

Product Overview

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

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

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

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

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

Makito X Encoder (Front View, Single Height Chassis)



Makito X HEVC Encoder (Front View, Dual Height Chassis)



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



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



Topics Discussed

- [Chassis Styles](#)
- [HEVC Encoding](#)
- [Dual Channel vs. High/Low Encoding](#)
- [Secure Reliable Transport \(SRT\)](#)
- [IPv6 Support](#)
- [Storage and Recording](#)
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Chassis Styles

The Makito X is available in the following chassis styles:

- as an ultra-compact appliance (single-height or dual-height) for single or dual channel encoding.
- as a blade within a 1RU chassis (MB6X) that can contain up to six single-height or three dual-height Makito X or other Haivision encoder/decoder blades.
- as a blade within a 4RU chassis (MB21) that can contain up to 21 single-height or ten dual-height Makito X or other Haivision encoder/decoder blades.

In addition, the following harsh or ruggedized appliances are available:

- Makito X Harsh semi-ruggedized, industrial single or dual SDI encoder appliance.
- Makito XR ("Ruggedized") platform supporting two or four video input variants in a MIL-STD rugged appliance. Note that support for analog and embedded audio capture or encoding is not currently provided for the Makito XR.
- Makito XCR ("Compact Ruggedized") SDI platform supporting two or four video input variants in a compact and ruggedized military-grade appliance.
- Makito X HEVC Rugged platform supporting HEVC encoding in a ruggedized military-grade appliance.

The Makito X single-height and dual-height chassis appliances and single blades are shown in the [Product Overview](#). The Makito X with HEVC, MB21 and MB6X chassis, Makito X Harsh, and Makito XCR are shown in the following figures.

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



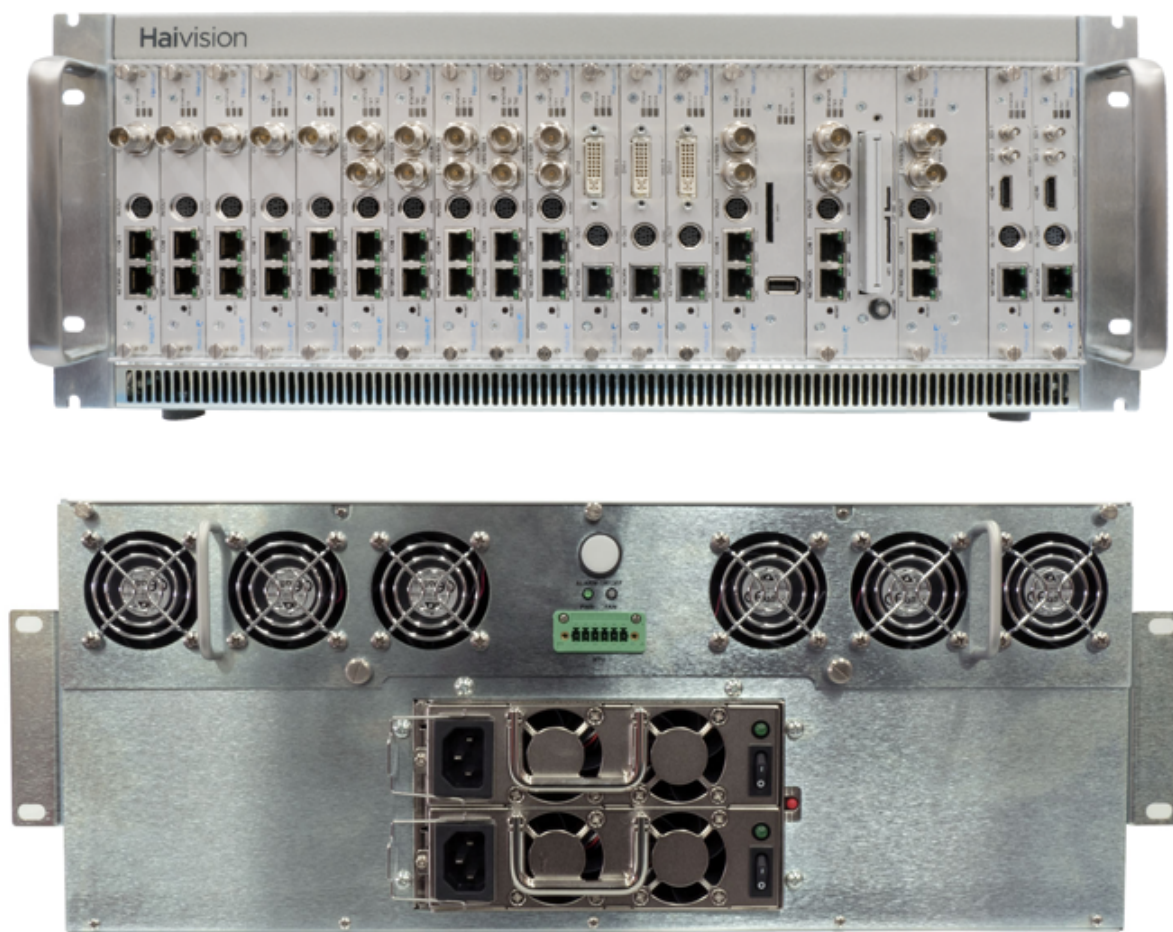
MB6X Multichannel Chassis (Front and Rear Views, #MB6X-RAC)



Note

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

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



Makito X Harsh (Dual SDI Encoder Appliance)



Makito XCR (compact and ruggedized Makito military-grade appliance)

**Note**

For details on the Makito X harsh or ruggedized encoders, please refer to the following documents (available on the Haivision InfoCenter):

- *Makito X HEVC Rugged Encoder Installation Guide*
- *Makito XCR Encoder Installation Guide*
- *Makito X Harsh Installation Guide*
- *Makito XR (Ruggedized) Installation Guide*

HEVC Encoding

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

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

Dual Channel vs. High/Low Encoding

In addition to encoding single input sources, the Makito X supports dual channel and High/Low encoding. Dual channel encoding features two input sources as two independent encoders. With High/Low encoding, the Makito X encodes a single input source and emits both high and low bandwidth streams simultaneously. Following are some differences between the two in H.264 vs. HEVC encoding:

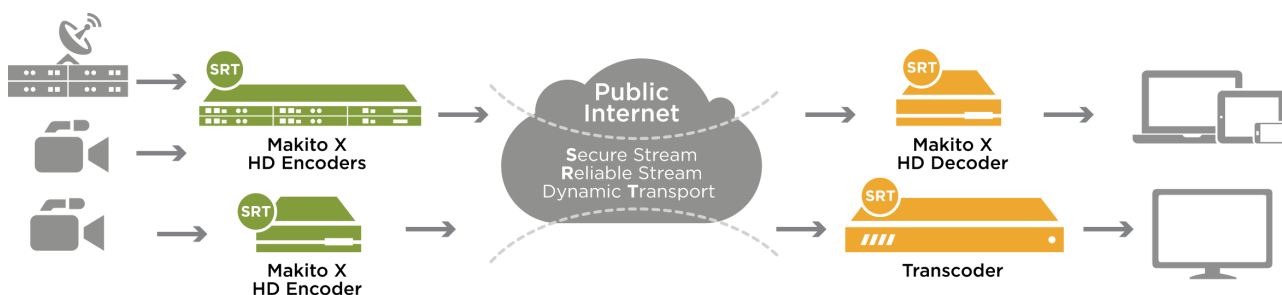
	Dual Channel	High/Low
H.264 Encoding	Both inputs can be up to 1080p60, with no limitations on the coded picture resolution or frame-rate.	No limitations on the two resolutions/frame-rates that a single input video source can encode.
HEVC Encoding	Each input (BNC1 and BNC2) supports up to a 720p60/1080i30/1080p30 HD-SDI signal.	A single input can be up to 1080p60, but both HEVC encoders must select lower coded picture resolutions/frame-rates. For example, Input is 1080p60 video, HEVC Video Encoder 4 is set to 1080p30, and HEVC Video Encoder 5 is set to 720p60.

Secure Reliable Transport (SRT)

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

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

Makito X SRT Workflow



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

Related Topics

- [\(2.5.2\) Configuring Secure Reliable Transport \(SRT\)](#)

IPv6 Support

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

Version 2.3 IPv6 capabilities include the following:

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

Related Topics

- [\(2.5.2\) Configuring Network Settings](#)
- [\(2.5.2\) ipv6config](#) (CLI command)

Storage and Recording

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

The Makito X with Storage provides the following benefits:

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

For more information, see [\(2.5.2\) Storage Options](#).

Applications

Typical examples of Makito X applications include:

- **IPTV Distribution** – delivering video channels to viewers in schools, financial institutions, live event venues, control rooms, and within government organizations.
- **Medical Systems** – driving controlled and secure video throughout healthcare facilities enabling education, consultation, and procedural review.
- **Streaming Services** – connecting facilities, affiliates, and event locations with realtime high definition video, simultaneously addressing streaming and distribution challenges.
- **ISR (Intelligence, Surveillance, Reconnaissance)** – combining the excellent image quality and performance of 1080p60 high definition video with KLV/CoT metadata capabilities.

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Founded in 2004, Haivision is now a market leader in enterprise video and video streaming technologies. We help the world's top organizations communicate, collaborate and educate. Recognized as one of the most influential companies in video by Streaming Media and one of the fastest growing companies by Deloitte's Technology Fast 500, organizations big and small rely on Haivision solutions to deliver video. Headquartered in Montreal, Canada, and Chicago, USA, we support our global customers with regional offices located throughout the United States, Europe, Asia and South America.

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