ST 2110 Software Based Solutions
Making the Transition

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Agenda

• Yellow Brick Road to ST2110 Software based solution
• A sneak peek to the future
  The move to software-based SMPTE ST 2110 solutions is happening – but what does it take to make it a reality?
  How do you bridge over the old and new industry challenges?

Let's build a check list -
Selecting the right IP NIC

• NIC – All in the box
  – Standard: 40 years of IP networking
  – Flexibility: COTS infrastructure (NICs, Switches, Cables)
  – Scalability: Deployment in large data centers
  – Storage: Locally On Premise and Remote Cloud
  – Security: Built in HW defenses against security attacks
  – OS: Windows and Linux
  – Low Power: (<25W) and fit any PCI slot (any server ready)
  – Low Cost: reduced $CPU - $600 desktop can stream out 4K
  – Future – Cloud ready (what is that?) , 8K (BW demands)

Performance (The need for bits)

• The Requirements:
  – More bandwidth – ~1.5Gbps (HD) to 12.5Gbps (4K 60FPS) streams
  – More Streams – Transmit and Receive more uncompressed streams
  – Low cost solution – Lower CPU utilization, Less space

• The Solution:
  – Leave CPU for user application –10Gbps 85% of 1 Core Vs. 5% of 1 Core with Rivermax
  – Single core can drive up to 85Gbps (Windows and Linux)
  – Utilize NIC HW accelerators to increase performance and simplify the solution – i.e. RTP header insertion/stripping
  – Packet Aggregation – Reduce CPU latency by keeping application at frame/line(s) level and allow the NIC HW to assemble the frame/lines(s) in memory
**Performance (The need for bits)**

**Throughput vs CPU Usage - Single Video Stream via 1 CPU Core**

- **Rivermax Transmitting 4K UHD Packet Pacing 2110-21**
- **10.5Gb/s with 5% CPU Single Core Util.**

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**SMPTE2110-21 - Packet Pacing**

**The Requirements:**
- Compliance to SMPTE2110-21 (Video Shaping) spec

**The Solution:**
- Inter Packet Gap for 4K can be as low as 470nSec – Pacing must be done in HW
- Transmit using the NIC hardware Packet Pacing with no dependency on CPU Strength, OS interrupt level or Application
- No extra burden on the user application – clean wrapper to the HW through simple API
- How to verify that the solution is SMPTE2110-21 compliant?
  - We have built our own tool – AnalyzeX (Real time, multi streams, Linux, up to 4K)
  - Worked with EBU LIST, Nevion, Phabrix and JTNM Interop Events
**The Requirements:**
- SMPTE ST 2059-1:2015 Generation and Alignment of Interface Signals to the SMPTE Epoch
- Support for 2110-20 TPNL (Narrow Linear Senders) and TPN (Narrow GAP Senders)

**The Solution:**
- The user application is committing a chunk of data with a time stamp indicating when it should be sent - TVD = (N * Tframe) + Troffset
- It’s enough to indicate the time of the first packet/chunk in the frame
- Our requirement - Rivermax will free the application from real time restrictions making sure that the frame will be sent on the exact time

**The Requirements:**
- Separate routing of Video, Audio (2110-30) & Ancillary (2110-40) over IP
- Synchronization of streams
  - Audio can reach 8 channels per stream

**The Solution:**
- 2110-40 - very small BW is required – a delayed send
- 2110-30 – very similar to Video scheduling less frequent/data
**The Requirements:**
- PTP client is needed in order to sync the server system time
- Off the shelf, cross platform solutions with best accuracy
- For each stream, sampling-time is set in the packet RTP time-stamp

**The Solution:**
- Best accuracy - The NIC provides HW time stamping at port level
- Linux – HW PTP - easy to integrate and allow PTP time and PHC (Sync time system clock to the PTP hardware clock on the network card)
- Windows – SW PTP (less accurate) – working with 3rd parties to enable Mellanox PHC synchronization

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**The Requirements:**
- The SW should be easy to use and allow fast integration
- The SW should works on multiple OSs (Linux & Windows) and be agnostic to HW

**The Solution:**
- Working closely with the leaders in the industry to define the SDK API and content
- There is no software without hardware – leveraging the availability of our NIC on Windows and Linux and also providing a cross platform solution
- The Rivermax SDK is providing a wrapper to the NIC HW
- Adaptive roadmap – provide ongoing SW releases with the required features
- Link speed agnostic – Same software for all Link speeds 10/25/40/50/100/200GbE
- The SDK is ready for the next generation NIC (Future compatible)
From IP Showcase Theatre at IBC 2018

September 2018

Collaborate

• The Requirements:
  – A product that will fit the industry - connecting the Networking world to the Media and Entertainment world

• The Solution:
  – Our solution - work with the industry leaders:
    • Understand the industry leaders’ needs and roadmap
    • Provide End 2 End solutions – NIC, Switch and cables
    • Fast response and quick solutions
    • Build joint solution and demos
    • Be on time

Deliver It

• Deliver a package with all the goodies - that will work in hours 😊

My Check List

✔ IP Network Card
✔ Performance
✔ Packet Pacing
✔ 2110-21 Timing
✔ 2110-30 2110-40
✔ 2059/PTP
✔ Simple
✔ Partner
A Sneak Peek To The Future - 2019

- **More HW accelerators for the Media & Entertainment** –
  - Performance, Simplicity, Offload and Accuracy (i.e. 2022-7)

- **Virtualization**
  - Linux and Windows. Utilize Mellanox NIC’s VM-support and adopt it to the M&E

- **Cloud**
  - Most deployed solution in the cloud (e.g. AZURE). Enable “bare metal” performance for a VM over SRIOV. The cloud is on the right path

Thank You

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IP SHOWCASE THEATRE AT IBC – SEPT. 14-18, 2018
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