

MK RX1



Multi Codec Professional Edge processor

The MK RX1 is an edge device specifically designed to meet the needs of the contribution and distribution markets.

As Operators move to 4k revenue generating services they are also looking to new IP infrastructure deployments. This enables low cost and flexible carriage of this high data rate content, but with the flexibility and fallback of traditional satellite connectivity.

With the addition of the MediaKind accelerator module, users can gain the benefit of delivering high quality, high density and low latency capability in a compact form-factor.

The RX1 can be deployed as a contribution decoder with 4:2:2 capability using the decoder card or as a distribution device with 4:2:0 software decode or 4:2:0 transcode.

A multitude of functions such as SRT and Zixi can be chained with the decode or transcode, offering a flexible framework to build a customised flow within the RX1.

In a cloud eco-system, RX1 can be used to transport content into and out of the cloud and adapt data to local networks.

RX1 is deployed in a rugged appliance with standard infrastructure including Satellite input, ASI and SDI. It is future-proofed for the all-IP world by offering functions such as SRT input and output, Zixi Feeder/Receiver and SMPTE ST 2110 output.

Product Overview

Decode

The RX1 can decode UHD (4k) HEVC, HD HEVC and MPEG-4 AVC compressed streams, whether 4:2:0 or 4:2:2, 8 bit or 10 bit, and produce uncompressed outputs via a range of outputs. Different combinations of codec and frame rates can be utilized simultaneously to maintain flexibility for onward processing.

High Bit-rate / High Quality / Low Latency

For the very highest quality contribution links, even with the use of HEVC encoding, bit-rates greater than 60 Mbit/s may be required. The RX1 can decode multiple compressed video components, with an aggregate bitrate of up to 150 Mbit/s.

Having low end-to-end latency is often an important requirement for live contribution links. So the introduction of latency has been minimized in the design of the RX1.

HDR and WCG

UHD (4k) services are expected to rapidly evolve to include High Dynamic Range (HDR) and Wider Color Gamut (WCG). RX1 supports the relevant HDR and WCG standards as they are formalized.

All IP Workflow

The RX1 supports the latest IP standards such as SMPTE ST 2110 for outputs, and SRT for IP inputs. The 25G Ethernet NIC option is available to enable SMPTE ST 2110 outputs up to UHD resolution with Dual ST2022-7 output.

The RX1's inclusion of NMOS IS-04 and IS-05 provides the connection management for this type of workflow.

Secure Reception of High Value Content

With high value content such as UHD sports events it remains important to prevent any security compromise. The RX1 supports BISS-CA decryption, the latest 128 bit, rotating key, content protection standard, as well as the long established BISS-1/E encryption and can be easily paired with MediaKind's CE1 Contribution encoder for the encryption.

Network adaptation for cloud ingress and egress

In addition to the decode functionality, RX1 can act as an edge device for ingress and egress to the cloud. It leverages network adaptation capabilities to receive data in and out of the cloud such as Satellite input and SRT output or SRT input, Zixi feeder or Receiver and transcode into a lower bitrate for ingesting into local networks.

Content replacement

Ad replacement upon SCTE-35 and scheduling of content replacement where programming events such as blackout & alternate content may be triggered in different ways: Signal-based, when program information is conveyed via SCTE-35, or time-based for

programmers who do not have the ability to decorate their linear channels with in-band SCTE-35. The spliced content can then be output via IP, decoded or transcoded.

Transcoding

RX1 can transcode from 4:2:0 IP sources and output as 4:2:0 encoded SPTS. It can also output an MPTS using the Multiplexing function.

Multiplexing

This feature allows re-multiplexing and de-multiplexing of IP input streams with PID remapping and PID filtering capability and adapt the output stream to a variety of networks.

Unit Features

The following features are available:

- Satellite* (DVB-S, DVB-S2/S2X), ASI* or IP input
- 4 x 3G / 12G SDI* and 1 x 3G SDI monitor port*
- SMPTE ST 2110 output** with SMPTE 2022-7*
- AMWA NMOS IS-04, IS-05
- SMPTE 2022-6 output*
- Quad 1GbE and Dual 10GbE, 25GbE IP I/O*
- MPEG-2, HEVC, MPEG-4 AVC, JPEG-XS
- SCTE 35 to SCTE 104
- 1080p compressed input converted to 1080i output via SDI/SMPTE ST110
- Audio Lip-sync adjustment on decoded output
- Multichannel 4:2:2 or 4:2:0 decode using a decoder accelerator card up to UHD resolution with Low and Super Low latency
- UDH or 1080p HEVC HDR to SDR using the decoder accelerator card (RX1 v17)
- Multichannel HD 4:2:0 channel 4:2:0 or 1 UHD 4:2:0 decode using SW (no acceleration required)
- BISS-1/E and BISS-CA*
- Director v5 and Director 6 decryption
- Dual CAM slots*
- Multiple Audio codecs
- Transport Stream passthrough
- PID filtering and remapping and Service level Demux and Remux*
- Transcode from and to 4:2:0 codecs*
- Splicing local adverts upon SCTE-35*
- SRT Caller, listener mode*, Zixi feeder or receiver*
- Front panel control with confidence monitor
- Web based user interface, REST API
- Dual swappable power supplies

* Optional

** Either ST 2110 or SDI outputs are available, but not both simultaneously

Specifications

Inputs and Control

ASI Input	<p>ASI option card:</p> <p>Provides 4 x ASI inputs</p> <p>Connector: 4 x BNC (F) 75 Ohm</p> <p>Max. input rate: 208 Mbps</p> <p>Packet length: 188/204 byte packets</p> <p>Standard: EN50083-9</p>
IP Input	<p>Base unit: 2 x 100/1000BaseT Ethernet ports via RJ45 connector</p> <p>Dual 10GbE NIC option card: Dual SFP+ cages, 10GBASE</p> <p>Quad 1GbE NIC option card: Quad RJ45, 1GbE</p> <p>UDP or RTP input</p> <p>ST2022-7 IP input*</p> <p style="text-align: right;">*Decode density may be affected when using ST2022-7</p>
Satellite Input	<p>4 independent demodulators</p> <p>Frequency range: 950MHz to 2150MHz DVB</p> <p>FEC decode</p> <p>LNB max. 19V</p> <p>Connector: 4 x F-type 75 Ohm</p> <p>Modulation: DVB-S, DVB-S2, DVB-S2X</p> <p>QPSK, 8PSK, 16PSK, 32PSK, 64PSK</p> <p>Packet length: 188/204 byte packets</p> <p>Standard: EN50083-9</p>
External Clock Reference input	<p>Connector: BNC (F) 75 Ohm</p> <p>Standard: EN50083-9</p> <p>Available either on the decoder card or on the SDI output card (SW decode)</p>

Control and Monitoring

Front Panel	Limited control and monitoring is available through the front panel keypad and display. LCD Confidence Monitor
IP	<p>Full control and status monitoring is provided via:</p> <ul style="list-style-type: none"> • Web browser user interface • REST API

Outputs

<p>SDI Output</p>	<p>Accelerator card (4:2:0, 4:2:2):</p> <p>Connector: Up to 5 x BNC 75 Ohm (4 x main + 1 x monitor)</p> <p>HD-SDI standard: SMPTE ST 292 3G-SDI standard: SMPTE ST 424 12G-SDI standard: SMPTE ST 2082* <i>*not available on the monitor port</i> Embedded audio: SMPTE ST 299 SDR/HDR Signalling: SMPTE ST 425-5</p> <p>SDI option card (required with SW only 4:2:0 decode):</p> <p>Provides 1 x HD SDI or 1 x 12G SDI inputs with a secondary 1 x HD SDI</p> <p><i>HD SDI: SMPTE 292M</i> <i>12G SDI SMPTE 2082</i> <i>Embedded Audio: SMPTE 299M (HD)</i></p>
<p>SMPTE ST 2110 output ** (needs the decoder card)</p>	<p>SMPTE ST 2110-10 with PTP synchronisation</p> <p>SMPTE ST 2110-20 uncompressed video</p> <p>SMPTE ST 2110-21 timing as Narrow Linear</p> <p>SMPTE ST 2110-30 uncompressed PCM audio. 4 Essences in RX1 v16</p> <p>SMPTE ST 2110-31 compressed audio. 4 Essences in RX1 v16</p> <p>SMPTE ST 2110-40 data (VITC/Time code, AFD/BAR, Closed captioning, OP-47 teletext and SMPTE 2031 teletext)</p> <p>All essences can be output as ST2022-7</p> <p>NMOS IS-04 and NMOS IS-05 support</p> <p><i>**The output from a single decoder service can either be SDI or SMPTE 2110, but not both simultaneously</i></p>
<p>IP Output</p>	<p>Connector: 2 x RJ45 — Format: 100/1000BaseT</p> <p>Connector: 2 x SFP — Format: 100/1000/10000BaseT*</p> <p>Connector: 4 x RJ45 — Format: 100/1000BaseT*</p> <p style="text-align: right;"><i>* Option</i></p> <p>Dual 25GbE NIC option card:</p> <p>Dual SFP28 cages</p> <p>Can support 1GbE, 10GbE or 25GbE</p> <p>Can provide hardware acceleration for SMPTE ST 2110 output with SMPTE 2022-7</p> <p><i>Note: SMPTE ST 2110 output requires the dual 25GbE NIC option card.</i></p>

Video and Audio Options for Decode

Video Formats	<p>Full video resolutions for 2160p 23.98, 24, 25, 29.97, 50, 59.94</p> <p>Full video resolutions for 1080p50, 1080p59.94, 1080i25, 1080i29.97, 720p50, 720p59.97</p>
Video Decoding on decoder card	<p>1 x UHD (4k) HEVC Main/Main 10/Main 4:2:2 10 Profiles @ Level 5.1, up to 150 Mbps</p> <p>4 x HD HEVC Main/Main 10/Main 4:2:2 10 Profiles @ Level 5.1**</p> <p>4 x HD MPEG-4 AVC Main/High Profiles @ Level 4*, High 4:2:2 Profile (includes 10-bit) @ Level 4.2**</p> <p>4 x HD MPEG-2 4:2:2 Profile**</p> <p>HDR to SDR conversion</p> <p>Up to 150 Mbps aggregate</p> <p style="text-align: right;">** some bitrate limitations apply</p>
Video Decoding with SW decode (SDI output card)	<p>1 x UHD (4k) HEVC Main 4:2:0 up to 50 Mbps with a down-converted HD output on SDI</p> <p>4 (RX1 v16) x HD MPEG-2, MPEG-4 AVC or HEVC 4:2:0 up to 25 Mbps with output on SDI</p> <p>1 x UHD or 4 x HD JPEG-XS over TS input as per ISO 13818-1:2019 (RX1 v16)</p>
Video conversions	<p>When using the decode card: 1080p50/59.4 compressed input to 1080i output over SDI or SMPTEST2110</p> <p>When using Software decode (no decoder card): UHD 4:2:0 to 720p50/59.94 SDI out</p>
HDR -> SDR Conversion	<p>HD HDR HLG or HDR PQ10 to BT.709 conversion (available on the monitor port only for HD input to HD output)</p> <p>HDR to SDR conversion for UHD and Multiple 1080p channel support (HDR HLG, HLG with custom LUT, PQ10 or HDR10) using the decoder accelerator card (RX1 v16.2)</p>
Audio Decoding on SDI output (SDI and SMPTE ST2110-30 output)	<p>Max. 8 stereo pairs per service (depending on codec) for SDI output</p> <p>Max. 4 stereo pairs per service (depending on codec) for ST 2110-30 output</p> <p>MPEG-1 Layer-II, Dolby Digital®, Dolby Digital® Plus, MPEG-H</p> <p>Audio sampling rate: 48 kHz</p> <p>Phase-Aligned Audio supported</p> <p>Lip-sync adjustment</p>
Audio Pass-through (SDI and SMPTE ST 2110-31)	<p>Dolby E®, Dolby Digital®, Dolby Digital Plus® and Linear PCM</p>
Data Decoding	<p>CEA-608 & CEA-708 Closed Captions</p> <p>Time Code</p> <p>Generic VANC</p> <p>Teletext</p> <p>AFD/BAR data</p> <p>SCTE-35 to SCTE 104</p>

Video and Audio Options for Transcode

Compressed Input	<p>Type: IP (IGMPv3-based redundancy and dual multicast redundancy), Dual source redundancy (active / active & active / passive modes).</p> <p>Protocols: MPEG-2 TS (MPTS & SPTS), RTMP (via IP input only)</p> <p>Codec: Video: MPEG-2, H.264, HEVC 4:2:0. Audio: MPEG-1 LIII, Dolby Digital (AC-3), Dolby Digital Plus (E-AC3), AAC, HEAAC v1 and v2, Dolby E</p> <p>Data rate: SD / HD up to 50 Mbps</p> <p>Input resolutions: Full video resolution for 1080p50, 1080p59.94, 1080i25, 1080i29.97, 720p50, 720p59.97, 567i25, 480i29.97</p>
Video transcoding	<p>HD MPEG-2, MPEG-4 AVC or HEVC 4:2:0 to HD or SD MPEG-2, MPEG-4 AVC or HEVC 4:2:0</p> <p>SD MPEG-2, MPEG-4 AVC or HEVC 4:2:0 to SD MPEG-2, MPEG-4 AVC or HEVC 4:2:0</p>
Metadata	<p>SCTE-35, IA 608 / 708 Closed Caption, SCTE-20, DVB Teletext, DVB-VBI, SCTE-27, OP47, SMPTE 2031</p>

Multiplexing

Inputs and outputs	<p>IP (UDP or RTP) input and output of MPEG Transport Streams</p> <p>ASI output*</p> <p>RTP re-ordering</p> <p>IGMP V3 redundancy</p> <p>Input bit-rate monitoring and CC error detection</p> <p>SMPTE 2022-1 FEC on input and output</p>
Processing	<p>PID filtering and PID remapping by re-multiplexing input programs</p> <p>Real-time PSI regeneration</p>

*Option module required

Ad Insertion

Ingest format	<p>MPEG-TS over IP (SPTS), with a video buffer of 1 second minimum</p> <p>Assets pre-encoded and stored inside RX1</p>
Scheduling control	<p>Triggered via advanced scheduling control options:</p> <ul style="list-style-type: none"> • Signal-based: based on submitted SCTE-35 signal (with matching criteria) • Signal-based / fallback to time SCTE-35 expected, but not present, fallback to out-of-band operations triggering.
Asset Management (RX1 v16)	<ul style="list-style-type: none"> • Storage of up to 90 minutes of assets in the unit • Assets and schedules fetched automatically from a central asset server • Automatic housekeeping of the asset store

SRT, RIST and Zixi

SRT and RIST	<p>Carriage of UDP or RTP streams over the SRT protocol</p> <p>SRT Listener or Caller mode</p> <p>RIST listener mode</p>
Zixi	<p>Zixi feeder or Zixi Receiver mode</p>

Content Security

Dual DVB Common Interface	Enables support for all major CAM modules Multi-service decryption Up to 2 CAM modules per option card
Decryption	Decryption of BISS-1/E and BISS-CA*
Director	A full Conditional Access system to secure delivery of digital content encrypted using rotating keys that are distributed within the transport stream Director v5* and Director 6*

*requires additional value pack

Physical and Power

Dimensions (W x D x H)	440 x 560 x 44mm (17.2 x 22 x 1.75" approx.)
Weight	10.5 kg (23 lbs) unpopulated
Input Voltage	110 VAC / 240 VAC
Power Consumption	550 Watt max. 175 Watt nominal.
Cooling	Integrated fans

Environmental Condition

Operating Temperature	0°C to 50°C (32° to 122°F)
Storage Temperature	-20°C to 65°C (4° to 150°F)
Relative Humidity	5% to 95% (Non-condensing)

Compliance

Compliance	CE Marked in accordance with all applicable EU and UKCA Directives
EMC Compliance	EN 55011: 2016 + A11:2020, EN 55032: 2015 + A11:2020, EN IEC 61000-6-4: 2019, EN 61000-3-2: 2019, EN 61000-3-3: 2013 + A1:2019, EN 55035:2017 + A11:2020, ETSI EN 300 386 V2.2.1 FCC 47 CFR Part 15 Subpart B, ANSI C63.4:2014, ISED ICES-003 (Issue 7)
Safety Compliance	EN 62368-1:2014, UL 62368-1, 2nd Edition 2014-12-01, CSA C22.2 No. 62368-1-14 2nd Edition 2014-12-01
RoHS Compliance	EN IEC 63000:2018
REACH	REACH Regulation (EC) No 1907/2006