

4K/MULTI-HD REMOTE PRODUCTION (REMI) ENCODER AND DECODER



Matrox® Monarch™ EDGE 4K/Multi-HD Remote Production (REMI) Encoder and Decoder

Coupled with the powerful Monarch EDGE decoder, the Monarch EDGE encoding device offers exceptional quality at the lowest latency while securely transporting your video feeds from the event to the centralized production facility. This compact, robust, and low-power remote production (REMI) encoder/decoder pair has made producing live, multi-camera events more affordable than ever by keeping talent in-house. Programs destined for web or over-the-top (OTT) delivery to the cloud can select the 4:2:0 8-bit encoder version, while the 4:2:2 10-bit capable version of the Monarch EDGE encoding device is ideal for demanding, broadcast-quality productions.

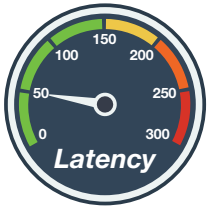


Big Productions, Small Footprint

Easily produce multi-angle live events by extending the production studio to any remote location with a network connection. Monarch EDGE can encode up to four camera feeds from HD or 3G-SDI sources. When an in-studio 4K production requires a remote feed, Monarch EDGE can accept either 4K signals over 12G-SDI, or a quad 3G-SDI to deliver a full-4K stream. All of the supported SDI resolutions will be available on the upcoming ST 2110¹ networked I/O ports using SFP28 connectivity. For events that require more cameras, its compact footprint ensures that two units will fit into a single 1RU space.

Built for High Quality 10-bit H.264 Encoding

The optimized H.264 engine powering Monarch EDGE keeps data rates exceptionally low without sacrificing quality. If quality is of the highest importance, streams can be encoded up to 120 Mbps. Four inputs can be streamed at resolutions up to 1080p60, or one input at 2160p60 using the High 4:2:2 H.264 encoding profile. Furthermore, multiple processes can be performed on each input by powerful scaling and de-interlacing engines. This enables each input to be streamed at multiple resolutions and bitrates simultaneously, which is useful for remote monitoring.

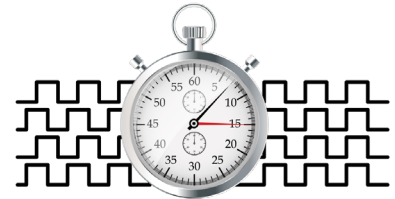


Exceptionally Low Latency

In live environments, high signal transport latencies are detrimental to remote production (REMI) quality. Audio and video may be hard to maintain, and return channels to the field are often too far behind the live action, hindering seamless staff interaction. With “glass-to-glass” latencies as low as 100ms between video input at encoder and video output at the decoder, Monarch EDGE achieves some of the lowest latencies on the market while using standard 1 GbE networks.

Keep it In-sync

All channels encoded by Monarch EDGE will be locked to a single clock, and the streams generated will have timestamps to allow the Monarch EDGE decoder to realign the streams at output. For the very best results, the cameras feeding the encoding appliance should be genlocked together to ensure each SDI source is in phase. Monarch EDGE offers a genlock output connector with a signal that can be distributed to those cameras if an on-site sync generator is not available.



Flexible Protocols

There are a variety of streaming protocols available to Monarch EDGE users for use during remote productions (REMI). On closed networks, MPEG-2 TS or RTSP streams can be selected for delivery. For cloud-based destinations, or when the network is congested, SRT may be more appropriate. SRT is a new open-source format that provides the reliability of RTMP, while reducing latency, for use on open networks. SRT streams can also be encrypted if security is a concern. The Monarch EDGE decoder supports the processing of MPEG-2 TS, RTSP, and SRT protocols.

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. This Monarch EDGE feature allows for ISO recordings of SDI inputs, which can be used for post-event editing or serve as backup recordings.



Simple, Easy-to-Use Tally² and Talkback

The Monarch EDGE remote production (REMI) encoder and decoder pair provides the transfer of tally signals and talkback channels to facilitate bi-directional communication between on-site camera operators and in-studio personnel. Eight tally signals can be sent from the production switcher to the decoder, which transfers these signals to the encoder for output to the cameras. Two balanced analog inputs and two balanced analog outputs are found on both the encoder and decoder for interfacing with local intercom systems.

¹ Available with a future update.

² These features must be supported at the decode end of the production chain with the help of custom integration by the user or vision mixer provider.

Comprehensive Connectivity

Both the Monarch EDGE encoder and decoder devices offer flexible, future-proof video connectivity with 3G, 12G SDI, and ST 2110¹ over 25 GbE network connections. Each of the Monarch EDGE encoder's SDI inputs supports 16 channels of embedded audio. Eight of these channels can be included in each stream using MPEG-2 or SRT protocols. Delivering multi-lingual or multi-channel productions is easy with Monarch EDGE.



Convenient, Centralized Control

Monarch EDGE Control Hub is a powerful application that provides management and configuration over all Monarch EDGE encoder and decoder units on the network. This convenient 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.

Localized Preview

Offering up to four simultaneous input (encoder) or output (decoder) previews on a single desktop monitor, Monarch EDGE's DisplayPort output allows operators to ensure that SDI and ST 2110¹ signals 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

Both the Monarch EDGE encoder and decoder were 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 remote productions (REMI). Redundant Ethernet (1 GbE) ports allow users to control the device from one port while the second port transfers media. Alternatively, with the encoder, users can opt to send the same streams taking completely separate network paths from each port. 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 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 Ports
15. DisplayPort
16. USB 3
17. Gigabit Ethernet Port
18. Power Connection
19. Power Switch

* SFP module supplied by third party

Technical Specifications

Connectivity

Input connections

- 1x 12G SDI per SMPTE ST 2082
- 3x 3G SDI per SMPTE ST 425 (Level A and B mapping)
- UHD support using 4x SDI per SMPTE ST 425-5
 - Square division
 - 2x sample interleave¹
- 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 2022-7¹.

Output connections

- 1x 12G SDI per SMPTE ST 2082
- 3x 3G SDI per SMPTE ST 425 (Level A mapping only)
- UHD support using 12G SDI per SMPTE ST 2082
 - Square division
 - 2x sample interleave¹
- 2x SFP 28 network ports (up to 25 Gbps)¹
- Output 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 (encoder)
- Bi-level or tri-level genlock input (decoder)

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 audio²

- 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 PCM¹ (uncompressed audio)
- Multi-channel audio support as separate audio pairs

USB ports

- 2x USB 2.0 (front)
- 1x USB 3.0 (back)

Confidence preview

- 1x DisplayPort 1.1
- Maximum resolution: 1920x1080

Multi-unit synchronization support

- Yes

Control and management

Access

- Matrox Monarch EDGE Command Center (web UI)
- Monarch EDGE Control Hub dedicated Windows® application
- RESTful HTTP API³

Physical

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

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/I2
- 4:2:0 (8-bit only) – MDG4/E8/I2
- 4:2:2 (8-bit and 10-bit), 4:2:0 (8-bit and 10-bit) – MDG4/D/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

Decoding controls

- Scaling of HD/UHD resolutions
- Frame rate conversions

Profile

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

Latency

- Encode latency as low as 100ms glass-to-glass (network transfers not included in value)

Encode density/workflow examples

- 4:2:2 workflows
 - 1x 3840x2160p @60fps plus 1x 1080p30 proxy stream (8-bit) or
 - 4x 1920x1080p @60fps plus 4x 720p30 proxy stream (8-bit)
- 4:2:0 workflows
 - 2x 3840x2160p @60fps or 8x 1920x1080p @60fps or 16x 1920x1080p @30fps

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 translation¹
- Vertical interval timecode (ST 12-2)¹
- HDR and colorimetry metadata¹

Tally⁴

- 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 RTP¹ (unicast or multicast)
- SRT (Caller, Listener and Rendez-Vous modes)
- RTMP (encoder only)

Network

- 2x RJ45, 100/1000BASE-T Ethernet
- 2x MSA-compatible SFP28 cage supporting 10 GbE and 25 GbE modules¹

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/I2

- Monarch EDGE appliance with 4:2:0 8-bit, 4:2:0 10-bit, and 4:2:2 10-bit encoding
- Includes IEC-C14 power cord (US, UK, AUS, EUR)

MDG4/E8/I2

- Monarch EDGE appliance with 4:2:0 8-bit encoding
- Includes IEC-C14 power cord (US, UK, AUS, EUR)

MDG4/D/I2

- Monarch EDGE appliance with 4:2:0 8-bit, 4:2:0 10-bit, and 4:2:2 10-bit decoding
- 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.

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. Enabled with future firmware update.

2. Available via optional audio cable.

3. Contact a Matrox Video representative for availability.

4. 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.

Contact Matrox Video

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