Matrox® Monarch™ EDGE
4K/Multi-HD Webcasting Encoder

In a media landscape filled with continuously evolving online video platforms (OVPs), traditional broadcasters are beginning to leverage their existing over-the-top (OTT) delivery methods to deliver content specialized for the web. By enhancing means of linear programming delivery, broadcasters can expand their reach and meet their audiences through new online-only channels. Using the latest in webcasting innovations, such as high-frame rate 4K (HFR), 4K 360 VR, and multi-camera selection, which are only supported on desktop, mobile, and Smart TV web-based video players, broadcasters can deliver unique and compelling live content. Designed to take on today's engaging webcasting workflows, Matrox Monarch EDGE provides broadcasters with robust, low-latency, and dynamic H.264 encoding capabilities packaged in a compact, low power, and portable appliance.

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matrox®
Digital Video Solutions

4K
ULTRA HD *HFR*
HIGH FRAME RATE

Pristine Quality Delivered to Any Screen

Producing and delivering live events in 4K is becoming more widespread, and homes across the globe are adding increasingly fast network download capabilities, as well as 4K TVs to accommodate this content. OVPs are capable of downscaling content optimized for large 4K TV screens to smaller screens when 4K streams are sent to them. When OVPs let TVs tackle the upscaling of HD content to fill screens, the result is not optimal. Monarch EDGE eliminates any comprise by encoding 4K at high frame rates (50 or 60 fps), while the OVP handles any downscaling. With Monarch EDGE, content providers can deliver a superlative 4K viewing experience.

Stream Every Angle

Monarch EDGE is a high-density encoding platform that can accept four independent HD inputs and deliver multiple streams per input, ideal for central equipment room installations. Also one of the latest innovations from YouTube is multi-camera event support, which allows users to view a main camera angle, or switch to a secondary angle if desired. With a single Monarch EDGE device, four different camera angles can be streamed simultaneously.

Even More Reach

Monarch EDGE's powerful encoding engine allows users to stream to multiple OVPs simultaneously for unprecedented reach and exposure. With Monarch EDGE's ability to reach over 16 top OVPs, such as YouTube, Facebook, Vimeo, Ustream, and LinkedIn among others, users can extend their reach and engage with their audiences where they are rather than luring them to a single OVP.

Uncompromising H.264 Quality

The H.264 codec is universally accepted for web contribution and live streaming. Monarch EDGE's unique implementation of the codec keeps data rates exceptionally low while minimizing latency without sacrificing quality. Monarch EDGE's independent encoding operations per input can be configured to stream to a single or multiple destinations. Each operation benefits from a powerful scaling and de-interlacing engine to ensure only pristine images and audio are encoded.

Flexible Streaming Formats

Monarch EDGE supports a variety of streaming protocols. Social media platforms such as Facebook and YouTube use the ever-popular RTMP format. SRT is a new open-source format that provides the reliability of RTMP, while reducing latency, for use on open networks. On local networks, MPEG-2 TS or RTSP streams can be selected for delivery over in-house networks. Finally, multiple destinations can be targeted for each encoding profile.

SDI and IP Connectivity

Monarch EDGE offers flexible, future-proof connectivity with 3G, 12G SDI, and ST 2110 over 25 GbE network connections. Inputs are auto-detectable and allow for a wide range of connectivity to devices such as cameras, switchers, vision mixers or routers. Additionally, audio can be selected from two channels of embedded audio per video input, or professional XLR connectors.

Convenient, Centralized Control

Monarch EDGE Control Hub is a powerful application that provides management and configuration remotely over all Monarch Edge units on the network. This powerful software provides authorized users with high-level views of all devices on the network, and enables full access and control from a single, easy-to-use interface.

Preview Inputs

Allowing up to four simultaneous input previews on a single desktop monitor, Monarch EDGE ensures that videos are ready to be webcasted. Monarch EDGE Control Hub allows users to effortlessly configure how they would like to preview audio sources of input. Users can choose to monitor one input at a time, or mute the DisplayPort audio output.
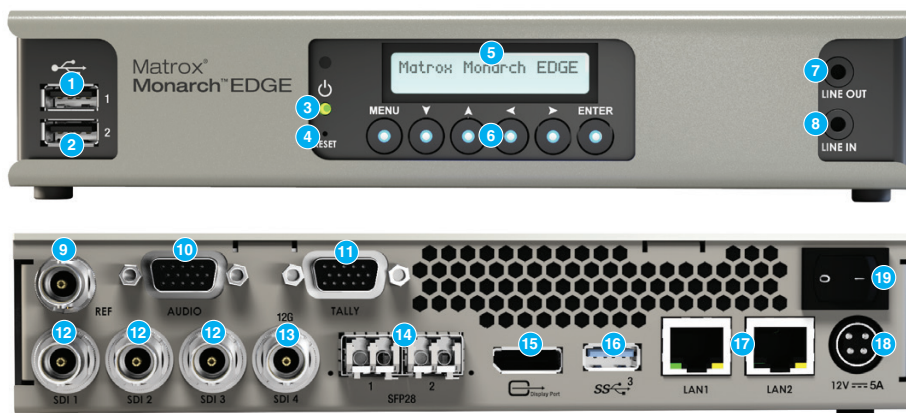
Robust and Practical Design

Monarch EDGE was built with reliability in mind. An LCD screen on the front of the appliance allows the user to quickly access its status and configuration settings. A locking power connector safeguards against connection loss during production. Redundant Ethernet (1 GbE) ports allow users to control the device from one port while sending video from a second port. Users can opt to send the same streams from each port while taking completely separate network paths. Finally, Monarch EDGE's compact design ensures it can be installed in a fly-pack or with a second Monarch EDGE unit in a 1RU-rack space.

Matrox Monarch EDGE connections

1. USB 1	**7.** Analog Audio Output	**14.** *SFP28 Ports
2. USB 2	**8.** Analog Audio Input	**15.** Display Port
3. Power LED	**9.** Genlock	**16.** USB 3
4. Reset Button	**10.** Balance Audio	**17.** Gigabit Ethernet Port
5. LCD Panel	**11.** Tally Signals	**18.** Power Connection
6. Navigation and Configuration Buttons	**12.** 3G SDI	**19.** Power Switch
	13. 12G SDI	

*SFP module supplied by third party

Technical Specifications

Connectivity

Input connections
- 1x 12G SDI input per ST 2082
- 3x 3G SDI inputs per ST 425
  (Level A mapping only)
- UHD support using 4 SDI inputs per SMPTE ST 425-5
  - Square division
  - 2x sample interleave input[1]
- 2x SFP 28 network ports (up to 25 Gbps)[1]
- Capture up to four independent 3 Gbps video streams or one 12 Gbps (4Kp60) stream encapsulated per SMPTE ST 2110-10, -20, and -21. Seamless protection (redundancy) according to SMPTE ST 2022-7.

Resolutions
- 2160p at 50, 59.94, 60 fps
- 1080p at 25[1], 29.97[1], 30[1],50, 59.94, 60 fps
- 1080i at 25, 29.97, 30[1] fps
- 720p at 50, 59.94, 60 fps

Configurable genlock
- Bi-level genlock output
- Bi-level or tri-level genlock input

Digital audio
- 8x channels of embedded audio support per SDI input. Two channels per input supported with first release.[1]

Analog audio[2]
- 2x channels of balanced analog audio input via XLR connector
- 2x channels of balanced analog audio output via XLR connector[1]
- 1 channel of unbalanced stereo audio output via 1/8" TRS connector
- All sampled at 48 kHz

Audio processing
- Embedded or analog audio channels can be compressed as a stereo pair or processed as PCM[1] (uncompressed audio)
- Multi-channel audio support as separate audio pairs[1]

Control and management

Access
- Monarch EDGE Control Hub dedicated Windows® application
- RESTful HTTP API[3]

Physical
- On-device buttons and screen for basic set up and monitoring operations

Monitoring output
- 1x DisplayPort (HD output only)

Compression

Codecs
- Video: H.264/MPEG-4 part 10 (AVC)
- Audio: AAC-HE and AAC-LC

Bitrate per stream
- Video: Up to 120 Mbps
- Audio: From 32 to 256 Kbps

Chroma sub-sampling
- 4:2:2 (8-bit and 10-bit),
  4:2:0 (8-bit and 10-bit) – MDG4/E10/I
- 4:2:0 (8-bit only) – MDG4/E8/I

Encoding controls
- Up to 5.2 level support
- GOP size and structure
- Variable and constant bit rate support
- Average max/min data rate controls
- Encoding frame rates offered independent of input frame rates

Profile
- Up to High 4:2:2 profile (Hi422P)

Latency
- Encode latency as low as 50ms (network transfers and decode operation not included in value)

Encode density/workflow examples
- One (1) 3840 x 2160p @60 fps (encoded as 4:2:0 or 4:2:2) plus one 1080p (4:2:0 8 bit) proxy stream
  OR
- Four (4) 1920 x 1080 @60 fps (encoded as 4:2:0 or 4:2:2) plus four 720p30 (4:2:0) proxy stream

  There are a number of additional encoding profiles that can be generated per input.

VANC ancillary data processing (SDI and IP)[1]

- Closed captioning (CC) embedded in VANC processing as CEA-608/708
- Vertical interval timecode (RP-188)
- HDR and colorimetry metadata

Tally light output[1]

- 8x tally signals (sent to cameras)
- Tally ports available via a 15-pin D-SUB connector

Streaming protocols

- MPEG-2 TS over UDP
- RTP/RTSP
- Native RTP[1] (unicast or multicast)
- SRT
- RTMP

Network

- 2x RJ45, 100/1000BASE-T Ethernet
- 2x MSA-compatible SFP28 cage supporting 10 GbE and 25 GbE modules[1]

Physical and power

Product dimensions (length x width x height)
- 8.53x7.45x1.68 in (21.7x18.9x4.3 cm)
- Rack-mountable; two Monarch EDGE appliances can fit in 1 RU space

Product weight
- 3.65 lbs (1,660 g)

Operating conditions
- 32 to 104 deg. F (0 to 40 deg. C), 20 to 80% relative humidity (non-condensing)

Power
- Line voltage: 12 volts
- Total power consumption: 45 watts [avg.]
- Connector: DIN 4

Power supply
- Line voltage: 100-240 VAC
- Frequency: 50-60 Hz
- Input: external AC/DC adapter - IEC320-C14
- DIN4 locking power connector

Regulatory
- EMI: FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
- Power-supply safety: UL/CUL(UL60950-1), TUV-GS(EN60950-1), T-LICENSE(BS EN60950-1), CCC(GB4943.1-2011), PSE(J60950), SAA(AS/NZS60950-1), KC-MARK(K60950), S-MARK(IEC60950-1)
- RoHS directive 2002/95/EC

Warranty
- Two-year limited warranty with free online or telephone support

Ordering information

MDG4/E10/I
- Monarch EDGE appliance with 4:2:0 8-bit and 4:2:2 10-bit encoding

MDG4/E8/I
- Monarch EDGE appliance with 4:2:0 8-bit encoding

MRCH/RACK/KIT
- Monarch Rack Mount Kit. Can fit up to two Monarch EDGE units in a 1RU space.

PWR/SUP/MDG
- Monarch EDGE power supply unit. Does not include IEC-C14 power cord. These cables must be sourced locally.

MDG/AUD/CBL
- Monarch EDGE break out audio cable. Provides two input channels and two output channels. DB15 to XLR I/O.

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1. Enabled with future firmware update.
2. Available via optional Audio cable.
3. Contact Matrox Representative for Availability.

Matrox is a market leader in the 4K and HD digital video hardware and software fields, offering accelerated H.264 encoding, streaming, AV signal conversion, capture/playout servers, and CGs. Matrox's Emmy award-winning technology powers a range of multi-screen content creation and delivery platforms used by broadcasters, telcos, cable operators, post-production facilities, live event producers, videographers, and AV professionals worldwide. Founded in 1976, Matrox is a privately held company headquartered in Montreal, Canada.
For more information, visit **www.matrox.com/video**.

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