Topics

- Video Transcoding Demand is Growing
- Video Transcoding Needs to Scale at Cloud and Edge
- ASIC-based Computational Storage
- Application of NVMe for Transcoding Control
Video Traffic is Large and Growing

IP Video will be **82%** of Global IP Traffic by 2022

Live Video will grow **15x** By 2022

Source: Cisco VNI Global IP Traffic Forecast. *Figures (n) refer to 2017, 2022*
Video Transcoding in Cloud

- Live Streaming -> Real-time, low-latency
- Long-form video -> Highest quality
- Short-form video -> High quality
- Video Surveillance as a Service -> Real-time
Video Edge Encoding and Storage in the Video Cloud

Use Cases with primary video flows

- Video Streaming
  - Video Surveillance
  - Interactive Video

Edge Data Center
- Regional Data Center
- Central Data Center

20ms latency for interactive applications

Source: NETINT adapted from LF Edge, and IHS Markit, NFV Strategies, Global Service Provider Survey, June 2017
Video Encoding Alternatives Compared: Density and Power

Approximated infrastructure required for 80x 1080p30 Encoding Streams, or 40x Typical Encoding Ladders.

- **Software Encoding on Compute Server**
  - Highest Power

- **GPU Accelerators Hosted in Server**
  - Better Power

- **FPGA Accelerators Hosted in Server**
  - Lower Power

- **Codensity T408 Video Transcoders**
  - NVMe Interface
  - ASIC-based Transcoding
  - Highest Density
  - Least Rack Space
  - Lowest Power

- **T408 Transcoders Hosted in 1RU NVMe Server**
Application of NVMe to control SSD and video processing
Scaling-up Video Transcoding within NVMe Servers

- Leverages standard NVMe drivers
- Transcoding U.2 modules plug into SSD slots of NVMe Server
Scaling-out Video Transcoding with NVMe-Over-Fabrics

• Work with proven NVMe and NVMe-oF device drivers
• Scaling video transcoding resources outside servers
• Sharing video transcoding resources among servers
Scaling-up Video Transcoding Together With Storage

Codensity™ G4
SSD Controller SoC
Computational Storage Architecture: Advanced SSD controller logic with H.264/H.265 video processors

Codensity™ D408
PCIe 4.0 NVMe SSD
For Application Developers and Datacenter Operators

Codensity™ T408
Video Transcoder
For Video Streamers and Content Providers

Codensity™ EdgeFusion E408
The fusion of SSD Storage combined with Video Processing into a Low-power compact module, designed for Edge Deployment in the Video Cloud.
FFmpeg integration achieved by installing FFmpeg Codec Lib and SDK into host server

- Seamlessly abstracts FFmpeg video transcoding functions from 1 or more T400 transcoder modules

T400 video transcode functions controlled through standard NVMe protocol
Virtualization for Cloud with Device-passthrough

Allocate Different T408s to Different Virtual Machines
Virtualization for Cloud with Device-passthrough
Allocate Different T408s to Different Containers

Container 1

Docker Images

Container 2

PCIe NVMe for Encoding

T408 instance 1

Encoder Module

Decoder Module

instance N

T408 instance 1

Encoder Module

Decoder Module

instance N

T408 instance 1

Encoder Module

Decoder Module

instance N

T408 instance 1

Encoder Module

Decoder Module

instance N

T408 instance 1

Encoder Module

Decoder Module

instance N

T408 instance 1

Encoder Module

Decoder Module

instance N
Virtualization for Edge with SR-IOV
Share One E408 among Virtual Machines
Virtualization for Edge with SR-IOV
Share One E408 among Containers

PCIe Physical Function 0
NVMe Controller SSD

PCIe Virtual Function(0,1)
NVMe Controller Encoding

PCIe Virtual Function(0,2)
NVMe Controller Encoding

Docker Images

Container 1
Container 2

Host

E408

Flash Translation Layer
NAND Flash Interface
NAND Flash

Namespace 0

Decoder
instance 1
instance 2
instance N

Encoder
instance 1
instance 2
instance N

Namespace 1

Decoder
instance 1
instance 2
instance N

Encoder
instance 1
instance 2
instance N

Namespace 2
Summary

- Video content on Internet is dominant and growing.
- Video processing migrating to network edge.
- It is challenging to scale up video transcoding in the cloud or edge.
- Solution is ASIC-based NVMe-enabled Computational Storage
  - Highest Density, Economic, Scalable, Pragmatic
  - NVMe provides high-performance control for SSD and video transcoding
  - Leverages existing NVMe solutions for scaling-out (NVMe-oF) and Virtualization
Questions?

Visit our booth#724 during FMS 2019, or [www.netint.ca](http://www.netint.ca) for more information

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