed on output (typically to a different format or bitrate).
TTL	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.
UI	User interface.
URI	Uniform Resource Identifier. The Web naming/addressing technology that uses short strings to identify resources.
URL	Uniform Resource Locator. A specific type of URI. For the purposes of this document, URI and URL are used interchangeably.
VBR	Variable Bit Rate. VBR streams vary the amount of output data per time segment. VBR allows a higher bitrate to be allocated to the more complex segments of media streams while less space is allocated to less complex segments.
Video Bitrate	The number of bits used per unit of time to represent a video stream. Measured in kilobits per second (kbps).
Viper	Haivision's Multi-Stream Recording, Streaming & Publishing Appliance
VoD	Video On Demand. An interactive technology that allows users to select and view programming in real time or download programs and view them later.

APPENDIX C: Warranty Information

Haivision One (1) Year Limited Warranty

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

EXCLUSIONS AND LIMITATIONS

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

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

This warranty does not apply:

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

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

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

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

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

TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY AND REMEDIES PROVIDED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, STATUTORY, EXPRESS OR IMPLIED. AS PERMITTED BY APPLICABLE LAW, HAIVISION SPECIFICALLY DISCLAIMS ANY AND ALL STATUTORY OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES AGAINST HIDDEN OR LATENT DEFECTS. IF HAIVISION CANNOT LAWFULLY DISCLAIM STATUTORY OR IMPLIED WARRANTIES THEN TO THE EXTENT PERMITTED BY LAW, ALL SUCH WARRANTIES SHALL BE LIMITED IN DURATION TO THE DURATION OF THIS EXPRESS WARRANTY AND TO REPAIR OR REPLACEMENT SERVICE AS DETERMINED BY HAIVISION

IN ITS SOLE DISCRETION. No Haivision reseller, agent, or employee is authorized to make any modification, extension, or addition to this warranty. If any term is held to be illegal or unenforceable, the legality or enforceability of the remaining terms shall not be affected or impaired.

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

OBTAINING WARRANTY SERVICE

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

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

APPLICABLE LAW

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

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

Software End User License Agreement

READ BEFORE USING

THIS SOFTWARE END USER LICENSE AGREEMENT ("AGREEMENT") IS FOR ANY OR ALL OF THE HAIVISION SOFTWARE PRODUCT(S) LICENSED, DOWNLOADED, INSTALLED AND/OR ACTIVATED BY YOU ("PRODUCT"). THE PRODUCT IS PROTECTED BY NATIONAL AND INTERNATIONAL COPYRIGHT LAWS AND TREATIES.

READ THE TERMS OF THE FOLLOWING AGREEMENT CAREFULLY. BY CLICKING THE ACCEPT BUTTON ON THIS AGREEMENT, OPENING THE SHRINKWRAP AROUND OR USING THE PRODUCT OR ANY PORTION THEREOF, OR BY USING OR DISTRIBUTING ANY VIDEO INFORMATION ENCODED BY, DECODED BY OR OTHERWISE MANIPULATED OR PASSED THROUGH THE PRODUCT, YOU CONFIRM YOUR ACCEPTANCE OF THIS AGREEMENT.

THIS AGREEMENT IS A LEGAL AGREEMENT BETWEEN YOU (A SINGLE CORPORATE ENTITY) AND HAIVISION. IF YOU DO NOT AGREE TO THESE TERMS, HAIVISION IS UNWILLING TO LICENSE THE PRODUCT TO YOU AND YOU ARE NOT AUTHORIZED TO INSTALL OR USE THE PRODUCT.

NOTWITHSTANDING SECTION **6.5** BELOW, THIS AGREEMENT ONLY GOVERNS THE PRODUCT(S) IF A SEPARATE SOFTWARE END USER LICENSE AGREEMENT HAS NOT BEEN SIGNED PRIOR TO THIS AGREEMENT FOR THE PRODUCT OR THE AGREEMENT IS NOT SUPERCEDED BY A SEPARATE SOFTWARE END USER LICENSE AGREEMENT FOR THE PRODUCT AT A LATER DATE.

1. DEFINITIONS

1.1. Entitlement. The collective set of applicable documents (e.g., warranty, support and maintenance documents, data sheets, etc.) authorized by Haivision Network Video or its affiliate Haivision (collectively, "Haivision") evidencing your obligation to pay associated fees (if any) for the license, associated Services, and the authorized scope of use of Product under this Agreement.

1.2. License Fee. License Fee shall mean the consideration paid to Haivision for use of the Product. The License Fee is part or all of the price paid for the relevant Product.

1.3. Product. Product shall mean the executable version of Haivision's computer software, program or code, in object code format (specifically excluding source code), together with any related material including, but not limited to the hardware, Reference Manuals or database schemas provided for use in connection with the Product and including, without limitation, all Upgrades through the date of installation.

1.4. Reference Manuals. Reference Manuals shall mean the most current version of the documentation for use in connection with the Product provided by Haivision to You.

1.5. Third-Party Content. Services or materials, which are not proprietary to Haivision or may not be part of the materials of the company, entity or individual using the Product.

1.6. Updates. Updates shall mean any periodic software releases, additions, fixes, and enhancements thereto, release notes for the Product and related Reference Manuals, (other than those defined elsewhere in this section as Upgrades) which have no value apart from their operation as part of the Product and which add minor new functions to the Product, but none so significant as to warrant classification as an Upgrade, which may be provided by Haivision to fix critical or non-critical problems in the Product on a scheduled, general release basis. Updates to the Product ("Version") are denoted by number changes to the right of the decimal point for a version and revision number (for example, going from 2.0.0 to 2.1.0).

1.7. Upgrades. Upgrades shall mean any modification to the Product made by Haivision, which are so significant, in Haivision's sole discretion, as to warrant their exclusion under the current license grant for the Product. Upgrades of Product are denoted by number changes to the left of the decimal point for a release number (for example, going from 2.0 to 3.0).

1.8. You (or Your). The legal entity specified in the Entitlement, or for evaluation purposes, the entity performing the evaluation.

2. RIGHTS AND RESTRICTIONS

2.1. License to Use. Subject to the terms and conditions set forth herein and subject to the terms of your Entitlement, Haivision hereby grants to You a non-exclusive, personal, limited and nontransferable right and license to use the Product in accordance with the terms of this Agreement. This license is granted to You and not, by implication or otherwise, to any parent, subsidiary or affiliate of Yours without Haivision's specific prior written consent. This license is for the limited use of the Product by You for the purpose of creating, managing, distributing and viewing IP Video assets. This license does not grant any license for content whatsoever. All rights not expressly granted to You by this Agreement are reserved by Haivision.

2.2. Restrictions.

(a) Reproduction. You shall not copy, modify, distribute, use or allow access to any of the Product, except as explicitly permitted under this Agreement and only in the quantities designated in the Entitlement. However, You have the right to make copies of the Product solely for archival purposes, but only in quantities necessary and typical for your Organization. You shall not modify, adapt, translate, export, prepare derivative works from, decompile, reverse engineer, disassemble or otherwise attempt to derive source code, hardware designs or other proprietary information from the Product or any internal data files generated by the Product, or use the Product embedded in any third party hardware or software. You shall also not use the Product in an attempt to, or in conjunction with, any device, program or service designed to circumvent technological measures employed to control access to, or the rights in other work protected by copyright laws. You shall not remove, modify, replace or obscure Haivision's copyright and patent notices, trademarks or other proprietary rights notices affixed to or contained within any Product. No right is granted hereunder for any third party who obtains access to any Product through You to use the Product to perform services for third parties. Most sublicensing arrangements are prohibited under this Agreement. However, if You are a Reseller, You are permitted to sublicense the Product to single end-users under terms and conditions similar to the provisions of this Agreement; however, You are responsible and liable pursuant to the terms and conditions of this Agreement for Your sublicensees' actions and failures to take required actions with respect to the Product.

(b) Ownership. The Product is conditionally licensed and not sold. As between the parties, Haivision and/or its licensors owns and shall retain all right, title and interest in and to all of the Product, including all copyrights, patents, trade secret rights, trademarks and other intellectual property rights therein, and nothing in this Agreement shall be deemed to transfer to You any ownership or title to the Product. You agree that you will not remove, alter or otherwise obscure any proprietary rights notices appearing in the Product. All Haivision technical data and computer software is commercial in nature and developed solely at private expense.

3. TERM AND TERMINATION

3.1. Term. The license and service term are set forth in your Entitlement(s). Additionally, this Agreement may be terminated without cause by You upon thirty (30) days written notice to Haivision.

3.2. Termination for Breach. Your rights under this Agreement will terminate immediately without notice from Haivision if You materially breach this Agreement or take any action in derogation of Haivision's rights to the Product. Haivision may terminate this Agreement should any Software become, or in Haivision's reasonable opinion likely to become, the subject of a claim of intellectual property infringement or trade secret misappropriation.

3.3. Termination for Bankruptcy. Haivision may terminate this Agreement, effective immediately, if You file, or have filed against You, a petition for voluntary or involuntary bankruptcy or pursuant to any other insolvency law, makes or seeks to make a general assignment for the benefit of its creditors or applies for, or consents to, the appointment of a trustee, receiver or custodian for a substantial part of its property.

3.4. Termination; Effect; Survival. Upon the termination of this Agreement for any reason:

(a) All license rights granted hereunder shall terminate;

(b) You shall immediately pay to Haivision all amounts due and outstanding as of the date of such termination or expiration; and

(c) You shall return to Haivision all Product and all Haivision Reference Manuals or certify that all such Product and Reference Manuals have been destroyed. Notwithstanding any termination of this Agreement, the following provisions of this Agreement shall survive for the relevant period of time set forth therein, if any: Sections **2.2**, **4**, **5** and **6**.

4. REPRESENTATIONS, DISCLAIMER AND LIMITATION OF LIABILITY

4.1. Limited Warranty. Haivision warrants that: (i) the Product will operate substantially in accordance with the Reference Manuals provided and (ii) any media on which the Product is provided will be free of material damage and defects in materials and workmanship under normal use for a term of ninety (90) days (the "Warranty Period") after its delivery date. As Your sole and exclusive remedy for any breach of this warranty, Haivision will use its commercially reasonable efforts to correct any failure of the Product to operate substantially in accordance with the Reference Manuals which is not the result of any improper or unauthorized operation of the Product and that is timely reported by You to Haivision in writing within the Warranty Period, provided that in lieu of initiating commercially reasonable efforts to correct any such breach, Haivision may, in its absolute discretion, either: (i) replace the Product with other software or technology which substantially conforms to the Reference Manuals or (ii) refund to You a portion of the fee paid for the relevant Product, whereupon this Agreement shall terminate. This warranty shall immediately terminate if You or any third party makes or attempts to make any modification of any kind whatsoever to the Product, engages in any improper or unauthorized operation of the Product, including uses prohibited by the Entitlement or installs or uses the Product on or in connection with any hardware or software not specified in the Entitlement or product data sheets.

4.2. Warranty Disclaimers. THE EXPRESS WARRANTIES SET FORTH IN SECTION **4.1** ABOVE IN RESPECT TO THE PRODUCT ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, OR STATUTORY, REGARDING THE PRODUCT, OR ITS OPERATION, FUNCTIONALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS (ALL OF WHICH ARE DISCLAIMED). HAIVISION DOES NOT WARRANT THAT ANY OF THE PRODUCT(S) WILL MEET ALL OF YOUR NEEDS OR REQUIREMENTS, OR THAT THE USE OF ANY OF THE PRODUCT(S) WILL BE UNINTERRUPTED OR ERROR-FREE, OR THAT ALL ERRORS WILL BE DETECTED OR CORRECTED.

4.3. Liability Limitation. IN NO EVENT SHALL HAIVISION OR ITS OFFICERS, EMPLOYEES, AGENTS, REPRESENTATIVES, OR MEMBERS, NOR ANYONE ELSE WHO HAS BEEN

INVOLVED IN THE CREATION, PRODUCTION OR DELIVERY OF THE PRODUCT, BE LIABLE TO YOU, YOUR CUSTOMERS OR TO ANY OTHER THIRD PARTY FOR CONSEQUENTIAL, INDIRECT, INCIDENTAL, PUNITIVE OR SPECIAL DAMAGES, LOST PROFITS, LOSS OF USE, INTERRUPTION OF BUSINESS OR FOR ANY DAMAGES FOR ANY BREACH OF THE TERMS OF THIS AGREEMENT OR FOR LOST OR CORRUPTED DATA ARISING FROM ANY CLAIM OR ACTION HEREUNDER, BASED ON CONTRACT, TORT OR OTHER LEGAL THEORY (INCLUDING NEGLIGENCE)AND WHETHER OR NOT SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. HAIVISION SHALL NOT BE LIABLE FOR DAMAGES FOR ANY CAUSE WHATSOEVER IN AN AMOUNT IN EXCESS OF THE FEE PAID TO HAIVISION BY YOU FOR THE RELEVANT PRODUCT.

5. INDEMNIFICATION

5.1. Indemnification by Haivision.

(a) Haivision shall indemnify and hold You harmless against any and all actions, claims, losses, damages, liabilities, awards, costs and expenses (including reasonable attorneys' fees) ("Claims") arising out of (i) any accusation or purported violation of any third person's US and Canadian copyright, trademark, patent rights or trade secrets, proprietary information on account of Your use of the Product when used in accordance with the terms of this Agreement, or (ii) relating to or arising out of any negligence or willful misconduct on the part of Haivision or any breach by Haivision of the terms of this Agreement or any Maintenance and Support Agreement, or applicable law. You shall promptly notify Haivision in writing of any such Claim and promptly tender the control of the defense and settlement of any such Claim to Haivision. Haivision shall thereafter undertake the defense of any such Claim using counsel of its choice. You shall cooperate with Haivision, in defending or settling such Claim at the expense of Haivision; provided that Haivision shall not settle any Claim against You which would require the payment of money by You without the prior written consent of You, which consent shall not be unreasonably withheld. You shall have the right to consult and provide input into the defense with counsel of its choice at its own expense. Haivision shall not reimburse You for any expenses incurred by You without the prior written approval of Haivision, which approval shall not be unreasonably withheld.

(b) If any Product is, or in the opinion of Haivision may become, the subject of any Claim for infringement, then Haivision may, or if it is adjudicatively determined that any of the Product infringes in the manner described above (except to the extent that any translation, modification, addition or deletion or combination by You is the sole source of such Claim), then Haivision shall, at its option, either (i) procure for You the right to continue use of the Product for the term hereof, (ii) replace or modify the Product with other suitable and reasonably equivalent products so that the Product becomes non-infringing, or (iii) terminate this Agreement and refund to You a portion of the fee paid for the relevant Product.

(c) Haivision shall have no liability for: (i) the use of other than the then current release of the Product; (ii) the use of the Product other than as set forth in its accompanying documentation and as permitted herein; (iii) the modification of any of the Product by any party other than Haivision; or (iv) any infringement arising from the use of any Product by You after Haivision has issued a written notice to You requiring You to cease using such Product when Haivision exercises its option to terminate the License pursuant to Section **3.2** (collectively, "Exclusions"). SECTION **5.1** STATES HAIVISION'S ENTIRE OBLIGATION WITH RESPECT TO ANY CLAIM REGARDING THE INTELLECTUAL PROPERTY RIGHTS OF ANY THIRD PARTY.

5.2. Indemnification by You. You shall indemnify and hold Haivision harmless against any and all Claims directly or indirectly arising out of, or in any manner whatsoever associated or connected with Your performance, purported performance or non-performance of your rights and obligations under this

Agreement, and against any and all Claims incurred by or on behalf of any of the foregoing in the investigation or defense of any and all such Claims.

6. OTHER PROVISIONS

6.1. Export and Other Restrictions. This Agreement, and all Your rights and Your obligations under this Agreement, are subject to all applicable Canadian and U.S. Government laws and regulations relating to exports including, but not limited to, the U.S. Department of Commerce Export Administration Act and its associated Regulations and all administrative acts of the U.S. Government thereunder. In the event the Product or the Hardware is exported from the United States or re-exported from a foreign destination, You shall ensure that the distribution and export/re-export of the Product or the Hardware is in compliance with all laws, regulations, orders, or other restrictions of the U.S. Export Administration Act and its associated Regulations. You agree that neither you nor any of your Affiliates will export/re-export any Product, any hardware on which the Product is loaded or embedded, technical data, process, or service, directly or indirectly, to any country for which the Canadian government or United States government (or any agency thereof) requires an export license, other governmental approval, or letter of assurance, without first obtaining such license, approval or letter.

6.2. Content. Your data and/or your use of the Product may not: (i) interfere in any manner with the functionality or proper working of the Product; (ii) stream any material that is copyrighted, protected by trade secret or otherwise subject to third party proprietary rights, including privacy and publicity rights, unless You are the owner of such rights or have permissions from the rightful owner to post the material; (iii) constitute, promote, facilitate or permit any illegal activities, including without limitation, activities that might be libelous or defamatory, invasive of privacy or publicity rights, abusive or otherwise malicious or harmful to any person or entity; (iv) distribute, share or facilitate unauthorized data, malware, viruses, Trojan horses, spyware, worms or other malicious or harmful distributions; or (v) otherwise violate, misappropriate or infringe the intellectual property, privacy, publicity, contractual or other proprietary rights of any third party.

6.3. Consent to Use Data. You agree that Haivision may collect and use technical data and related information, including but not limited to technical information about Your device, system and application software and peripherals, that is gathered periodically to facilitate the provision of software updates, product support and other services to You (if any) related to the Product. Haivision may use this information, as long as it is in a form that does not personally identify You, to improve its products or to provide services or technologies to You.

6.4. Transfer and Assignment. Haivision may assign, sublicense, or transfer this Agreement and/or any or all of its rights or obligations hereunder. You may not assign, transfer or delegate any of its rights or obligations hereunder (whether by operation of law or otherwise) without the prior written consent of Haivision. For purposes of the preceding sentence, and without limiting its generality, any merger, consolidation or reorganization involving You (regardless of whether You are a surviving or disappearing entity) will be deemed to be a transfer of rights, obligations or performance under this Agreement for which Haivision's prior written consent is not required. Any unauthorized assignment, transfer or delegation by You shall be null and void. This Agreement is binding upon and inures to the benefit of the parties hereto and their respective permitted successors and assigns.

6.5. Waiver and Amendment. No modification, amendment or waiver of any provision of this Agreement shall be effective, unless in writing signed by both parties. No failure or delay by either party in exercising any right, power or remedy under this Agreement, except as specifically provided herein, shall operate as a waiver of any such right, power or remedy. Without limiting the foregoing, any additional legal terms and conditions submitted by You in any other documents, including but not limited to the Entitlement, shall be of no legal force or effect.

6.6. Enforcement by Third Party. For any Product licensed by Haivision from other suppliers, the applicable supplier is a third party beneficiary of this Agreement with the right to enforce directly the obligations set forth in this Agreement against You.

6.7. Third Party Content. Haivision is not responsible for examining or evaluating the data, accuracy, completeness, timeliness, validity, copyright compliance, legality, decency, quality or any other aspect of any Third Party Content. Haivision does not warrant or endorse and does not assume and will not have any liability or responsibility to You or any other person for any Third Party content. You agree that any Third Party Content may contain proprietary information and material that is protected by applicable intellectual property and other laws, including but not limited to copyright, and that you will not use such proprietary content, information or materials in any way whatsoever except for permitted uses of the Third Party Content.

6.8. Third Party Royalties. Your further reuse, retransmission, rebroadcast, display or other distribution of your Third Party Content using the Product may require that you obtain a license from and / or pay royalties to the owners of certain third party audio and video formats. You are solely responsible for obtaining such licenses and paying such royalties.

6.9. Governing Law/Submission to Jurisdiction. This Agreement shall be governed by and construed in accordance with the laws of the Province of Québec, Canada and the Laws of Canada applicable therein (excluding any conflict of laws rule or principle, foreign or domestic), exclusive of the U.N. Convention on the International Sale of Goods. You hereby consent to the jurisdiction of any provincial or federal court located within the Province of Quebec and waive any objection which You may have based on improper venue or forum non conveniens to the conduct of any proceeding in any such court.

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

6.11. Force Majeure. Neither party shall be liable to the other party for any failure or delay in performance to the extent that such delay or failure is caused by fire, flood, explosion, war, terrorism, embargo, government requirement, labor problems, export controls, failure of utilities, civil or military authority, act of God, act or omission of carriers or other similar causes beyond its control. If any such event of force majeure occurs, the party delayed or unable to perform shall give immediate notice to the other party, and the party affected by the other's delay or inability to perform may elect, at its sole discretion, to terminate this Agreement or resume performance once the condition ceases, with an option in the affected party to extend the period of this Agreement up to the length of time the condition endured. Unless written notice is given within 30 calendar days after the affected party is notified of the condition, the latter option shall be deemed selected. During an event of force majeure, the affected party shall exercise reasonable effort to mitigate the effect of the event of force majeure.

6.12. Entire Agreement. This Agreement, together with the Entitlement and all other documents that are incorporated by reference herein, constitutes the sole and entire agreement between Haivision and You with respect to the subject matter contained herein, and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to such subject matter.

6.13. Language. The parties confirm that it is their wish that this Agreement, together with the Entitlement and any other documents relating hereto, have been and shall be drawn up in the English language only. Les parties conferment que c'est leur volonte expresse que ce contrat et tous documents y etant relative, y compris les bons de commande, le avis, le anneses, les autorisations, les pieces jointes et les amendments solent rediges en langue anglais seulement.

6.14. Headings Not Controlling. The headings used in this Agreement are for reference purposes only and shall not be deemed a part of this Agreement.

6.15. US Government Rights. Some Products are commercial computer software, as such, term is defined in 48 C.F.R. §2.101. Accordingly, if You, as the Licensee, is the US Government or any contractor therefor, You shall receive only those rights with respect to the Product and Reference Materials as are granted to all other end users under license, in accordance with:

(a) 48 C.F.R. §227.7201 through 48 C.F.R. §227.7204, with respect to the Department of Defense and their contractors; or

(b) 48 C.F.R. §12.212, with respect to all other US Government licensees and their contractors.

6.16. Notices. All notices, requests, consents, claims, demands, waivers and other communications hereunder shall be in writing and shall be deemed to have been given:

(a) When delivered by hand (with written confirmation of receipt);

(b) When received by the addressee if sent by a nationally recognized overnight courier (receipt requested);

(c) On the date sent by facsimile (with confirmation of transmission) if sent during normal business hours of the recipient, and on the next business day if sent after normal business hours of the recipient; or

(d) On the third day after the date mailed, by certified or registered mail, return receipt requested, postage prepaid. Such communications must be sent to the respective parties at the addresses set forth on the Entitlement (or to such other address as may be designated by a party from time to time in accordance with this Section **6.16**.

If you have questions, please contact Haivision Systems Inc., at 4445 Garand, Montréal, Québec, H4R 2H9 Canada or legal@haivision.com.