# Haivision

# Multichannel Bidirectional Low Latency H.264 Codec

**Low Latency Performance Communications** The Mako™ is a high performance encoder/decoder (codec) designed for interactive communications, achieving an end-to-end latency as low as 70 milliseconds for up to 1080p H.264, providing truly interactive sessions between remote sites. The Mako offers the ultimate network video system and global standard for video conferencing within the world's foremost boardrooms, telepresence suites, classrooms, control rooms, and medical operating theaters. The Mako delivers a true-to-life video communication experience at remarkably low bandwidth.

**Flexible Multi-Stream Architecture** Ideal for multi-stream communications, the Mako's chassis enclosure (Hai1000) provides up to 10 channels of bi-directional HD video within a single, telecom-grade appliance. Churches use this capability to transmit center and IMAG feeds simultaneously. Telepresence integrators can assign all displays and cameras within a single system. Within medical applications, a multi-blade Mako system effectively handles stereoscopic endoscope video along with room cameras as well as other sources.
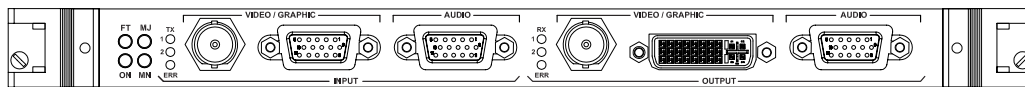
**Power Features** The Mako can encode up to 1080p video and up to 1280x768 on RBG. Uniquely, it can share its compression power between both input ports simultaneously – each at adjusted frame rates. The Mako supports HD-SDI, component, and WXGA inputs, can encode WXGA and HD-SDI simultaneously, and can deliver multiple stream bitrate/resolutions from a single source (Multi-bitrate (MBR) streaming). The Mako is best suited for always-on performance and is typically configured to connect to its remote counterparts upon power-up with no user interaction. The Mako blades reside in the Hai1000 series enclosure. These are available in two varieties: Hai1020 and Hai1060. The Hai1060 model supports up to 5 Mako blades and 10 HD video channels in a single 3 RU frame and a single IP port without the need for any external devices (no MCU required).

## Product **Features**    Product **Benefits**

| Product Features | Product Benefits |
|---|---|
| **Extensible multi-stream system** | Aggregate all of your sources and displays within a single system |
| **Always-on performance** | Initial set up is designed for 24/7 performance |
| **Low latency** | Pristine, interactive, two-way communication |
| **Two HD video channels per blade** | Integrate up to 10 HD and computer sources & displays |
| **Four audio channels per blade** | Designed for both active and auxiliary audio channels |
| **Multi-bitrate (MBR) streaming** | Delivers multiple stream bitrates from any single source stream |
| **Multi-blade high density enclosure** | Tackle any installation with 1 to 5 codec blades, in a 1RU or 3RU chassis, respectively |
| **3rd party integration** | Easily integrate with commonly used room control systems |

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**VIDEO ENCODING / DECODING**
H.264 AVC (MPEG-4 part 10)
*HD-SDI/SDI Resolution:*
    720x480/576i 25, 30 frames per second
    1280x720p 25, 30, 50, 60 frames per second
    1920x1080i 25, 30 frames per second
    1920x1080p 25, 30 frames per second
*YPbPr Resolution:*
    720x480/576i 25, 30 frames per second
    1280x720p 25, 30, 50, 60 frames per second
    1920x1080i 25, 30 frames per second
*RGBHV Resolution:*
    SVGA 800x600 up to 85 Hz
    XGA 1024x768 up to 85 Hz
    WXGA 1280x768 up to 60 Hz
*Bit Rates:*
    HD from 256 kbps to 10 Mbps
    SD from 256 kbps to 10 Mbps
*Rate Control:*
    VBR/CBR
*Latency (end-to-end):*
    Less than 70ms
*Compression Standard:*
    H.264 AVC (MPEG-4 part 10)
    ISO/IEC 14496-10
    Baseline and Main Profile
    Level 4.1 and lower Intermediate Levels
    I, IP framing
    Variable Group of Picture (GOP) size

**AUDIO ENCODING / DECODING**
MPEG AAC
*Compression Standard:*
    MPEG-2 AAC-LC ISO/IEC 13818-7
    MPEG-4 AAC-LC ISO/IEC 14496-3
*Audio Channels:*
    Up to 4 per video channel
*Bit Rates:*
    From 32 to 448 kbps per audio pair
*Frequency Response:*
    From 20 Hz to 22 kHz
*A-V Synchronization:*
    Under 20 milliseconds

**ADVANCED FEATURES**
    Logo overlay
    EIA-608-8 closed captioning (NTSC Line 21)
    Deblocking filter
    Dual port encoding
    (HD-SDI with YPbPr or RGBHV)
    Multi-bitrate (MBR) streaming
    Built-in downscaling

**AUDIO/VIDEO INTERFACES**
*SDI / HD-SDI (Input/Output):*
    SMPTE 259M-C 75Ω BNC
    SMPTE 296M 75Ω BNC
    SMPTE 274M 75Ω BNC
    SMPTE 292M 75Ω BNC
    Embedded audio supported
*YPbPr (Input/Output):*
    CEA_770.2-C
    CEA_770.3-C
    DB15 to 3xBNC breakout required on input
    DVI-I to 3xBNC breakout required on output
*RGBHV (Input/Output):*
    VGA
    SVGA
    XGA
    WXGA
    No breakout required on input
    DVI-I to VGA DB-15 (breakout required on output)
*Audio (Input/Output):*
    4 analog audio channels
    Balanced XLR connectors
    Unbalanced RCA connectors
    DB15 breakout required, specify when ordering
    Embedded audio supported on SDI
    SMPTE 272M
    SMPTE 299M

**NETWORK & MANAGEMENT INTERFACES**
*IP Network Interface:*
    Ethernet 10/100 Base-T, auto-detect,
    Half/Full-duplex
*Connector:*
    RJ45
*Networking Protocols:*
    H.264 over RTP (RFC 3984)
    Transport stream over UDP / RTP
    RTP / RTCP
*Management Interface:*
    RS-232
    RJ45 to RS-232 DB-9 management cable req'd
*Management:*
    HTTP (web browser)
    Command line over SSH/Telnet/RS-232
    FTP/TFTP
    SNMP v3

**Hai1060, 6 slot (3RU)**
*Temperature:*
    0° to 50° C (32° to 122° F) operating
    -40° to 70° C (-40° to 158° F) non-operating
*Dimensions:*
    130mm H x 438mm W x 343 mm D
    5.125"H x 17.25"W x 13.5"D
*Power Requirements:*
    110-240V AC or -48V DC; 200 W max
*Weight:*
    Approximately 9.1 kg (20 lbs) fully loaded
    Relative Humidity:
    Up to 95% without condensation
*Certification:*
    UL/CSA/CE, RoHS/WEEE
*Compliance:*
    EN 55022/55024;
    FCC Part 15, Subpart B, Class A
*Rackmount:*
    19" included

**Hai1020, 2 slot (1RU)**
*Temperature:*
    0° to 50° C (32° to 122° F) operating
    -40° to 70° C (-40° to 158° F) non-operating
*Dimensions:*
    44mm H x 438mm W x 305 mm D
    1.75"H x 17.25"W x 12"D
*Power Requirements:*
    110-240V AC; 125W max.
*Weight:*
    Approximately 4.5 kg (10 lbs)
    Relative Humidity:
    Up to 95% without condensation
Certification:
    UL/CSA/CE, RoHS/WEEE
*Compliance*:
    EN 55022/55024;
    FCC Part 15, Subpart B, Class A
*Rackmount:*
    19" included

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## Mako Product Portfolio & Ordering Information **

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|---|---|---|
| Mako HD Codec Blade | **B-1000-HDED** | **MPEG-4 AVC (H.264) HD Encoder/Decoder Blade** - HD-SDI w/ AES/EBU and YPbPr/RGBHV w/ 4 Channel Analog Audio - 720p/1080i/1080p. |
| Hai1060 6 Slot Chassis | **F-1060-AC/DC** | 6 slot chassis with CPU & IP Ethernet Network Interface Blade (AC or DC Power Supply) |
| Hai1020 2 Slot Chassis | **F-1020** | Hai1020 2 slot chassis with CPU & IP Ethernet Network Interface Blade (AC Power Supply) |
| Hai1020 2 Slot Chassis Med | **F-1020-MED** | 6 slot chassis with CPU & IP Ethernet Network Interface Blade (AC Medical Grade Power Supply) |

** For complete pricing and ordering, contact us at sales@haivision.com or your certified Haivision reseller.

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