Makito
HD H.264 Encoder

Intelligent IP Video
COMPACT – HIGH PERFORMANCE – AFFORDABLE
HD H.264 - Encode Once & Deliver HD Everywhere!

Makito™ encoders revolutionize video-over-IP by enabling HD to be distributed throughout the organization without reservation. At a fraction of the price and with a significant performance advantage over competing technology, the Makito is ideal for multi-channel enterprise IPTV delivery, for HD signage deployments, and for mass HD distribution/record environments such as schools, medical facilities, stadiums, auditoriums, professional training, and simulation environments.

H.264 up to 1080p60. The Makito is perfectly suited for today’s and tomorrow’s challenges. The Makito is based on the highly efficient H.264 compression standard saving over 50% of the bandwidth and disk space required by MPEG-2 IP video deployments. It supports HD up to 1080p60 (component analog or digital) or computer resolutions including 1920x1080, 1280x1024, and 1024x768 at full frame rate (RGB or DVI-D) input via its DVI-I connector. The Makito SDI supports SDI, HD-SDI, 3G-SDI (the new standard for 1080p60), and composite on a single BNC. S-video for standard definition is also supported. With this array of compatibility, the Makito addresses video-over-IP encoding anywhere on a resolution/ bandwidth scale from CIF as low as 150 kbps to Full HD at 15 Mbps.

5 times the density. 10 times as energy efficient – much more powerful – extremely fast!!! The Makito is based on Haivision's progressive ASIC / DSP mini-blade architecture. It is available as an ultra compact appliance for single channel encoding or within a 1RU or 4RU chassis for high-density challenges. The Makito uses 1/5 of the rack space and 1/10 the power (green technology) and delivers twice the resolution of typical 1RU encoders. To complete the picture of the revolutionary power of the Makito, it encodes up to 1080p60 video into H.264 in well under 70 milliseconds.

Makito Decoder. Haivision also offers a mated performance decoder in the same form factor supporting HD H.264 up to 1080p60, with HDMI and HD-SDI, and delivering lower than 70-millisecond end-to-end performance.

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 real-time high definition video, simultaneously addressing streaming and distribution challenges.
“Encode Once” technology. The Makito marries the most advanced IP video networking features with the power and ubiquity of the H.264 standard. This allows users to address many network video destinations and delivery methods simultaneously. A single Makito can stream to many distinct network client “destinations” simultaneously, with each video stream specifically groomed. Client destinations may include local multicasts (addressing unlimited numbers of users, players, or set top boxes), remote unicast destinations (the WAN typically supports point to point unicast traffic), streams directed at specific streaming server systems (such as the powerful Wowza Media Server™ for Flash and other standards), and streams managed by Haivision’s Furnace IP video distribution system. Furthermore, the Makito supports HiLo-Streaming™ – the ability to produce both a full resolution full bandwidth stream and a reduced resolution low bandwidth stream simultaneously (perhaps, for example, HD at 8 Mbps and SD at 700 kbps). The combination of these two features allows users to encode once with the Makito and deliver the best high definition video to wherever it is needed.

Easy. Although the Makito is complete with the latest compression and networking features it remains an easy to use and deploy, robust appliance. Users can control the Makito through its intuitive web interface (complete with on-line help facilities). Integrators may opt to control the Makito over IP or serial port via its comprehensive command line interface or even through SNMP. Advanced encoder control is also available directly through Haivision’s Furnace system.

Directly Integrated with the Furnace & Absolutely Secure. The Makito also supports very advanced features such as traffic shaping, forward error correction, and encryption. Supporting AES encryption ensures that even in multicast environments your video content is absolutely secure. When combined with Haivision’s Furnace IP video distribution system and InStream™ “zero footprint” desktop player technology, you get end-to-end confidence that only those who are allowed to view specific content can access that content, and that they cannot record or copy that content directly in any way.

Open & Standards Based. The Makito fully supports H.264 video compression and AAC audio compression, industry standards that have been adopted by all major companies in the IP video segment. End-to-end solutions rely on seamless interoperability. Haivision’s applications team takes compliance and third party and quality assurance testing seriously. The Makito is interoperable with industry standard set top boxes, with HaiPLAY (Haivision’s open source free performance soft player), VideoLAN’s VLC player and Apple QuickTime. With the release of Haivision’s Furnace system, the Makito is also integrated with and compatible with the Furnace Portal Manager, the InStream player, and the Stingray™ set top box, providing a complete end-to-end HD H.264 IP video distribution solution.
## SPECIFICATIONS

**Makito (x-290E-DVI)**

**Video (Inputs):**
- Y, Pb, Pr / RGBHV component analog
- Y, Cb, Cr / DVI component digital

**Video Resolutions:**
- 1920x1080p 60/59.94/59.94/50 Hz
- 1280x720p 60/59.94/50 Hz
- 720x480p 60/59.94/50 Hz
- 1024x768 65/75/60 Hz

**Audio (Input):**
- Available through terminal block connector:
  - Balanced Stereo Analog Audio
  - Unbalanced Stereo Analog Audio

**Makito-SDI (x-290E-HDSDI)**

**Video (Inputs):**
- S/Video NTSC/PAL
- Composite NTSC/PAL
- SD-SDI SMPTE 299M-C
- HD-SDI SMPTE 29M
- HD-SDI SMPTE 24M
- 3G-SDI SMPTE 42M
- 4K-SDI SMPTE 42M

**Audio Resolutions:**
- 1920x1080p 60/59.94/59.94/50 Hz
- 1280x720p 60/59.94/50 Hz
- 720x480p 60/59.94/50 Hz

**Audio (Input):**
- Available through terminal block connector:
  - Balanced Stereo Analog Audio
  - Unbalanced Stereo Analog Audio

**Advanced Features:**
- Hilo-Streaming
- SD De-interlacing
- Built-In Downscaling
- Deblocking Filter
- EIA-608-B Closed Captioning (NTSC Line 21)
- Forward Error Correction
- AES Encryption 128-bit or 256-bit
- Logo overlay
- Still image transmission
- SD aspect ratio configuration
- SD AFD and WSS (x-290E-HDSDI)
- Color space configuration (x-290E-DVI)

### Video Encoding

**Compression Standard:**
- H.264 (MPEG-4 AVC Part 10)

**Main Profile**
- Level 4.2 and lower

**Intermediate Levels**
- I, P, B frames

**Configurable Group of Picture (GOP) Size**
- Configurable frame rate

**Bit Rates:**
- SDHD from 150 kbps to 15 Mbps
- Rate Control:
  - CBR/VBR

**Latency:**
- 80 ms

#### Audio Encoding

**Compression Standard:**
- MPEG-2 AAC-LC ISO/IEC 13818-7
- MPEG-4 AAC-LC ISO/IEC 14496-3

**Audio Channels:**
- 2 per video channel

**Bit Rates:**
- From 32 to 448 kbps per audio pair

**Frequency Response:**
- 20 Hz to 22 KHz

### Networking Protocols

- Ethernet 10/100/1000 Base-T, auto-detect, Half/Full-duplex
- Direct RTP - H.264 over RTP (RFC 3984)
- RTP / RTCP (RFC 3550)
- QuickTime RTSP* (RFC 3640)
- SMTP / 259M-C

**Level:**
- Level 4.2 and lower

**Intermediate Levels**
- Level 4.2

**Rate Control:**
- CBR
- VBR

**Unicast Streaming:**
- 21 slot empty chassis
- 20 lbs

**Multicast Streaming:**
- 6 slot empty chassis
- 10 lbs

**Single Blade:**
- 2 slot empty chassis
- 1 lb

### Management Interfaces

- RJ45
- Serial Port
- Telnet
- SSH
- RS-232

**IP Address:**
- 10.10.10.1

### Metadata (Optional)

- CoT to KLV Conversion
- KLV over serial RS-232/422
- KLV over UDP and SDI
- SMPTE 338M compliant
- SMPTE 424M compliant
- Metadata Multiplexing per SMPTE 0604

### Ordering Information

(please obtain complete system quotations from Haivision or an authorized Haivision integration partner)

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Dimensions</th>
<th>Weight</th>
<th>Power</th>
<th>Temperature</th>
</tr>
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<td>S-290E-DVI</td>
<td>Makito Encoder Appliance - HD/SD H.264 IP Video Encoder - Component Analog (Y,Pb,Pr/RGBHV) and Digital Video (DVI) input over DVI-I; up to 1080p60 HD Video or 1280x1024 75Hz Computer; 150 kbps to 15 Mbps.</td>
<td>24mm H x 149mm W x 202mm D (0.92”H x 5.85”W x 8.0”D)</td>
<td>2.5 lbs</td>
<td>5VDC, 13W (each blade); 100-240VAC 15W external locking power supply</td>
<td>Operating: -20º to 50ºC Non-operating: -40º to 50ºC</td>
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<td>MB1 - Makito/Barracuda 6 Slot Chassis</td>
<td>Rackmount 1RU Chassis - Up to 6 Makito/Barracuda mini-blades, dual AC power supply.</td>
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