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.

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. Thanks to innovations such as multi-camera event support offered by YouTube, users have the ability to select from main or secondary camera angles when viewing content. 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 each input to multiple OVPs simultaneously for unprecedented reach and exposure. With Monarch EDGE's ability to reach over 16 destinations, 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 protocols

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.

Versatile recording

Monarch EDGE offers the ability to record SDI inputs – at the user's quality of choice – while simultaneously streaming using the user's preferred transport protocol. Recordings can be saved to USB 3.0 attached storage or to local networks. Monarch EDGE makes sharing post-event recordings easier than ever with the ability to record to the popular H.264 codec with MOV and MP4 wrapper options. Thanks to Monarch EDGE's support of the H.264 codec, files can be played on any device.

Ancillary data for automation and viewer experience

Monarch EDGE supports contribution and distribution workflows by sending and receiving ancillary data, including closed captioning and SCTE messaging. Easily integrate into automated workflows for playout and ad insertion and transmit closed captions to enhance audience engagement. Monarch EDGE improves operational efficiency and strengthens the overall viewer experience, all with the highest video quality, making it a trusted choice for broadcasters.

Localized preview

Allowing up to four simultaneous input previews on a single desktop monitor, Monarch EDGE's DisplayPort output ensures that videos are valid and ready to use. Monarch EDGE Control Hub allows users to effortlessly configure how they would like to preview audio sources of input. From the DisplayPort and line out, users can choose to monitor one audio input at a time, or mute all.

Robust and practical design.

Monarch EDGE was built with reliability in mind. An LCD screen on the front of the appliance allows users 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, OB van, or with a second Monarch EDGE unit in a 1RU-rack space.

Comprehensive connectivity

The Monarch EDGE encoder 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, and routers. The audio included in each web stream can be selected from any of the stereo pairs embedded in the SDI signal, or from the balanced analog audio via XLR connectors.

Centralized command, convenient control

Enhance your experience with Monarch EDGE devices with Monarch EDGE Commander Center. Manage and access your Monarch EDGE devices locally or online via a web browser, without additional software installation requirements. Benefit from web-based firmware updates and included technical support to ensure your devices are up-to-date and running smoothly. Monarch EDGE Control Hub software enables you to discover all Monarch EDGE units on a local network through a Windows® desktop application.

Appliance overview

Matrox Monarch EDGE (encoder/decoder connections)

1. USB 1
2. USB 2
3. Power LED
4. Reset button
5. LCD panel
6. Navigation and configuration buttons
7. Analog audio output
8. Analog audio input
9. Genlock
10. Balanced audio
11. Tally signals
12. 3G SDI
13. 12G SDI
14. SFP28[1] ports
15. DisplayPort
16. USB 3
17. Gigabit ethernet port
18. Power connection
19. Power switch

1. SFP module supplied by third party.

Technical specifications

Product	Monarch EDGE
Part number	• MDG4/E8/I2 - Monarch EDGE appliance with 4:2:0 8-bit encoding - Includes IEC-C14 power cord (US, UK, AUS, EUR) • 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.
Connectivity	
Input connections	• 1x 12G SDI input per ST 2082 • 3x 3G SDI inputs per ST 425 (Level A and B mapping) • UHD support using 4 SDI inputs per SMPTE ST 425-5 - Square division - 2x sample interleave input • 2x SFP 28 network ports (up to 25 Gbps) • 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 23.98, 24, 25, 29.97, 30, 50, 59.94, 60 fps • 1080i at 25, 29.97, 30 fps • 720p at 50, 59.94, 60 fps
Genlock	• Bi-level genlock output
Digital audio	• 16x channels of embedded SDI audio is supported per input • 16x channels of audio support per encode using SRT or MPEG2 TS
Analog audio[1]	• 2x channels of balanced analog audio input via XLR connector • 2x channels of balanced analog audio output via XLR connector • 1 channel of unbalanced stereo audio output via 1/8” TRS connector
Audio processing	• Embedded or analog audio channels can be compressed as a stereo pair or processed as PCM (uncompressed audio) • Multi-channel audio support as separate audio pairs
USB ports	• 2x USB 2.0 (front) • 1x USB 3.0 (back)
Confidence preview	• Maximum resolution: 1920x1080
Multi-unit synchronization support	• Yes
Reconfigurable I/O	• Yes. Monarch EDGE E4 10-bit SKU only
Control and management	
Access	• Matrox Monarch EDGE Command Center (web UI) • Monarch EDGE Control Hub dedicated Windows® application • RESTful HTTP API[2]
Physical	• On-device buttons and screen for basic set up and monitoring operations
Compression	
Codecs	• H.264/MPEG-4 part 10 (AVC) • Audio: AAC-HE, AAC-LC and PCM S302M
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/I2 • 4:2:0 (8-bit only) – MDG4/E8/I2
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

Compression (Cont.)	
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	· 4:2:0 - 1x 3840x2160p @60fps 8x 1920x1080 @60fps 16x 1920x1080 @30fps **Plus proxy stream** - 1x 1080p proxy stream (8-bit) 4x 720p30 proxy stream · 4:2:2 - 1x 3840x2160p @60 fps 4x 1920x1080 @60 fps There are a number of additional encoding profiles that can be generated per input.
VANC ancillary data transport as per ST-2038	
	· Closed captioning (CC) embedded as CEA-608/708 · SCTE-104 messages (Matrox encoder to decoder) - SCTE-104 to SCTE-35 translation - SCTE-35 to SCTE-104 translation · Vertical interval timecode (ST 12-2) · HDR and colorimetry metadata
Tally[3]	
	· 8x tally signals (sent to cameras – encoder) · 8x tally signals (sent from switcher – decoder) · Tally ports available via a 15-pin D-SUB Connector
Streaming protocols	
	· MPEG-2 TS over UDP or RTP · RTP/RTSP · Native RTP (unicast or multicast) · SRT (Caller, Listener, Rendez-Vous, Stream ID, and Connection Bonding modes) · RTMP
Network	
	· 2x RJ45, 100/1000BASE-T Ethernet · 2x MSA-compatible SFP28 cage supporting 10 GbE and 25 GbE modules
Physical and power	
Product dimensions	· L: 21.7cm (8.53 in) x W: 18.9 cm (7.45 in) x H: 4.3 cm (1.68 in) · 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
Accessories	
NRG redundant power supply	· NRG-5-1DB: Rack tray with one NRG RPSU pre-installed · NRG-5-2DB: Rack tray with two NRG RPSU pre-installed

1. *Available via optional audio cable.*
2. *Contact a Matrox Video representative for availability.*
3. *This feature is offered via a 15 Position Pin D-Sub Standard Connector. With the help of a Pinout diagram, a cable can be assembled to interface to any tally output interface on the vision mixer.*

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