



HAIVISION

Kraken Encoder/Transcoder 3.0
User's Guide

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Edition Notice

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About This Document

Conventions

The following conventions are used to help clarify the content.

Typographic Conventions and Elements

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

Action Alerts

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



Tip

Indicates highlights, suggestions, or helpful hints.



Note

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



Important

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

⚠ Caution

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

⚠ Warning

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

Obtaining Documentation

This document was generated from the Haivision InfoCenter. To ensure you are reading the most up-to-date version of this content, access the documentation online at <https://doc.haivision.com>. You may generate a PDF at any time of the current content. See the footer of the page for the date it was generated.

Getting Service Support

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

Introduction

This section provides a brief overview of Haivision's Kraken H.264/HEVC Video Encoder/Transcoder, along with a description of the main hardware components for the appliance.

Topics Discussed

- [New Features](#)
- [Product Overview](#)
- [Kraken Features](#)
- [Appliance Options](#)
- [Physical Description \(Kraken Server\)](#)

New Features

Kraken v3.0 introduces the following features and enhancements:

- **Role-Based User Account Management** — Ability to add, edit and remove user accounts within each user role: Administrator, Operator and Viewer. See [Role-based Authorization](#).
- **API Updates** — Public offering of REST API v2.0 and JSON Web format. API v2.0 provides all functionality from the Kraken Web GUI and is also harmonized with other Haivision appliances. Note that REST API v1.0 is still available and unchanged with this release. See [Accessing the REST API](#).
- **NVIDIA Support** — (On qualified hardware) Offloads encode processing from the Kraken transcode pipeline to NVIDIA GPUs. Assumes Kraken is running as a VM in an ESXi 6.5+ environment. See [Configuring Transcoder Parameters](#) and the [Kraken OVA Deployment Guide](#).
- **Infrastructure Upgrades** — Architecture Transition to CentOS 7 64-bit.

Release History

Kraken v2.9 introduced the following features and enhancements:

- **KLV Metadata Filtering** — Filter out undesired or unused MISB 0601 UAS KLV metadata tags to reduce the outbound metadata bitrate. This allows more bandwidth to be allocated to video on limited capacity network links. See [Filtering UAS KLV Metadata Tags](#).
- **KLV Metadata Decimation** — Configure the transcoder to frame-decimate KLV (Key Length Value) metadata. This can reduce the rate at which metadata is transmitted from Kraken to allow better control of the outbound metadata bitrate. See [Configuring Transcoder Parameters](#).
- **Improved System Feedback** — A new feedback component features stream event reporting within the Web Interface with the option to download the stream event log. This feature is intended to aid in diagnostics and debugging sessions. See [Monitoring Stream Health](#).
- **Security** — A continual commitment to security. Updates to the kernel and other related mitigations to ever-evolving vulnerabilities.

Kraken v2.8 introduced the following features and enhancements:

- **SRT 1.3.1** — Integration of the latest SRT 1.3.1 libraries. Expanded configurability of SRT to include MTU, and TTL. SRT Passphrases is now protected in logs and Kraken configuration files.
- **Improved UX** — Enhanced debugging logs per transcode session. Alpha version of v2 API available upon request to Haivision Technical Support.
- **Streaming** — Added MPEG4 (Part 2) Encoding capability. Improved and enhanced the interoperability with RTSP camera sources. Updated underlying QSV libraries.
- **Security** — Continual commitment to security. Updates to the kernel and other related mitigations to ever-evolving vulnerabilities.

Product Overview

Note

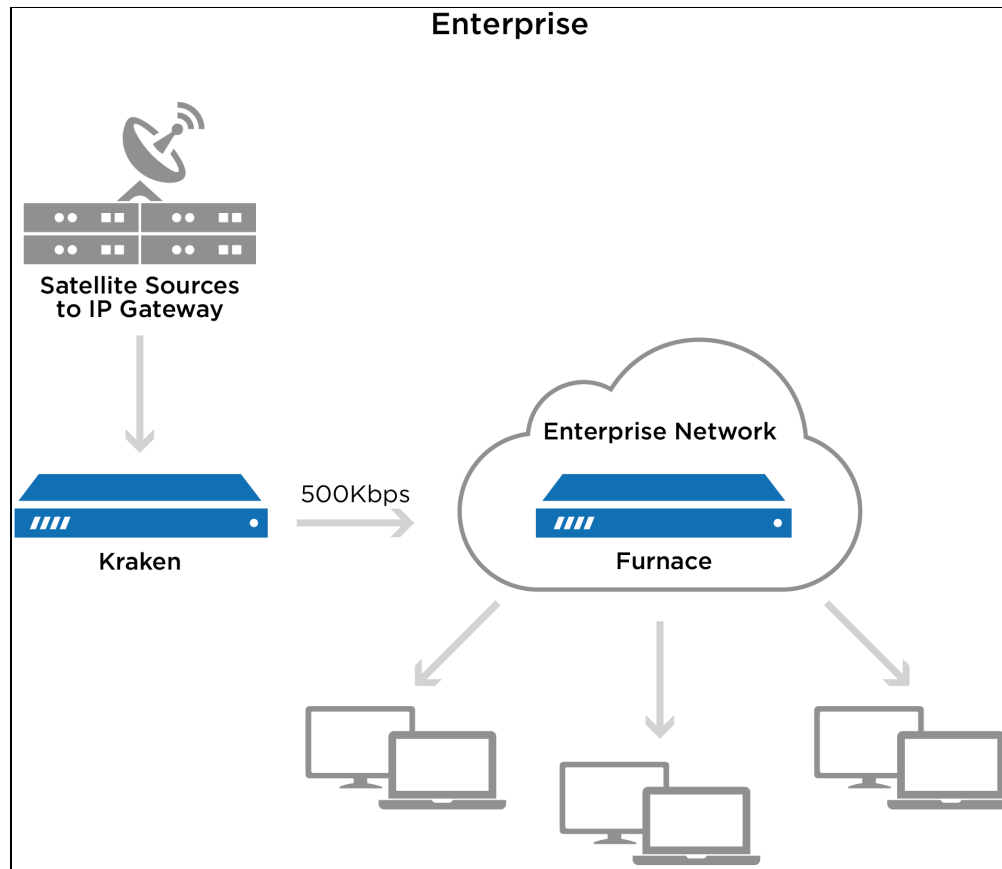
Transcoding is defined as the process of converting a media stream or object from one format to another. This may be done in cases where a target device (or workflow) does not support the format, has limited storage capacity or limited network bandwidth that mandates a reduced stream size, or to convert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

Haivision's Kraken Video Encoder/Transcoder delivers performance IP video transcoding. 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. 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.

Haivision also enables live HEVC baseband encoding and H.264 to HEVC or HEVC to H.264 transcoding.

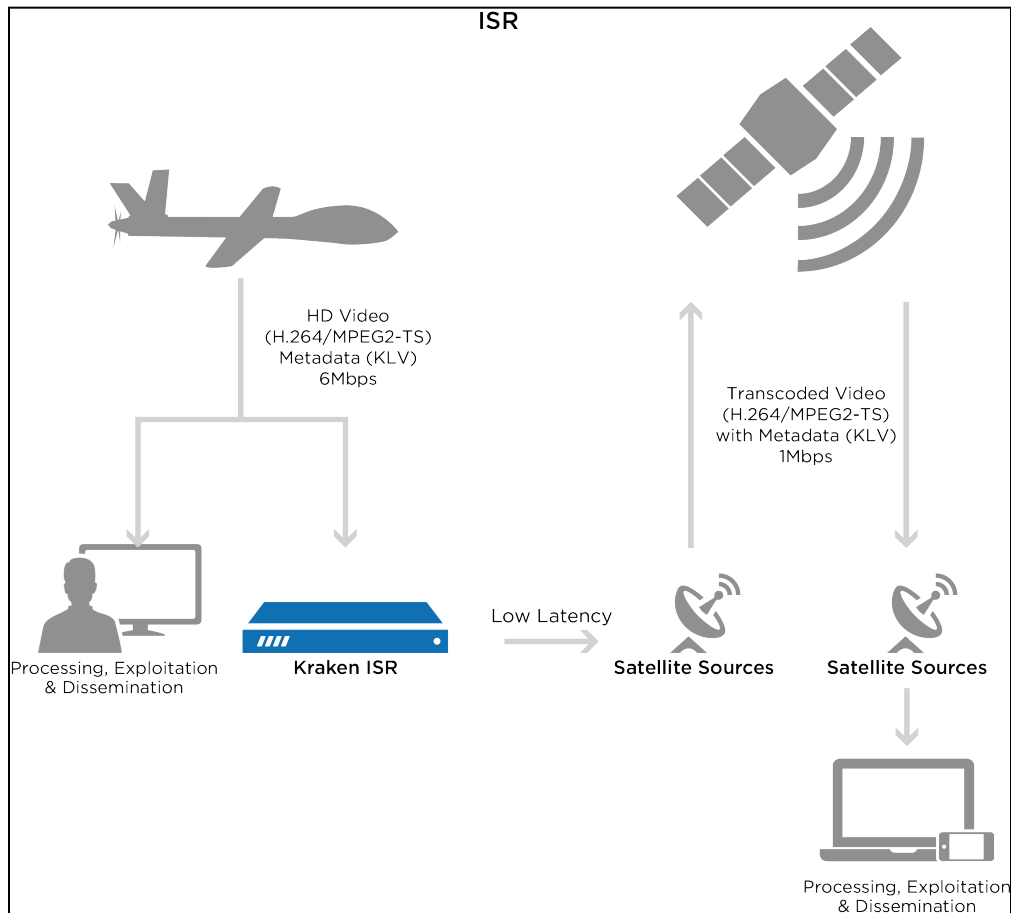
Kraken Enterprise - Distributing Streams for Enterprise

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.



Kraken ISR - Intelligence, Surveillance, and Reconnaissance

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. 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.



Kraken Features

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.

As a transcoder, 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).

As a baseband encoder (Kraken CR platform), Kraken captures and encodes/processes baseband digital video, digital audio and ancillary metadata.

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 v1.0 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

Note

Kraken only supports Single Program Transport Stream (SPTS) inputs. Multi Program Transport Stream (MPTS) inputs are not supported.

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. Kraken outputs video in progressive format only.

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 UDP unicast (the stream is sent to Kraken), UDP multicast, TCP unicast (the stream is sent to Kraken), or TCP unicast (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.

Output streams may be UDP unicast (the stream is sent to a third party device), UDP multicast, TCP unicast (Kraken listens for a request), or TCP unicast (Kraken sends a stream to a third party device). Output streams are VBR. The maximum single bandwidth for an output stream is 20 Mbps.

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.

SRT (Secure Reliable Transport)

Kraken supports Haivision's Secure Reliable Transport (SRT) input and output streaming format for interoperability with the Haivision eco-system. This enables end-to-end security and stream resiliency for recording and streaming applications. For more information, please refer to the *SRT Deployment Guide* (available from the [Download Center](#) on the Haivision Support Portal).

SRT is a transport technology that optimizes streaming performance across unpredictable networks, including the public Internet, for secure, reliable, low latency HD video. SRT as a protocol is included with Makito X encoders and decoders and Haivision's Media Gateway.

Console User Interface (Appliance Only)

A Console UI is available for Kraken appliances which may be accessed directly by connecting a keyboard and monitor to the appliance (either from the front or the back of the appliance), 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.

Related Topics

- [Using the Console UI with Haivision Hardware](#)

Appliance Options

Kraken server is available in Base, Premium, and Ultra System server appliance options. Kraken CR is a small form factor H.264/HEVC encoding/transcoding appliance.

Kraken Server

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

- The **Base System** 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** 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** 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 also provides redundant Hot Swap Hard drives (RAID 1) and power supplies.

All server appliances are 1RU tall. For more information, see [Physical Description \(Kraken Server\)](#).



Kraken CR

Kraken CR is a small form factor H.264/HEVC encoding/transcoding appliance, supporting capture of Analog Composite Video or HD/SD-SDI digital.

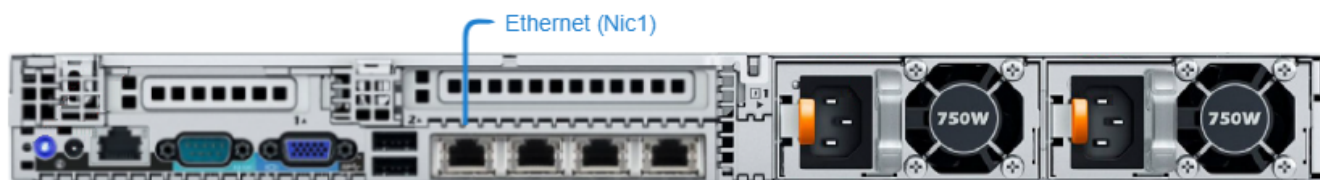
Note

References to Kraken CR include variants of Kraken CR that provide HEVC hardware acceleration.

For more information, please refer to the [Kraken CR Quick Start Guide](#).



Ultra System Appliance



Related Topics

- [Connecting Kraken Server](#)
- [Getting Started with the Web Interface](#)

Getting Started with the Web Interface

This section provides system access control information, followed by a basic overview of the Kraken Web interface.

Topics Discussed

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

Signing in to the Web Interface

✓ Tip

Make sure that your browser is configured to accept cookies.

To sign in to the Kraken configuration Web page:

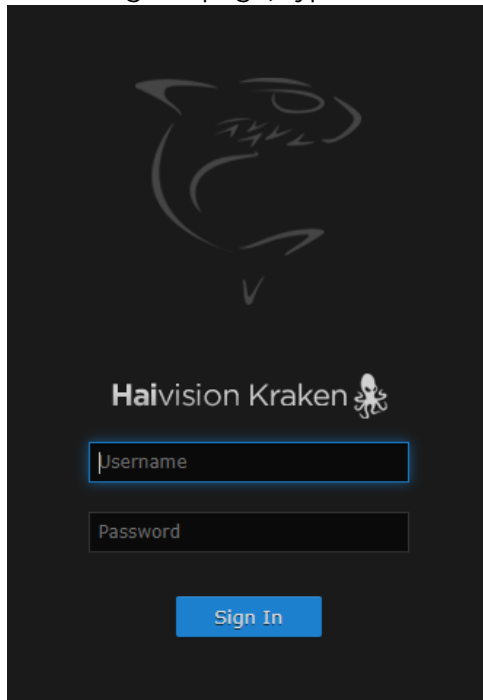
1. From your computer, open a Web browser.
2. Type the Kraken's IP Address in the browser's address bar and press **Enter**.

i Note

The appliance's IP address is set by Haivision prior to delivery. Please refer to the *Important Notice* for the default IP address and administrative user information. The *Important Notice* is shipped with the device or available from the [Download Center](#) on the Haivision [Support Portal](#).

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

3. On the Sign-in page, type the Username and Password and click **Sign In** (or press Enter).



Please refer to the *Important Notice* document for the default sign-in credentials. Kraken provides three predefined user accounts. For information, see [Role-based Authorization](#).

Role-based Authorization

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

Kraken provides three defined account roles to assign privileges to users:

| Account | Default Username | Privileges |
|---------------|------------------|---|
| Viewer | viewer | Read-only access to the system. |
| Operator | operator | All rights to configure A/V and stream settings, start/stop streams, etc. Does <i>not</i> include rights to reboot or upgrade the system, modify the network settings, install licenses, or manage accounts. |
| Administrator | haiadmin | All access rights and Administrator privileges. |

All three roles provide Web interface access to the system. Please refer to the *Important Notice* (included in the box or available from the [Download Center](#) on the Haivision Support Portal) for the default sign-in credentials.

Caution

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

Administrators can create, delete, and change the password for all accounts from the [Accounts page](#) (see [Managing User Accounts](#)). Operators and guests can manage their password from the [My Account page](#) (see [Changing Your Password](#)).

Note

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

Related Topics

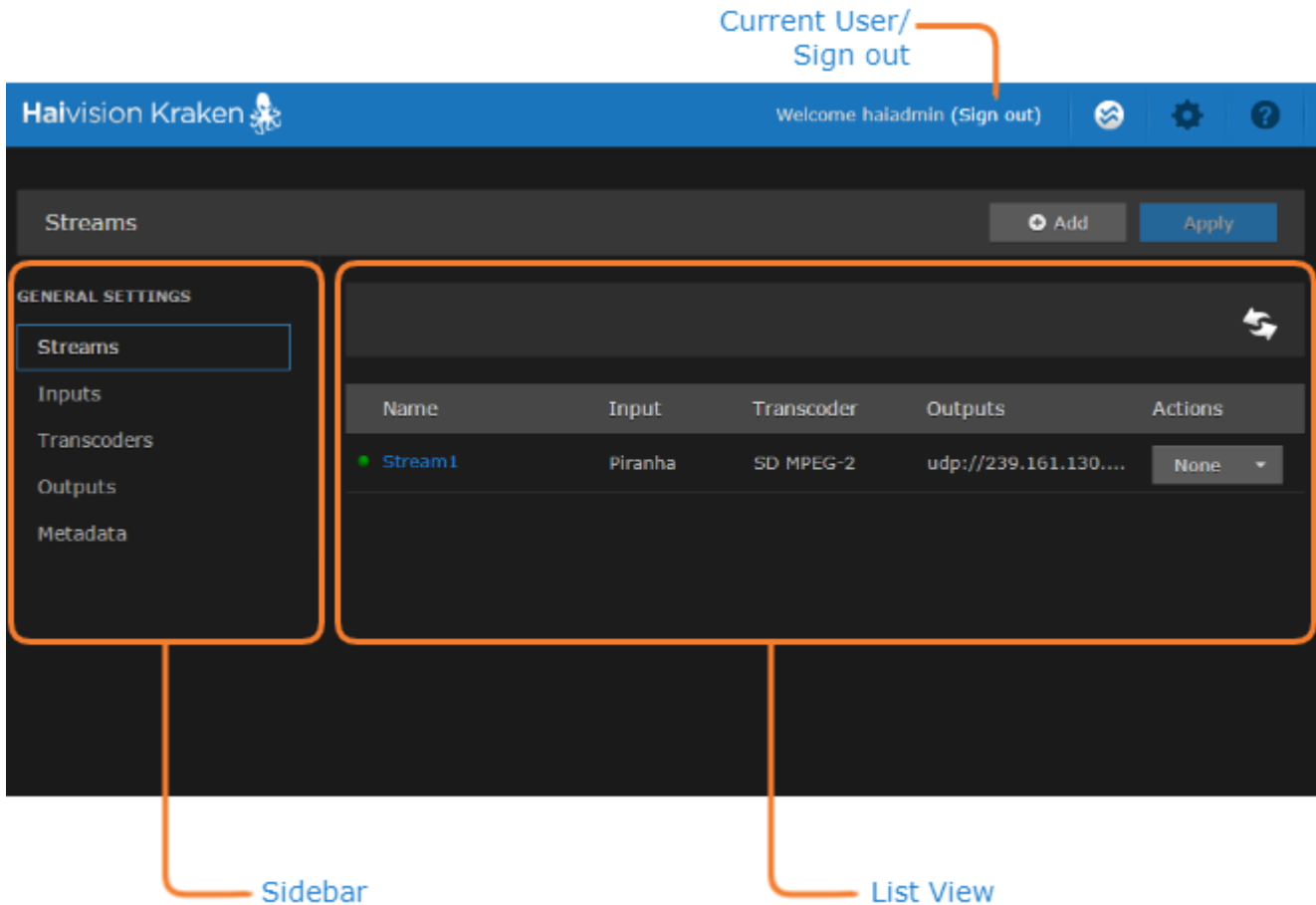
- [Managing User Accounts](#)
- [Changing Your Password](#)

Exploring the Web Interface

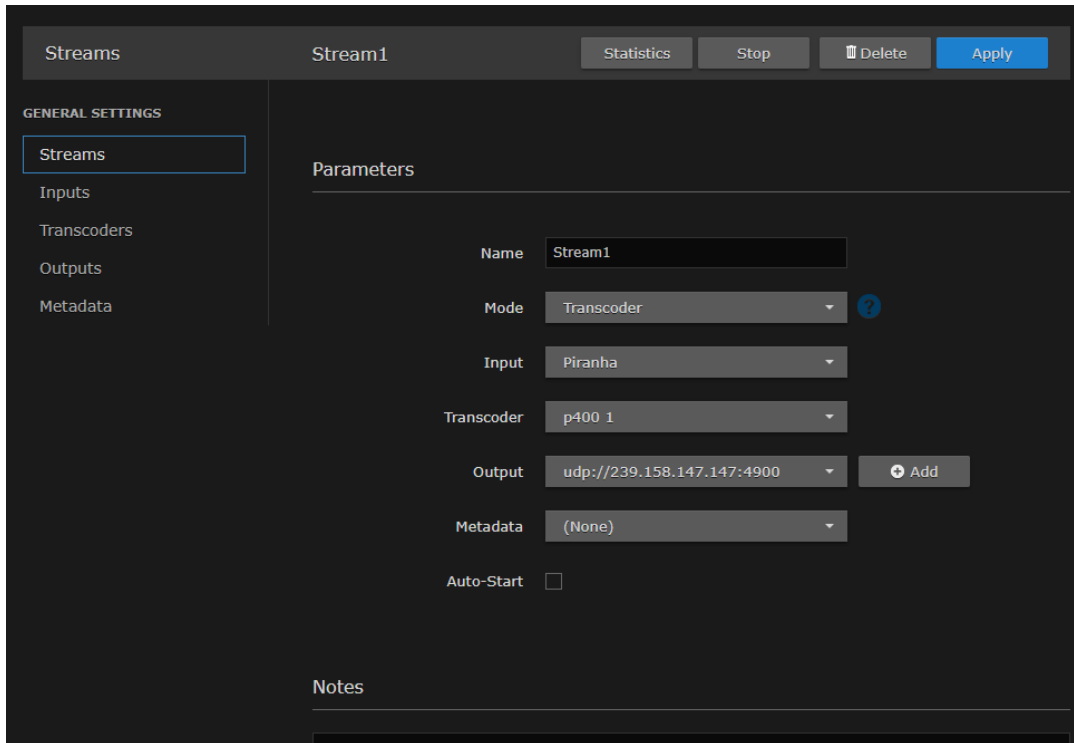
After logging in to the Web configuration interface, you will have access to the appliance configuration settings.

Navigational Menus

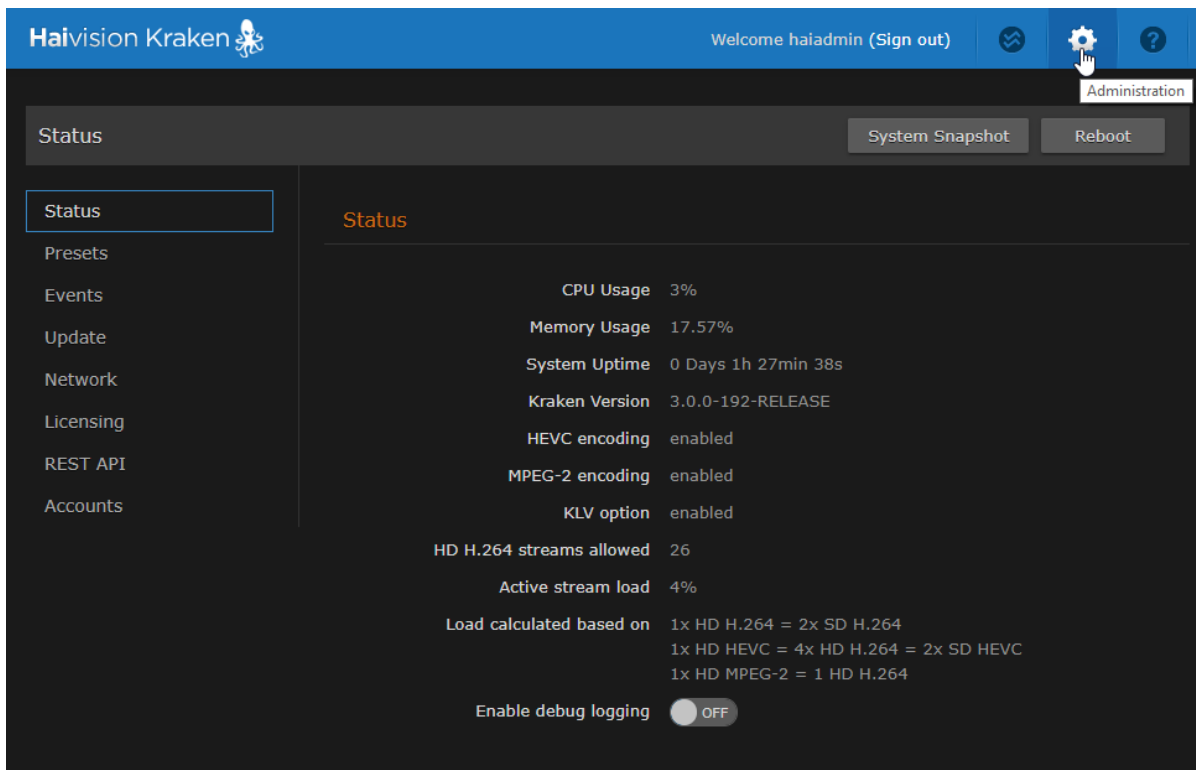
Once you have successfully signed in, the Kraken Web interface opens to the Streams List View. Your account information is displayed on the toolbar (along the top).



- To set up stream-based transcoding or encoding, select the configuration option from the sidebar, for example, **Streams**, **Inputs**, **Transcoders**, or **Outputs**.
- To open the Detail View (from the List View), click a link (any line) in the table. For example, on the Streams List View (shown above), click a link to open the Streams Detail View (shown following).



- To access the administration settings, click the  **Administration** icon on the toolbar and then select the option from the sidebar, for example **Presets**, **Network**, or **Accounts**.



Changing Your Password

Important


For security purposes, be sure to change the default password!

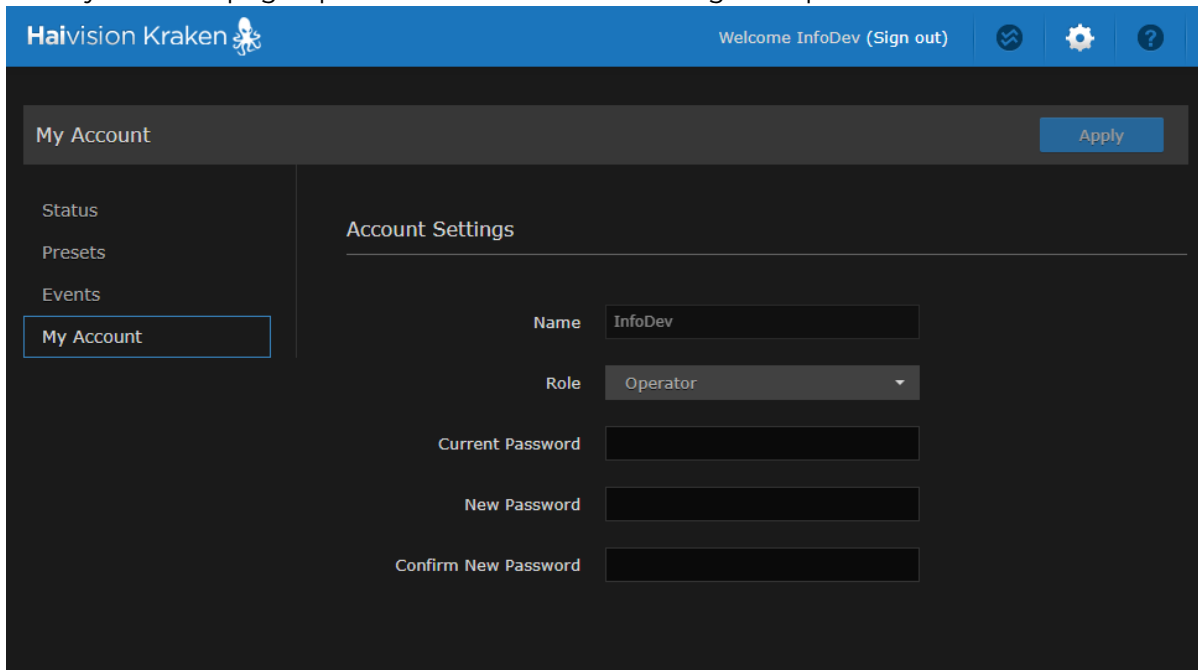
If you are logged in as a non-administrative user, you can change your own password from the My Account page, as described in this section. This is useful when logging into a Kraken on which the factory defaults have not been changed.

Note

The My Account page is available to users assigned either Operator or Viewer accounts. Administrative users may change their passwords from the Accounts page. For the privileges assigned to accounts, see [Role-based Authorization](#).

To change your password:

1. Click the  **Administration** icon on the toolbar and then click **My Account** on the sidebar. The My Account page opens as shown in the following example.



2. Type your current password in the Current Password field.
3. Type the new password in the New Password field and again in the Confirm New Password field.
4. Click **Apply**.
The new password will take effect immediately.

Related Topics

- [Password Requirements](#)

Password Requirements

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

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

Note

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

Signing Out

After you finish using the Kraken, be sure to log out. To do so, click **Sign out** from the toolbar.

Signing out prevents misuse and unauthorized access to the appliance.

Managing Kraken from the Web Interface

This section explains how to set up real-time stream-based transcoding and/or encoding using the Web interface.

Tip

To set up transcoding, you need to define:

- **Inputs** - the source URL, or an SDI or Analog Composite Input (Kraken CR or other supported hardware) for baseband input encoding
- **Transcoders** - audio and video characteristics to change
- **Outputs** - one or more output URLs
- **Streams** - select from defined Inputs, Outputs, Transcoders, and (optionally) Metadata sources.

You may optionally configure Kraken to capture KLV or CoT **Metadata** from a UDP network source or from the SDI or Serial Input interface.

Topics Discussed

- [Configuring Streams](#)
- [Configuring Inputs](#)
- [Configuring Transcoders](#)
- [Configuring Outputs](#)
- [Configuring Metadata Capture](#)

Configuring Streams

A Kraken stream typically consists of a user-defined stream Name, Input, Transcoder, Output(s), and (optionally) Metadata source(s).

From the Streams pages, you can define an unlimited number of Kraken streams. However, the number of active streams supported by Kraken depends on your Kraken hardware and Haivision licensing applied to that hardware.

Stream Routing

Kraken supports three stream routing modes:

| Mode | Stream Routing | Description |
|------------|--------------------------------|---|
| Transcoder | Input, Transcode and Output(s) | This is the traditional transcoding workflow (i.e., the only option pre-Release 2.5). |

| Mode | Stream Routing | Description |
|-----------------------|---|--|
| Transcoder + Passthru | Input with Retransmission, Transcode, and Output(s) | This is similar to the Transcoder workflow but also re-transmits the input stream to another destination (i.e., to "pass through" the system and be rerouted to a different remote IP address). |
| Bypass | Input and Output(s) | This mode does not transcode the input stream, but simply re-transmits it to the outputs without any manipulation of the content. |


Topics Discussed

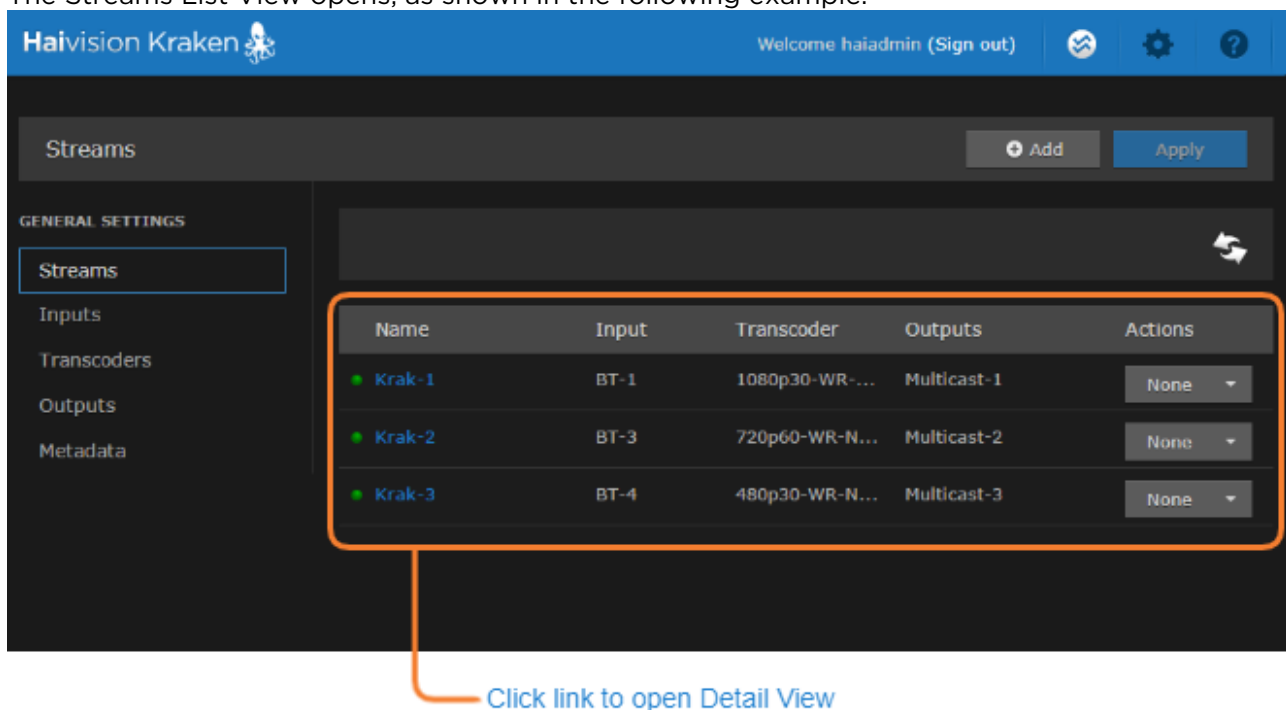
- [Streams List View](#)
- [Configuring Stream Parameters](#)
- [Stream Settings](#)
- [Stream Statistics](#)


Streams List View

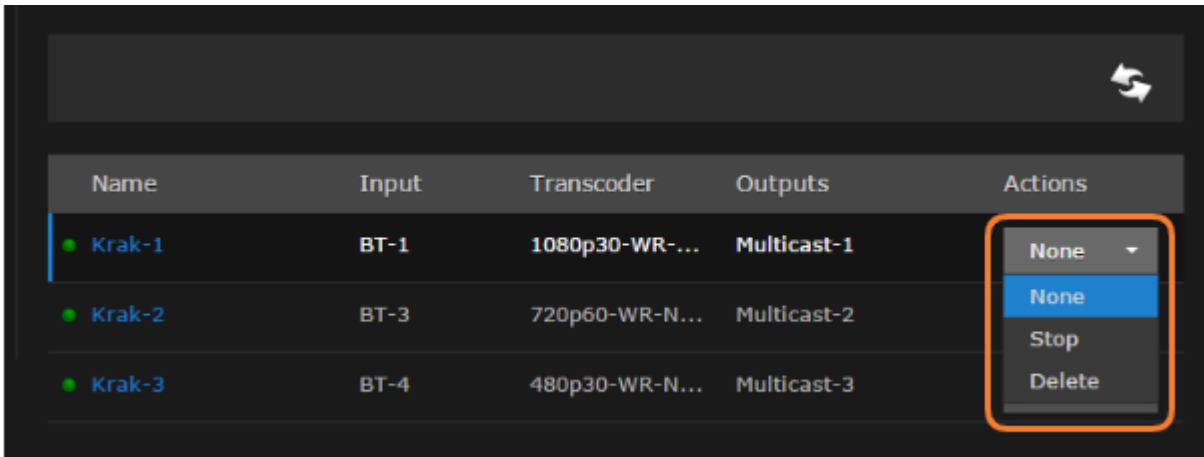
The Streams List View displays a status icon along with the Stream Name, Input, Transcoder, and Output(s) for each defined stream. It also provides options for you to start, stop or delete a stream.

To open the Streams List View:

1. Click the  **Streaming** icon on the toolbar, and then click **Streams** on the sidebar. The Streams List View opens, as shown in the following example.



2. From here, you can perform the following tasks:
 - To add a stream, click the  **Add** button.
 - To view details or modify the components of a stream, click a line in the table to open the Streams Detail View.
 - To change the status for a stream, click the drop-down list under **Actions** and select either Start/ Stop (as applicable) or Delete.



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

Related Topics

- [Configuring Stream Parameters](#)

Configuring Stream Parameters

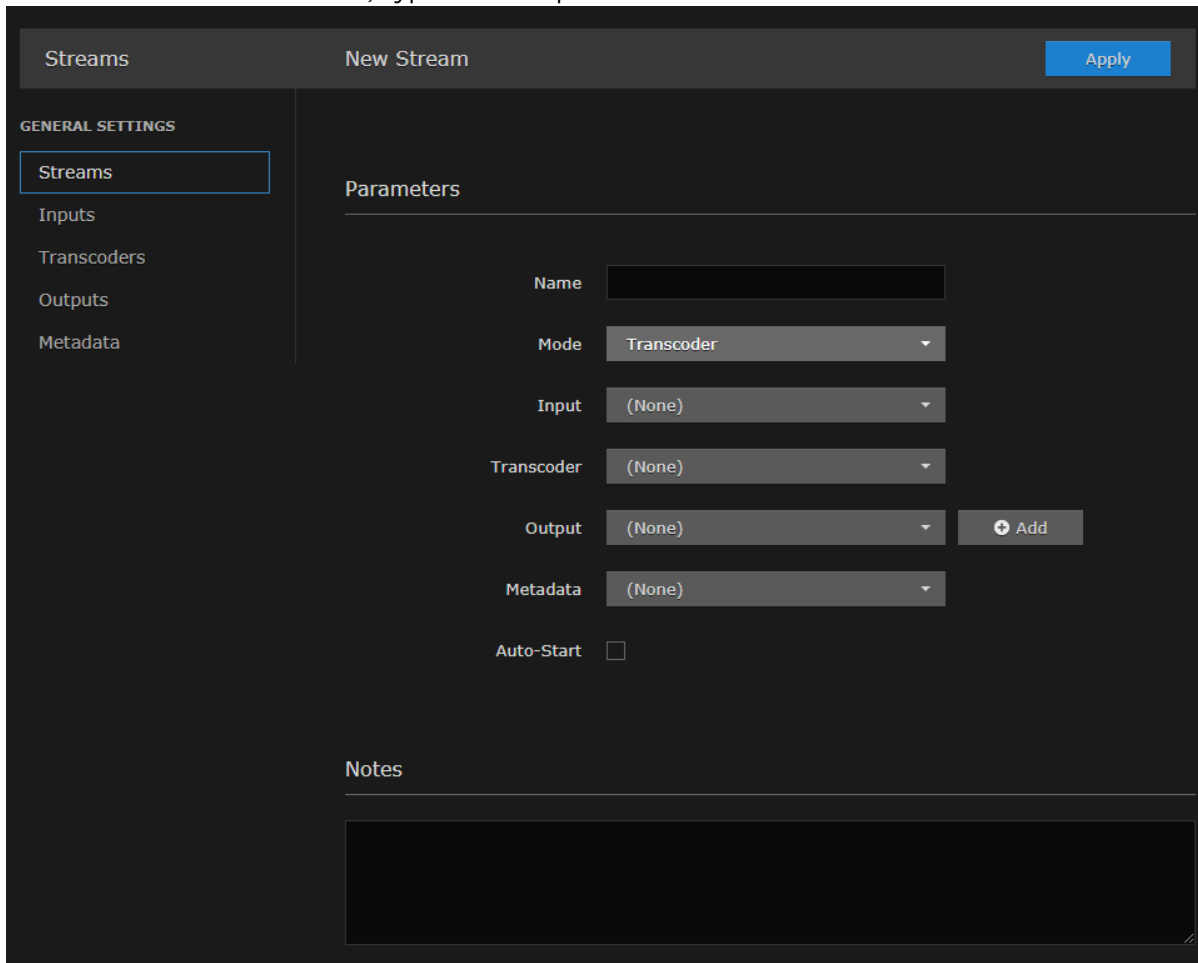
Note

You must first define the Inputs, Transcoders, Outputs, and (optionally) Metadata sources before you can define a Stream.

The Inputs, Transcoders, Outputs, and Metadata sources that you have previously defined will be selectable when you add or modify a stream.

To view and configure Stream parameters:

1. From the Streams List view, click the **+ Add** button or click any line in the table for an existing stream.
2. On the Streams Detail View, type in a unique name for the stream.



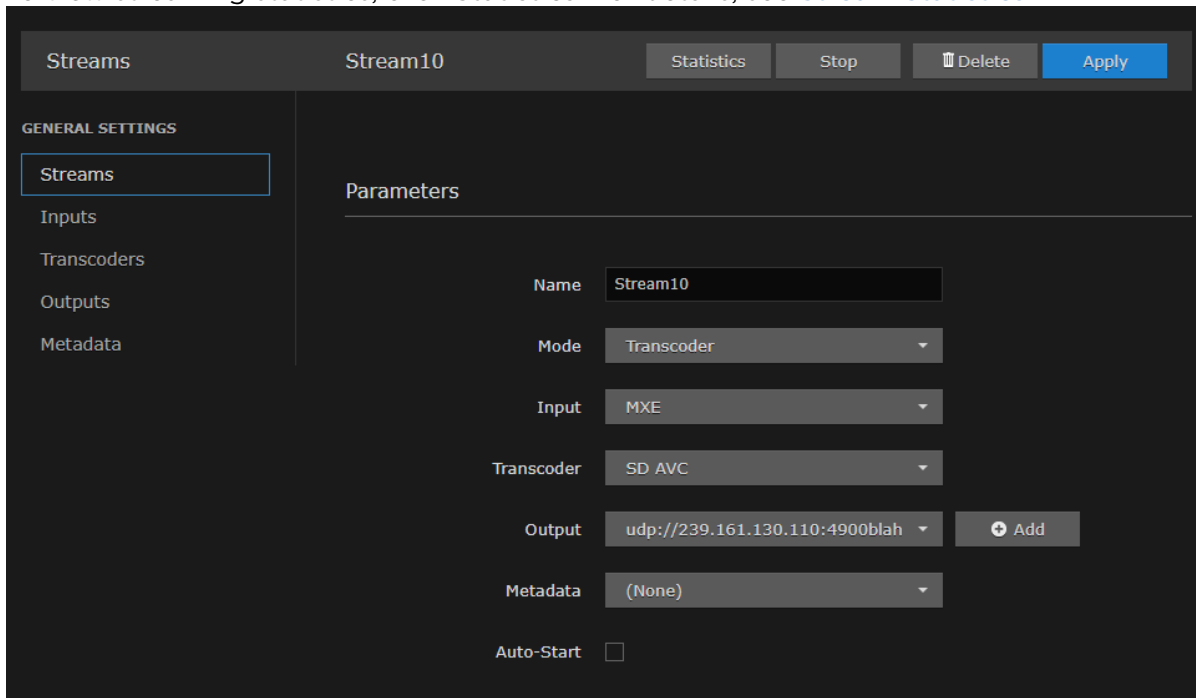
3. (Optional) To configure alternate stream routing modes, such as “Transcoder + Passthru” or “Bypass”, select the stream routing mode. See [Stream Routing](#).
4. Select an Input, Transcoder, one or more Outputs, and (optionally) one or more Metadata sources to define the stream. See [Stream Settings](#).
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.

Note

You must click **Apply** 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 > Presets** page. See [Saving and Loading Presets](#).

The new stream is added to the Streams List.

6. To start or stop the stream, click **Start** or **Stop** (as applicable). Or click **Streams** from the sidebar to return to the Streams List View.
7. To view streaming statistics, click **Statistics**. For details, see [Stream Statistics](#).



Note

- With MPEG TS or RAW Motion JPEG inputs, Kraken takes the source URL, re-encodes the audio/video, and sends it out as a new stream with different encoding characteristics.
- With SDI or Analog Composite inputs, the Kraken CR captures and encodes/processes baseband video and ancillary metadata.

Related Topics

- [Stream Settings](#)

Stream Settings

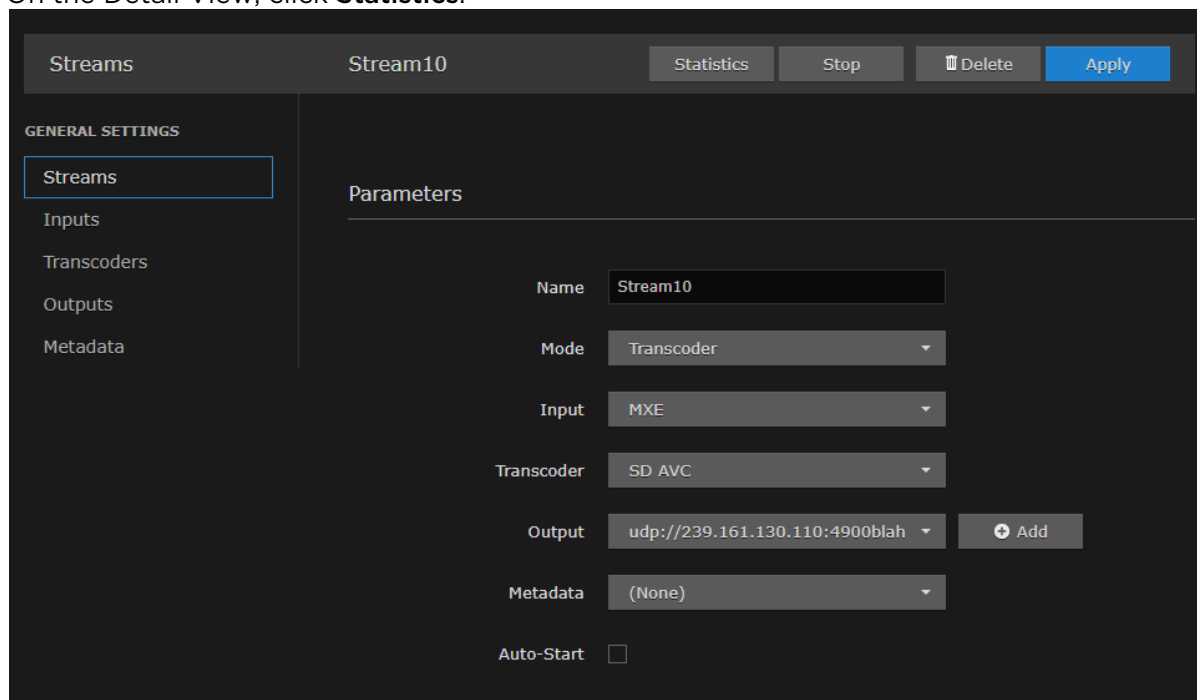
The following table lists the Kraken Stream settings:

| Stream Setting | Description/Values |
|-----------------|---|
| Name | Enter a unique name for the stream. |
| Mode | <p>Select the stream routing mode: See Stream Routing.</p> <ul style="list-style-type: none"> • Transcoder (default): The Input will be transcoded to one or more Outputs. • Transcoder + Passthru: The Input will be transcoded and also re-transmitted to another destination. • Bypass: The Input will not be transcoded, but simply copied (as is) to the Outputs. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note Bypass supports the TS/UDP and TS/SRT stream types, but does not support RTSP input streams. Passthru (in Transcoder + Passthru) is limited to stream types that the transcoder supports.</p> </div> <p>Bypass supports multiple outputs whereas Passthru supports only one.</p> |
| Input | Select the Input for the stream. |
| Passthru Output | (Mode must be Transcoder + Passthru) Select the Output for the re-transmitted stream. |
| Transcoder | (Mode <i>cannot</i> be Bypass) Select the Transcoder to apply to the stream. |
| Output | <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note To specify multiple Outputs, click Add and select from the list.</p> </div> |
| Metadata | (Mode must be Transcoder or Transcoder + Passthru) Select the Metadata source for the transcoded stream. |
| Auto-Start | Check this checkbox to auto-start this stream when a Preset is loaded via the Administration Preset page or applied after a reboot. |
| Notes | (Optional) Type in any related information or comments. |

Stream Statistics

To view stream statistics:

1. From the Streams List view, click any line in the table to open the Detail View for an active stream.
2. On the Detail View, click **Statistics**.



The Statistics page opens in a separate tab.

3. Scroll down to view the statistics.

The Streams Statistics page shows statistics for the stream Input, Decoder, Encoder, and Output.

Stream Stream10
Enable Logs and Restart Stream

| | |
|------------|-------------------------------------|
| UUID | a2738889-f0f1-4c5a-97db-ffb2ccb6779 |
| Name | Stream10 |
| State | Active |
| Uptime | 1 days, 02:21:04 |
| Process ID | 43692 |

INPUT

| | |
|----------------|----------------------------|
| URL | udp://239.162.186.100:4900 |
| Stream Type | MPEG2 Transport Stream |
| Bytes | 77,449,163,756 (72.13 GB) |
| Video Bytes | 70,534,003,848 (65.68 GB) |
| Audio Bytes | 3,010,216,618 (2.8 GB) |
| Aux Bytes | No Aux |
| Bitrate | 6.5 (Mbps) |
| Video Bitrate | 5.9 (Mbps) |
| Audio Bitrate | 256.5 (kbps) |
| Aux Bitrate | 0 |
| Video Type | H264 |
| Audio Type | MPEG4_AAC_ADTS |
| Aux Type | unset |
| Video Count | 5,639,438 |
| Audio Count | 4,409,497 |
| Aux Count | 0 |
| Video Prog. ID | 33 |

Configuring Inputs

You must first define one or more Inputs before you can define a Stream. Inputs can either be a source URL, an SRT source, or an SDI or Analog Composite input:

- For transcoding, each Input consists of a valid source URL with an optional name and notes. In addition, with TS over UDP, you can select the network interface to input streams from any of the available Network Interface Cards (NICs).
- The default stream type for the Input is MPEG TS over UDP. You may also select TS over SRT, RTSP, or Raw Motion JPEG (MJPEG), which Kraken will transcode into a standard H.264 or HEVC MPEG Transport Stream.
- To configure encoding/processing of baseband video and ancillary metadata (depending on your hardware setup), you may select an SDI or Analog Composite input.

Topics Discussed

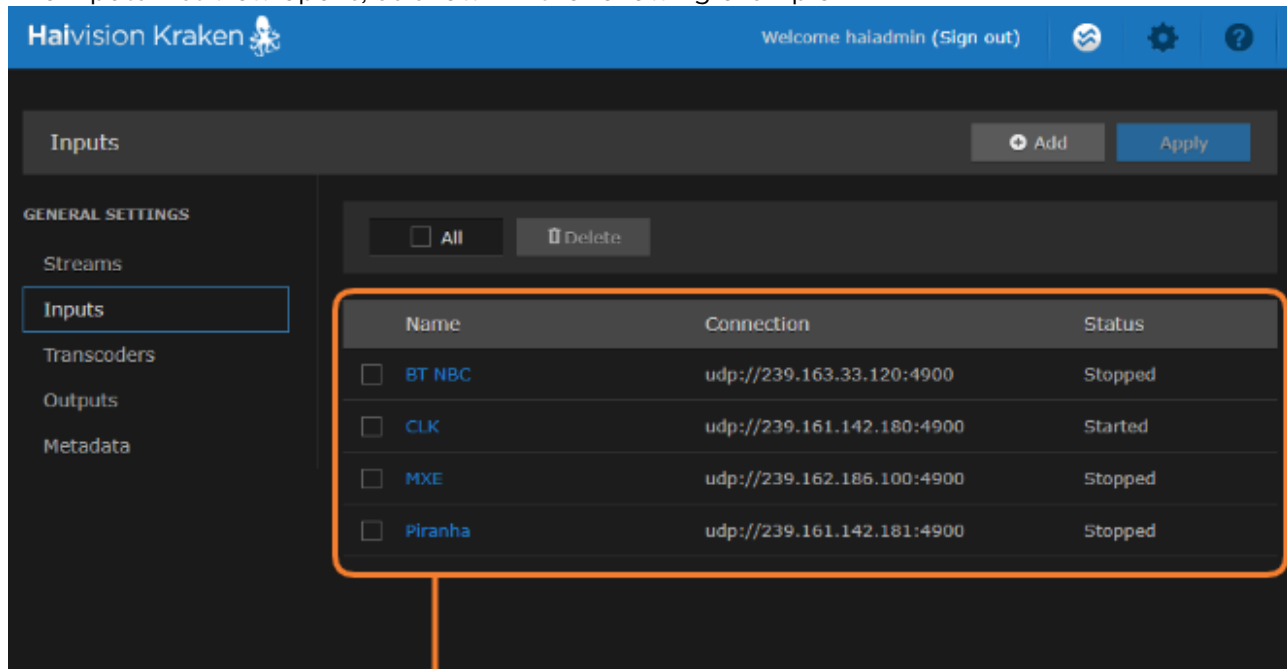
- [Inputs List View](#)
- [Configuring Input Parameters](#)
- [Input Settings](#)
- [Input Statistics](#)

Inputs List View

The Inputs List view displays a summary of defined inputs for Kraken, including the Input Name, Connection (source) URL, and Status for each input. It also provides an option for you to delete an input.

To open the Inputs List View:

1. On the Streaming page, click **Inputs** on the sidebar.
The Inputs List view opens, as shown in the following example.



- To add a new input, click the **+ Add** button.
 - To view details or modify the settings for an input, click a line in the table to open the Inputs Detail View.
 - To delete an existing input, check the checkbox next to the item in the list and click the **Delete** button.
2. To apply your changes, click **Apply**.

Related Topics

- [Configuring Input Parameters](#)
- [Transport Characteristics](#)

Configuring Input Parameters

To view and configure Input parameters:

1. From the Inputs List view, click the **+** **Add** button or click any line in the table.
2. On the Inputs Detail View, type in a unique name for the input and select the Source.

3. Select or enter values in the fields to define the input. For details, see [Input Settings](#).
4. The Input parameters vary depending on the hardware setup of the appliance and the Input Source selected.
 - For transcoding, select either TS over UDP (default), RTSP, or Raw Motion JPEG (MJPEG). Type in a valid source URL. For TS over UDP input, select the network interface.
 - To configure SRT input, select TS over SRT for the source and then complete the additional fields under SRT Settings. See [SRT Input Settings](#)
5. (**Kraken CR** or appliance with SDI capture card installed) To encode HD/SD-SDI video, select DeckLink Micro Recorder 1 and then select the DeckLink (capture card) Mode. See "DeckLink Mode" (under [Input Settings](#)).

Tip

For HD/SD-SDI encoding, begin by using "Autodetect" for the DeckLink Mode. If this does not work correctly on your system, refer to "DeckLink Mode" (under [Input Settings](#)) for details on manually selecting the DeckLink Mode.

6. (**Kraken CR** or appliance with Analog Composite capture card installed) To encode Analog Composite video, select Analog Capture 1 and then select the capture card Mode. See "Analog Capture Mode" (under [Input Settings](#)).

7. To apply your changes, click **Apply**.
The new input is added to the Inputs List.
8. To view input statistics, click **Statistics**. For details, see [Input Statistics](#).

Related Topics

- [Input Settings](#)
- [Transport Characteristics](#)

Input Settings

The following table lists the Kraken Input settings:

General SRT Input Settings

General Input Settings

| Input Setting | Description/Values |
|---------------|---|
| Name | <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note</p> <p>The Input name is not required. Kraken will use the Input URL as the name if none is provided.</p> </div> |
| Source | <p>Select the Source for the Input, either:</p> <ul style="list-style-type: none"> • TS over UDP: MPEG2 Transport Stream over UDP (no RTP header, default) • TS over SRT: Haivision's Secure Reliable Transport. See SRT (Secure Reliable Transport). • RTSP: Select to configure Kraken to interoperate with ISR "sensors" such as wearable IP cameras, which are typically H.264 RTP/RTSP. See NOTE: below. • Raw Motion JPEG: Allows you to input a Motion JPEG (MJPEG) live stream and transcode the payload into a standard H.264 or HEVC video within an MPEG Transport Stream. • DeckLink Micro Recorder 1 (Kraken CR or SDI capture card must be installed): Select to capture HD/SD-SDI video for baseband input encoding. <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note</p> <p>Kraken supports RTSP Input for H.264 video only under these conditions:</p> <ul style="list-style-type: none"> • Stream authentication through RTSP URL (username and password) • H.264 video instance selection through RTSP URL </div> |

| Input Setting | Description/Values |
|---------------------------|---|
| URL | <p>Type in the source URL for the Input, for example, <code>udp://239.100.100.100:5000</code></p> <p>Examples of supported input formats:</p> <ul style="list-style-type: none"> <code>udp://239.100.100.100:5000</code> = multicast UDP to 239.100.100.100 port 5000 <code>udp://:5000</code> = unicast UDP. Allows an inbound stream to be sent to this server's IP address on port 5000. <code>tcp://10.66.132.20:4045</code> = unicast TCP on 10.66.132.20 port 4045 <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p>Note Kraken input streams may be UDP unicast or multicast, or TCP unicast.</p> </div> |
| Source Specific Multicast | <div style="border: 1px solid #f0e68c; padding: 5px; margin-bottom: 10px;"> <p>Note As of Release 2.6, Kraken supports IGMPv3 Source Specific Multicast reception, which allows input streams to join a multicast group and filter the input streams based on a specific source IP address. Only streams originating from the specified source IP will be forwarded to Kraken. This allows Kraken to quickly and easily select an input stream in environments with many sources sharing a common multicast IP.</p> </div> <p>When the receiving device specifies a source device IP address, the IGMP protocol will filter out devices that use the same multicast group address and only forward the traffic with the specified source IP address as well the destination IP multicast address to the requesting destination device.</p> |
| Network Interface | <p>Select the network (Ethernet) interface for the Input, either:</p> <ul style="list-style-type: none"> Auto (default): Uses static route, if defined; otherwise uses the default eth0 eth1 <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p>Note Network Interface names for Ethernet interfaces may vary, such as eth0/eth1/..., pNp1/pNp2/..., or em1/em2/....</p> </div> <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px; background-color: #fff9c4;"> <p>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.</p> </div> |

| Input Setting | Description/Values |
|---------------------|--|
| Deck Link Mode | <p>(Source must be DeckLink) Select the capture card mode:</p> <ul style="list-style-type: none"> <div data-bbox="277 359 1474 621" style="border: 1px solid #f9e79f; padding: 5px;"> <p>Note</p> <p>DeckLink inputs start up and match the input regardless of whether Autodetect is set or the chosen inputs match. When set to Autodetect, Kraken attempts to detect the input resolution and frame-rate. If the input resolution and frame-rate cannot be detected, then you have the option of providing a resolution and frame-rate hint to the DeckLink card so as to allow the DeckLink card to lock on the input signal. The selected DeckLink input resolution and frame-rate must match the actual input resolution and frame-rate for the signal to be correctly recognized and processed.</p> </div> <div data-bbox="277 632 1474 894" style="border: 1px solid #d9ead3; padding: 5px;"> <p>Tip</p> <p>Autodetect may not work correctly for some cameras. For instance the capture card may detect a wrong mode. Also the capture card may not detect all sources for all modes. For instance, it may correctly detect a certain camera when it is in 720-60p but not when it is in 720-50p. Therefore, we recommend that you use Autodetect mode when possible and when it works, and use the manual mode selection if necessary. Also, some capture cards do not support “Autodetect” in which case only the supported modes of the capture card will be listed and can be selected.</p> </div> <ul style="list-style-type: none"> Manually select the resolution |
| Analog Capture Mode | <p>(Source must be Analog Capture) Select the capture card mode:</p> <ul style="list-style-type: none"> Autodetect (default) Manually select the display system (NTSC, PAL, etc.) |

General SRT Input Settings

SRT Input Settings

| Input Setting | Description/Values |
|------------------|--|
| Mode | <p>Selects the SRT Connection Mode:</p> <ul style="list-style-type: none"> • Caller: Kraken acts like a client and connects to a server listening and waiting for an incoming call. • Listener (default): Kraken acts like a server and listens & waits for clients to connect to it. • Rendezvous: Allows calling and listening at the same time. <div style="border: 1px solid #f0e68c; padding: 5px;"> <p>Note</p> <p>To simplify firewall traversal, Rendezvous Mode allows Kraken and the encoder to traverse a firewall without the need for IT to open a port.</p> </div> |
| Address | <div style="border: 1px solid #c8e6c9; padding: 5px;"> <p>Tip</p> <p>You can also enter a Fully Qualified Domain Name (FQDN).</p> </div> |
| Source Port | <div style="border: 1px solid #fff9c4; padding: 5px;"> <p>Note</p> <p>This simplifies firewall configuration as the firewall/NAT rules can be precisely tailored to the SRT stream.</p> </div> |
| Destination Port | (Caller and Rendezvous Connection Modes) Specifies the UDP destination port for the SRT stream. |
| Port | (Listener Connection Mode only) Specifies the UDP local port for the SRT stream. |
| Latency | <p>Specifies how long Kraken will buffer received packets. The size of this buffer adds up to the total latency. A minimum value must be 3 times the round-trip-time (RTT). Range = 20-8000 ms Latency is for the SRT protocol only and does not include the capture, encoding, decoding and display processes of the end-point devices.</p> |
| Passphrase | <p>(Optional, must match encoder passphrase) This parameter is required if the stream is encrypted and is used to retrieve the cryptographic key protecting the stream. Range = 10-79 UTF-8 characters</p> |
| Notes | (Optional) Type in any related information or comments |

Note

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

Input Statistics

The Input Statistics page shows statistics for the selected SDI (DeckLink) or Analog Capture encoding input.

| DeckLink | |
|---------------------------|--------------------------------------|
| Service UUID | 3e55ea75-26b8-4d83-bc10-f58d7a8f60e6 |
| Keep Alive Counter | 120180 |
| Start Time | 2019-Apr-09 16:08:07.950624 |
| PID | 2039 |
| Running | True |
| DeckLink Micro Recorder 1 | |
| Input mode auto-detection | True |
| Keep Alive Counter | 120205 |
| Device is opened | True |
| Device is started | True |
| Config Mode | -1 |
| Config Pixel Format | UNSET |
| Video Counter | 42948779 |
| Audio Counter | 42948779 |
| Drop Counter | 0 |
| Video Width | 1280 |
| Video Height | 720 |
| Video Framerate | 59.94 |
| Video Interlaced | False |

Configuring Transcoders

Topics Discussed

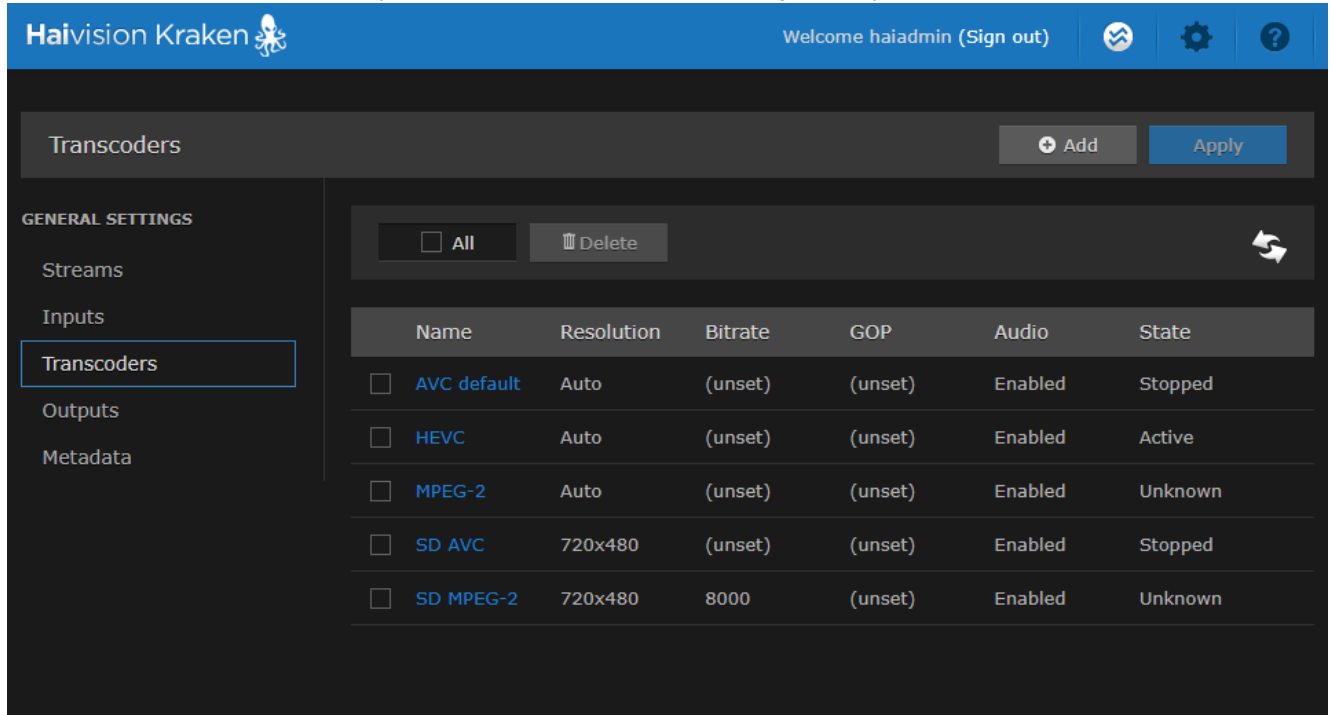
- [Transcoders List View](#)
- [Configuring Transcoder Parameters](#)
- [Filtering UAS KLV Metadata Tags](#)
- [Transcoder Settings](#)
- [Advanced Shaping Settings](#)
 - [Recommended Start Settings for Advanced Shaping Settings](#)


Transcoders List View

The Transcoders List view displays a summary of defined transcoders for Kraken, including the Name, Resolution, Video Bitrate, Group of Pictures (GOP) size, Audio enable setting, and State for each transcoder. It also provides an option for you to delete transcoders.

To open the Transcoders List View:

1. On the Streaming page, click **Transcoders** on the sidebar.
The Transcoders List View opens, as shown in the following example.



- To refresh the page, click .
 - To add a transcoder, click the **+ Add** button.
 - To view transcoder details or add a transcoder, click a line in the table to open the Transcoders Detail View.
 - To delete one or more existing transcoders, check the checkbox(es) next to the item(s) in the list and click the **Delete** button.
2. To apply your changes, click **Apply**.

Related Topics

- [Configuring Transcoder Parameters](#)

Configuring Transcoder Parameters

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.

KLK Options

With KLV (Key Length Value) input, you can also configure the transcoder to reduce the KLV data rate by frame-decimating the KLV metadata and/or filtering out data fields from MISB 0601 UAS KLV metadata. This is useful to lower the amount of bandwidth consumed by metadata and thereby allow higher video bitrates within bandwidth-constrained ISR workflows.

- KLV Rate Decimation causes Kraken to ingest KLV metadata at one KLV frame rate and decimate it to another rate. You select the factor (1:N, N=1..60), and then (N-1/N) metadata frames are dropped and only 1/N frames are passed through to the Output Stream. (See "KLV Decimation" under [Transcoder Settings](#))
- KLV Tag Filtering filters out selected data fields from MISB 0601 UAS KLV metadata. You select either a 0601 minimum UAS metadata set or a 0601 minimum security set, or you can define a custom set by removing tags for fields deemed not relevant to your operation. (See [Filtering UAS KLV Metadata Tags](#))

Note

KLV metadata insertion and KLV decimation/filtering are mutually exclusive. If metadata insertion is specified, it will override KLV tag filtering.

To view and configure Transcoder parameters:

1. From the Transcoders List view, click the **+** **Add** button or click any line in the table.

2. On the Transcoders Detail View, type in a unique name for the transcoder.

The screenshot shows the 'New Transcoder' configuration interface. On the left, a sidebar under 'GENERAL SETTINGS' has 'Transcoders' selected. The main area is titled 'Parameters' and contains the following settings:

- Transcoder Name:** An empty text input field.
- Encoder:** A dropdown menu set to 'Software'.
- Format:** A dropdown menu set to 'H.264(AVC)'.
- Video Bitrate:** An empty text input field with the label 'bitrate in kbps' to its right.
- Resolution:** A dropdown menu set to 'Auto (Detect Continuously)'.
- KLV Metadata:** An unchecked checkbox with the label 'Check this box to pass through KLV data'.
- Frame Rate:** A dropdown menu set to 'Auto (Detect Continuously)'.
- Framing:** A dropdown menu set to 'Auto'.
- GOP Size:** An empty text input field.
- Intra Refresh:** An unchecked checkbox.

Below the Parameters section is the 'Audio Parameters' section, which includes:

- Audio:** A checked checkbox with the label 'Check this box to enable audio on the outbound stream'.
- Audio Bitrate:** An empty text input field with the label 'bitrate in kbps' to its right.

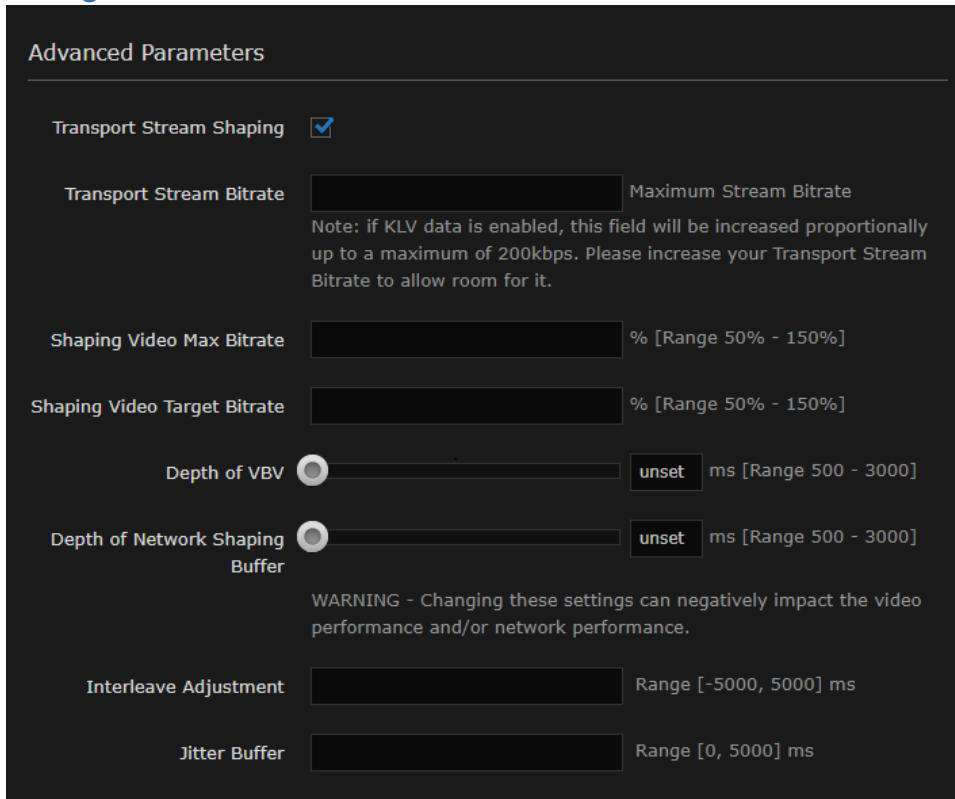
At the bottom is the 'Advanced Parameters' section, which includes:

- Transport Stream Shaping:** An unchecked checkbox.

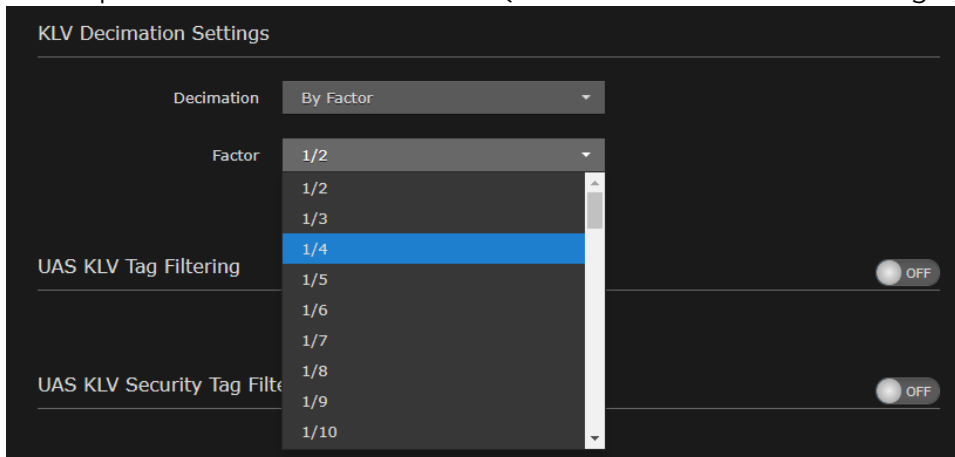
- (Optional) To enable hardware acceleration on qualified hardware (such as QSV-capable processors or NVIDIA GPUs), select the Encoder type.

- Select or enter values in the fields to define the transcoder (i.e., to change in the outbound stream), for example, the Format, Video Bitrate, or Resolution. For details, see [Transcoder Settings](#).
- To pass through KLV data, check the KLV Metadata checkbox.
- To enable audio on the outbound stream, check the Audio checkbox.
- (Optional) If Transport Stream Shaping is enabled (under Advanced Parameters), you can define additional parameters, as shown in the following example. For details, see [Advanced Shaping](#)

Settings.



- To configure KLV Rate Decimation, select By Factor for Decimation and then select the factor from the drop-down list. See “Decimation” (under “KLV Decimation Settings”) in [Transcoder Settings](#).



- To configure UAS KLV Tag Filtering or UAS KLV Security Tag Filtering, see [Filtering UAS KLV Metadata Tags](#).
- To apply your changes, click **Apply**.

The new transcoder is added to the Transcoders List.

Related Topics

- [Transcoder Settings](#)

- **Audio/Video Characteristics**

Filtering UAS KLV Metadata Tags

You can configure the transcoder to filter out data fields from MISB 0601 UAS KLV metadata in order to reduce the KLV data rate. Lowering the amount of bandwidth consumed by metadata allows higher video bitrates within bandwidth-constrained ISR workflows.

You can filter MISB 0601 metadata tags on a per tag basis, by specifying all or any subset of the MISB 0601 tags. If a tag is included, it is allowed to proceed to the metadata elementary stream (ES). Tags that are not included are filtered out of the metadata AU and not transmitted in the metadata ES. Non-MISB 0601 metadata (such as MISB 0605 or custom metadata adhering to SMPTE 336) is not affected by the MISB 0601 filtering.

When filtering MISB 0601 metadata tag 48 (security metadata), you can also filter the security metadata tags defined in MISB 0102.

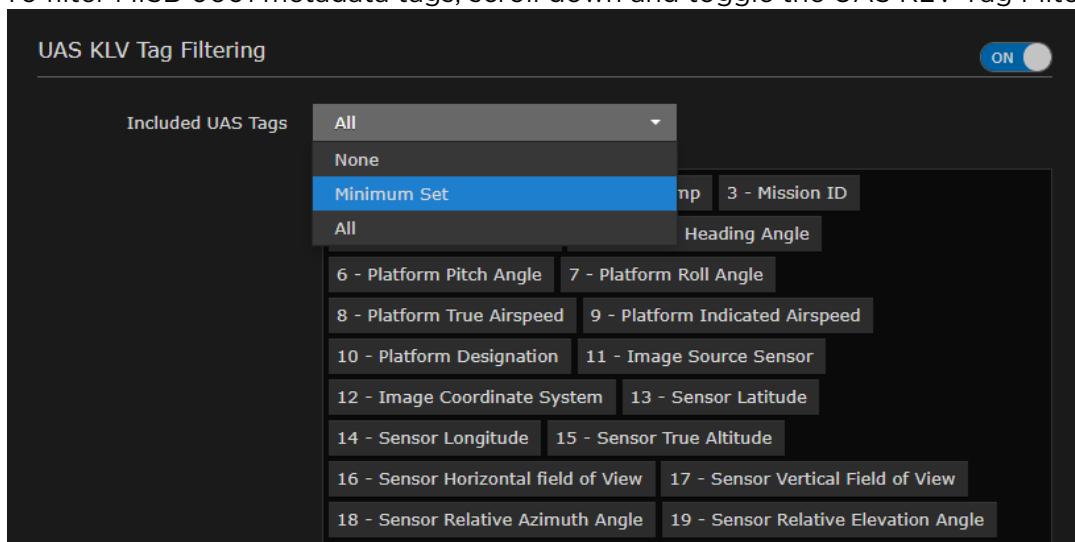
This is useful to eliminate unwanted KLV information in order to minimize the metadata bandwidth required. You may choose to down-scale and frame-decimate the video and decimate the metadata as well.

Tip

Frame decimation on the video is accomplished by reducing or down-scaling the frame rate of the encoder on the Transcoders page.

To filter UAS KLV metadata tags:

1. From the Transcoders List view, click the link for the transcoder to filter.
2. On the Transcoders Detail View, check the KLV Metadata checkbox to pass through KLV data.
3. To filter MISB 0601 metadata tags, scroll down and toggle the UAS KLV Tag Filtering button to **On**.



4. To configure the scope of filtering, select either Minimum Set or All from the Included UAS Tags drop-down list.

- To remove tags for fields deemed not relevant to your operation, browse through the list and click **X** next to any tag labels to exclude, i.e., to filter out of the metadata. This creates a new option “Custom Set” on the Included UAS Tags drop-down list.
 - To re-include a tag that has been excluded, click the down arrow at the bottom right of the list box and select the tag from the drop-down list of excluded tags.
5. To filter the security metadata tags defined in MISB 0102, toggle the UAS KLV Security Tag Filtering button to **On**, select Minimum Set or All, and fine-tune the Included Security Tags list as required to configure the scope of filtering.

**Tip**

Make sure #48 is included under UAS KLV Tag Filtering.

6. Fill in the remaining fields and click **Apply**.

Related Topics

- [Configuring Transcoder Parameters](#)


Transcoder Settings

The following table lists the Kraken Transcoder settings:

[Basic Parameters](#) [Audio Parameters](#) [Advanced Parameters](#) [KLV Decimation](#)

UAS KLV Tag Filtering

Basic Parameters

| Transcoder Setting | Description/Values |
|--------------------|---|
| Transcoder Name | Enter a unique name for the transcoder. This name will be selectable from the list of Transcoders when you define a stream. |
| Encoder | <p>(Optional, to enable hardware acceleration on qualified hardware, if detected) Select the encoding type, either:</p> <ul style="list-style-type: none"> • Software (default, Kraken legacy): CPU-based encoding • Hardware (QSV): Video encoding will be hardware accelerated using the Intel Quick Sync Video capabilities of the processor. • Hardware (<name #n>): Enables encode processing from the Kraken transcoder to be handled by NVIDIA GPUs. Assumes Kraken is running as a VM in an ESXi 6.5+ environment. Offloads the transcoding processing to the NVIDIA GPUs so that the server CPU remains free to be utilized by other applications. See Kraken OVA Deployment Guide. <div style="border: 1px solid green; padding: 5px; margin-top: 10px;"> <p> Tip Capabilities of the particular NVIDIA card dynamically affect available (basic) parameters, for example, NVIDIA does not support Intra-refresh or B-frames.</p> </div> |
| Format | <p>Select the video compression standard for the outbound stream, either:</p> <ul style="list-style-type: none"> • H.264 (AVC) (default) • H.265 (HEVC) • MPEG-4 (Part 2) • MPEG-2: The stream will be transcoded to MPEG-2 Video (ISO/IEC 13818-2) and MPEG-1 or MPEG-2 audio with closed captioning pass-through. This allows Kraken to inter-operate with legacy systems. |
| Codec Profile | <p>(Format must be MPEG-2 or MPEG-4) Select the video profile for the encoder:</p> <ul style="list-style-type: none"> • Auto: Defaults to Main profile. • Simple: Specifies that the output encoded video will adhere to the ISO/IEC 13818-2 / MPEG-2 Simple Profile. • Main: Specifies that the output encoded video will adhere to the ISO/IEC 13818-2 / MPEG-2 Main Profile. |
| Video Bitrate | Type in the Video Bitrate in kbps for the outbound stream, for example, 1024. Range = 150..15000 |

| Transcoder Setting | Description/Values |
|--------------------|--|
| Resolution | <p>Select the resolution for the outbound stream:</p> <ul style="list-style-type: none"> • Auto (Detect Continuously) (default) • Auto (Detect on Stream Start) • Custom: Type in a horizontal and vertical (W x H) resolution, for example, 1280x720. <div data-bbox="272 445 1474 604" style="border: 1px solid #f0e68c; padding: 5px;"> <p>Note</p> <p>To maintain the resolution of the outbound stream that was detected at stream start (even if the input resolution changes), select “Auto (Detect on Stream Start)”. 720x576 or lower is considered SD resolution.</p> </div> <div data-bbox="272 613 1474 739" style="border: 1px solid #c1e1c1; padding: 5px;"> <p>Tip</p> <p>With NVIDIA encoders, Kraken provides validation of custom resolutions and notification when a stream exceeds supported resolutions.</p> </div> |
| KLV Metadata | <div data-bbox="272 772 1474 877" style="border: 1px solid #f0e68c; padding: 5px;"> <p>Note</p> <p>Disabled if KLV isn't licensed.</p> </div> |
| Frame Rate | <p>Select the coded picture frame rate per second (fps):</p> <ul style="list-style-type: none"> • Auto (Detect Continuously) (default) • Auto (Detect on Stream Start) • Select a frame rate from the list: 60..1 <div data-bbox="272 1045 1474 1339" style="border: 1px solid #f0e68c; padding: 5px;"> <p>Note</p> <p>In previous releases, selecting “Auto” caused the frame rate of the outbound stream to be what was detected at stream start. The legacy “Auto” setting has been renamed “Auto (Detect on Stream Start)” since it does an early detection of the input frame rate and uses that as the fixed output frame rate for the transcoder. The new default “Auto (Detect Continuously)” is an additional encoding/transcoding mode where the output Frame Rate follows the source frame rate. This mode monitors the incoming frame rate and if it can detect a steady frame rate that differs from the one it is currently using, it resets the video encoder and configures it accordingly.</p> </div> |
| Framing | <p>Select the number of B-frames and B reference frames per P-Frames to allow in the output stream:</p> <ul style="list-style-type: none"> • Auto (default): The Kraken software decides how many B-Frames and B reference frames to allow • IP: I and P frames only (lowest delay; lowest quality) • IBP: I, B and P frames • IBBP: I, BB (two B-frames and B reference frames in sequence) and P frames (higher delay; higher quality) • IBBBP: I, BBB (three B-frames and B reference frames in sequence) and P frames (highest delay; highest quality) <div data-bbox="272 1633 1474 1789" style="border: 1px solid #f0e68c; padding: 5px;"> <p>Note</p> <p>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.</p> </div> |

| Transcoder Setting | Description/Values |
|--------------------|---|
| GOP Size | Type in the GOP (Group of Pictures) Size for the outbound stream, for example, 30. Range = 0..1000 <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p>Note</p> <p>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.</p> </div> <div style="border: 1px solid #ccc; padding: 5px;"> <p>Tip</p> <p>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.</p> </div> |
| Intra Refresh | Check this checkbox to enable Intra Refresh for X.264 and X.265. This is an advanced feature that puts the encoder into a mode where it does not generate I-Frames. Instead the individual macro blocks are refreshed and over time all of the picture is refreshed. <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note</p> <p>Not all decoders may support this feature so it can be enabled/disabled as desired.</p> </div> |

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 [KLV Decimation](#)

UAS KLV Tag Filtering

Audio Parameters

| Transcoder Setting | Description/Values |
|--------------------|--|
| Audio | <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p>Tip</p> <p>Kraken will automatically insert a silent audio stream into the output when the input source has no audio (see “Silent Audio Insertion” on page 61)</p> </div> <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note</p> <p>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.</p> </div> |
| Audio Codec | (Format must be MPEG-2 or MPEG-4) Select the audio compression algorithm: <ul style="list-style-type: none"> • Auto: Defaults to MPEG1 Layer II • MPEG1 Layer II: Encodes audio using the ISO/IEC 11172-3 / MPEG-1 Layer II algorithm. • MPEG2 AAC ADTS: Encodes audio using the ISO/IEC 13818-7 / MPEG-2 AAC-LC algorithm with an ADTS header. |
| Audio Bitrate | Type in the Audio Bitrate in kbps for the outbound stream, for example, 128. Range = 14..576 Kbps |

UAS KLV Tag Filtering

Advanced Parameters

| Transcoder Setting | Description/Values |
|----------------------------------|---|
| Performance Control System | (Video Format must be HEVC) Check this checkbox to enable the Performance Control System, an HEVC encoder feature that dynamically monitors the runtime performance of the encoder and adjusts the video encoder quality based on the instantaneous performance of the encoder. The goal is to provide optimal quality of the video encoder based on the performance of the system. It is particularly useful on small form factor (i.e., lower power) systems such as Kraken CR. |
| Transport Stream Shaping | <p>Check this checkbox to enable Shaping on the outbound stream. Checking this checkbox also displays advanced settings (see Advanced Shaping Settings).</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p>Note</p> <p>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 in Advanced Shaping Settings).</p> </div> <div style="border: 1px solid #ccc; padding: 5px;"> <p>Tip</p> <p>When Shaping is enabled, the Video Bitrate becomes the ceiling video bitrate target. When Shaping is disabled, this parameter represents the average video bitrate.</p> </div> |
| Output Pacing | <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p>Note</p> <p>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.</p> </div> <p>When pacing is enabled, you can set the Output Pacing Buffering Interval (see below).</p> |
| Output Pacing Buffering Interval | <p>(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.</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note</p> <p>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.</p> </div> |

| Transcoder Setting | Description/Values |
|-----------------------|---|
| Interleave Adjustment | <p>(Optional) Type in the number of milliseconds to delay audio before multiplexing (“muxing”). Range = <code>-5000, 5000ms</code></p> <ul style="list-style-type: none"> • -1 (the default) leaves it up to the transcoder to decide. • 0 makes no interleaving adjustment. • > 0 specifies the number of milliseconds to delay audio before muxing. • < -1 Number of milliseconds to delay video before muxing. <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p>Note Interleave adjustment is actually a muxer interleave adjustment of the packets without touching timestamps and does not affect AV sync.</p> </div> <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p>Note The latency within the transcoder pipeline is higher for the video than the audio, so users typically want to delay the audio so that the video comes out of the muxer before the corresponding audio. By default, the transcoder attempts to adjust the interleaving to some appropriate value. This control allows you to override that when desired.</p> </div> |
| Jitter Buffer | <p>(Optional) Type in the Jitter Buffer for the inbound source/stream. A jitter buffer may be applied to video streams coming in at irregular intervals to help output the video in a steady stream (default = 250 ms). Range = <code>0, 5000ms</code></p> <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p>Note Transcoding latency will be affected proportionately.</p> </div> |

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UAS KLV Tag Filtering


KLV Decimation

| Transcoder Setting | Description/Values |
|--------------------|--|
| Decimation | <p>(KLV Metadata pass-through must be enabled) Select “By Factor” to frame-decimate ingested KLV messages to reduce the bandwidth used by the metadata service.</p> <ul style="list-style-type: none"> • None • By Factor: <code>1/2 . . 1/60</code> <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p>Note <code>1/2</code> means divide the amount by half, etc.</p> </div> |
| Factor | <p>(“By Factor” must be selected) Select the decimation factor.</p> |

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[KLV Decimation](#)

UAS KLV Tag Filtering

UAS KLV Tag Filtering (See [Filtering UAS KLV Metadata Tags](#))

| Transcoder Setting | Description/Values |
|--------------------------------|--|
| UAS KLV Tag Filtering | <p>(KLV Metadata pass-through must be enabled) Specifies a list of tag numbers/labels from the UAS Datalink Local Set that are allowed to be streamed. Tags not included in this list will be discarded. Select either:</p> <ul style="list-style-type: none"> • None • Minimum Set: the set of metadata objects as define in MISB 0902. • All: the set of metadata objects as define in MISB 0601. |
| UAS KLV Security Tag Filtering | <p>Specifies a list of tag numbers/labels from the Security Local Data set inside the UAS that are allowed to be streamed. Tags not included will be discarded. Select either:</p> <ul style="list-style-type: none"> • None • Minimum Set: the set of metadata objects as define in MISB 0902. • All: the set of metadata objects as define in MISB 0102. <div style="border: 1px solid green; padding: 5px; margin-top: 10px;"> <p> Tip #48 must be included under UAS KLV Tag Filtering</p> </div> |

 **Note**

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

Advanced Shaping Settings

⚠ Caution

Changing these settings can have a negative impact on the video performance and/or network performance.

✓ Tip

See [Recommended Start Settings for Advanced Shaping Settings](#).

| Advanced Setting | Description/Values |
|--------------------------|---|
| Transport Stream Bitrate | <p>(Transport Stream Shaping must be enabled) Type in the Maximum Transport Stream (TS) Bitrate in kbps for the outbound stream, for example, 3000.</p> <p>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).</p> <div data-bbox="621 888 1498 1150" style="border: 1px solid #f9c77f; padding: 5px;"> <p>i Note</p> <p>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.</p> </div> <div data-bbox="621 1157 1498 1465" style="border: 1px solid #c7e9c0; padding: 5px;"> <p>✓ Tip</p> <p>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.</p> </div> |

| Advanced Setting | Description/Values |
|------------------------------|---|
| Shaping Video Max Bitrate | <p>Type in the maximum video bitrate for shaping the outbound stream, as a percentage.</p> <div data-bbox="618 312 1495 472" style="border: 1px solid #f0e68c; padding: 5px;"> <p>Note</p> <p>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%.</p> </div> <div data-bbox="618 478 1495 737" style="border: 1px solid #c1e1c1; padding: 5px;"> <p>Tip</p> <p>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.</p> </div> |
| Shaping Video Target Bitrate | <p>Type in the target video bitrate for shaping the outbound stream, as a percentage.</p> <div data-bbox="618 831 1495 982" style="border: 1px solid #c1e1c1; padding: 5px;"> <p>Tip</p> <p>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.</p> </div> |
| Depth of VBV | <p>Type in or adjust the slider to specify the value in milliseconds for the Video Buffering Verifier (VBV) depth.</p> <div data-bbox="618 1079 1495 1283" style="border: 1px solid #f0e68c; padding: 5px;"> <p>Note</p> <p>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.</p> </div> <div data-bbox="618 1289 1495 1423" style="border: 1px solid #c1e1c1; padding: 5px;"> <p>Tip</p> <p>This is the depth of the CBR buffer in the decoder VBV model in milliseconds.</p> </div> <p>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.</p> |

| Advanced Setting | Description/Values |
|---------------------------------|---|
| Depth of Network Shaping Buffer | <p>Type in or adjust the slider to specify the value in milliseconds for the network shaping buffer depth.</p> <div style="border: 1px solid #f9e79f; padding: 10px; margin-top: 10px;"> <p>Note</p> <p>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.</p> </div> |

Recommended Start Settings for Advanced Shaping 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

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

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.

Topics Discussed

- [Outputs List View](#)
- [Configuring Output Parameters](#)
- [Output Settings](#)

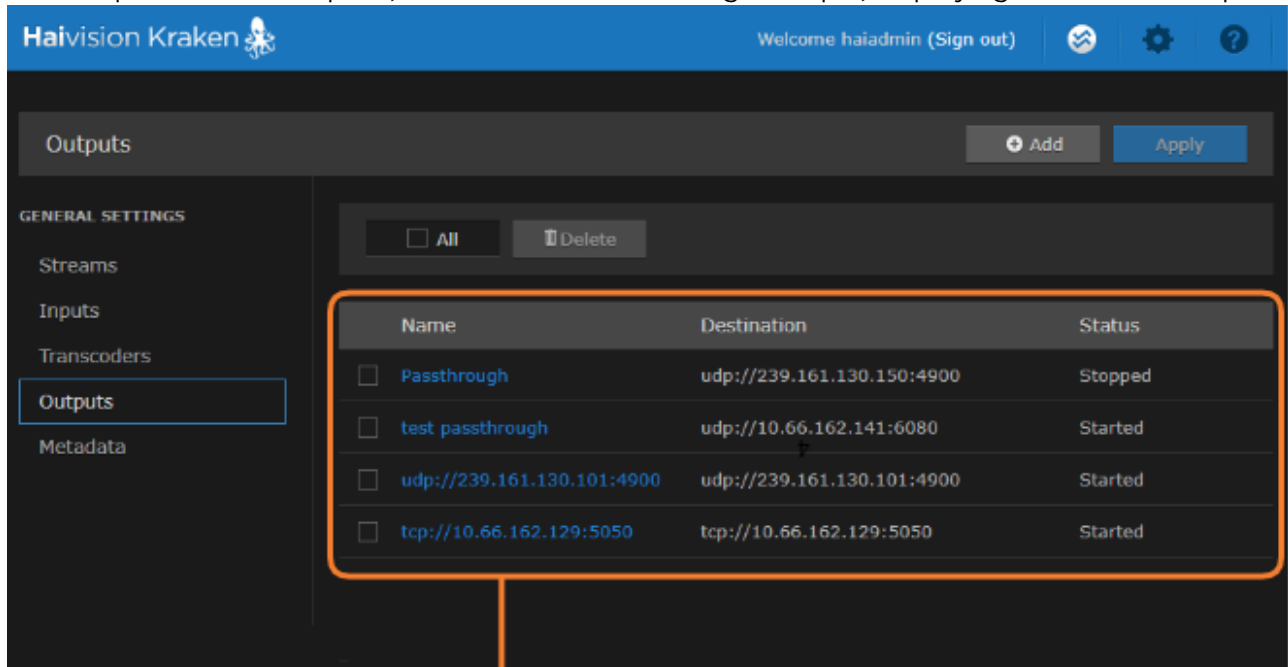
Outputs List View

The Outputs List view displays a summary of defined outputs for Kraken, including the Output Name, Destination (output) URL, and Status for each output. It also provides an option for you to delete an output.

To open the Outputs List View:

1. On the Streaming page, click **Outputs** on the sidebar.

The Outputs List View opens, as shown in the following example, displaying the defined outputs.



- To add an output, click the **+ Add** button.
- To view output details or add an output, click a line in the table to open the Outputs Detail View.
- To delete an existing output, check the checkbox next to the item in the list and click the **Delete** button.

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

Related Topics

- [Configuring Output Parameters](#)
- [Transport Characteristics](#)

Configuring Output Parameters

To view and configure Output parameters:

1. From the Outputs List view, click the **+** **Add** button or click any line in the table.
2. On the Outputs Detail View, type in a unique name for the output and an output URL, for example, `udp://239.100.100.100:4900`.

The screenshot shows the 'New Output' configuration page. On the left, a sidebar lists 'GENERAL SETTINGS' including Streams, Inputs, Transcoders, **Outputs**, and Metadata. The main area is titled 'New Output' and contains an 'Apply' button. The configuration is organized into three sections:

- Parameters:** Includes fields for 'Name', 'Protocol' (set to 'Default'), and 'URL' (with an example: 'e.g. udp://239.100.100.100:6000').
- Link Parameters:** Includes 'Network Interface' (set to 'Auto'), 'MTU' (range [124 - 1374]), 'TTL' (range [0 - 255]), and 'ToS' (range [0 - 255]).
- SAP:** Includes a 'Transmit SAP' checkbox, and fields for 'Name', 'Description', 'Keywords', 'Author', 'Address' (pre-filled with '224.2.127.254'), and 'Port' (pre-filled with '9875').

3. Select or enter values in the fields to define the output. See [Output Settings](#).
4. To modify link parameters, such as the MTU (Maximum Transmission Unit) size, TTL (Time-to Live for stream packets), or To (Type of Service) values, type these in.

- To configure SRT output, select TS over SRT for the source and then complete the additional fields under SRT Settings. See [SRT Output Settings](#).

The screenshot shows a configuration interface for SRT output settings, divided into three sections: Parameters, SRT Settings, and Link Parameters.

- Parameters:**
 - Name: [Empty text field]
 - Protocol: **TS over SRT** (dropdown menu)
- SRT Settings:**
 - Mode: **Caller** (dropdown menu)
 - Address: [Empty text field] IP or Hostname
 - Source Port: **Auto-Assign** (dropdown menu)
 - Destination Port: [Empty text field]
 - Latency: **125** (text field)
 - Encryption: **(None)** (dropdown menu)
 - Passphrase: [Empty text field]
- Link Parameters:**
 - MTU: [Empty text field] [124 - 1374]
 - TTL: [Empty text field] [0 - 255]
 - ToS: [Empty text field] [0 - 255]
 - Bandwidth Overhead: **25** (text field) [5 - 100] %

- To apply your changes, click **Apply**.
The new output is added to the Outputs List.

Related Topics

- [Output Settings](#)
- [Transport Characteristics](#)

Output Settings

The following table lists the Kraken Output settings:

General Link Parameters SAP SRT Output Settings

General Settings

| Output Parameter | Description/Values |
|------------------|--|
| Name | <p>Note</p> <p>The Output name is not required. The Kraken will use the Output URL as the name if none is provided.</p> |
| Protocol | <p>Select the Protocol type for the output streaming format:</p> <ul style="list-style-type: none"> • Default (TS over UDP) • To use Haivision’s Secure Reliable Transport (SRT) input and output streaming format, select TS over SRT for the protocol. <p>For more information, please refer to the SRT Deployment Guide.</p> |
| URL | <p>(Protocol must be "Default") Type in the URL for the Output, for example, <code>udp://239.100.100.100:4900</code></p> <p>Examples of supported output formats:</p> <ul style="list-style-type: none"> • <code>udp://239.100.100.100:4900</code> = multicast UDP on 239.100.100.100 port 4900 • <code>udp://10.1.10.10:4900</code> will send unicast UDP to host 10.1.10.10 on port 4900 • <code>tcp://10.66.132.20:4045</code> = unicast TCP on 10.66.132.20 port 4045 <p>Note</p> <p>Kraken output streams may be UDP unicast or multicast, or TCP unicast. However, some limitations have been observed with TCP output to third-party media players.</p> |

General Link Parameters SAP SRT Output Settings

Link Parameters

| Output Parameter | Description/Values |
|-------------------|---|
| Network Interface | <p>(Protocol must be "Default") Select the network (Ethernet) interface for the Output, either:</p> <ul style="list-style-type: none"> • Auto (uses static route, if defined; otherwise uses the default) • <eth0> • <eth1> • ... <div style="border: 1px solid #f0e68c; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>Network Interface names for Ethernet interfaces may vary, such as eth0/eth1/..., pNp1/pNp2/..., or em1/em2/....</p> </div> |
| MTU | <p>(Maximum Transmission Unit Size) Specifies the maximum allowed size of IP packets for the outgoing data stream.</p> <p>Range = 124..1374</p> <div style="border: 1px solid #c8e6c9; padding: 5px; margin-top: 10px;"> <p>Tip</p> <p>You may want to change the MTU on the outbound Kraken stream in order to be compatible with network segments or other systems/devices.</p> </div> |
| TTL | <p>(Time-to Live for stream packets) Specifies the number of router hops that IP packets from this stream are allowed to traverse before being discarded.</p> <p>Range = 0..255</p> |
| ToS | <p>(Type of Service) Specifies the desired quality of service (QoS). This value will be assigned to the Type of Service field of the IP Header for the outgoing streams.</p> <p>Range = 0..255 (decimal) or 0x00..0xFF (hex)</p> <div style="border: 1px solid #e0e0e0; padding: 5px; margin-top: 10px;"> <p>Important</p> <p>A DiffServ or DSCP (Differentiated Services Code Point) value must be converted to a ToS precedence value. For example, AF41 or DSCP 34 becomes ToS 136. For more information, see RFC2474.</p> </div> <div style="border: 1px solid #fff9c4; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>The ToS setting must be chosen so as to not interfere with Voice over IP systems and other equipment that may reside on your network. For example, when the ToS value for a stream is set to 0xB8, it can interfere with some third party Voice / IP Telephony systems.</p> </div> |


| Output Parameter | Description/Values |
|------------------------|--|
| Bandwidth Overhead (%) | <p>(Protocol must be TS over SRT) Specifies how much data SRT is allowed to add to the transmission over the actual bitrate of the stream being transcoded. This defines the extra bandwidth used to accommodate SRT controls as well as retransmission of lost packets. For example, with the overhead set to the default 25%, for a 10 MBit/s MPEG-TS stream, SRT is allowed to use 12.5 MBit/s of bandwidth on the network link. Range = 5-100% (default value is 25%).</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note SRT streams may temporarily overshoot the defined bandwidth overhead limit.</p> </div> |

General Link Parameters SAP SRT Output Settings

SAP (Protocol must be "Default")

| Output Parameter | Description/Values |
|------------------|--|
| Transmit SAP | Check this checkbox to enable SAP announcements. |
| Name | <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note Name is a required field for SAP entry.</p> </div> |
| 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. |
| Address | <p>Type in a valid multicast address for the SAP announcement.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note Leave this blank to use the standard SAP address.</p> </div> |
| Port | <p>Type in a valid port number for the SAP announcement. Range = 1025-65535</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note Leave this blank to use the standard SAP port.</p> </div> |

SRT Output Settings

| Output Parameter | Description/Values |
|------------------|---|
| Mode | <p>Selects the Connection Mode for the SRT output:</p> <ul style="list-style-type: none"> • Caller: Kraken acts like a client and connects to a server listening and waiting for an incoming call. • Listener: Kraken acts like a server and listens & waits for clients to connect to it. • Rendezvous: Allows calling and listening at the same time. <div style="border: 1px solid green; padding: 5px; margin-top: 10px;"> <p> Tip</p> <p>When using Listener or Rendezvous mode with multiple active interfaces, be sure to set the Default Interface on the Network page (see Network Settings). Listener and Rendezvous output modes require that an IP address be specified in the endpoint. However, since you cannot specify which interface to use with an SRT output, setting the Default Interface forces Kraken to use that specified interface for SRT. Otherwise the SRT endpoint may not receive the stream from Kraken.</p> </div> |
| Address | (Mode must be Caller or Rendezvous) The target IP address or hostname for the SRT stream (i.e., another device such as HMP or Media Gateway). |
| Source Port | (Mode must be Caller or Rendezvous) The UDP source port for the SRT stream, which is the unique port over which Kraken will be sending the SRT stream. You can (optionally) specify the UDP source port. If not filled in, an ephemeral source port will be assigned (between 32768 and 61000). |
| Destination Port | (Mode must be Caller or Rendezvous) The port over which the other device (i.e., HMP or Media Gateway) will be listening (between 1025 and 65535). |
| Latency | <p>Specifies how long Kraken will buffer received packets. The size of this buffer adds up to the total latency. A minimum value must be 3 times the round-trip-time (RTT).</p> <p>Range = 20 - 8000ms</p> <p>Latency is for the SRT protocol only and does not include the capture, encoding, decoding and display processes of the end-point devices.</p> |
| Encryption | <p>Select the AES (Advanced Encryption Standard) encryption key length and cipher:</p> <ul style="list-style-type: none"> • None (default) • AES-128 • AES-256 |
| Passphrase | (Only required and accepted if Encryption is enabled) Specifies a string used to generate the encryption keys to protect the stream (between 10 and 79 UTF8 characters). |
| Notes | (Optional) Type in any related information or comments. |

i Note

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

Configuring Metadata Capture

Note

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

From the Metadata pages, you can configure the Kraken to capture either KLV (Key Length Value) or CoT (Cursor on Target) metadata and then incorporate data information within the metadata elementary stream of the standard MPEG Transport Stream. You can set up multiple metadata inputs to include in Transport Streams. The Kraken supports up to three metadata input types: either from the COM1 serial port, the HD-SDI interface, or a user definable network port (up to eight UDP inputs).

- **Serial port:** The Kraken SDI extracts either KLV or CoT metadata packets from the serial port. From the Metadata Detail View, you must specify the Data Format, and for CoT metadata, the Max Aircraft-SPI Delta.
- **SDI:** The Kraken SDI extracts KLV metadata packets from the HD-SDI interface as per MISB RP 0605.2. Only progressive scan formats are supported (i.e., 1280x720p and 1920x1080p). The Kraken can capture only 1024 bytes of KLV metadata per video frame.
- **Network:** The Kraken can receive either (a) KLV payload encapsulated in UDP or (b) CoT inside UDP that is converted to KLV and then streamed. You must specify the UDP port on which the Kraken will listen for incoming metadata. The Multicast Address is only required for reception of multicast metadata, or if you only want to accept messages coming from a specific sender.

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

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

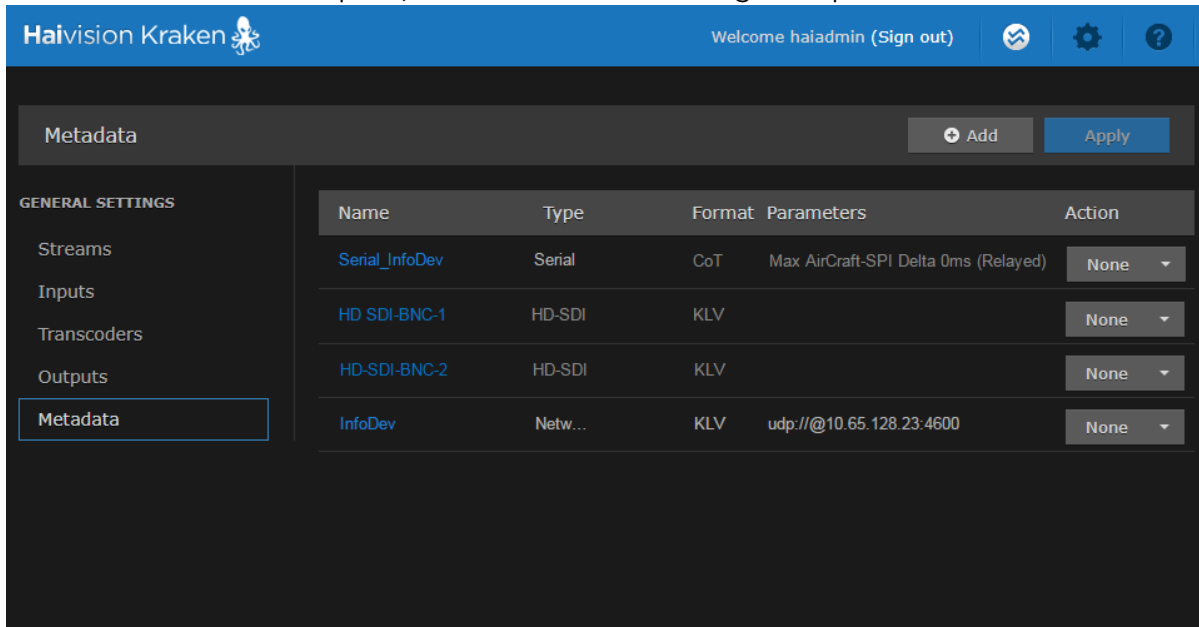
Topics Discussed

- [Metadata List View](#)
- [Configuring Metadata Parameters](#)
- [Configuring CoT Retransmission](#)
- [Configuring KLV Metadata Insertion](#)
- [Metadata Settings](#)

Metadata List View

The Metadata List View displays a summary of defined metadata sources for Kraken, including the Source Name, Type (Input Method), Data Format (KLV or CoT), and Parameters (Network Settings) for each source. It also provides an option for you to delete a source.

1. On the Streaming page, click **Metadata** on the sidebar.
The Metadata List View opens, as shown in the following example.



- To add a metadata source, click the **+** **Add** button.
 - To view details or modify the settings for a metadata source, click a line in the table to open the Metadata Detail View.
 - To delete a metadata source, click the drop-down list under Actions and select **Delete**.
2. To apply your changes, click **Apply**.

Related Topics

- [Configuring Metadata Parameters](#)

Configuring Metadata Parameters

To view and configure Metadata source parameters:

1. From the Metadata List view, click the **+** **Add** button or click any line in the table.
2. On the Metadata Detail View, type in the source Name and select the Input Method, either Serial, HD-SDI (Video Source), or Network (UDP).

The screenshot shows the 'Create New Metadata Source' configuration window. The window has a dark theme and a sidebar on the left with 'GENERAL SETTINGS' including Streams, Inputs, Transcoders, Outputs, and Metadata (selected). The main area is titled 'Create New Metadata Source' and has an 'Apply' button in the top right. It is divided into three sections: 'Metadata' with 'Name' and 'Input Method' (set to 'Video Source') fields; 'Mission ID Insertion' with a 'Mission ID' field; and 'Security Data Set Insertion' with a toggle switch set to 'OFF'.

The remaining parameters vary depending on the Input Method selected. For more information, see [Metadata Settings](#).

[HD-SDI Source](#) [Serial Source](#) [Network Source](#)

HD-SDI Source

To configure HD-SDI (Video Source) input:

1. Select Video Source for the Input Method (as shown in the figure above).
2. (Optional) To define a set of static KLV objects to be used to replace erroneous or insert missing metadata within outbound TS streams, see [Configuring KLV Metadata Insertion](#).
3. To apply your changes, click **Apply**.

The new source is added to the Metadata List.

Serial Source

To capture CoT or KLV metadata from the serial port:

1. Select Serial for the Input Method, as shown in the following example.

2. Select the serial port from the drop-down list or type in the text box.

3. If CoT has been installed, select CoT for the Data Format (under Input Settings) and fill in the [Max Aircraft-SPI Delta](#) and [SPI UID](#).
4. If required, adjust the Serial settings.
5. (Optional) For CoT sources, you can configure CoT Relaying to retransmit CoT sources to other IP destinations for analysis and archiving. See [Configuring CoT Retransmission](#).
6. (Optional) To define a set of static KLV objects (i.e., Mission IDs and Security Classification) to be used to replace erroneous or insert missing metadata within outbound TS steams, see [Configuring KLV Metadata Insertion](#).
7. To apply your changes, click **Apply**.

The new source is added to the Metadata List.

Network Source

To configure a network input:

1. Select Network (UDP) for the Input Method, as shown in the following example.

2. If CoT has been installed, select CoT for the Data Format (under Input Settings) and fill in the [Max AirCraft-SPI Delta](#) and [SPI UID](#).
3. If required, under Network Settings, select Multicast for the type and fill in the multicast address and port.
4. (Optional) For CoT sources, you can configure CoT Relaying to retransmit CoT sources to other IP destinations for analysis and archiving. See [Configuring CoT Retransmission](#).

5. (Optional) To define a set of static KLV objects (i.e., Mission IDs and Security Classification) to be used to replace erroneous or insert missing metadata within outbound TS steams, see [Configuring KLV Metadata Insertion](#).
6. To apply your changes, click **Apply**.

The new source is added to the Metadata List.

Related Topics

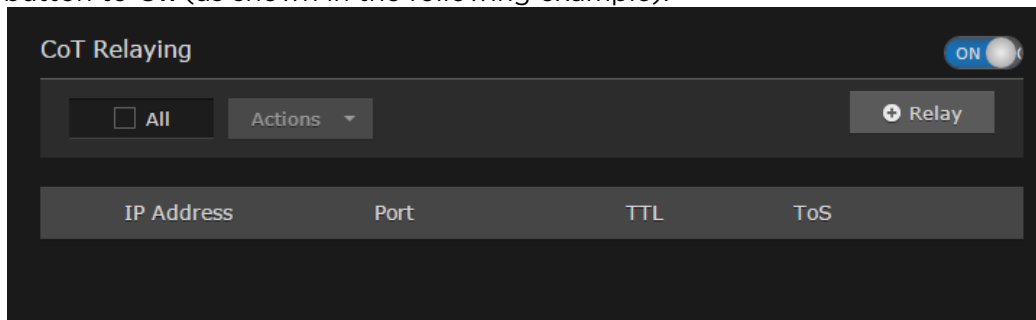
- [Metadata Settings](#)

Configuring CoT Retransmission

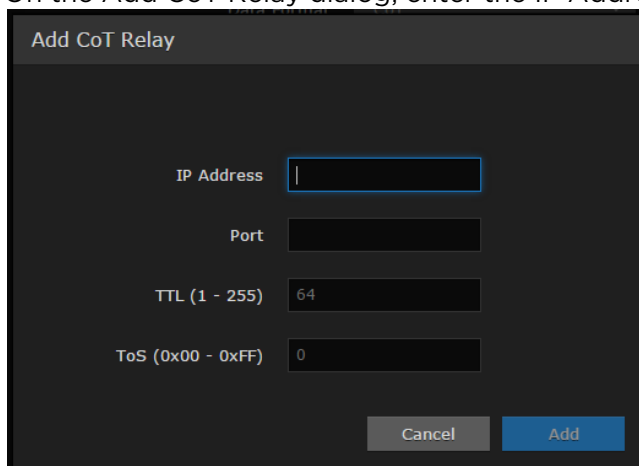
From the Metadata Detail View, you can configure CoT retransmission of COT metadata received over the Serial or UDP interface. The metadata will be retransmitted as a CoT/UDP unicast or multicast stream so that multiple CoT listeners can access the source CoT data. You can retransmit up to 8 CoT/UDP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

To configure CoT Retransmission:

1. From the Metadata List View, create or click the link for a serial or UDP CoT metadata source to retransmit. For details on setting up the metadata source, see [Configuring Metadata Parameters](#).
2. On the Metadata Detail View, (if necessary) scroll down the page and toggle the CoT Relaying button to **On** (as shown in the following example).

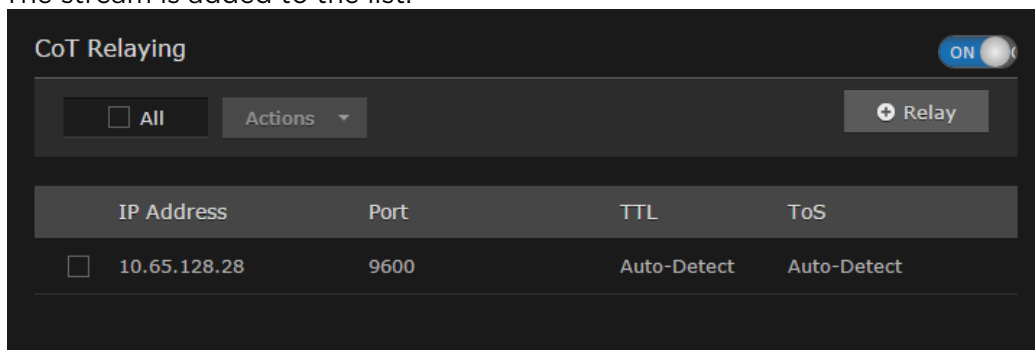


3. To add a CoT retransmission destination, click the **+ Relay** button.
4. On the Add CoT Relay dialog, enter the IP Address and Port for the destination.



5. Click **Add**.

The stream is added to the list:



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

Related Topics

- [Metadata Settings](#)

Configuring KLV Metadata Insertion

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

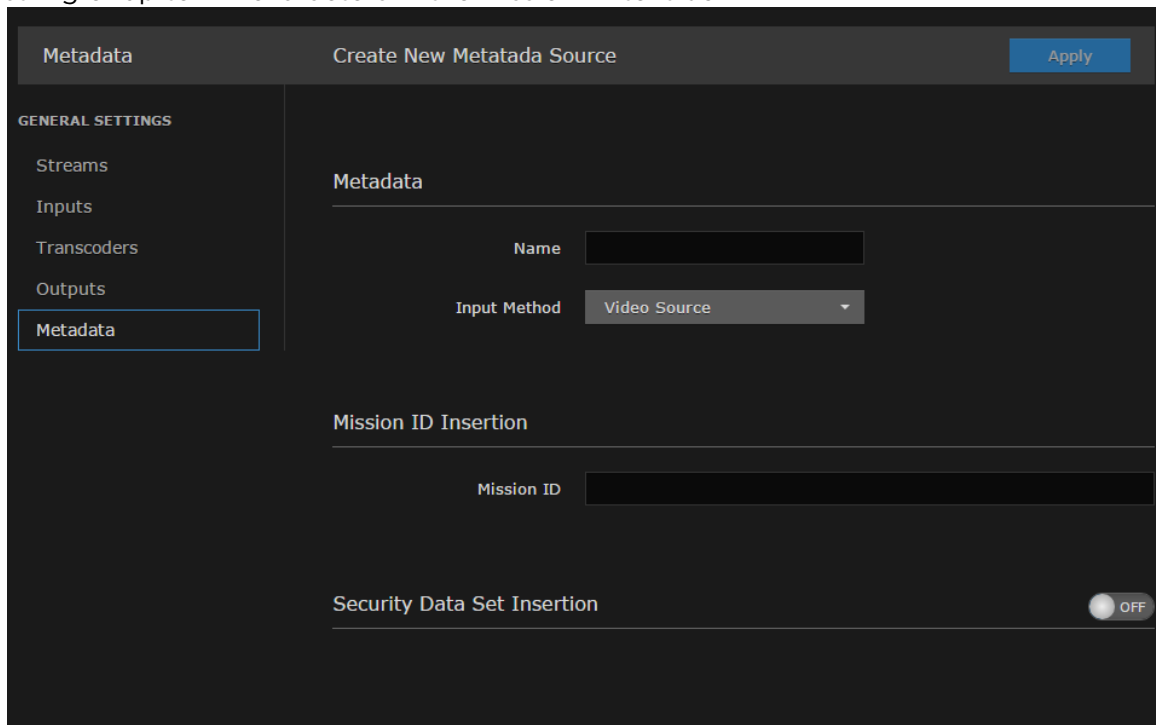
- Configure a mission ID string of up to 127 characters: When the mission ID is configured, any received UAS KLV dataset will be processed in order to modify the existing mission ID or add a mission ID element if not there with the configured value.
- Enable or disable the update/generation of the security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

Note

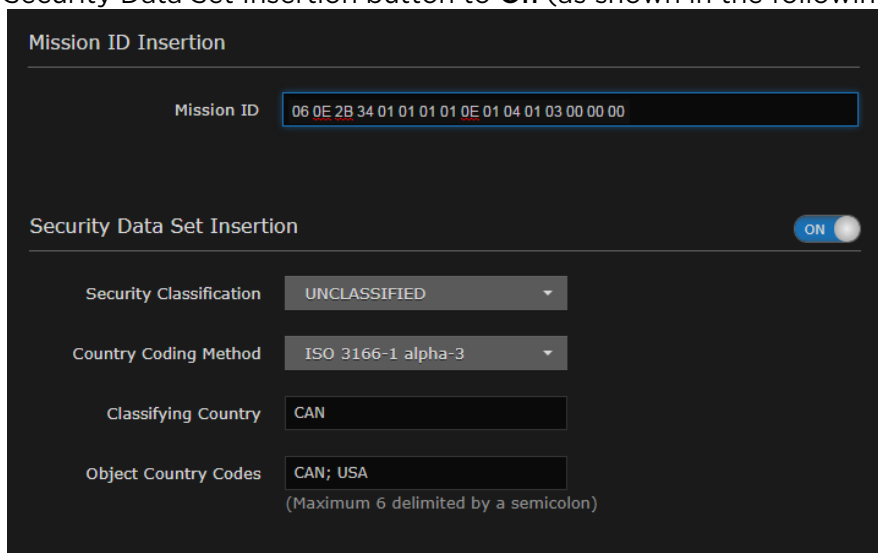
Metadata insertion and KLV decimation/filtering are mutually exclusive. If metadata insertion is specified, it will override KLV tag filtering.

To configure insertion of static KLV objects:

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



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



The screenshot shows a configuration window with two main sections. The top section, titled "Mission ID Insertion", contains a text input field labeled "Mission ID" with the value "06 0E 2B 34 01 01 01 01 0E 01 04 01 03 00 00 00". The bottom section, titled "Security Data Set Insertion", features a toggle switch set to "ON". Below the toggle are four fields: "Security Classification" (UNCLASSIFIED), "Country Coding Method" (ISO 3166-1 alpha-3), "Classifying Country" (CAN), and "Object Country Codes" (CAN; USA). A note below the last field states "(Maximum 6 delimited by a semicolon)".

- Fill in the remaining fields and click **Apply**.

Related Topics

- [Metadata Settings](#)

Metadata Settings

The following table lists the Kraken Metadata settings:

[General](#) [Input Settings](#) [Network Settings](#) [CoT Relaying](#) [KLV Insertion](#)

General

| Metadata Setting | Default | Description/Values |
|------------------|---------|---|
| Name | n/a | Enter a unique name for the metadata source. |
| Input Method | HD-SDI | Select the input interface for the source, either: <ul style="list-style-type: none"> Serial Video Source (HD-SDI) Network (UDP) |
| Serial Port | n/a | (Serial input only) Enter the serial port name if not auto-detected. For example, <code>/dev/ttyS0</code> or <code>/dev/ttyUSB1</code> . |

[General](#) [Input Settings](#) [Network Settings](#) [CoT Relaying](#) [KLV Insertion](#)

Input Settings

| Metadata Setting | Default | Description/Values |
|---|---------|--|
| Input Settings (Serial or Network input) | | |
| Data Format | KLV | Select the data format for the metadata. <ul style="list-style-type: none"> KLV (Key Length Value) or CoT (Cursor on Target) |
| Max Aircraft-SPI Delta | 0 ms | (CoT input only) Specifies the maximum delta between SPI and Aircraft message time-stamps for them to be considered a valid pair that can be converted to KLV. 0..1000 ms |
| SPI UID | n/a | (CoT input only) Double-click the text box to display the list of the SPI messages detected by the Kraken and select a string for the UID filter. |

[General](#) [Input Settings](#) [Network Settings](#) [CoT Relaying](#) [KLV Insertion](#)

Network Settings

| Metadata Setting | Default | Description/Values |
|-------------------------------------|---------|--|
| Network Settings (UDP Input) | | |
| Type | Unicast | Select the stream type, either unicast or multicast. |

| Metadata Setting | Default | Description/Values |
|-------------------------------------|---------|--|
| Network Settings (UDP Input) | | |
| Multicast Address | n/a | (Optional) The address is only required for reception of multicast metadata. In this case, you need to provide the multicast IP address to which the data is being sent. You can also specify the address if you only want to accept KLV messages coming from a specific sender. |
| Port | n/a | (Required) Specifies the local UDP port on the Kraken that is receiving the packets. |

[General](#)
[Input Settings](#)
[Network Settings](#)
[CoT Relaying](#)
[KLV Insertion](#)

CoT Relaying

| Metadata Setting | Default | Description/Values |
|--|---------|---|
| CoT Relaying (See Configuring CoT Retransmission) | | |
| CoT Relaying | Off | When set to On, the system will retransmit received CoT/UDP or CoT/Serial metadata to up to 8 other hosts over UDP. <code>on,off</code> |
| +Relay | n/a | Use to specify the IP address and UDP port for each relayed packets. You can optionally specify the <code>ttl</code> and <code>tos</code> . |
| TTL | 64 | (Time-to Live for stream packets) Specifies the number of router hops that IP packets from this stream are allowed to traverse before being discarded. Range = <code>0..255</code> |
| ToS | 0xB8 | (Type of Service) Specifies the desired quality of service (QoS). This value will be assigned to the Type of Service field of the IP Header for the outgoing streams. Range = <code>0..255</code> (decimal) or <code>0x00..0xFF</code> (hex) |

Important

A DiffServ or DSCP (Differentiated Services Code Point) value must be converted to a ToS precedence value. For example, AF41 or DSCP 34 becomes ToS 136. For more information, see RFC2474.

Note

The ToS setting must be chosen so as to not interfere with Voice over IP systems and other equipment that may reside on your network. For example, when the ToS value for a stream is set to 0xB8, it can interfere with some third party Voice / IP Telephony systems.

[General](#)
[Input Settings](#)
[Network Settings](#)
[CoT Relaying](#)
[KLV Insertion](#)

KLV Insertion

| Metadata Setting | Default | Description/Values |
|---|--------------------|---|
| KLV Insertion (See Configuring KLV Metadata Insertion) | | |
| Mission ID Insertion | n/a | Enter a string of up to 127 characters. |
| Security Data Set Insertion | Off | When set to On, enables reclassification of received UAS KLV messages. <code>on,off</code> |
| Security Classification | UNCLASSIFIED | Specifies the classification of the security data set: UNCLASSIFIED, RESTRICTED, CONFIDENTIAL, SECRET, TOP SECRET |
| Country Coding Method | ISO 3166-1 alpha-3 | The country coding method: ISO 3166-1 alpha-3 (only) |
| Classifying Country | n/a | The ISO 3166-1 3-letter code for the classifying country. |
| Object Country Codes | n/a | The ISO 3166-1 3-letter code(s) for up to six object countries separated by semicolons. |

System Administration

Note

Before proceeding, make sure that the appliance is set up correctly and the network connection is established. For information on installing and connecting to your Kraken appliance, please refer to the [Kraken Server Quick Start Guide](#) or [Kraken CR Quick Start Guide](#).

Topics Discussed


- [Monitoring the System Status](#)
- [Saving and Loading Presets](#)
- [Monitoring Stream Health](#)
- [Installing Firmware Updates](#)
- [Configuring Network Settings](#)
- [Updating the System License](#)
- [Accessing the REST API](#)
- [Managing User Accounts](#)

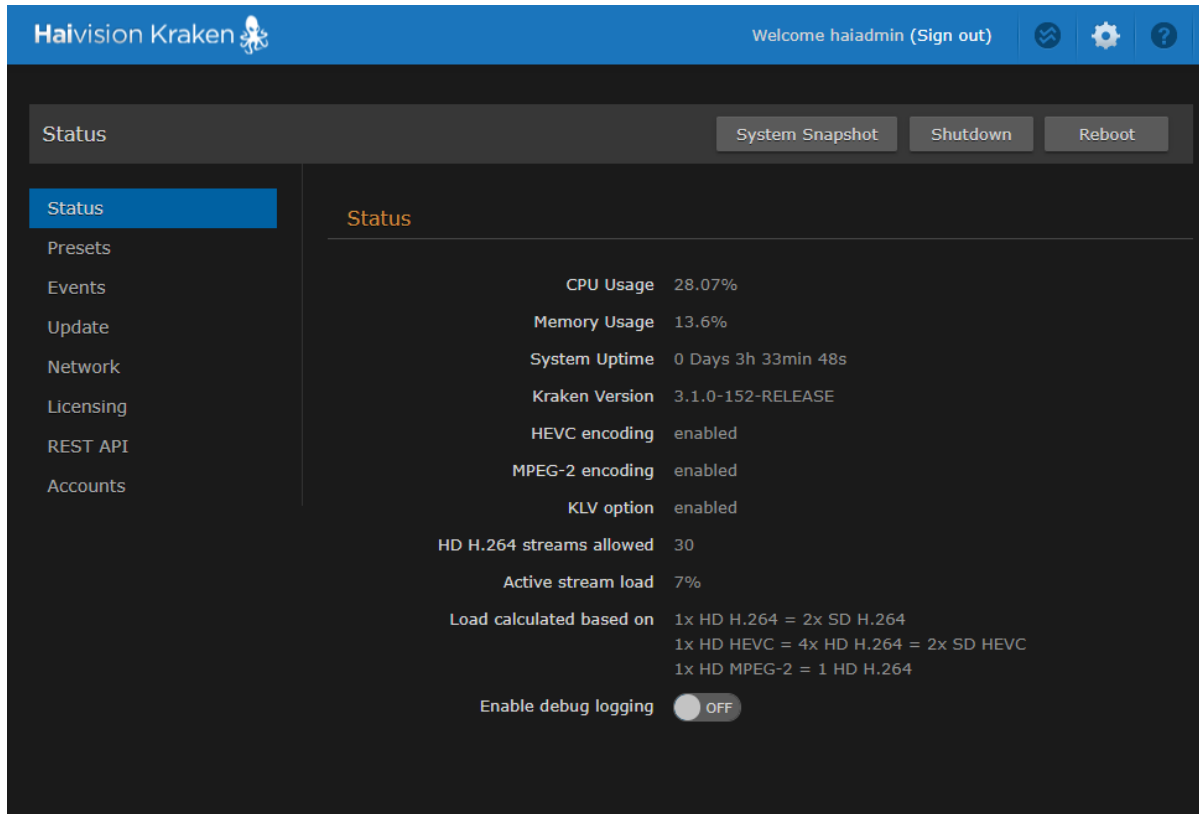
Monitoring the System Status

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 and take a system snapshot from the Status page.

To view status information:

1. Click the  **Administration** icon on the toolbar to navigate to the Administration page. The Status page opens, as shown in the following example.



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

2. To reboot the encoder, see [Rebooting Kraken](#).
3. To display a snapshot of system information, see [Taking a System Snapshot](#).

Topics Discussed

- [Status Settings](#)
- [Rebooting Kraken](#)
- [Taking a System Snapshot](#)

Status Settings

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

| Status Setting | Description/Values |
|----------------|--|
| CPU Usage | The combined CPU usage (across all cores). [100% minus the percentage of time the CPU remains idle.] |
| Memory Usage | The total RAM usage in percentage% (does not include swap space = 0). |
| System Uptime | The length of time (dd:hh:mm:ss) the appliance has been “up” and running. |
| Kraken Version | The firmware version of the Kraken, e.g., v2.6- XXXXX |

| Status Setting | Description/Values |
|--------------------------|---|
| HEVC Encoding | Whether the HEVC Encoding license is enabled or disabled. |
| MPEG-2 Encoding | Whether the MPEG-2 Encoding license is enabled or disabled. |
| KLV option | Whether the KLV pass-through license is enabled or disabled. |
| HD H.264 streams allowed | The number of HD/SD H.264 channels licensed. |
| Active stream load | 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. |
| Enable debug logging | <p>Set to On or Off to enable or disable transcoder debug logging.</p> <div style="border: 1px solid #f0e68c; padding: 10px; margin-top: 10px;"> <p>Note</p> <p>Enabling transcoder logs may affect system performance and should <i>not</i> be used in production. We recommend that transcoder logs be used for debugging purposes only, under the guidance of Haivision Technical Support. Transcoder logs are Off by default and can be turned On/Off individually for each stream with a button in the Stream Statistics page. If you disable debug logging, streams with logs previously enabled will be restarted.</p> </div> |
| System Snapshot | Displays a snapshot of system information in a new window. See Taking a System Snapshot . |
| Reboot | Reboots the encoder. See the following section, Rebooting Kraken . |

Rebooting Kraken

To reboot Kraken:

1. Click the  **Administration** icon on the toolbar.
2. On the Status page, click **Reboot**.

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

Taking a System Snapshot

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

Tip

The system snapshot includes device probe information, to show any hardware encoder/decoder acceleration capabilities available on your Kraken system (VM or appliance). These include:

- NVIDIA hardware capabilities and current State
- Intel hardware capabilities and current State
- Capture device capabilities and current State

To take a system snapshot:

1. From the Status page, click **System Snapshot**.
The system will display a timestamped snapshot of system information in a new window, as shown in the following example:


```

=====
START OF SYSTEM SNAPSHOT
=====

-----
Credentials:
-----
uid=0(root) gid=0(root) groups=0(root) context=system_u:system_r:initrc_t:s0

-----
Local Time:
-----
Tue Apr 16 13:44:06 EDT 2019

-----
Universal Time:
-----
Tue Apr 16 17:44:06 UTC 2019

-----
System UP Time:
-----
13:44:06 up 3 days, 23:38, 1 user, load average: 0.23, 0.18, 0.12

-----
System Information:
-----
Created VFLOG to HVMFAF Logger adapter.
Haivision Transcoder Application -- Version 2.9.0-52-RELEASE
{
  "release-info": {
    "product": "Kraken",
    "version": "2.9.0",
    "build_id": "52",
    "build_type": "RELEASE",
    "commit_id": "885b30455a372a47e6c9077cc3b4bfa20e564c52",
    "pretty_version": "2.9.0-52",
    "pretty_name": "Haivision Kraken release 2.9.0-52"
  }
}

=====
IGNORE Protobuf SPAM
=====

HVMFAF DeckLink Capture Client -- hvmaf-0.9.0 (20190327 12:34:27)

ffmpeg version 885b30455a372a47e6c9077cc3b4bfa20e564c52-VF Copyright (c) 2000-2018 the FFmpeg developers
built with gcc 4.4.7 (GCC) 20120313 (Red Hat 4.4.7-23)
configuration: --extra-version=VF --prefix=/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-
ortbuild/ort/stage/ffmpeg --cc=/usr/bin/gcc --objcc=/usr/bin/gcc --cxx=/usr/bin/g++ --ar=/usr/bin/ar --nm=/usr/bin/nm --target-os=linux --
arch=x86_64 --cpu=x86_64 --enable-pic --enable-static --enable-shared --enable-rpath --disable-appkit --enable-avfilter --enable-zlib --enable-
bzlib --enable-runtime-cpudetect --enable-hardcoded-tables --disable-doc --disable-audiotoolbox --disable-videotoolbox --disable-amf --disable-
cuda --disable-cuvid --disable-d3d11va --disable-dxva2 --disable-nvdec --disable-nvenc --disable-vaapi --enable-optimizations
x86asmexe=/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-ortbuild/ort/tools/nasm/bin/nasm --sd12-
config=/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-ortbuild/ort/stage/sd12/lib/./bin/sd12-config --
enable-vaapi --disable-vaapi-x11 --extra-cflags='-I/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-
ortbuild/ort/stage/bzip2/include -I/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-
ortbuild/ort/stage/lzma/include -I/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-
ortbuild/ort/stage/sd12/include -I/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-
ortbuild/ort/stage/vaapi/include -DVFBUILD_DISABLE_INTMATH_OPTIMIZATIONS=1' --extra-ldflags='-L/var/tmp/tinderbox_build/vfcore-
kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-ortbuild/ort/stage/zlib/lib -L/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-
2.9.0/vf.git/vfcore/kraken-ortbuild/ort/stage/bzip2/lib -L/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-
ortbuild/ort/stage/lzma/lib -L/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-ortbuild/ort/stage/sd12/lib
-L/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-ortbuild/ort/stage/vaapi/lib -Wl,-
rpath,/var/tmp/tinderbox_build/vfcore-kraken/2.9/release_Kraken-2.9.0/vf.git/vfcore/kraken-ortbuild/ort/stage/vaapi/lib' --disable-stripping --
enable-optimizations
libavutil      56. 21.100 / 56. 21.100
libavcodec     58. 34.202 / 58. 34.202
libavformat    58. 19.202 / 58. 19.202
libavdevice    58.  4.106 / 58.  4.106
libavfilter     7. 39.200 /  7. 39.200
libswscale     5.  2.100 /  5.  2.100
libswresample  3.  2.100 /  3.  2.100

=====
IGNORE Protobuf SPAM
=====

HVMFAF Shared Memory IPC EnCoder -- hvmaf-0.9.0 (20190327 12:34:27)

```

2. Save the file.

Saving and Loading Presets

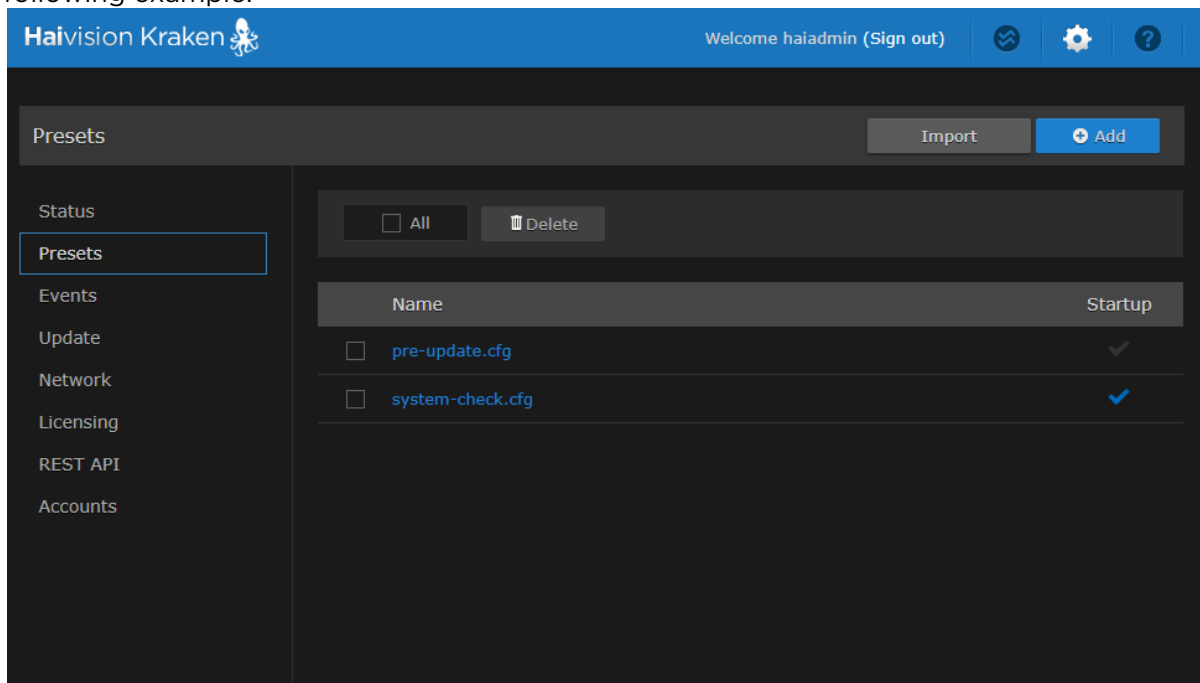
Each Kraken is configured by users' selecting and setting values of applicable system settings, such as encoder and stream settings and the stream destination. Although these configuration settings are not automatically saved, *presets* provide a way for you to save groups of settings and recall these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

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

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

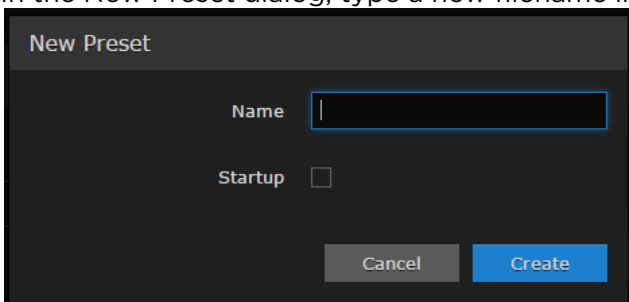
To view and manage presets:

1. On the Administration page, click **Presets** on the sidebar.
2. The Presets List View opens displaying the list of saved presets for the encoder, as shown in the following example.



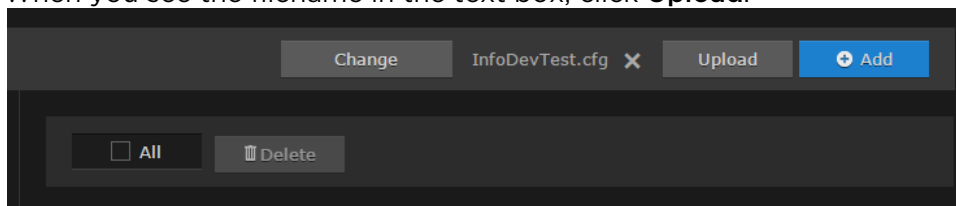
The Presets List View opens displaying the list of saved presets for the encoder, as shown in the following example.

3. To load an existing preset into the current session, hover over the preset name or anywhere in the row and click **Load**.
4. To select an existing preset to load at startup, hover over the preset row and click the (grayed out) check mark under **Startup**.
5. To save the current settings as a new preset, click **Add** button.
 - a. In the New Preset dialog, type a new filename in the Name text box.



- b. To select this preset to load at startup, check the **Startup** checkbox.

- c. Click **Create**.
6. To save the current settings as an existing preset, hover over the preset row and click **Save**. You can (optionally) check the **Startup** check mark.
7. To save the preset as a text file to view or export to other Kraken encoders, click the preset name and save it in the Save As dialog. Note that the file is in Unix format.
8. To import a preset, for example, from another Kraken encoder, click **Import** and select the file in the Open File dialog box.
9. When you see the filename in the text box, click **Upload**.



✔ **Tip**

To select a different preset file, click **Change**. To remove the selection, click the **×** icon.

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

Monitoring Stream Health

Kraken offers stream event reporting with the option to download the stream event log. This feature is designed to aid in diagnostics and debugging sessions, in particular, providing feedback related to problematic streams that have been restarted by Kraken error handling or the watchdog process.

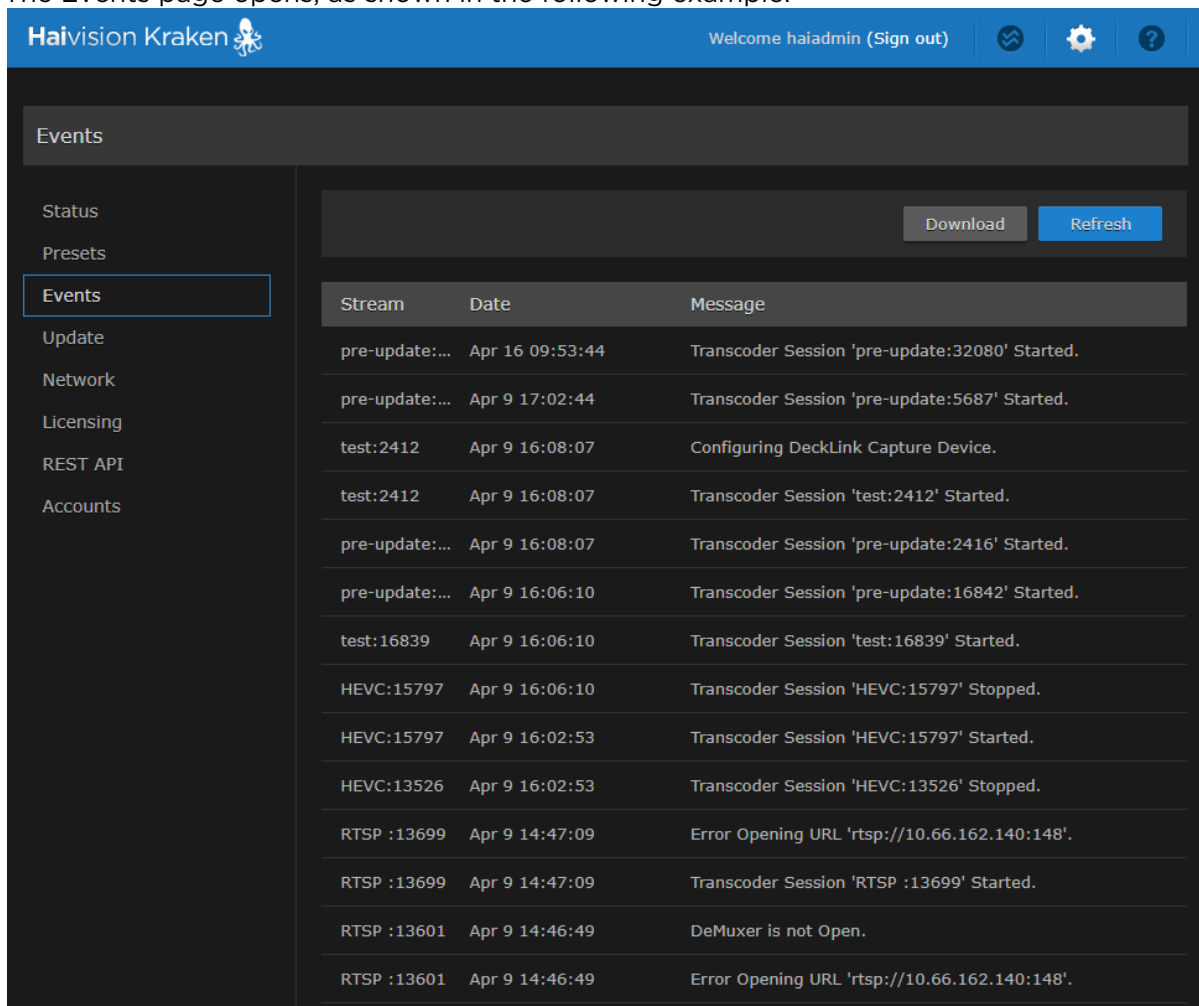
The Events page displays a list of events in reverse chronological order (newest to oldest). The list shows the stream name and UUID, followed by the date and a description of the event. Hovering your mouse over a message displays the full message, which is useful for longer messages.

Note

The event log rolls over every two days; i.e., events are removed from the list after two days.

To view event information:

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



2. To refresh the list, click **Refresh**.

3. To download the list, click **Download** and save the log file. You can then open the log in a text editor.

Installing Firmware Updates

 **Tip**

On systems licensed for MPEG-2 output, when upgrading from v2.5.0 or earlier, you will need to apply the license *before* the upgrade and a second time after the upgrade to license the new features.

When you first receive the Kraken, the necessary firmware is pre-installed on it. Firmware updates are issued through Haivision's Download Center on our website at: <https://support.haivision.com>

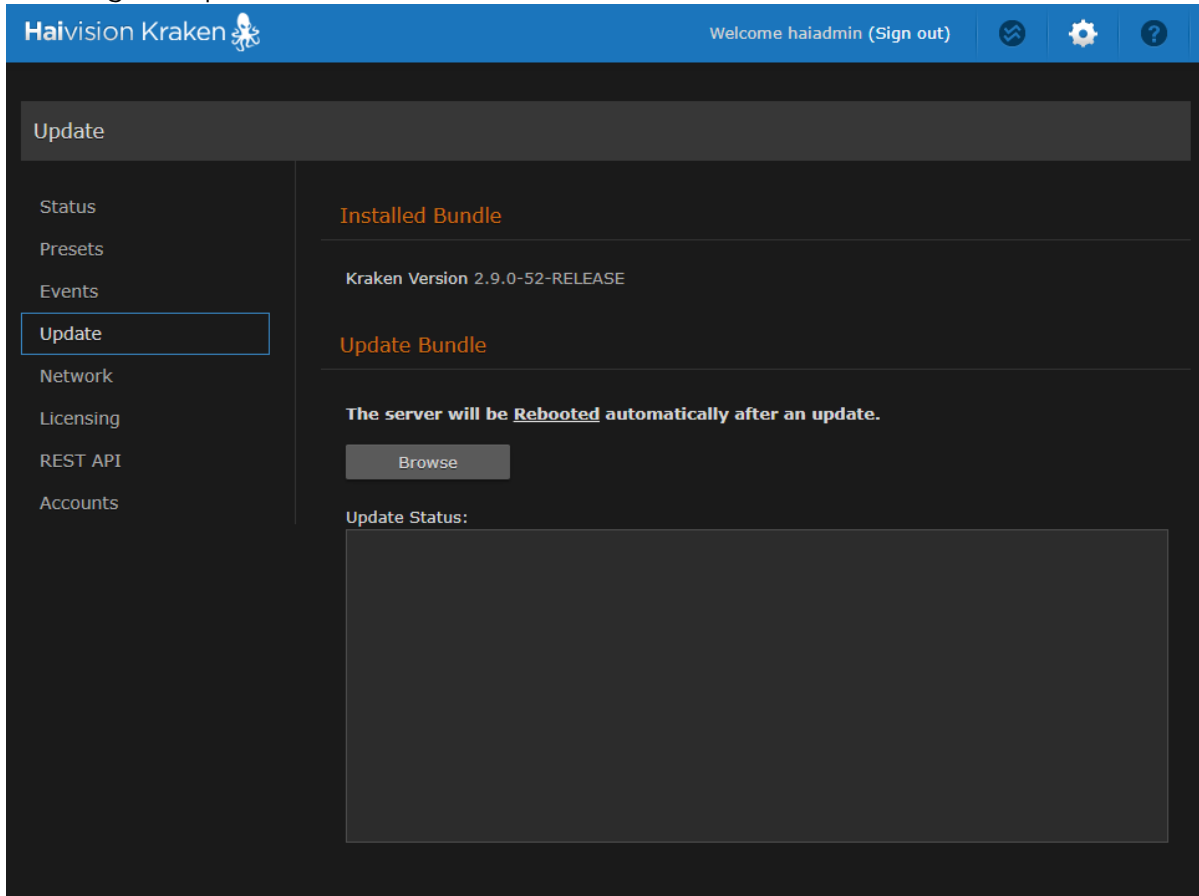
Please note that you may download the latest firmware and documentation by registering via the Haivision Support Portal.

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

1. On the Administration page, click **Update** on the sidebar.

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



- Click **Browse** (or **Choose File**, depending on your browser) to select the .hai file to upload.
- Click **Update**.

! 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.

-

✓ Tip

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

- Type the Username and Password and click **Log In** (or press Enter).

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.

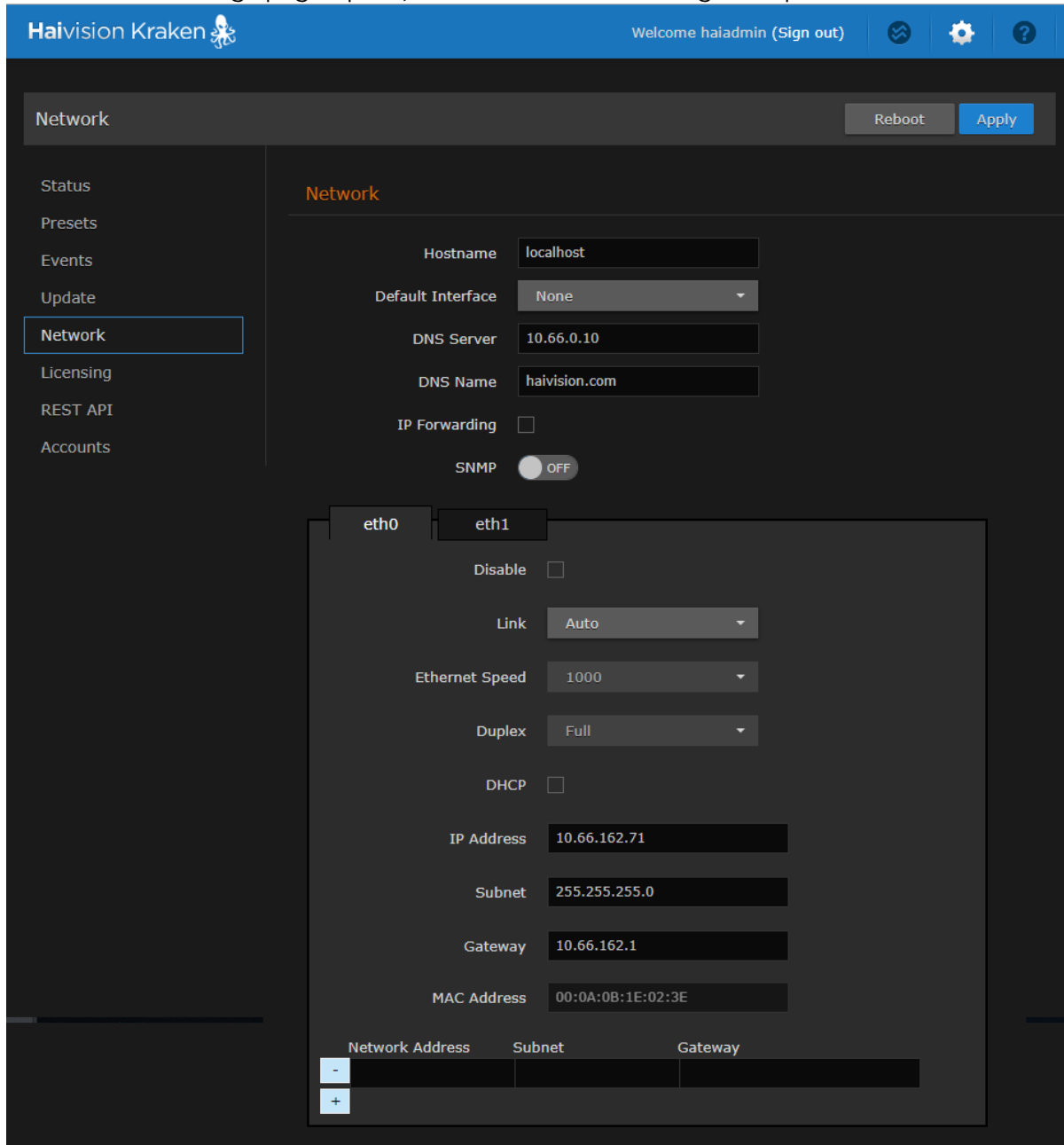
From the Network Settings page, you can modify the network interface settings for the Kraken, including the unit's IP Address.

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. On the Administration page, click **Network** on the sidebar. The Network Settings page opens, as shown in the following example.



2. Select or enter the new value(s) in the appropriate field(s). See [Network Settings](#).
3. To enable SNMP alerts, toggle the SNMP button to On and specify the read-only community string and trap server(s).
4. 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.

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

6. Click **Apply**.

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

7. 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.

Topics Discussed

- [Network Settings](#)

Network Settings

The following table lists the Kraken Network settings:

| Network Setting | Description/Values |
|---|--|
| Hostname | You may, optionally, enter a unique name for the Kraken. |
| Default Interface | <p>The default Ethernet interface: Select an available interface, such as eth0, eth1, em1, or em2.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>Network Interface names for Ethernet interfaces may vary, such as eth0/eth1/... or em1/em2/.... "None" indicates that the default interface is not set.</p> </div> |
| DNS Server | (Optional) Enter the DNS server address for your network. |
| DNS Name | (Optional) Enter the domain for the Kraken. |
| IP Forwarding | Check this checkbox to enable IP forwarding when setting up streams using non-primary interfaces for their input. |
| SNMP | To enable SNMP (Simple Network Management Protocol) alerts for out-of-band monitoring, toggle this button to On . This tells Kraken to start the SNMP server, in order to query for OS information, such as CPU usage. SNMP alerts are typically used by IT administrators to monitor system health. |
| Read-Only Community | (SNMP must be enabled) Type in the SNMP community string associated with the SNMP Trap Server. This is the string to use when sending a trap to an SMTP Trap server. For example: "Kraken" |
| SNMP Trap Servers | (SNMP must be enabled) The SNMP server to send SNMP Traps to. This is an IPv4 or FQDN of an SMTP Trap server listening for traps via SNMP. For example: SNMP1.mycompany.com |
| Network Interface (eth0, eth1, etc.) | |

| | |
|----------------|--|
| Disable | <p>Check this checkbox to disable (i.e., bypass) transcoding. This may be useful in the following cases:</p> <ul style="list-style-type: none"> Monitoring: Kraken's NICs are often used over multiple network segments, where it routes inbound traffic from one NIC to a second one with transcoding involved during the process. This feature supports routing the traffic from one NIC to another - straight through, as is - without any transcoding for distribution to the "public" segment where monitoring/troubleshooting tools can be used (such as VLC, InStream, Amino STB, etc.) High quality routing: In IPTV applications, the need may be present to send high quality HD content to set-top boxes and lower resolution streams to desktops. This feature may be used to send the inbound streams straight out (to an STB), while a copy would be then transcoded/transrated to a lower bit rate for desktop consumption. |
| Link | <p>Determines whether the Ethernet parameters are set automatically or manually (i.e., enables or disables autonegotiation):</p> <ul style="list-style-type: none"> 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. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note Always use Auto with Gigabit Ethernet (GigE) speed (1000 Mbps).</p> </div> |
| Ethernet Speed | <p>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):</p> <ul style="list-style-type: none"> 100 10 |
| Duplex | <p>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:</p> <ul style="list-style-type: none"> Full Half |
| DHCP | <div style="border: 1px solid #ccc; padding: 5px;"> <p>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.</p> </div> |
| IP Address | <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note If DHCP is disabled, you may enter an IP address in dotted-decimal format.</p> </div> |
| Subnet | <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note If DHCP is disabled, you may enter a Netmask in dotted-decimal format.</p> </div> |
| Gateway | <div style="border: 1px solid #ccc; padding: 5px;"> <p>Note If DHCP is disabled, you may enter a gateway address in dotted-decimal format.</p> </div> |
| MAC Address | <p>(Read-only) The Media Access Control address assigned to the Kraken.</p> |
| static routes | <p>Fill in first row to add a static route. Click + to add routes.</p> |

| | |
|-----------------|--|
| 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. |

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.

Your first step is to obtain the new license file from Haivision Technical Support (<https://support.haivision.com>). Next you 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.

Note

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

Tip

The Upgrade Version Limit indicates the highest version that the current license supports. For example, if the upgrade version limit is 2.8, you would need to re-license your system for 2.9 (or higher) prior to upgrading to 2.9.

To update your system license:

1. On the Administration page, click **Licensing** from the sidebar.
The Licensing page opens displaying the installed license, including its expiration date and license

features, as shown in the following example.

The screenshot shows the Haivision Kraken web interface. At the top, there is a blue header with the logo and navigation icons. The main content area is dark-themed and titled 'Licensing'. On the left, a sidebar menu lists various settings categories, with 'Licensing' selected. The main panel shows the following information:

- License Status:** A green checkmark indicates the license is valid, with an expiration date of 03/06/2019, 20:00.
- Product:** Kraken 2.9.0-52-RELEASE
- MAC Address:** 00:0A:0B:1E:02:3E
- License Features:**
 - Upgrade Version Limit: 2.9
 - Hardware Accelerated (QSV) H.264 encoder: Enabled
 - Hardware Accelerated (QSV) HEVC encoder: Enabled
 - MPEG-2 video encoder: Enabled
 - HEVC video encoder: Enabled
 - KLV option: Enabled
 - HD H.264 streams allowed: 22
 - Active stream load: 5%
 - Load calculated based on:
 - 1x HD H.264 = 2x SD H.264
 - 1x HD HEVC = 4x HD H.264 = 2x SD HEVC
 - 1x HD MPEG-2 = 1x HD H.264
- License Update:** A section with a text box for pasting a new license string.

Note

If you are running a VM Kraken version, the Licensing page also shows the Instance UUID and CPU ID.

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

Accessing the REST API

Kraken release 3.0 introduces Application Programming Interface (API) v2.0, a modern Representational State Transfer (REST) API stack that provides all functionality from the Kraken Web GUI and is also harmonized with other Haivision appliances.

Note

API v1.0 is still functioning and is not changed with this release. However, it is anomalous when compared to the other Haivision product APIs and is not used by the Kraken Web GUI.

- [API v2.0](#)
- [API v1.0](#)

API v2.0

Kraken API v2.0 is designed for system integrators to incorporate stream configuration and management from Kraken into their management software for applications deployed within tactical communications kits.

Important

With API v2.0, verified signed-in users are already authorized. The key pair authentication procedure below for API v1.0 does *not* apply to API v2.0.

To access the API v2.0 endpoint documentation (Kraken v2.9 or later), simply type in the IP hostname of your Kraken followed by `/apidoc`.

The Kraken API Documentation page opens, as shown in the following example.

API v1.0

Kraken API v1.0 is PHP-based and uses the OAuth standard for authorization when a third party application requests access. For more information about API v1.0, please see the [Kraken API v1.0 Integrator's Guide](#).

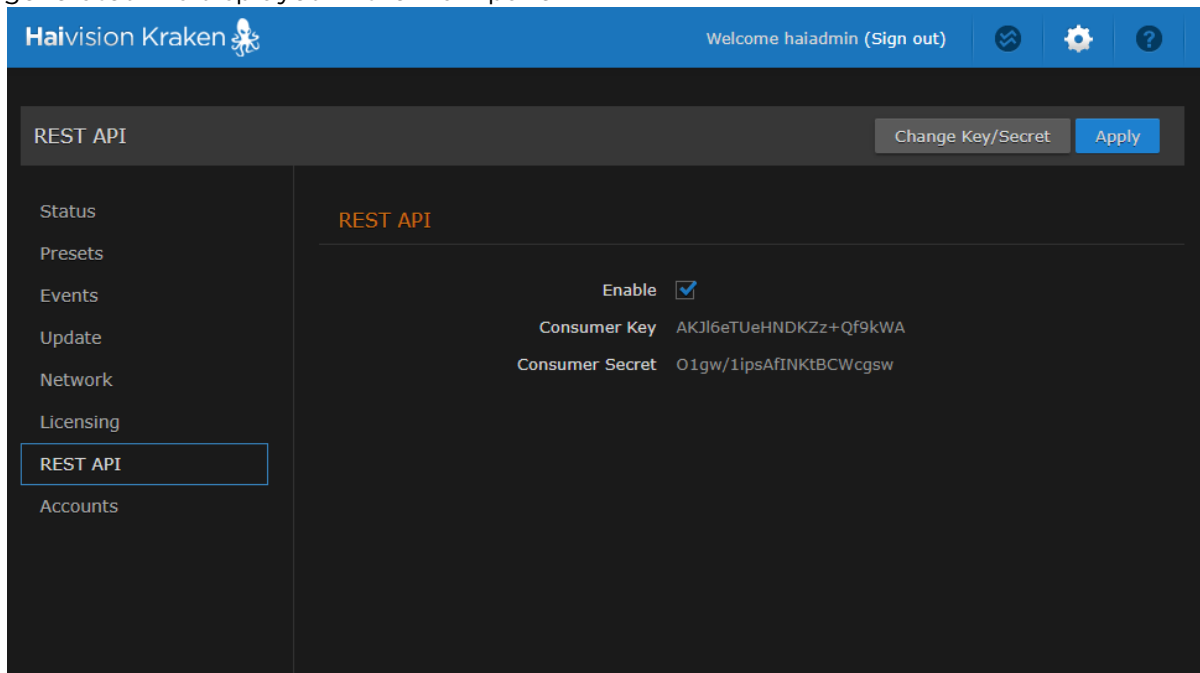
! Important

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 (API v1.0):

1. On the Administration page, click **REST API** on the sidebar.
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**.

Managing User Accounts

Note

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

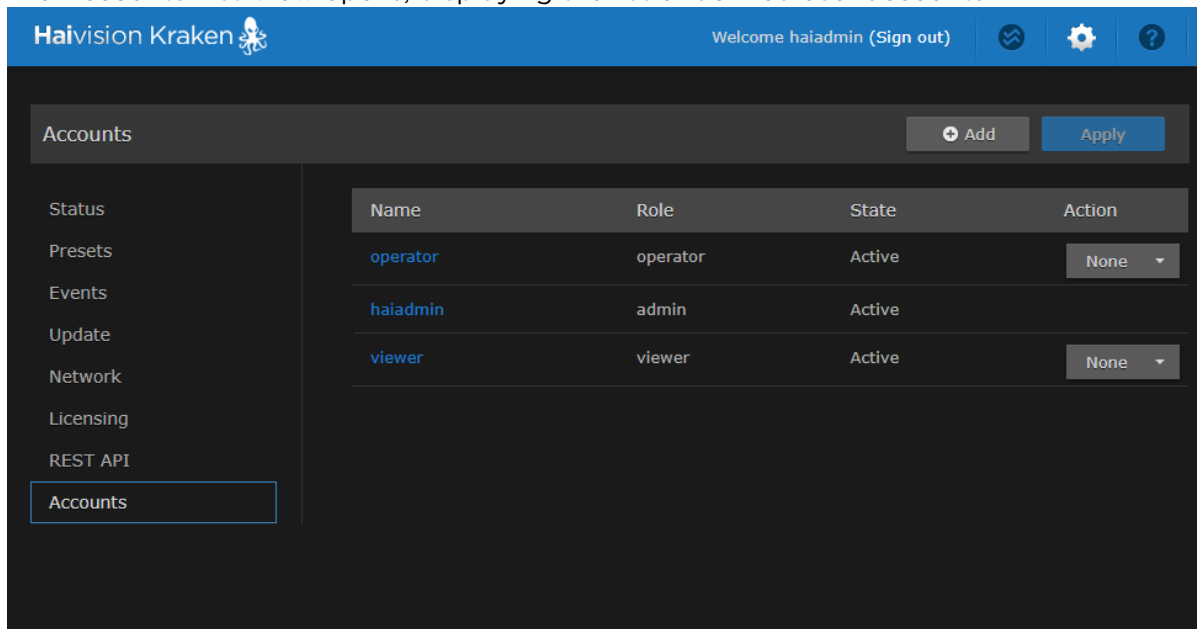
The My Account page is available to users assigned either **Operator** or **Viewer** roles to change their own account password. For information, see [Changing Your Password](#).

From the Accounts pages, administrators can create, delete and modify user accounts for the Web interface.

An account can be allocated to each user of the system so that the identity of the user can be uniquely determined. Kraken provides three predefined account roles to assign privileges to users: Administrator, Operator and Viewer. For details, see [Role-based Authorization](#).

To view and configure user accounts:

1. On the Administration page, click **Accounts** on the sidebar. The Accounts List View opens, displaying the list of defined user accounts.



The Accounts List View displays the Name, Role, and State for each account. In the current release, the State is always "Active".

2. To view or modify user account details, click the account link in the table to open the Account Settings page. For details, see [Account Management](#).
3. To add a new account, click the **+ Add** button. For details, see [Account Management](#).
4. To delete an account, click the drop-down menu under **Action** and select Delete.
5. To apply your changes, click **Apply**. The changes will take effect immediately.

Account Management

To add a new account:

1. From the Accounts List View, click the **+** **Add** button.
- 2.

Tip

The user name cannot include special characters ' / \ [] : ; | = , + * ? < > ' .

The screenshot shows a dark-themed 'Add Account' dialog box. It has four input fields: 'Name' (empty), 'Role' (a dropdown menu currently showing 'Administrator'), 'Password' (empty), and 'Confirm Password' (empty). At the bottom, there are two buttons: a grey 'Cancel' button and a blue 'Add' button.

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

To manage existing accounts:

1. From the Accounts List View, click a link in the table for an existing account. The Account Settings page opens for the selected account (as shown in the following example).

The screenshot shows the 'Account Settings' page. On the left is a sidebar with a menu containing 'Status', 'Presets', 'Events', 'Update', 'Network', 'Licensing', 'REST API', and 'Accounts' (which is highlighted with a blue border). The main content area is titled 'Account Settings' and contains four fields: 'Name' (text input with 'operator'), 'Role' (dropdown menu with 'Operator'), 'New Password' (text input), and 'Confirm New Password' (text input). In the top right corner of the main area, there is a blue 'Apply' button.

2. To reset the password of an existing account, type the password in the New Password field and again in the Confirm New Password field. For the allowed characters, see [Password Requirements](#).
3. To change your own password (i.e., for the account to which you have logged in), type your old password in the Current Password field, type your new password in the New Password field and again in the Confirm New Password field.
4. To apply your changes, click **Apply**.

Related Topics

- [Account Settings](#)

Account Settings

The following table lists the Accounts controls and settings:

| Account Setting | Default | Description/Values |
|----------------------|---------|--|
| Name | n/a | (Read-only for existing accounts) The user name for the account. (New account) Type in a unique name for the account. |
| Role | n/a | (Read-only for existing accounts) The Role assigned to the account. (New account) Select the Role for the user account, either: <ul style="list-style-type: none"> • Administrator • Operator • Viewer |
| Current Password | n/a | (Your own account only) Type in your current password. <div style="border: 1px solid #ccc; padding: 5px; background-color: #fff9c4;"> <p>⚠ Note</p> <p>This is not required for other accounts since an administrator is frequently asked to change the password by users who have forgotten their passwords.</p> </div> |
| New Password | n/a | Type in the new password. |
| Confirm New Password | n/a | Re-type the new password. |

Related Topics

- [Role-based Authorization](#)
- [Password Requirements](#)

Technical Specifications

This section lists the technical specifications for the Kraken.

Topics Discussed

- [Transcoding](#)
- [Video Processing](#)
- [Networking](#)
- [Management](#)
- [Kraken Transcoding System](#)
- [Physical](#)

Transcoding

| | |
|---|---|
| Sources | |
| <ul style="list-style-type: none"> • Makito, Piranha Encoders • 3rd Party Encoders • MJPEG from L-3 Vortex • Digital Video Broadcast | |
| Input H.265/HEVC | Output H.265/HEVC |
| <ul style="list-style-type: none"> • Main Profile • Up to Level 4 (1080p30) • Transport Stream • Up to 10 Mbps • CBR, VBR | <ul style="list-style-type: none"> • Main Profile • Up to Level 4 (1080p30) • Transport Stream • Up to 10 Mbps • Transport Stream Shaping, VBR |
| Input H.264/AVC | Output H.264 |
| <ul style="list-style-type: none"> • Baseline, Main, High Profile • Up to Level 4.2 (1080p60) • Transport Stream • 0 kbps - 20 Mbps • CBR, VBR | <ul style="list-style-type: none"> • Baseline, Main, High Profile • Up to Level 4.2 (1080p60) • Transport Stream • Up to 20 Mbps • Transport Stream Shaping, VBR |
| Input MPEG-2 | Output MPEG-2 Video |
| <ul style="list-style-type: none"> • MainProfile@MainLevel (SD) • MainProfile@HighLevel (HD) • Transport Stream • Up to 20 Mbps • CBR, VBR | <ul style="list-style-type: none"> • Simple and Main Profile@MainLevel • Up to 10 Mbps • Transport Stream Shaping, VBR |
| Input Audio | Output AAC Audio |
| <ul style="list-style-type: none"> • MPEG1 layer 2 • AAC 2 channel and 5.1 | <ul style="list-style-type: none"> • AAC 2 channel • Audio Sync Preserved |

| | |
|--|---|
| | Output MPEG-1 Audio |
| | <ul style="list-style-type: none"> • 2 Channel MPEG-1 Layer II • Audio Sync Preserved |
| Metadata Pass-through (Supported Standards) | |
| <ul style="list-style-type: none"> • 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 |
| <p>Note Multi Program Transport Stream (MPTS) inputs are <i>not</i> supported.</p> |
| Unicast/Multicast |
| TS over UDP |
| Session Announcement (SAP) |

Management

| |
|---------------------------------|
| Management |
| Web User Interface (HTTPS only) |
| REST API v1.0 and v2.0 |
| Console UI |

Kraken Transcoding System

| | |
|----------------------------------|--|
| Kraken Transcoding System | |
| Operating System: | Software-only for Linux or appliance form factor |
| Standard IP Interfaces: | 2 x RJ-45 Ethernet |

Physical

Kraken Server Base System (S-KR-BASE)

| Physical Specifications - Kraken Server Base System (S-KR-BASE) | |
|---|--|
| 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): <ul style="list-style-type: none"> • 1.66" x 17.09" x 15.52" • 42.4 mm x 434.0 mm x 394.3 mm |
| Weight: | 17.76 lbs. (8.06 kg) |
| Power: | 1x Non-Redundant 100-240 VAC 250 W Power Supply |

Kraken Server Premium System (S-KR-PREMIUM)

| Physical Specifications - Kraken Server Premium System (S-KR-PREMIUM) | |
|---|---|
| Capacity: | <ul style="list-style-type: none"> • 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): <ul style="list-style-type: none"> • 1.68" x 17.09" x 23.9" • 42.8 mm x 434.0 mm x 607 mm |
| Weight: | 43.87 lbs. (19.9 kg) |
| Power: | 2x Redundant 100-240 VAC 550 W Power Supplies |

Kraken Server Ultra System (S-KR-ULTRA)

| Physical Specifications - Kraken Server Ultra System (S-KR-ULTRA) | |
|---|---|
| Capacity: | <ul style="list-style-type: none"> • 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): <ul style="list-style-type: none"> • 1.68" x 18.98" x 27.6" • 42.8 mm x 482.3 mm x 700.5 mm |
| Weight: | 59 lbs. (26.76 kg) |
| Power: | 2x Redundant 100-240 VAC 750 W Power Supplies |

Kraken CR (S-KR-CR-KLV)

| Physical Specifications - Kraken CR (S-KR-CR-KLV) | |
|---|---|
| Dimensions (L x W x H): | <ul style="list-style-type: none"> • 8.42" x 4.92" x 1.75" • 213.87 mm x 124.97 mm x 44.45 mm |
| Weight: | 2.6 lbs. (1.18 kg) |
| Power: | 100-240 VAC External locking power supply 12-28 VDC, 45W |

Physical Specifications - Kraken CR (S-KR-CR-KLV)

Temperature:

- Operating: 0° to 50°C (32° to 122° F)
- Non-Operating: -40° to 50°C (-40° to 122° F)

Open Source Software Credits

Kraken ships with and/or utilizes the following Open Source Projects:

| Package | Version | Description | License |
|----------------------------------|-------------------------|---|--|
| CentOS | 7 | Operating System Distribution: https://www.centos.org/ End User License Agreement: http://mirror.centos.org/centos/7/os/x86_64/EULA Legal Disclaimers: https://www.centos.org/legal/ | GPLv2 |
| acl | 2.2.51 | Utilities to manipulate access control lists: http://acl.bestbits.at/ | GPLv2+ |
| acpid | 2.0.19 | Daemon that dispatches ACPI events to user-space programs: http://acpid.sourceforge.net/ | GPLv2+ |
| adwaita-cursor-theme | 3.28.0 | Adwaita cursor theme: http://www.gnome.org | LGPLv3+ or CC-BY-SA |
| adwaita-icon-theme | 3.28.0 | Adwaita icon theme: http://www.gnome.org | LGPLv3+ or CC-BY-SA |
| aic94xx-firmware | 30 | Adaptec SAS 44300, 48300, 58300 Sequencer Firmware for AIC94xx driver: http://www.adaptec.com/en-US/speed/scsi/linux/aic94xx-seq-30-1_tar_gz.htm | Redistributable, no modification permitted |
| alsa-firmware | 1.0.28 | Firmware binaries for a number of sound cards: http://www.alsa-project.org/ | GPL+ and BSD and GPLv2+ and GPLv2 and LGPLv2+ |
| alsa-lib | 1.1.6 | Advanced Linux Sound Architecture (ALSA) library: http://www.alsa-project.org/ | LGPLv2+ |
| alsa-tools-firmware | 1.1.0 | ALSA tools for uploading firmware to some soundcards: http://www.alsa-project.org/ | GPLv2+ |
| apr apr-util apr-util-ldap | 1.4.8 1.5.2 1.5.2 | Apache Portable Runtime library: http://apr.apache.org/ | ASL 2.0 and BSD with advertising and ISC and BSD ASL 2.0 ASL 2.0 |
| aspell | 0.60.6.1 | Spell checker: http://aspell.net/ | LGPLv2+ and LGPLv2 and GPLv2+ and BSD |
| atk | 2.28.1 | Interfaces for accessibility support: http://developer.gnome.org/projects/gap/ | LGPLv2+ |
| at-spi2-atk | 2.26.2 | A GTK+ module that bridges ATK to D-Bus at-spi: https://wiki.linuxfoundation.org/en/AT-SPI_on_D-Bus | LGPLv2+ |
| at-spi2-core | 2.28.0 | Protocol definitions and daemon for D-Bus at-spi: http://www.linuxfoundation.org/en/AT-SPI_on_D-Bus | LGPLv2+ |
| attr | 2.4.46 | Utilities for managing filesystem extended attributes: http://acl.bestbits.at/ | GPLv2+ |

| Package | Version | Description | License |
|---|----------|---|--------------------|
| audit | 2.8.4 | User space tools for 2.6 kernel auditing: http://people.redhat.com/sgrubb/audit/ | GPLv2+ |
| audit-libs | 2.8.4 | Dynamic library for libaudit: http://people.redhat.com/sgrubb/audit/ | LGPLv2+ |
| audit-libs-python | 2.8.4 | Python bindings for libaudit: http://people.redhat.com/sgrubb/audit/ | LGPLv2+ |
| authconfig | 6.2.8 | Tool for setting up authentication from network services: https://fedorahosted.org/authconfig | GPLv2+ |
| autogen-libopts | 5.18 | Automated option processing library based on autogen: http://www.gnu.org/software/autogen/ | LGPLv3+ |
| autossh | 1.4e | Utility to autorestart SSH tunnels: http://www.harding.motd.ca/autossh/index.html | BSD |
| avahi-autoipd avahi-libs | 0.6.31 | Libraries for avahi run-time use: http://avahi.org | LGPLv2+ |
| basesystem | 10.0 | The skeleton package which defines a simple Red Hat Enterprise Linux system: https://www.centos.org/ | Public Domain |
| bash | 4.2.46 | The GNU Bourne Again shell: http://www.gnu.org/software/bash | GPLv3+ |
| bc | 1.06.95 | GNU's bc (a numeric processing language) and dc (a calculator): http://www.gnu.org/software/bc/ | GPLv2+ |
| bind-libs bind-libs-lite bind-license bind-utils | 9.9.4 | Utilities and libraries for querying DNS name servers: http://www.isc.org/products/BIND/ | ISC |
| binutils | 2.27 | A GNU collection of binary utilities: http://sources.redhat.com/binutils | GPLv3+ |
| biosdevname | 0.7.3 | Udev helper for naming devices per BIOS names: http://linux.dell.com/files/biosdevname | GPLv2+ |
| btrfs-progs | 4.9.1 | Userspace programs for btrfs: http://btrfs.wiki.kernel.org/index.php/Main_Page | GPLv2 |
| bwidget | 1.9.0 | Extended widget set for Tk: http://tcllib.sourceforge.net/ | TCL |
| bzip2 bzip2-libs | 1.0.6 | File compression utility and library: http://www.bzip.org/ | BSD |
| ca-certificates | 2018.2.2 | The Mozilla CA root certificate bundle: http://www.mozilla.org/ | Public Domain |
| cairo cairo-gobject | 1.15.12 | A 2D graphics library: http://cairographics.org | LGPLv2 or MPLv1.1 |
| checkpolicy | 2.5 | SELinux policy compiler: https://www.centos.org/ | GPLv2 |
| chkconfig | 1.7.4 | Tool for maintaining the /etc/rc*.d hierarchy: https://www.centos.org/ | GPLv2 |
| colord-libs | 1.3.4 | Color daemon library: http://www.freedesktop.org/software/colord/ | GPLv2+ and LGPLv2+ |

| Package | Version | Description | License |
|--|----------|---|--|
| compat-libf2c-34 | 3.4.6 | Fortran 77 compatibility runtime: http://gcc.gnu.org | GPLv2+ and GPLv2+ with exceptions |
| coreutils | 8.22 | Libraries and utilities for coreutils: http://www.gnu.org/software/coreutils/ | GPLv3+ |
| cpio | 2.11 | A GNU archiving program: http://www.gnu.org/software/cpio/ | GPLv3+ |
| cpp | 4.8.5 | The C Preprocessor: http://gcc.gnu.org | GPLv3+ and GPLv3+ with exceptions and GPLv2+ with exceptions and LGPLv2+ and BSD |
| cracklib cracklib-dicts | 2.9.0 | A password-checking library: http://sourceforge.net/projects/cracklib/ | LGPLv2+ |
| cronie cronie-anacron | 1.4.11 | Cron daemon for executing programs at set times: https://fedorahosted.org/cronie | MIT and BSD and ISC and GPLv2+ |
| crontabs | 1.11 | Root crontab files used to schedule the execution of programs: https://www.centos.org/ | Public Domain and GPLv2 |
| cryptsetup cryptsetup-libs | 2.0.3 | A utility for setting up encrypted disks: https://gitlab.com/cryptsetup/cryptsetup | GPLv2+ and LGPLv2+ |
| cuda-drivers | 418.67 | CUDA Driver meta-package: http://nvidia.com | NVIDIA Proprietary |
| cuda-runtime-10-1 | 10.1.168 | CUDA Runtime 10.1 meta-package: http://nvidia.com | NVIDIA Proprietary |
| cups-libs | 1.6.3 | Common Unix Printing System - libraries: http://www.cups.org/ | LGPLv2 and zlib |
| curl | 7.29.0 | A utility for getting files from remote servers (FTP, HTTP, and others): http://curl.haxx.se/ | MIT |
| cvs | 1.11.23 | A version control system: http://www.cvshome.org/ | BSD and GPL+ and GPLv2+ and LGPLv2+ and zlib and Public Domain |
| cyrus-sasl cyrus-sasl-lib cyrus-sasl-plain | 2.1.26 | Cyrus SASL: http://asg.web.cmu.edu/sasl/sasl-library.html | BSD with advertising |
| dash | 0.5.10.2 | Small and fast POSIX-compliant shell: http://gondor.apana.org.au/~herbert/dash/ | BSD and GPLv2+ and Public Domain and Copyright only |
| dbus | 1.10.24 | D-BUS message bus: http://www.freedesktop.org/software/dbus/ | (GPLv2+ or AFL) and GPLv2+ |
| dbus-glib | 0.100 | Glib bindings for D-Bus: http://www.freedesktop.org/software/dbus/ | AFL and GPLv2+ |
| dbus-libs | 1.10.24 | Libraries for accessing D-BUS: http://www.freedesktop.org/software/dbus/ | (GPLv2+ or AFL) and GPLv2+ |
| dbus-python | 1.1.1 | D-Bus Python Bindings: http://www.freedesktop.org/software/dbus/ | MIT |
| dconf | 0.28.0 | A configuration system: http://live.gnome.org/dconf | LGPLv2+ and GPLv2+ and GPLv3+ |

| Package | Version | Description | License |
|--|------------|---|--|
| dejavu-fonts-common | 2.33 | Common files for the DejaVu font set: http://dejavu-fonts.org/ | Bitstream Vera and Public Domain |
| dejavu-sans-fonts | 2.33 | Variable-width sans-serif font faces: http://dejavu-fonts.org/ | Bitstream Vera and Public Domain |
| desktopvideo | 10.9.11 | Blackmagic Design Desktop Video 10.9.11 - Driver and Firmware Update Utility: http://blackmagicdesign.com | Proprietary |
| device-mapper | 1.02.149 | Device mapper utility: http://sources.redhat.com/dm | GPLv2 |
| device-mapper-event | 1.02.149 | Device-mapper event daemon: http://sources.redhat.com/lvm2 | GPLv2 |
| device-mapper-event-libs device-mapper-libs | 1.02.149 | Device-mapper shared library: http://sources.redhat.com/lvm2 | LGPLv2 |
| device-mapper-persistent-data | 0.7.3 | Device-mapper Persistent Data Tools: https://github.com/jthorner/thin-provisioning-tools | GPLv3+ |
| dhclient dhcp-common dhcp-libs | 4.2.5 | Provides the ISC DHCP client daemon and dhclient-script: http://isc.org/products/DHCP/ | ISC |
| diffutils | 3.3 | A GNU collection of diff utilities: http://www.gnu.org/software/diffutils/diffutils.html | GPLv3+ |
| dkms | 2.7.1 | Dynamic Kernel Module Support Framework: http://linux.dell.com/dkms | GPLv2+ |
| dkms-nvidia | 418.67 | NVIDIA display driver kernel module: http://www.nvidia.com/object/unix.html | NVIDIA License |
| dmidecode | 3.1 | Tool to analyse BIOS DMI data: http://www.nongnu.org/dmidecode/ | GPLv2+ |
| dmraid | 1.0.0.rc16 | Device-mapper RAID tool and library: http://people.redhat.com/heinzm/sw/dmraid | GPLv2+ |
| dmraid-events | 1.0.0.rc16 | dmevent_tool (Device-mapper event tool) and DSO: http://people.redhat.com/heinzm/sw/dmraid | GPLv2+ |
| dnsmasq | 2.76 | A lightweight DHCP/caching DNS server: http://www.thekelleys.org.uk/dnsmasq/ | GPLv2 or GPLv3 |
| dracut | 033 | Initramfs generator using udev: http://apps.sourceforge.net/trac/dracut/wiki | GPLv2+ and LGPLv2+ |
| dracut-network | 033 | dracut modules to build a dracut initramfs with network support: https://dracut.wiki.kernel.org/ | GPLv2+ and LGPLv2+ |
| e2fsprogs e2fsprogs-libs | 1.42.9 | Utilities for managing ext2, ext3, and ext4 filesystems: http://e2fsprogs.sourceforge.net/ | GPLv2 GPLv2 and LGPLv2 |
| eatables | 2.0.10 | Ethernet Bridge frame table administration tool: http://eatables.sourceforge.net/ | GPLv2+ |

| Package | Version | Description | License |
|--|------------|--|---|
| ecryptfs-utils | 111 | The eCryptfs mount helper and support libraries: https://launchpad.net/ecryptfs | GPLv2+ |
| elfutils | 0.172 | A collection of libraries, utilities and DSOs to handle compiled objects: https://fedorahosted.org/elfutils/ | GPLv3+ and (GPLv2+ or LGPLv3+) |
| elfutils-default-yama-scope elfutils-libelf elfutils-libelf-devel elfutils-libs | 0.172 | A collection of libraries, utilities and DSOs to handle compiled objects: https://fedorahosted.org/elfutils/ | GPLv2+ or LGPLv3+ |
| elinks | 0.12 | A text-mode Web browser: http://elinks.or.cz | GPLv2 |
| ethtool | 4.8 | Ethernet settings tool for PCI ethernet cards: http://sourceforge.net/projects/gkernel/ | GPLv2+ |
| expat | 2.1.0 | An XML parser library: http://www.libexpat.org/ | MIT |
| expect | 5.45 | A program-script interaction and testing utility: http://expect.nist.gov/ | Public Domain |
| fetchmail | 6.3.24 | A remote mail retrieval and forwarding utility: http://fetchmail.berlios.de/ | GPL+ and Public Domain |
| file file-libs | 5.11 | Libraries for applications using libmagic: http://www.darwinsys.com/file/ | BSD |
| filesystem | 3.2 | The basic directory layout for a Linux system: https://fedorahosted.org/filesystem | Public Domain |
| findutils | 4.5.11 | The GNU versions of find utilities (find and xargs): http://www.gnu.org/software/findutils/ | GPLv3+ |
| fipscheck fipscheck-lib | 1.4.1 | FIPS validated modules: http://fedorahosted.org/fipscheck/ | BSD |
| fontconfig | 2.13.0 | Font configuration and customization library: http://fontconfig.org | MIT and Public Domain and UCD |
| fontpackages-filesystem | 1.44 | Directories used by font packages: http://fedoraproject.org/wiki/fontpackages | Public Domain |
| freetype | 2.8 | A free and portable font rendering engine: http://www.freetype.org License: https://www.freetype.org/license.html | (FTL or GPLv2+) and BSD and MIT and Public Domain and zlib with acknowledgement |
| fribidi | 1.0.2 | Library implementing the Unicode Bidirectional Algorithm: https://github.com/fribidi/fribidi/ | LGPLv2+ and UCD |
| ftp | 0.17 | The standard UNIX FTP Client: ftp://ftp.uk.linux.org/pub/linux/Networking/netkit | BSD with advertising |
| fxload | 2002_04_11 | A helper program to download firmware into FX and FX2 EZ-USB devices: http://linux-hotplug.sourceforge.net/ | GPLv2+ |
| gamin | 0.1.10 | Library providing the FAM File Alteration Monitor API: http://www.gnome.org/~veillard/gamin/ | LGPLv2 |

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|---|----------|---|--|
| gawk | 4.0.2 | The GNU version of the awk text processing utility: http://www.gnu.org/software/gawk/gawk.html | GPLv3+ and GPL and LGPLv3+ and LGPL and BSD |
| gcc | 4.8.5 | GNU Compiler Collection: http://gcc.gnu.org | GPLv3+ and GPLv3+ with exceptions and GPLv2+ with exceptions and LGPLv2+ and BSD |
| GConf2 | 3.2.6 | A process-transparent configuration system: http://projects.gnome.org/gconf/ | LGPLv2+ and GPLv2+ |
| gdb | 7.6.1 | A GNU source-level debugger: http://gnu.org/software/gdb/ | GPLv3+ and GPLv3+ with exceptions and GPLv2+ and GPLv2+ with exceptions and GPL+ and LGPLv2+ and BSD and Public Domain |
| gdbm | 1.10 | A GNU set of database routines which use extensible hashing: http://www.gnu.org/software/gdbm/ | GPLv3+ |
| gdk-pixbuf2 | 2.36.12 | An image loading library: http://www.gt.org | LGPLv2+ |
| GeoIP | 1.5.0 | Library for country/city/organization to IP address or hostname mapping: http://www.maxmind.com/app/c | LGPLv2+ and GPLv2+ and CC-BY-SA |
| gettext gettext-libs | 0.19.8.1 | GNU libraries and utilities for producing multi-lingual messages: http://www.gnu.org/software/gettext/ | GPLv3+ and LGPLv2+ |
| ghostscript | 9.07 | A PostScript interpreter and renderer: http://www.ghostscript.com/ | AGPLv3+ and Redistributable, no modification permitted |
| ghostscript-fonts | 5.50 | A PostScript interpreter and renderer: http://www.ghostscript.com/ | GPLv2+ and Hershey and MIT and OFL and Public Domain |
| glib2 | 2.56.1 | A library of handy utility functions: http://www.gtk.org | LGPLv2+ |
| glibc glibc-common glibc-devel glibc-headers | 2.17 | The GNU libc libraries: http://sources.redhat.com/glibc/ | LGPLv2+ and LGPLv2+ with exceptions and GPLv2+ |
| glib-networking | 2.56.1 | Networking support for GLib: http://www.gnome.org | LGPLv2+ |
| gmp | 6.0.0 | A GNU arbitrary precision library: http://gmplib.org/ | LGPLv3+ or GPLv2+ |
| gnupg2 | 2.0.22 | Utility for secure communication and data storage: http://www.gnupg.org/ | GPLv3+ |
| gnutls | 3.3.29 | A TLS protocol implementation: http://www.gnutls.org/ | GPLv3+ and LGPLv2+ |
| gobject-introspection | 1.56.1 | Introspection system for GObject-based libraries: https://wiki.gnome.org/Projects/GObjectIntrospection | GPLv2+, LGPLv2+, MIT |
| gpgme | 1.3.2 | GnuPG Made Easy - high level crypto API: http://www.gnupg.org/related_software/gpgme/ | LGPLv2+ |

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|--|---------|--|---|
| gpm gpm-libs | 1.20.7 | A mouse server for the Linux console: http://www.nico.schottelius.org/software/gpm/ | GPLv2 and GPLv2+ with exceptions and GPLv3+ and Verbatim and Copyright only |
| graphite2 | 1.3.10 | Font rendering capabilities for complex non-Roman writing systems: https://sourceforge.net/projects/silgraphite/ | (LGPLv2+ or GPLv2+ or MPL) and (Netscape or GPLv2+ or LGPLv2+) |
| grep | 2.20 | Pattern matching utilities: http://www.gnu.org/software/grep/ | GPLv3+ |
| groff groff-base | 1.22.2 | A document formatting system: http://groff.ffii.org | GPLv3+ and GFDL and BSD and MIT |
| grub2 grub2-common grub2-pc grub2-pc-modules grub2-tools grub2-tools-extra grub2-tools-minimal | 2.02 | Bootloader with support for Linux, Multiboot and more: http://www.gnu.org/software/grub/ | GPLv3+ |
| grubby | 8.28 | Command line tool for updating bootloader configs: http://git.fedorahosted.org/git/grubby.git | GPLv2+ |
| gsettings-desktop-schemas | 3.28.0 | A collection of GSettings schemas: http://bugzilla.gnome.org/enter_bug.cgi?product=gsettings-desktop-schemas | LGPLv2+ |
| gssproxy | 0.7.0 | GSSAPI Proxy: https://pagure.io/gssproxy | MIT |
| gtk2 | 2.24.31 | GIMP ToolKit (GTK+): http://www.gtk.org | LGPLv2+ |
| gtk3 | 3.22.30 | GTK+ graphical user interface library: http://www.gtk.org | LGPLv2+ |
| gtk-update-icon-cache | 3.22.30 | Icon theme caching utility: http://www.gtk.org | LGPLv2+ |
| gzip | 1.5 | GNU data compression program: http://www.gzip.org/ | GPLv3+ and GFDL |
| hardlink | 1.0 | Create a tree of hardlinks: http://pkgs.fedoraproject.org/gitweb/?p=hardlink.git | GPL+ |
| harfbuzz | 1.7.5 | Text shaping library: http://freedesktop.org/wiki/Software/HarfBuzz | MIT |
| hdparm | 9.43 | A utility for displaying and/or setting hard disk parameters: http://sourceforge.net/projects/hdparm/ | BSD |
| hesiod | 3.2.1 | Shared libraries for querying the Hesiod naming service: https://www.centos.org/ | MIT |
| hicolor-icon-theme | 0.12 | Basic requirement for icon themes: http://icon-theme.freedesktop.org/wiki/HicolorTheme | GPL+ |
| hmacalc | 0.9.13 | Tools for computing and checking HMAC values for files: https://fedorahosted.org/hmacalc/ | BSD |

| Package | Version | Description | License |
|---------------|----------|---|--|
| hostname | 3.13 | Utility to set/show the host name or domain name: http://packages.qa.debian.org/h/hostname.html | GPLv2+ |
| hwdata | 0.252 | Hardware identification and configuration data: http://git.fedorahosted.org/git/hwdata.git | GPLv2+ |
| iftop | 1.0 | Command line tool that displays bandwidth usage on an interface: http://www.ex-parrot.com/~pdw/iftop/ | GPLv2+ |
| ilmbase | 1.0.3 | Math Libraries: http://www.openexr.com/ | BSD |
| ImageMagick | 6.7.8.9 | Image Manipulation: http://www.imagemagick.org/ | ImageMagick |
| imake | 1.0.5 | imake source code configuration and build system: http://www.x.org | MIT |
| info | 5.1 | Reader for GNU texinfo documentation: http://www.gnu.org/software/texinfo/ | GPLv3+ |
| initscripts | 9.49.46 | The inittab file and the /etc/init.d scripts: http://fedorahosted.org/releases/i/n/initscripts/ | GPLv2 and GPLv2+ |
| iperf | 2.0.13 | Measurement tool for TCP/UDP: http://sourceforge.net/projects/iperf | BSD |
| ipmitool | 1.8.18 | Utility for IPMI control: http://ipmitool.sourceforge.net/ | BSD |
| iproute | 4.11.0 | Advanced IP routing and network device configuration: http://linux-net.osdl.org/index.php/lproute2 | GPLv2+ and Public Domain |
| iprutils | 2.4.16.1 | Utilities for the IBM Power Linux RAID adapters: http://sourceforge.net/projects/iprdd/ | CPL |
| iptables | 1.4.21 | Tools for managing Linux kernel packet filtering capabilities: http://www.netfilter.org/ | GPLv2 |
| iptstate | 2.2.5 | A top-like display of IP Tables state table entries: http://www.phildev.net/iptstate/ | zlib |
| iputils | 20160308 | Network monitoring tools: http://www.skbuff.net/iputils | BSD and GPLv2+ |
| irqbalance | 1.0.7 | IRQ balancing daemon: https://github.com/irqbalance/irqbalance | GPLv2 |
| ivtv-firmware | 20080701 | Firmware for the Hauppauge PVR: http://dl.ivtvdriver.org/ivtv/firmware/ | Redistributable, no modification permitted |
| iw-firmware | various | Firmware for Intel® PRO/Wireless: http://intellinuxwireless.org | Redistributable, no modification permitted |
| jansson | 2.10 | C library for encoding, decoding and manipulating JSON data: http://www.digip.org/jansson/ | MIT |
| jasper-libs | 1.900.1 | Runtime libraries for jasper: http://www.ece.uvic.ca/~mdadams/jasper/ | JasPer |
| jbigkit-libs | 2.0 | JBIG1 lossless image compression library: http://www.cl.cam.ac.uk/~mgk25/jbigkit/ | GPLv2+ |
| js | 1.8.5 | JavaScript interpreter and libraries: http://www.mozilla.org/js/ | GPLv2+ or LGPLv2+ or MPLv1.1 |

| Package | Version | Description | License |
|--|----------|--|--------------------|
| json-c | 0.11 | A JSON implementation in C: https://github.com/json-c/json-c/wiki | MIT |
| json-glib | 1.4.2 | Library for JavaScript Object Notation format: https://wiki.gnome.org/Projects/JsonGlib | LGPLv2+ |
| jwhois | 4.0 | Internet whois/nickname client: http://www.gnu.org/software/jwhois/ | GPLv3 |
| kbd kbd-legacy kbd-misc | 1.15.5 | Tools for configuring the console: http://ftp.altlinux.org/pub/people/legion/kbd | GPLv2+ |
| kernel-ml kernel-ml-devel kernel-ml-headers kernel-ml-tools kernel-ml-tools-libs | 4.18.7 | The Linux kernel. (The core of any Linux-based operating system.): https://www.kernel.org/ | GPLv2 |
| keyutils keyutils-libs | 1.5.8 | Key utilities: http://people.redhat.com/~dhowells/keyutils/ | GPLv2+ and LGPLv2+ |
| kmod | 20 | Linux kernel module management utilities: http://git.kernel.org/?p=utils/kernel/kmod/kmod.git;a=summary | GPLv2+ |
| kmod-libs | 20 | Libraries to handle kernel module loading and unloading: http://git.kernel.org/?p=utils/kernel/kmod/kmod.git;a=summary | LGPLv2+ |
| kpartx | 0.4.9 | Partition device manager: http://christophe.varoqui.free.fr/ | GPL+ |
| krb5-libs | 1.15.1 | Kerberos 5 Libraries: http://web.mit.edu/kerberos/www/ | MIT |
| ksh | 20120801 | ATT Korn Shell: http://www.kornshell.com/ | EPL |
| lcms2 | 2.6 | Color Management Engine: http://www.littlecms.com/ | MIT |
| less | 458 | A text file browser: http://www.greenwoodsoftware.com/less/ | GPLv3+ |
| lftp | 4.4.8 | A sophisticated file transfer program: http://lftp.yar.ru/ | GPLv3+ |
| libacl | 2.2.51 | Dynamic library for access control list: http://acl.bestbits.at/ | LGPLv2+ |
| libaio | 0.3.109 | Linux-native asynchronous I/O access library: http://git.kernel.org/?p=libs/libaio/libaio.git | LGPLv2+ |
| libassuan | 2.1.0 | GnuPG IPC library: http://www.gnupg.org/ | LGPLv2+ and GPLv3+ |
| libattr | 2.4.46 | Dynamic library for extended attribute support: http://acl.bestbits.at/ | LGPLv2+ |

| Package | Version | Description | License |
|-----------------|------------|--|------------------------------|
| libbasicobjects | 0.1.1 | Basic object types for C: https://pagure.io/SSSD/ding-libs | GPLv3+ |
| libblkid | 2.23.2 | Block device ID library: ftp://ftp.kernel.org/pub/linux/utils/util-linux-ng | LGPLv2+ |
| libcap | 2.22 | Library for getting and setting POSIX.1e capabilities: http://ftp.kernel.org/pub/linux/libs/security/linux-privs/kernel-2.6/ | LGPLv2+ |
| libcap-ng | 0.7.5 | An alternate posix capabilities library: http://people.redhat.com/sgrubb/libcap-ng | LGPLv2+ |
| libcgroup | 0.41 | Tools and libraries to control and monitor control groups: http://libcg.sourceforge.net/ | LGPLv2+ |
| libcollection | 0.7.0 | Collection data-type for C: https://pagure.io/SSSD/ding-libs | LGPLv3+ |
| libcom_err | 1.42.9 | Common error description library: http://e2fsprogs.sourceforge.net/ | MIT |
| libcroco | 0.6.12 | A CSS2 parsing library: https://github.com/GNOME/libcroco | LGPLv2 |
| libcublas10 | 10.2.0.168 | CUBLAS native runtime libraries: http://nvidia.com | NVIDIA Proprietary |
| libcurl | 7.29.0 | A library for getting files from web servers: http://curl.haxx.se/ | MIT |
| libdaemon | 0.14 | Library for writing UNIX daemons: http://Opointer.de/lennart/projects/libdaemon/ | LGPLv2+ |
| libdb | 5.3.21 | the Berkeley DB database library for C: http://www.oracle.com/database/berkeley-db/ | BSD and LGPLv2 and Sleepycat |
| libdb-utils | 5.3.21 | Command line tools for managing Berkeley DB databases: http://www.oracle.com/database/berkeley-db/ | BSD and LGPLv2 and Sleepycat |
| libdrm | 2.4.91 | Direct Rendering Manager runtime library: http://dri.sourceforge.net | MIT |
| libecap | 1.0.0 | Squid interface for embedded adaptation modules: http://www.e-cap.org/ | BSD |
| libedit | 3.0 | The NetBSD Editline library: http://www.thrysoee.dk/editline/ | BSD |
| libepoxy | 1.5.2 | epoxy runtime library: http://github.com/anholt/libepoxy | MIT |
| libestr | 0.1.9 | String handling essentials library: http://libestr.adiscon.com/ | LGPLv2+ |
| libevent | 2.0.21 | Abstract asynchronous event notification library: http://monkey.org/~provos/libevent/ | BSD |
| libfastjson | 0.99.4 | A JSON implementation in C: https://github.com/rsyslog/libfastjson | MIT |
| libffi | 3.0.13 | Portable foreign function interface library: http://sourceware.org/libffi | MIT and Public Domain |

| Package | Version | Description | License |
|---|---------|---|--|
| libfontenc | 1.1.3 | X.Org X11 libfontenc runtime library: http://www.x.org | MIT |
| libgcc | 4.8.5 | GCC support library: http://gcc.gnu.org | GPLv3+ and GPLv3+ with exceptions and GPLv2+ with exceptions and LGPLv2+ and BSD |
| libgcrypt | 1.5.3 | General-purpose cryptography library: http://www.gnupg.org/ | LGPLv2+ |
| libglade2 | 2.6.4 | Library for loading user interfaces: http://www.gnome.org | LGPLv2+ |
| libglvnd libglvnd-core-devel libglvnd-devel libglvnd-egl libglvnd-gles libglvnd-glx libglvnd-opengl | 1.0.1 | The GL Vendor-Neutral Dispatch library: https://github.com/NVIDIA/libglvnd | MIT |
| libgomp | 4.8.5 | GCC OpenMP v3.0 shared support library: http://gcc.gnu.org | GPLv3+ and GPLv3+ with exceptions and GPLv2+ with exceptions and LGPLv2+ and BSD |
| libgpg-error | 1.12 | Library for error values used by GnuPG components: ftp://ftp.gnupg.org/gcrypt/libgpg-error/ | LGPLv2+ |
| libgsf | 1.14.26 | GNOME Structured File library: http://www.gnome.org/projects/libgsf/ | LGPLv2 |
| libgudev1 | 219 | Libraries for adding libudev: http://www.kernel.org/pub/linux/utils/kernel/hotplug/udev.html | LGPLv2+ |
| libgusb | 0.2.9 | GLib wrapper around libusb1: https://gitorious.org/gusb/ | LGPLv2+ |
| libhugetlbfs | 2.16 | A library which provides easy access to huge pages of memory: http://libhugetlbfs.sourceforge.net/ | LGPLv2+ |
| libICE | 1.0.9 | X.Org X11 ICE runtime library: http://www.x.org | MIT |
| libIDL | 0.8.14 | Library for parsing IDL: https://ftp.gnome.org/pub/gnome/sources/libIDL/ | LGPLv2+ |
| libidn | 1.28 | Internationalized Domain Name support library: http://www.gnu.org/software/libidn/ | LGPLv2+ and GPLv3+ and GFDL |
| libidn2 | 2.2.0 | Library to support IDNA2008 internationalized domain names: https://www.gnu.org/software/libidn/#libidn2 | (GPLv2+ or LGPLv3+) and GPLv3+ |
| libini_config | 1.3.1 | INI file parser for C: https://pagure.io/SSSD/ding-libs | LGPLv3+ |
| libitm | 4.8.5 | GNU Transactional Memory library: http://gcc.gnu.org | GPLv3+ and GPLv3+ with exceptions and GPLv2+ with exceptions and LGPLv2+ and BSD |

| Package | Version | Description | License |
|------------------------|---------|--|----------------------|
| libjpeg-turbo | 1.2.90 | Accelerated library for manipulating JPEG images: http://sourceforge.net/projects/libjpeg-turbo | IJG |
| libmnl | 1.0.3 | A minimalistic Netlink library: http://netfilter.org/projects/libmnl | LGPLv2+ |
| libmodman | 2.0.1 | A simple library for managing C++ modules (plugins): http://code.google.com/p/libmodman/ | LGPLv2+ |
| libmount | 2.23.2 | Device mounting library: http://en.wikipedia.org/wiki/Util-linux | LGPLv2+ |
| libmpc | 1.0.1 | C library for multiple precision complex arithmetic: http://www.multiprecision.org/ | LGPLv3+ and GFDL |
| libndp | 1.2 | Library for Neighbor Discovery Protocol: http://www.libndp.org/ | LGPLv2+ |
| libnetfilter_conntrack | 1.0.6 | Netfilter conntrack userspace library: http://netfilter.org | GPLv2+ |
| libnfnl | 1.0.1 | Netfilter netlink userspace library: http://netfilter.org | GPLv2+ |
| libnfsidmap | 0.25 | NFSv4 User and Group ID Mapping Library: http://www.citi.umich.edu/projects/nfsv4/linux/ | BSD |
| libnl | 1.1.4 | Convenience library for kernel netlink sockets: http://www.infradead.org/~tgr/libnl/ | LGPLv2 |
| libnl3 | 3.2.28 | Convenience library for kernel netlink sockets: http://www.infradead.org/~tgr/libnl/ | LGPLv2 |
| libnl3-cli | 3.2.28 | Command line interface utils for libnl3: http://www.infradead.org/~tgr/libnl/ | LGPLv2 |
| libpath_utils | 0.2.1 | Filesystem Path Utilities: https://pagure.io/SSSD/ding-libs | LGPLv3+ |
| libpcap | 1.5.3 | System-independent interface for user-level packet capture: http://www.tcpdump.org | BSD with advertising |
| libpciaccess | 0.14 | PCI access library: http://gitweb.freedesktop.org/?p=xorg/lib/libpciaccess.git | MIT |
| libpipeline | 1.2.3 | A pipeline manipulation library: http://libpipeline.nongnu.org/ | GPLv3+ |
| libpng | 1.5.13 | Library for manipulating PNG images: http://www.libpng.org/pub/png/ | zlib |
| libproxy | 0.4.11 | A library handling all the details of proxy configuration: http://code.google.com/p/libproxy/ | LGPLv2+ |
| libpwquality | 1.2.3 | A library for password generation and password quality checking: https://github.com/libpwquality/libpwquality/ | BSD or GPLv2+ |
| libref_array | 0.1.5 | A recounted array for C: https://pagure.io/SSSD/ding-libs | LGPLv3+ |
| libreport-filesystem | 2.1.11 | Filesystem layout for libreport: https://fedorahosted.org/abrt/ | GPLv2+ |

| Package | Version | Description | License |
|--|---------|---|--|
| librsvg2 | 2.40.20 | SVG library: https://github.com/GNOME/librsvg | LGPLv2+ |
| libseccomp | 2.3.1 | Enhanced seccomp library: https://github.com/seccomp/libseccomp | LGPLv2 |
| libselenium libselenium-python libselenium-utils | 2.5 | SELinux library: http://www.selinuxproject.org | Public Domain |
| libsemanage libsemanage-python | 2.5 | SELinux binary policy manipulation library: http://www.selinuxproject.org | LGPLv2+ |
| libsepol | 2.5 | SELinux binary policy manipulation library: http://www.selinuxproject.org | LGPLv2+ |
| libSM | 1.2.2 | X.Org X11 SM runtime library: http://www.x.org | MIT |
| libsmartcols | 2.23.2 | Formatting library for ls-like programs.: http://en.wikipedia.org/wiki/Util-linux | LGPLv2+ |
| libsmbios | 2.3.1 | Libsmbios C/C++ shared libraries: http://linux.dell.com/libsmbios/main | GPLv2+ or OSLv2.1 |
| libsoup | 2.62.2 | Soup, an HTTP library implementation: https://wiki.gnome.org/Projects/libsoup | LGPLv2 |
| libss | 1.42.9 | Command line interface parsing library: http://e2fsprogs.sourceforge.net/ | MIT |
| libssh2 | 1.4.3 | Library implementing the SSH2 protocol: http://www.libssh2.org/ | BSD |
| libstdc++ | 4.8.5 | GNU Standard C++ Library: http://gcc.gnu.org | GPLv3+ and GPLv3+ with exceptions and GPLv2+ with exceptions and LGPLv2+ and BSD |
| libsysfs | 2.1.0 | Library for interfacing with sysfs: http://sourceforge.net/projects/linux-diag/ | LGPLv2+ |
| libtalloc | 2.1.13 | The talloc library: http://talloc.samba.org/ | LGPLv3+ |
| libtasn1 | 4.10 | ASN.1 library used in GNUTLS: http://www.gnu.org/software/libtasn1/ | GPLv3+ and LGPLv2+ |
| libtdb | 1.3.15 | The tdb library: http://tdb.samba.org/ | LGPLv3+ |
| libteam | 1.27 | Library for controlling team network device: http://www.libteam.org | LGPLv2+ |
| libtevent | 0.9.36 | The tevent library: http://tevent.samba.org/ | LGPLv3+ |
| libthai | 0.1.14 | Thai language support routines: http://linux.thai.net | LGPLv2+ |
| libtiff | 4.0.3 | Library of functions for manipulating TIFF format images: http://www.remotesensing.org/libtiff/ | libtiff |
| libtirpc | 0.2.4 | Transport Independent RPC Library: http://nfsv4.bullopensource.org/ | SISSL and BSD |
| libtool-ltdl | 2.4.2 | GNU Libtool Dynamic Module Loader: http://www.gnu.org/software/libtool/ | LGPLv2+ |

| Package | Version | Description | License |
|---|---------|--|-----------------------------|
| libunistring | 0.9.3 | GNU Unicode string library: http://www.gnu.org/software/libunistring/ | LGPLv3+ |
| libusb | 0.1.4 | Library which allows userspace access to USB devices: http://sourceforge.net/projects/libusb/ | LGPLv2+ |
| libusbx | 1.0.21 | Library for accessing USB devices: http://libusb.info/ | LGPLv2+ |
| libuser | 0.60 | User and group account administration library: https://fedorahosted.org/libuser/ | LGPLv2+ |
| libutempter | 1.1.6 | Privileged helper for utmp/wtmp updates: ftp://ftp.altlinux.org/pub/people/ldv/utempter | LGPLv2+ |
| libuuid | 2.23.2 | Universally unique ID library: ftp://ftp.kernel.org/pub/linux/utils/util-linux-ng | BSD |
| libv4l | 0.9.5 | Video4linux support libraries: http://hansdegoede.livejournal.com/3636.html | LGPLv2+ and GPLv2 |
| libva-vdpau-driver | 0.7.4 | HW video decode support for VDPAU platforms: http://cgit.freedesktop.org/vaapi/vdpau-driver | GPLv2+ |
| libvdpau | 1.1.1 | Wrapper library for the Video Decode and Presentation API: http://freedesktop.org/wiki/Software/VDPAU | MIT |
| libverto libverto- tevent | 0.2.5 | Main loop abstraction library: https://fedorahosted.org/libverto | MIT |
| libwayland- client | 1.15.0 | Wayland client library: http://wayland.freedesktop.org/ | MIT |
| libwayland- cursor | 1.15.0 | Wayland cursor library: http://wayland.freedesktop.org/ | MIT |
| libwayland- egl | 1.15.0 | Wayland egl library: http://wayland.freedesktop.org/ | MIT |
| libwayland- server | 1.15.0 | Wayland server library: http://wayland.freedesktop.org/ | MIT |
| libwmf libwmf-lite | 0.2.8.4 | Windows MetaFile Library: http://www.sourceforge.net/libwmf.html | LGPLv2+ and GPLv2+ and GPL+ |
| libX11 libX11- common libX11-devel | 1.6.5 | Core X11 protocol client library: http://www.x.org | MIT |
| libXau libXau-devel | 1.0.8 | Sample Authorization Protocol for X: http://www.x.org | MIT |
| libxcb libxcb-devel | 1.13 | C binding to the X11 protocol: http://www.x.org | MIT |
| libXcomposite | 0.4.4 | X Composite Extension library: http://xcb.freedesktop.org/ | MIT |
| libXcursor | 1.1.15 | Cursor management library: http://www.x.org | MIT |
| libXdamage | 1.1.4 | X Damage extension library: http://www.x.org | MIT |

| Package | Version | Description | License |
|----------------------------|----------|--|--|
| libXdmpc | 1.1.2 | X Display Manager Control Protocol library: http://www.x.org | MIT |
| libXext | 1.3.3 | X.Org X11 libXext runtime library: http://www.x.org | MIT |
| libXfixes | 5.0.3 | X Fixes library: http://www.x.org | MIT |
| libXfont | 1.5.4 | X.Org X11 libXfont runtime library: http://www.x.org | MIT |
| libXfont2 | 2.0.3 | X.Org X11 libXfont2 runtime library: https://www.x.org | MIT |
| libXft | 2.3.2 | X.Org X11 libXft runtime library: http://www.x.org | MIT |
| libXi | 1.7.9 | X.Org X11 libXi runtime library: http://www.x.org | MIT |
| libXinerama | 1.1.3 | X.Org X11 libXinerama runtime library: http://www.x.org | MIT |
| libxkbcommon | 0.7.1 | X.Org X11 XKB parsing library: http://www.x.org | MIT |
| libxkbfile | 1.0.9 | X.Org X11 libxkbfile runtime library: http://www.x.org | MIT |
| libxml2-libxml2-python | 2.9.1 | Library providing XML and HTML support: http://xmlsoft.org/ | MIT |
| libXpm | 3.5.12 | X.Org X11 libXpm runtime library: http://www.x.org | MIT |
| libXrandr | 1.5.1 | X.Org X11 libXrandr runtime library: http://www.x.org | MIT |
| libXrender | 0.9.10 | X.Org X11 libXrender runtime library: http://www.x.org | MIT |
| libxshmfence | 1.2 | X11 shared memory fences: http://www.x.org/ | MIT |
| libxslt | 1.1.28 | Library providing the Gnome XSLT engine: http://xmlsoft.org/XSLT/ | MIT |
| libXt | 1.1.5 | X.Org X11 libXt runtime library: http://www.x.org | MIT |
| libXtst | 1.2.3 | X.Org X11 libXtst runtime library: http://www.x.org | MIT |
| libXv | 1.0.11 | X.Org X11 libXv runtime library: http://www.x.org | MIT |
| libXxf86vm | 1.1.4 | X.Org X11 libXxf86vm runtime library: http://www.x.org | MIT |
| linuxconsoletools | 1.4.5 | Tools for connecting joysticks & legacy devices to the kernel's input subsystem: http://sourceforge.net/projects/linuxconsole/ | GPLv2+ |
| linux-firmware | 20180911 | Firmware files used by the Linux kernel: https://git.kernel.org/cgit/linux/kernel/git/firmware/linux-firmware.git/ | GPL+ and GPLv2+ and MIT and Redistributable, no modification permitted |
| llvm-private | 6.0.1 | llvm engine for Mesa: http://llvm.org | NCSA |
| lm_sensors-lm_sensors-libs | 3.4.0 | Hardware monitoring tools: http://www.lm-sensors.org/ | LGPLv2+ and GPLv3+ and GPLv2+ and Verbatim and Public Domain |

| Package | Version | Description | License |
|-------------------|----------|--|--|
| lockdev | 1.0.4 | A library for locking devices: https://alioth.debian.org/projects/lockdev/ | LGPLv2 |
| logrotate | 3.8.6 | Rotates, compresses, removes and mails system log files: https://fedorahosted.org/logrotate/ | GPL+ |
| logwatch | 7.4.0 | A log file analysis program: http://www.logwatch.org/ | MIT |
| lshw | B.02.18 | Hardware lister: http://ezix.org/project/wiki/HardwareLiSter | GPLv2 |
| lsof | 4.87 | Utility which lists open files: ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof | zlib and Sendmail and LGPLv2+ |
| lsscsi | 0.27 | List SCSI devices (or hosts) and associated information: http://sg.danny.cz/scsi/lsscsi.html | GPLv2+ |
| ltrace | 0.7.91 | Tracks runtime library calls from dynamically linked executables: http://ltrace.alioth.debian.org/ | GPLv2+ |
| lua | 5.1.4 | Powerful light-weight programming language: http://www.lua.org/ | MIT |
| lvm2 lvm2-libs | 2.02.180 | Userland logical volume management tools: http://sources.redhat.com/lvm2 | GPLv2 |
| lz4 | 1.7.5 | Extremely fast compression algorithm: https://lz4.github.io/lz4/ | GPLv2+ and BSD |
| lzo | 2.06 | Data compression library with very fast (de)compression: http://www.oberhumer.com/opensource/lzo/ | GPLv2+ |
| m2crypto | 0.21.1 | Support for using OpenSSL in python scripts: http://wiki.osafoundation.org/bin/view/Projects/MeTooCrypto | MIT |
| m4 | 1.4.16 | GNU macro processor: http://www.gnu.org/software/m4/ | GPLv3+ |
| mailx | 12.5 | Enhanced implementation of the mailx command: http://heirloom.sourceforge.net/mailx.html | BSD with advertising and MPLv1.1 |
| make | 3.82 | GNU tool which simplifies the build process: http://www.gnu.org/software/make/ | GPLv2+ |
| man-db | 2.6.3 | Tools for searching and reading man pages: http://www.nongnu.org/man-db/ | GPLv2+ and GPLv3+ |
| mariadb-libs | 5.5.60 | The shared libraries required for MariaDB/MySQL clients: http://mariadb.org | GPLv2 with exceptions and LGPLv2 and BSD |
| mcstrans | 0.3.4 | SELinux Translation Daemon: https://www.centos.org/ | GPL+ |
| mdadm | 4.1 | Program controls Linux md devices: http://www.kernel.org/pub/linux/utils/raid/mdadm/ | GPLv2+ |

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|--|---------|--|---|
| mesa-dri-drivers mesa-filesystem mesa-libEGL mesa-libgbm mesa-libGL mesa-libglapi | 18.0.5 | Mesa-based drivers: http://www.mesa3d.org | MIT |
| mesa-private-llvm | 3.9.1 | llvm engine for Mesa: http://llvm.org | NCSA |
| mgetty | 1.1.36 | Getty replacement for use with data and fax modems: http://mgetty.greenie.net/ | GPLv2+ |
| microcode_ctl | 2.1 | Tool to update x86/x86-64 CPU microcode: http://www.urbanmyth.org/microcode/ | GPLv2+ and Redistributable, no modification permitted |
| mlocate | 0.26 | An utility for finding files by name: https://fedorahosted.org/mlocate/ | GPLv2 |
| mozjs17 | 17.0.0 | JavaScript interpreter and libraries: http://www.mozilla.org/js/ | GPLv2+ or LGPLv2+ or MPLv1.1 |
| mpfr | 3.1.1 | A C library for multiple-precision floating-point computations: http://www.mpfr.org/ | LGPLv3+ and GPLv3+ and GFDL |
| mtools | 4.0.18 | Programs for accessing MS-DOS disks without mounting the disks: http://mtools.linux.lu/ | GPLv3+ |
| mtr | 0.85 | A network diagnostic tool: http://www.BitWizard.nl/mtr | GPLv2+ |
| nano | 2.3.1 | Small text editor: http://www.nano-editor.org | GPLv3+ |
| ncompress | 4.2.4.4 | Fast compression and decompression utilities: http://ncompress.sourceforge.net/ | Public Domain |
| ncurses ncurses-base ncurses-libs | 5.9 | Ncurses support utilities: http://invisible-island.net/ncurses/ncurses.html | MIT |
| net-snmp net-snmp-agent-libs net-snmp-libs net-snmp-utils | 5.7.2 | SNMP protocol tools and libraries: http://net-snmp.sourceforge.net/ | BSD |
| nettle | 2.7.1 | A low-level cryptographic library: http://www.lysator.liu.se/~nisse/nettle/ | LGPLv2+ |
| net-tools | 2.0 | Basic networking tools: http://net-tools.berlios.de/ | GPLv2+ |
| newt newt-python | 0.52.15 | Library for text mode user interfaces: https://fedorahosted.org/newt/ | LGPLv2 |
| nfs-utils | 1.3.0 | Network File System Support Libraries and Utilities: http://www.citi.umich.edu/projects/nfsv4/linux/ | MIT and GPLv2 and GPLv2+ and BSD |
| nload | 0.7.4 | A tool can monitor network traffic and bandwidth usage in real time: http://www.roland-riegel.de/nload/ | GPLv2+ |

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|---------------------------|---------|--|--|
| nmap nmap-ncat | 6.40 | Network exploration tool and security scanner: http://nmap.org/ | GPLv2 and LGPLv2+ and GPLv2+ and BSD |
| node | 8.11.2 | A tool can monitor network traffic and bandwidth usage in real time: http://www.roland-riegel.de/nload/ | MIT License |
| nspr | 4.19.0 | Netscape Portable Runtime: http://www.mozilla.org/projects/nspr/ | MPLv2.0 |
| nss | 3.36.0 | Network Security Services: http://www.mozilla.org/projects/security/pki/nss/ | MPLv2.0 |
| nss_compat_ossli | 0.9.6 | Source-level compatibility library for OpenSSL to NSS porting: http://rcritten.fedorapeople.org/nss_compat_ossli.html | MIT |
| nss-pem | 1.0.3 | PEM file reader for Network Security Services (NSS): https://github.com/kdudka/nss-pem | MPLv1.1 |
| nss-softokn | 3.36.0 | Network Security Services Softoken Module: http://www.mozilla.org/projects/security/pki/nss/ | MPLv2.0 |
| nss-softokn-freebl | 3.36.0 | Freebl library for the Network Security Services: http://www.mozilla.org/projects/security/pki/nss/ | MPLv2.0 |
| nss-sysinit | 3.36.0 | System NSS Initialization: http://www.mozilla.org/projects/security/pki/nss/ | MPLv2.0 |
| nss-tools | 3.36.0 | Tools for the Network Security Services: http://www.mozilla.org/projects/security/pki/nss/ | MPLv2.0 |
| nss-util | 3.36.0 | Network Security Services Utilities Library: http://www.mozilla.org/projects/security/pki/nss/ | MPLv2.0 |
| ntp ntpdate | 4.2.6p5 | NTP daemon and utilities: http://www.ntp.org | (MIT and BSD and BSD with advertising) and GPLv2 |
| ntsysv | 1.7.4 | Tool to set the stop/start of system services: https://www.centos.org/ | GPLv2 |
| numactl numactl-libs | 2.0.9 | Library for tuning for Non Uniform Memory Access: ftp://oss.sgi.com/www/projects/libnuma/download | GPLv2 LGPLv2 and GPLv2 |
| nvidia-driver | 418.67 | NVIDIA's proprietary display driver for NVIDIA graphic cards: http://www.nvidia.com/object/unix.html | NVIDIA License |
| nvidia-driver-cuda | 418.67 | CUDA integration for nvidia-driver: http://www.nvidia.com/object/unix.html | NVIDIA License |
| nvidia-driver-cuda-libs | 418.67 | Libraries for nvidia-driver-cuda: http://www.nvidia.com/object/unix.html | NVIDIA License |
| nvidia-driver-devel | 418.67 | Development files for nvidia-driver: http://www.nvidia.com/object/unix.html | NVIDIA License |
| nvidia-driver-libs | 418.67 | Libraries for nvidia-driver: http://www.nvidia.com/object/unix.html | NVIDIA License |
| nvidia-driver-NvFBCOpenGL | 418.67 | NVIDIA OpenGL-based Framebuffer Capture libraries: http://www.nvidia.com/object/unix.html | NVIDIA License |

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|--|---------|---|---------------------------|
| nvidia-driver-NVML | 418.67 | NVIDIA Management Library (NVML): http://www.nvidia.com/object/unix.html | NVIDIA License |
| nvidia-libXNVCtrl | 418.67 | Library providing the NV-CONTROL API: http://www.nvidia.com/object/unix.html | GPLv2+ |
| nvidia-libXNVCtrl-devel | 418.67 | Development files for libXNVCtrl: http://www.nvidia.com/object/unix.html | GPLv2+ |
| nvidia-modprobe | 418.67 | NVIDIA kernel module loader: http://www.nvidia.com/object/unix.html | GPLv2+ |
| nvidia-persistenced | 418.67 | A daemon to maintain persistent software state in the NVIDIA driver: http://www.nvidia.com/object/unix.html | GPLv2+ |
| nvidia-settings | 418.67 | Configure the NVIDIA graphics driver: http://www.nvidia.com/object/unix.html | GPLv2+ |
| nvidia-xconfig | 418.67 | NVIDIA X configuration file editor: http://www.nvidia.com/object/unix.html | GPLv2+ |
| ocl-icd | 2.2.12 | OpenCL ICD Bindings: https://forge.imag.fr/projects/ocl-icd/ | BSD |
| opencl-filesystem | 1.0 | OpenCL filesystem layout: http://www.khronos.org/registry/cl/ | Public Domain |
| OpenEXR-libs | 1.7.1 | OpenEXR runtime: http://www.openexr.com/ | BSD |
| OpenIPMI OpenIPMI-libs OpenIPMI-modalias | 2.0.23 | Intelligent Platform Management Interface library and tools: http://sourceforge.net/projects/openipmi/ | LGPLv2+ and GPLv2+ or BSD |
| openldap openldap-clients openldap-servers | 2.4.44 | OpenLDAP: http://www.openldap.org/ | OpenLDAP |
| openssh openssh-clients openssh-server | 7.4p1 | SSH protocol versions 1 and 2: http://www.openssh.com/portable.html | BSD |
| openssl openssl-libs | 1.0.2k | Cryptography library with TLS implementation: http://www.openssl.org/ License: https://www.openssl.org/source/license.html | OpenSSL |
| ORBit2 | 2.14.19 | CORBA Object Request Broker: http://www.gnome.org/projects/ORBit2 | LGPLv2+ and GPLv2+ |
| os-prober | 1.58 | Probes disks on the system for installed operating systems: http://kitenet.net/~joey/code/os-prober | GPLv2+ and GPL+ |
| p11-kit p11-kit-trust | 0.23.5 | Loading and sharing PKCS#11 modules: http://p11-gluem.freedesktop.org/p11-kit.html | BSD |
| pam | 1.1.8 | Provides authentication for applications: http://www.linux-pam.org/ | BSD and GPLv2+ |

| Package | Version | Description | License |
|--|---------|--|--|
| pango | 1.42.4 | System for layout and rendering of internationalized text: http://www.pango.org | LGPLv2+ |
| parted | 3.1 | GNU disk partition manipulation program: http://www.gnu.org/software/parted | GPLv3+ |
| passwd | 0.79 | Utility for setting or changing passwords using PAM: http://fedorahosted.org/passwd | BSD or GPL+ |
| patch | 2.7.1 | Utility for modifying/upgrading files: http://www.gnu.org/software/patch/patch.html | GPLv3+ |
| pciutils pciutils-libs | 3.5.1 | PCI bus related utilities and library: http://atrey.karlin.mff.cuni.cz/~mj/pciutils.shtml | GPLv2+ |
| pcre | 8.32 | Perl-compatible regular expression library: http://www.pcre.org/ | BSD |
| perf | 4.18.7 | Performance monitoring of the Linux kernel: https://www.kernel.org/ | GPLv2 |
| perl | 5.16.3 | Practical Extraction and Report Language: http://www.perl.org/ | (GPL+ or Artistic) and (GPLv2+ or Artistic) and Copyright Only and MIT and Public Domain and UCD |
| perl-modules | various | Various Perl Modules | Various |
| pinentry | 0.8.1 | Collection of simple PIN or passphrase entry dialogs: http://www.gnupg.org/aegypten/ | GPLv2+ |
| pixman | 0.34.0 | Pixel manipulation library: http://cgit.freedesktop.org/pixman/ | MIT |
| pkcs11-helper | 1.11 | A library for using PKCS#11 providers: http://www.opensc-project.org/opensc/wiki/pkcs11-helper | GPLv2 or BSD |
| pkgconfig | 0.27.1 | Tool for determining compilation options: http://pkgconfig.freedesktop.org | GPLv2+ |
| plymouth plymouth-core-libs plymouth-graphics-libs plymouth-plugin-script plymouth-scripts | 0.8.9 | Graphical Boot Animation and Logger: http://freedesktop.org/software/plymouth/releases | GPLv2+ |
| pm-utils | 1.4.1 | Power management utilities and scripts: http://pm-utils.freedesktop.org | GPLv2 |
| policycoreutils policycoreutils-python | 2.5 | SELinux policy core utilities: http://www.selinuxproject.org | GPLv2 |
| polkit | 0.112 | PolicyKit Authorization Framework: http://www.freedesktop.org/wiki/Software/PolicyKit | LGPLv2+ |
| polkit-pkla-compat | 0.1 | Rules for polkit to add compatibility with pklocalauthority: https://fedorahosted.org/polkit-pkla-compat/ | LGPLv2+ |

| Package | Version | Description | License |
|--------------------|---------|--|--|
| poppler-data | 0.4.6 | Encoding files: http://poppler.freedesktop.org/ | BSD and GPLv2 and GPLv3+ |
| popt | 1.13 | C library for parsing command line parameters: http://www.rpm5.org/ | MIT |
| portreserve | 0.0.5 | TCP port reservation utility: http://cyberelk.net/tim/portreserve/ | GPLv2+ |
| postfix | 2.10.1 | Postfix Mail Transport Agent: http://www.postfix.org | IBM and GPLv2+ |
| ppp | 2.4.5 | The Point-to-Point Protocol daemon: http://www.samba.org/ppp | BSD and LGPLv2+ and GPLv2+ and Public Domain |
| procmail | 3.22 | Mail processing program: http://www.procmail.org | GPLv2+ or Artistic |
| procps-ng | 3.3.10 | System and process monitoring utilities: https://sourceforge.net/projects/procps-ng/ | GPL+ and GPLv2 and GPLv2+ and GPLv3+ and LGPLv2+ |
| psacct | 6.6.1 | Utilities for monitoring process activities: https://www.centos.org/ | GPLv3+ |
| psmisc | 22.20 | Utilities for managing processes: http://sourceforge.net/projects/psmisc | GPLv2+ |
| pth | 2.0.7 | GNU Portable Threads library: http://www.gnu.org/software/pth/ | LGPLv2+ |
| pygpgme | 0.3 | Python module for working with OpenPGP messages: http://cheeseshop.python.org/pypi/pygpgme | LGPLv2+ |
| pyliblzma | 0.5.3 | Python bindings for lzma: https://launchpad.net/pyliblzma | LGPLv3+ |
| python | 2.7.5 | Python object-oriented programming language: http://www.python.org/ | Python |
| python-modules | various | Various python modules | Various |
| pyxattr | 0.5.1 | Extended attributes library wrapper for Python: http://pyxattr.sourceforge.net/ | LGPLv2+ |
| qrencode-libs | 3.4.1 | QR Code encoding library - Shared libraries: http://megaii.net/fukuchi/works/qrencode/index.en.html | LGPLv2+ |
| quota quota-nls | 4.01 | System administration tools: http://sourceforge.net/projects/linuxquota/ | BSD and LGPLv2+ and GPLv2 and GPLv2+ |
| rdist | 6.1.5 | Maintains identical copies of files on multiple machines: http://www.MagniComp.com/rdist | BSD |
| rdma-core | 17.2 | RDMA core userspace libraries and daemons: https://github.com/linux-rdma/rdma-core | GPLv2 or BSD |
| readline | 6.2 | Library for editing typed command lines: http://cnswww.cns.cwru.edu/php/chet/readline/rltop.html | GPLv3+ |
| rest | 0.8.1 | A library for access to RESTful web services: http://www.gnome.org | LGPLv2 |
| rhdb-utils | 9.2.0 | Miscellaneous utilities for PostgreSQL - Red Hat Edition: http://sources.redhat.com/rhdb/ | GPLv2+ |

| Package | Version | Description | License |
|---|----------|--|--|
| rootfiles | 8.1 | root user's directory: https://www.centos.org/ | Public Domain |
| rpcbind | 0.2.0 | Universal Addresses to RPC Program Number Mapper: http://nfsv4.bullopen-source.org | BSD |
| rpm rpm-build-libs rpm-libs rpm-python | 4.11.3 | RPM package management system: http://www.rpm.org/ | GPLv2+ GPLv2+ and LGPLv2+ with exceptions |
| rsync | 3.1.2 | Program for synchronizing files over a network: http://rsync.samba.org/ | GPLv3+ |
| rsyslog | 8.24.0 | Enhanced system logging: http://www.rsyslog.com/ | (GPLv3+ and ASL 2.0) |
| screen | 4.1.0 | Screen manager: http://www.gnu.org/software/screen | GPLv2+ |
| SDL | 1.2.15 | A cross-platform multimedia library: http://www.libsdl.org/ | LGPLv2+ |
| sed | 4.2.2 | GNU stream text editor: http://sed.sourceforge.net/ | GPLv3+ |
| selinux-policy selinux-policy-targeted | 3.13.1 | SELinux policy configuration: http://oss.tresys.com/repos/refpolicy/ | GPLv2+ |
| sendmail | 8.14.7 | Mail Transport Agent: http://www.sendmail.org/ | Sendmail |
| setools | 3.3.8 | Policy analysis tools for SELinux: http://oss.tresys.com/projects/setools | GPLv2 |
| setools-console | 3.3.8 | Policy analysis command-line tools for SELinux: http://oss.tresys.com/projects/setools | GPLv2 |
| setools-gui | 3.3.8 | Policy analysis graphical tools for SELinux: http://oss.tresys.com/projects/setools | GPLv2 |
| setools-libs | 3.3.8 | Policy analysis support libraries for SELinux: http://oss.tresys.com/projects/setools | LGPLv2 |
| setools-libs-tcl | 3.3.8 | Tcl bindings for SELinux policy analysis: http://oss.tresys.com/projects/setools | LGPLv2 |
| setserial | 2.17 | Utility for configuring serial ports: http://setserial.sourceforge.net/ | GPL+ |
| setup | 2.8.71 | System configuration and setup files: https://www.centos.org/ | Public Domain |
| setuptools | 1.19.11 | Text mode system configuration tool: http://git.fedorahosted.org/git/?p=setuptools.git | GPLv2+ |
| sgml-common | 0.6.3 | Common SGML catalog and DTD files: http://www.w3.org/2003/entities/ | GPL+ |
| sgpio | 1.2.0.10 | SGPIO captive backplane tool: http://sources.redhat.com/lvm2/wiki/DMRAID_Eventing | GPLv2+ |
| shadow-utils | 4.1.5.1 | Utilities for managing accounts and shadow password files: http://pkg-shadow.alioth.debian.org/ | BSD and GPLv2+ |

| Package | Version | Description | License |
|---------------------------------|---------|--|--|
| shared-mime-info | 1.8 | Shared MIME information database: http://freedesktop.org/Software/shared-mime-info | GPLv2+ |
| slang | 2.2.4 | Library for the S-Lang extension language: http://www.jedsoft.org/slang/ | GPLv2+ |
| smartmontools | 6.5 | Tools for monitoring SMART capable hard disks: http://smartmontools.sourceforge.net/ | GPLv2+ |
| smbios-utils-bin | 2.3.1 | Binary utilities that use libsbios: http://linux.dell.com/libsbios/main | GPLv2+ or OSLv2.1 |
| snappy | 1.1.0 | Fast compression and decompression library: http://code.google.com/p/snappy/ | BSD |
| sqlite | 3.7.17 | Embeddable SQL database engine: http://www.sqlite.org/ | Public Domain |
| squid squid-migration-script | 3.5.20 | Squid proxy caching server: http://www.squid-cache.org | GPLv2+ and (LGPLv2+ and MIT and BSD and Public Domain) |
| strace | 4.12 | Tracks and displays system calls: http://sourceforge.net/projects/strace/ | BSD |
| stunnel | 4.56 | SSL-encrypting socket wrapper: http://stunnel.mirt.net/ | GPLv2 |
| sudo | 1.8.23 | Allows restricted root access: http://www.courtesan.com/sudo/ | ISC |
| supervisor | 3.1.4 | A System for Allowing the Control of Process State on UNIX: http://supervisord.org/ | ZPLv2.1 and BSD and MIT |
| symlinks | 1.4 | Utility which maintains a system's symbolic links: ftp://metalab.unc.edu/pub/Linux/utils/file/ | Copyright only |
| sysfsutils | 2.1.0 | Utilities for interfacing with sysfs: http://sourceforge.net/projects/linux-diag/ | GPLv2 |
| sysstat | 10.1.5 | System monitoring commands: http://perso.orange.fr/sebastien.godard/ | GPLv2+ |
| systemd | 219 | A System and Service Manager: http://www.freedesktop.org/wiki/Software/systemd | LGPLv2+ and MIT and GPLv2+ |
| systemd-devel | 219 | Development headers for systemd: http://www.freedesktop.org/wiki/Software/systemd | LGPLv2+ and MIT |
| systemd-libs | 219 | systemd libraries: http://www.freedesktop.org/wiki/Software/systemd | LGPLv2+ and MIT |
| systemd-sysv | 219 | SysV tools for systemd: http://www.freedesktop.org/wiki/Software/systemd | LGPLv2+ |
| sysvinit-tools | 2.88 | Process and utmp management tools: https://alioth.debian.org/projects/pkg-sysvinit/ | GPLv2+ |
| tar | 1.26 | GNU file archiving program: http://www.gnu.org/software/tar/ | GPLv3+ |
| tcl | 8.5.13 | Tool Command Language: http://tcl.sourceforge.net/ | TCL |

| Package | Version | Description | License |
|-------------------|---------|--|---|
| tcp_wrappers | 7.6 | Wrapper for TCP daemons: ftp://ftp.porcupine.org/pub/security/index.html | BSD |
| tcp_wrappers-libs | 7.6 | Libraries for tcp_wrappers: ftp://ftp.porcupine.org/pub/security/index.html | BSD |
| tcpdump | 4.9.2 | Network traffic monitoring tool: http://www.tcpdump.org | BSD with advertising |
| tcsh | 6.18.01 | C shell: http://www.tcsh.org/ | BSD |
| teamd | 1.27 | Team network device control daemon: http://www.libteam.org | LGPLv2+ |
| telnet | 0.17 | Remote login protocol client: https://www.centos.org/ | BSD |
| tftp | 5.2 | TFTP client: http://www.kernel.org/pub/software/network/tftp/ | BSD |
| tk | 8.5.13 | Graphical toolkit for the Tcl scripting language: http://tcl.sourceforge.net | TCL |
| tmpwatch | 2.11 | Utility for removing files based on when they were last accessed: https://fedorahosted.org/tmpwatch/ | GPLv2 |
| traceroute | 2.0.22 | Traceroute utility: http://traceroute.sourceforge.net | GPLv2+ |
| tree | 1.6.0 | File system tree viewer: http://mama.indstate.edu/users/ice/tree/ | GPLv2+ |
| trousers | 0.3.14 | TCG's Software Stack: http://trousers.sourceforge.net | BSD |
| tuned | 2.10.0 | A dynamic adaptive system tuning daemon: http://www.tuned-project.org/ | GPLv2+ |
| tzdata | 2019b | Timezone data: https://www.iana.org/time-zones | Public Domain |
| unzip | 6.0 | Utility for unpacking zip files: http://www.info-zip.org/UnZip.html | BSD |
| urw-fonts | 2.4 | Standard PostScript fonts: http://svn.ghostscript.com/ghostscript/tags/urw-fonts-1.0.7pre44/ | GPL+ |
| usbutils | 007 | USB utilities: http://www.linux-usb.org/ | GPLv2+ |
| usermode | 1.111 | User account management tools: https://fedorahosted.org/usermode/ | GPLv2+ |
| ustr | 1.0.4 | String library: http://www.and.org/ustr/ | MIT or LGPLv2+ or BSD |
| util-linux | 2.23.2 | A collection of basic system utilities: http://en.wikipedia.org/wiki/Util-linux | GPLv2 and GPLv2+ and LGPLv2+ and BSD with advertising and Public Domain |
| vim-common | 7.4.160 | VIM editor: http://www.vim.org/ | Vim |
| vim-enhanced | 7.4.160 | A version of the VIM editor which includes recent enhancements: http://www.vim.org/ | Vim |
| vimfilesystem | 7.4.160 | VIM filesystem layout: http://www.vim.org/ | Vim |

| Package | Version | Description | License |
|--------------------------|----------|--|--------------------|
| vim-minimal | 7.4.160 | A minimal version of the VIM editor: http://www.vim.org/ | Vim |
| virt-what | 1.18 | Detect if we are running in a virtual machine: http://people.redhat.com/~rjones/virt-what/ | GPLv2+ |
| vulkanfilesystem | 1.1.73.0 | Vulkan filesystem package: https://github.com/KhronosGroup | ASL 2.0 |
| wget | 1.14 | Utility for retrieving files: http://www.gnu.org/software/wget/ | GPLv3+ |
| which | 2.20 | Displays where a particular program in your path is located: http://www.xs4all.nl/~carlo17/which/ | GPLv3 |
| wpa_supplicant | 2.6 | WPA/WPA2/IEEE 802.1X Supplicant: http://w1.fi/wpa_supplicant/ | BSD |
| xfspgms | 4.5.0 | Utilities for managing the XFS filesystem: http://oss.sgi.com/projects/xfst/ | GPL+ and LGPLv2+ |
| xinetd | 2.3.15 | Secure replacement for inetd: http://www.xinetd.org | xinetd |
| xkeyboard-config | 2.24 | X Keyboard Extension configuration data: http://www.freedesktop.org/wiki/Software/XKeyboardConfig | MIT |
| xml-common | 0.6.3 | Common XML catalog and DTD files: http://www.w3.org/2003/entities/ | GPL+ |
| xorg-x11-font-utils | 7.5 | X.Org X11 font utilities: http://www.x.org | MIT |
| xorg-x11-protocol-devel | 2018.4 | X.Org X11 Protocol headers: https://www.x.org | MIT |
| xorg-x11-server-common | 1.20.1 | Xorg server common files: http://www.x.org | MIT |
| xorg-x11-server-Xorg | 1.20.1 | Xorg X server: http://www.x.org | MIT |
| xorg-x11-xkb-utils | 7.7 | X.Org X11 xkb utilities: http://www.x.org | MIT |
| xz | 5.2.2 | LZMA compression utilities: http://tukaani.org/xz/ | LGPLv2+ |
| xz-libs | 5.2.2 | Libraries for decoding LZMA compression: http://tukaani.org/xz/ | LGPLv2+ |
| xz-lzma-compat | 5.2.2 | Older LZMA format compatibility binaries: http://tukaani.org/xz/ | GPLv2+ and LGPLv2+ |
| yum | 3.4.3 | RPM package installer/updater/manager: http://yum.baseurl.org/ | GPLv2+ |
| yum-metadata-parser | 1.1.4 | A fast metadata parser for yum: http://linux.duke.edu/projects/yum/ | GPLv2 |
| yum-plugin-fastestmirror | 1.1.31 | Yum plugin which chooses fastest repository from a mirrorlist: http://yum.baseurl.org/download/yum-utils/ | GPLv2+ |

| Package | Version | Description | License |
|------------|---------|---|----------------|
| yum-utils | 1.1.31 | Utilities based around the yum package manager: http://yum.baseurl.org/download/yum-utils/ | GPLv2+ |
| zip | 3.0 | File compression and packaging utility: http://www.info-zip.org/Zip.html | BSD |
| zlib | 1.2.7 | zlib compression and decompression library: http://www.gzip.org/zlib/ | zlib and Boost |
| zlib-devel | 1.2.7 | Header files and libraries for Zlib development: http://www.zlib.net/ | zlib and Boost |

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Note

Source code for packages covered under the [LGPL](#) that contain modifications is located in the file system of the appliance at `/opt/haivision/src/` and can be accessed through the appliance console.

Orthrus Software Credits

Haivision’s Orthrus project is an Media Application Framework and Build System for Media Applications. Kraken is built using a subset of the Orthrus project. This project utilizes numerous 3rd party libraries and source code licensed under various terms. This document lists those 3rd party contributions that may be used in programs and libraries delivered to customers and other 3rd parties by Haivision.

Note

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| Library | Version | Description | License |
|---------------|----------|--|---------------------|
| AESGladman | 2013114 | AES Crypto library: https://github.com/BrianGladman/aes | BSD-Style |
| Aften | 0.0.8 | Audio Encoder Library: http://aften.sourceforge.net/ | LGPLv2.1 |
| AudioFile | 0.3.6 | AudioFile Library: https://github.com/mpruett/audiofile/ | LGPLv2.1 |
| Azure-iot-sdk | 20190318 | Azure IoT SDK: https://github.com/Azure/azure-iot-sdk-c | MIT-Style |
| BOOST | 1.69.0 | BOOST Portable C++ Libraries: http://www.boost.org/ | BOOST |
| BOOST-process | 0.5 | BOOST.Process Library: http://www.highscore.de/boost/process0.5/index.html | BOOST |
| BZip2 | 1.0.8 | BZip2 Compression Library: http://www.sourceware.org/bzip2/ | BSD |
| CMRT | 1.0.6 | https://github.com/intel/cmrt | MIT-Style |
| DesktopVideo | 10.9.11 | BlackMagic Design Desktop Video Utilities, Libraries, Firmware, and Drivers: http://blackmagicdesign.com | Proprietary |
| expat | 2.2.5 | XML Parser Library: http://www.libexpat.org/ | MIT-Style |
| faac | 1.29.9.2 | Freeware AAC Codec: https://sourceforge.net/projects/faac/ | LGPLv2.0 |
| fdk-aac | 2.0.0 | Fraunhofer OpenSource AAC Codec: http://opencore-amr.sourceforge.net/ | ASLv2.0 |
| FFMPEG | 4.3-DEV | Cross platform solution to record, convert, and stream audio and video: https://www.ffmpeg.org/ | LGPLv2.1 |
| FFNVCodec | 9.0.18.1 | NVIDIA Codec Headers for use with FFMPEG: https://github.com/FFmpeg/nv-codec-headers | BSD |
| flac | 1.3.2 | Free Lossless Audio Codec: http://flac.sourceforge.net/ | BSD-Style |
| FreeType | 2.9.1 | Free and portable font rendering engine: http://www.freetype.org | Free-Type BSD-Style |

| Library | Version | Description | License |
|------------------|--------------------|--|-------------|
| FreeBSD | 11.0 | Components from the FreeBSD Runtime. In particular inet_c and str.c functions: https://github.com/freebsd | BSD |
| GLIB2 | 2.55.0 | Library of handy utility functions: http://www.gtk.org | LGPLv2.0 |
| iconv | 1.15 | Unicode and user/system string conversion library: https://www.gnu.org/software/libiconv/ | LGPLv2.0 |
| isc | 9.11.0-P1 | ISC NS Software Components: http://www.isc.org/downloads/ | BSD |
| IQA | 1.1.2 | Image QUALit Assessment: http://tdistler.com/iqa | BSD and MIT |
| LAME | 1.15 | MPEG1 Layer III Audio Encoder: http://lame.sourceforge.net/ | LGPLv2.0 |
| libcurl | 7.44.07.54.17.64.1 | Multiprotocol File Transfer Library: https://curl.haxx.se/libcurl/ | MIT-Style |
| libdrm | 2.4.98 | Direct Rendering Manager runtime library: http://dri.sourceforge.net | MIT |
| libffi | Various | Portable, high level programming interface to various calling conventions: https://sourceware.org/libffi/ | BSD-Style |
| libgcc | Various | GCC Runtime Library: http://gcc.gnu.org/onlinedocs/gccint/Libgcc.html | GCC and GPL |
| liblzma | 5.2.4 | Compressoin Library: http://tukaani.org/xz/ | Public |
| libogg | 1.3.3 | Ogg bitstream file format library: http://www.xiph.org/ | BSD |
| libpciaccess | 0.14 | PCI access library: http://gitweb.freedesktop.org/?p=xorg/lib/libpciaccess.git | MIT |
| libpng | 1.6.36 | Library for manipulating PNG images: http://www.libpng.org/pub/png/ | ZLIB |
| libpthread-stubs | 0.1 | Library that provides weak aliases for pthread functions not in the c runtime or not available by default: https://xcb.freedesktop.org/dist/ | MIT |
| libsamplerate | 0.1.9 | Sample rate conversion library: http://www.mega-nerd.com/SRC/ | BSD-Style |
| libsndfile | 1.0.28 | Library for reading and writing sound files: http://www.mega-nerd.com/libsndfile/ | LGPLv2.0 |

| Library | Version | Description | License |
|------------|------------|---|---|
| libsodium | 1.0.16 | Encryption, decryption, signature, and password hashing library with an API compatible with NaCl: https://github.com/jedisct1/libsodium/ | ISC |
| libstdc++ | Various | GNU C++ Runtime Library: https://gcc.gnu.org/onlinedocs/libstdc++/ | LIBSDTC and LIBSDTCFAQ |
| libudev | Various | Library to access udev device information: http://www.kernel.org/pub/linux/utils/kernel/hotplug/udev.html | LGPLv2.0 |
| libusb | Various | Library which allows userspace access to USB devices: http://sourceforge.net/projects/libusb/ | LGPLv2.0 |
| libuuid | Various | Universally unique ID library: ftp://ftp.kernel.org/pub/linux/utils/util-linux-ng | BSD |
| libvorbis | 1.3.6 | Vorbis General Audio Compression Codec: http://www.xiph.org/ | BSD |
| libvpx | Dev | VP8/VP9 Codec and WebM library: https://www.webmproject.org/code/ | BSD-Style |
| libyuv | Dev | YUV scaling and conversion functionality: https://chromium.googlesource.com/libyuv/libyuv/ | BSD-Style |
| LMOParser | 1.7 | Command line option parser: http://optionparser.sourceforge.net/index.html | MIT |
| msinttypes | r29 | ISO C9x compliant standard inttypes: http://code.google.com/p/msinttypes/ | BSD |
| numactl | 2.0.12 | Library for tuning for Non Uniform Memory Access: ftp://oss.sgi.com/www/projects/libnuma/download | LGPLv2.1 |
| OpenBSD | 6.4 | Components from the OpenBSD Runtime. In particular inet_c and str.c functions: https://github.com/openbsd | BSD |
| openssl | 1.0.2r | Cryptography library with TLS implementation: http://www.openssl.org/ | https://www.openssl.org/source/license.html |
| PortAudio | v190600 | Portable, realtime audio IO library: http://www.portaudio.com/download.html | http://www.portaudio.com/license.html |
| ProtoBuf | 2.4.12.5.0 | Google Protocol Buffers for Data Interchange Format library: https://github.com/google/protobuf | BSD |
| SDL2 | 2.0.10 | Simple Direct Media Layer v2: http://www.libsdl.org/index.php | https://wiki.libsdl.org/FAQ Licensing |

| Library | Version | Description | License |
|-----------|----------|---|----------|
| SHA2 | 07-01-07 | SHA1, SHA2, HMAC, and Key Derivation Library: https://github.com/BrianGladman/sha | BSD |
| Speex | 1.2.rc1 | Voice compression format (codec): http://www.speex.org/ | BSD |
| SRT | 1.3.4 | Secure, reliable transport protocol library: https://github.com/Haivision/srt | MPL |
| TwoLAME | 0.3.13 | MPEG1 Layer II audio encoder: http://www.twolame.org/ | LGPLv2.1 |
| URIParser | 0.9.3 | URI parser library: https://uriparser.github.io/ | BSD |
| UTF8-CPP | 2.3.4 | Library for handling UTF-8 encoded strings: http://utfcpp.sourceforge.net/ | MIT |
| V4L2 | 1.8.1 | Video for Linux (V4L2) API: http://linuxtv.org/downloads/v4l-utils/ | LGPLv2.1 |
| VAAPI | 2.4.1 | Video Acceleration API: https://01.org/linuxgraphics/downloads/ | BSD |
| ZeroMQ | 4.3.1 | Multi-platform distributed RPC library: http://zeromq.org/ | LGPLv3.0 |
| Zlib | 1.2.11 | Zlib compression and decompression library: http://www.gzip.org/zlib/ | ZLIB |
| ZVBI | 20160208 | Zapping VBI library: http://zapping.sourceforge.net/ZVBI/ | LGPLv2.0 |

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- (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.

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OBTAINING WARRANTY SERVICE

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

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

APPLICABLE LAW

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

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

EULA - End User License Agreement

READ BEFORE USING

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

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

If you have questions, please contact legal@haivision.com

SLA - Service Level Agreement

1. Introduction

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

2. Definitions

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

3. Service Levels for the Video Content Management System

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

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

4. Exceptions to Availability for the VCMS

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

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

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

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

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

5. Credits for Downtime for the VCMS

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

6. Support Services for the VCMS

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

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

| Severity Level | Error State Description | Status Response Within | Incident Resolution within |
|-----------------------|--|------------------------|----------------------------|
| 1 - Critical Priority | Renders Haivision VCMS inoperative or causes Haivision VCMS to fail catastrophically. | 15 minutes | 4 hours |
| 2 - High Priority | Affects the operation of Haivision VCMS and materially degrades Your use of Haivision VCMS. | 30 minutes | 6 hours |
| 3 - Medium Priority | Affects the operation of Haivision VCMS, but does not materially degrade Your use of Haivision VCMS. | 2 hours | 12 hours |

| Severity Level | Error State Description | Status Response Within | Incident Resolution within |
|------------------|--|------------------------|----------------------------|
| 4 - Low Priority | Causes only a minor impact on the operation of Haivision VCMS. | 1 business day | 3 business days |

7. Service Levels for Haivision Streaming Media Service

Haivision agrees to provide a level of service demonstrating 99.9% Uptime. The Haivision Streaming Media Service will have no network Outages.

The following methodology will be employed to measure Streaming Media Service availability:

Agents and Polling Frequency

- a. From six (6) geographically and network-diverse locations in major metropolitan areas, Haivision’s Streaming Media will simultaneously poll the domain identified on the Haivision Streaming Media network.
- b. The polling mechanism will perform a PING operation, sending a packet of data and waiting for a reply. Success of the PING operation is defined as a reply being received.
- c. Polling will occur at approximately 6-minute intervals.
- d. Based on the PING operation described in (b) above, the response will be assessed for the purpose of measuring Outages.

If an Outage is identified by this method, the customer will receive (as its sole remedy) a credit equivalent to the fees for the day in which the failure occurred.

Haivision reserves the right to limit Your use of the Haivision Streaming Media network in excess of Your committed usage in the event that Force Majeure events, defined in the Agreement, such as war, natural disaster or terrorist attack, result in extraordinary levels of traffic on the Haivision Streaming Media network.

8. Credits for Outages of Haivision Streaming Media Service

If the Haivision Streaming Media network fails to meet the above service level, You will receive (as your sole remedy) a credit equal to Your or such domain’s committed monthly service fee for the day in which the failure occurs, not to exceed 30 days of fees.

9. No Secondary End User Support

UNDER NO CIRCUMSTANCES MAY YOU PROVIDE CONTACT INFORMATION FOR HAIVISION SERVICES TO CUSTOMERS OR AUDIENCE MEMBERS OR OTHER THIRD PARTIES WITHOUT HAIVISION’S EXPRESS PRIOR WRITTEN CONSENT.

Getting Help

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

