



Rivermax[®]

Video Streaming Library for Media and Entertainment, Smart Cities and Content Delivery Networks (CDNs)

With the increasing global demand for video content, the media and entertainment (M&E) market is projecting tremendous growth in 4K and 8K ultra-high-definition video. This is taking place among a wide range of emerging trends that are reinventing the quality of video, including high dynamic range (HDR) and higher frame rates. As media production solution providers gear up for the anticipated demand, they are increasingly moving their proprietary SDI-based video production solutions to next-generation IP-based infrastructures, which inherently offer better scalability and flexibility.

For IP-based solution providers, Mellanox Technologies offers Rivermax[®], an Ethernet Video Fabric (EVF) solution that boosts video streaming performance in 10, 25, 40, 50 and up to 100 gigabits per second networks.

Rivermax implements an optimized software library API for media streaming applications. Rivermax runs on Mellanox ConnectX[®]-5, or higher, network adapters and makes use of ConnectX dedicated hardware streaming accelerations. These offloads allow the application to remain in frame/line(s) level while hardware strips packet-level headers and assembles frames/line(s) directly to application memory. Rivermax enables the use of common off-the-shelf (COTS) servers for HD to Ultra HD flows. Rivermax combined with the use of world-leading Mellanox ConnectX-5, or higher, network adapters offers a unique IP-based solution that enables compliance with SMPTE 2110-21, while reducing CPU utilization for video data streaming and achieving highest throughput.

HIGHLIGHTS

- Single Xeon core receives or sends 64 HD streams
- Performance scales linearly
- SMPTE 2110-21 compliance with network adapter packet pacing even at 100GbE
- SMPTE ST 2022-6 Transport, 2110-30 Audio, and 2110-40 Ancillary for live production
- Offloads application to deal with frames/lines level
- Cloud ready
- Easy integration with PTP stack
- Supports Linux and Windows
- Simple straight forward API to meet the streaming application needs
- Short integration time

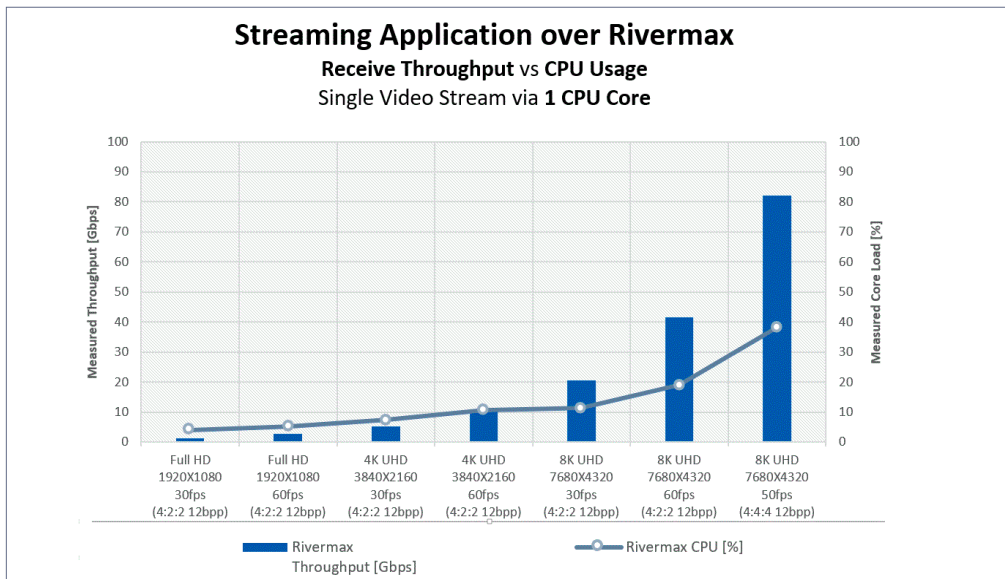


Figure 1. Streaming Application over Rivermax: Receive Throughput vs. CPU Usage

Running on ConnectX® Off-the-Shelf Network Adapters

Rivermax runs on top of a Mellanox ConnectX®-5, or higher, COTS adapter that is qualified and certified by industry-leading OEMs and enables applications to seamlessly run in both bare metal and virtualized deployments.

Leading Performance

Rivermax delivers from Full HD to 8K UHD (7680x4320 50fps 4:4:4 12bpp) equivalent to 82.2Gb/s bandwidth using a single CPU core with low CPU usage as seen in Figure 1.

Features

Cloud Ready

- Supports IP streaming over VMWare ESXi VMs
- Each VM owns a ConnectX-5 (or higher) adapter instance
- Streaming on both Linux and Windows guest OSs
- SMPTE 2110-21/30/40 spec compliancy is maintained on VMs

Packet Pacing in Hardware

- Complying with SMPTE ST 2110-21 (2110-21N Gapped or 2110-21NL*) with minimum dependency on CPU strength, interrupt level or application
- Packet pacing for any resolution bit rate in a standard network card

Software Library Main Characteristics

- Easy to use API – specifically designed for M&E applications
- Zero copy send of media packets (e.g. RTP)
- Application may receive full frames without headers
- Hardware offloads enable software invoking once in a frame
- Cross platform supporting both Linux and Windows
- API for SDP file format
- QoS support
- Best out-of-box experience – less than 2 hour integration time proven

Offloading Packet Handling to Network Adapter

- Keeping application at frame/line(s) level
- RX fully assembled frame/lines(s) in memory
- RTP header stripping
- Notification to application at full frame/line(s)
- TX synchronously transmits packet paced 2110-21 full frames or lines (or chunks)
- First packet synchronized to EPOCH time
- All packets paced in network adapter hardware according to 2110-21 specification
- Supporting SMPTE ST 2022-6, 2022-7, 2110-30, 2110-31 and 2110-40
- JT-NM tested**

* Roadmap

** For more details on the JT-NM Tested program at NAB 2019 and its test results, please visit: https://jt-nm.org/jt-nm_tested

Specifications

Software Prerequisites

- Mellanox Rivermax library
- Supports x86_64 CPU architecture
- 4GB RAM minimum
- Windows 10, Windows Server 2016, Linux RedHat, CentOS, VMWare ESXi ; see release notes for full matrix support

More on Rivermax

- For more information on the Mellanox Rivermax software, visit www.mellanox.com/page/rivermax

OPN for ConnectX-5	Description
LIC-RIVERMAX-1	Rivermax Perpetual License for the right to use Rivermax software library for bare metal deployments (one per Mellanox ConnectX-5 adapter).
LIC-RIVERMAX-VIR-1	Rivermax Perpetual License for the right to use Rivermax software library for virtualized deployments (any number of Rivermax instances running over a single Mellanox ConnectX-5 adapter).