



HYPERSCALE PROFITABLY

**Server**

Codensity ASIC G4

**Video Transcoding**

# Executive Summary

Today's world of interactive streaming is rapidly evolving with live video applications and the emergence of cloud gaming. Video platforms have immense pressure to expand their capacity while simultaneously reducing their costs, power consumption and environmental impact.

NETINT solved these challenges with their application-specific integrated circuits (ASICs) replacing software driven video encoding on CPUs in data centers and public clouds. Now, video platforms and delivery services wanting to hyperscale can achieve an exponential decrease in carbon emissions by 80x, reduction in operating costs by 40x and an unprecedented 90% reduction in hardware required for the same video encoding workloads. The results are profound and transformational.

**Early adoption of this technology slingshots streaming platforms ahead of their competition positioning them as industry leaders because they overcame obstacles and hyperscaled first.**



**We believe ASICs will be the  
engine powering all future  
streaming video experiences**



**HYPERSCALE PROFITABLY**

First, let's establish the challenges.

## Density is a dirty problem

Global corporations spend 80% of their annual CAPEX powering data centers.

Data centers operate 24/7, massively consume energy, require redundancy so multiple centers in multiple countries are duplicating efforts and depleting our planet's resources at an accelerated and unsustainable rate. Today, there are 8.4 million data centers globally and their collective consumption is expected to double by 2025.

### 2% = airplanes

Data centers produce 2% of the world's carbon emissions. Sadly, that 2% is equivalent to all global air traffic.

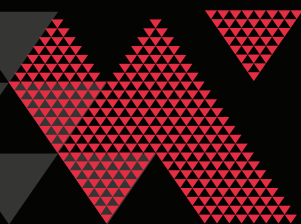
Here's what we did.

# Designed an ASIC to slash the encoding footprint up to 80X

By replacing video encoding software with ASIC-powered video processing units, you solve two problems:

- 1) exponentially reduce consumption
- 2) massively increase capacity.

You save your bottom line and the planet.  
That's a win-win.



Less is more.

This graphic conceptually illustrates the profound reduction in consumption and the exponential gain when ASIC technology replaces software video encoding.

# Real-time streaming experiences are seeing rapid adoption

Applications:

- Live events
- Interactive video
- Cloud gaming
- Real-Time video
- Virtual worlds
- 360/VR/AR





# The insatiable appetite of video consumers

They want nonstop, never-ending, high-resolution, non-buffering content accessible on any device. Now.

Viewers have developed an addiction to continuous content streaming. Video delivery and entertainment experiences are shifting from file-based to real-time where low latency and controlling operational costs are paramount.

- Increased public cloud provider costs are stressing businesses
- Video files are growing in size, resolution and quality expectations
- Playback is expected on every device using its full capability
- More data centers are needed to handle capacity increases

## 2021

**Social video viewing surpassed Google search traffic**

> 1 billion active monthly users on short-form video apps.

## 65%

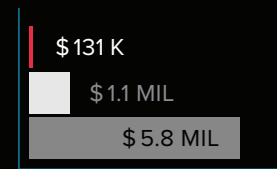
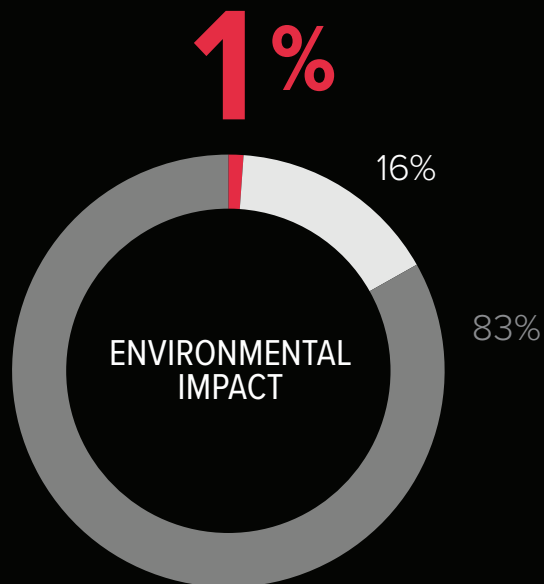
Percentage of ALL internet traffic is video streaming, increasing 24% year over year.

## 40%

Percentage of people 18 to 24 turning to visual-based social media platforms for internet searches.

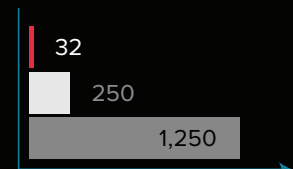


# The data speaks for itself



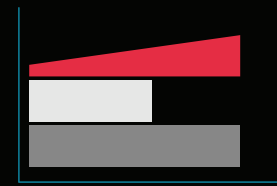
## ANNUAL OPEX

*Required to deliver 10K concurrent live HD streams*

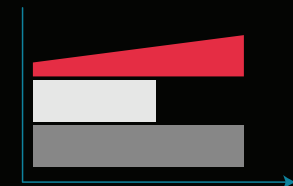


## SERVER DENSITY

*Servers required to deliver 10K concurrent live HD streams*



## VIDEO QUALITY



## BITRATE EFFICIENCY

## ASIC

*NETINT VPUs powered by ASIC*

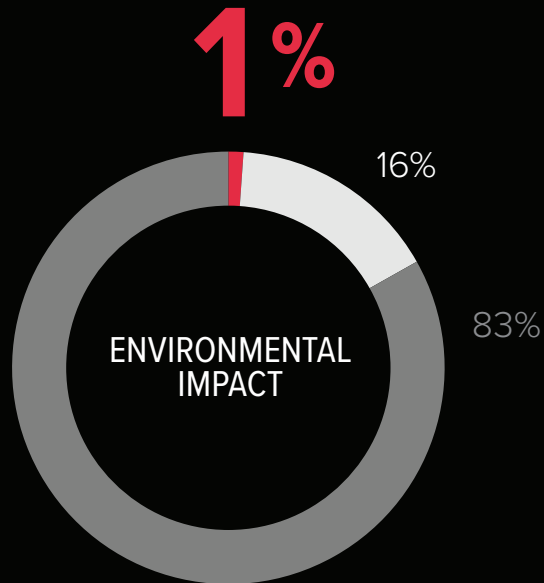
## GPU

*Graphic processing units with Nvidia T4*

## CPU

*Computer processing units with Intel SV*

# This is why Google built a custom **ASIC** for YouTube



For everyone else who isn't Google, we did the heavy lifting for you.

Google developed its own ASIC called 'Argos' to help YouTube process videos much more efficiently. Argos chips provide "up to 20-33x improvements in compute efficiency compared to its previous traditional server set up" stated a Google executive. According to another report, Argos replaced over 10 million Intel CPUs in YouTube alone.

**NETINT's ASIC-powered VPUs empower you to hyperscale profitably.**

# Now you do the math:

ASICs reduce carbon emissions

and saves the planet by replacing dated, energy-consuming technology.

ASICs reduce total operating costs

because they draw less power and are optimized for one function—speed.



ASICs enable platforms to hyperscale

by processing massive volumes in less time with almost no latency.



**NETINT's ASIC technology  
promotes the greater good and  
enables profitable hyperscaling.**



# Byproduct of ASIC conversions

- Less hardware inventory
- Less energy consumption
- Less carbon emissions
- Less total cost of operations
- Less by a factor of 10x vs. software encoding

## Ultra High Density

Up to 80x 1080p30 live streams in 1RU. Ten times the density of software encoding.

## 4K / UHD TV / HDTV

Encode up to 10x 4Kp60 live streams supporting a wide variety of streaming applications.

## Low Latency

Drop in server solution for interactive video applications including Cloud Mobile Gaming, AR and VR.

## Scalable

Fully integrated 1RU encoding solution can be easily deployed for additional encoding capacity.

## HEVC, H.264

Ultra flexible server platform, HEVC and H.264 live encoding and decoding.

## Low Cost

Cost effective server platform with ultra-low CAPEX and OPEX costs.

# Server

Codensity ASIC G4

## Video Transcoding

Built on the Supermicro 1114S-WN10RT server platform, NETINT's Video Transcoding Server boasts advanced encoding capability enabled by ten (10) Codensity T408 Video Transcoders.

This server supports:

- HEVC and H.264 video encoding
- up to 4K resolution
- 10-bit HDR

The high throughput of the server enables ultra low latency encoding of 80 broadcast quality 1080p30 live streams in a compact 1RU form factor. Its massive encoding capacity enables breakthrough reductions of up to 80% in both OPEX and CAPEX costs compared to software-based encoding systems.

The NETINT Video Transcoding Server's encoding performance is enabled by an AMD EPYC™ 7232P CPU. For encoding workloads that require additional CPU processing capacity, CPU options including the AMD EPYC 7543P and 7713P are available.



# Transcoder

Codensity ASIC Technology

## T408

### The engine inside.

The NETINT T408 is a real-time, low-latency video transcoder. Available in a U.2 form factor, the T408 enables hyperscale video platforms to easily transition from software to hardware encoding and benefit from a 10x TCO reduction, 10x increase in encoding density and 20x carbon footprint reduction compared to CPU-based software video encoding.

The T408 is based on the NETINT Codensity G4 ASIC that supports H.264 and HEVC video encoding at up to 4K resolution with 10-bit HDR. The NETINT T408 Video Transcoder plugs into any enterprise-class server offering an easy upgrade path from software to hardware-based encoding. The high throughput of the T408 enables ultra-low latency encoding of 80 broadcast quality 1080p30 streams in a 1RU server using ten T408's.





# ASIC

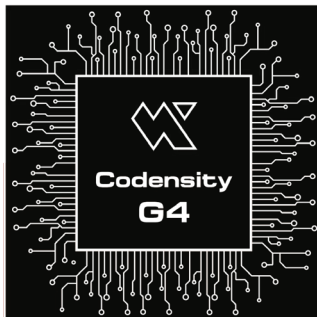
Application Specific Integrated Circuit

## Codensity G4

### ASIC Video Transcoder

Codensity G4 combines on-chip H.264 and HEVC video encoding and processing engines which deliver scalability for video-intensive live streaming applications. The core of NETINT's Codensity technology is an in-house built ASIC to increase encoding density compared to CPU-based software encoding solutions.

This increase in encoding density expands the number of channels that can be encoded without increasing the rack footprint. Reduced power and HVAC cost means a lower TCO and higher density can be achieved without sacrificing video quality or latency.



### 4K UHD Video Encoding

On-chip H.264 and HEVC encoders and decoders deliver 4K live streaming scalability. Today, video is streamed using the ubiquitous H.264 standard while HEVC is a more complex codec that requires up to 10x the processing power. This limits the scalability of software encoding, including GPU-based video processing solutions. NETINT Codensity G4 delivers the flexibility and quality of software with the performance of hardware for 4K live encoding.

### Flexible Architecture

All NETINT VPUs work with x86 and Arm-based servers. The Codensity G4 is built on a programmable microprocessor architecture, allowing NETINT engineers to optimize the flash translation layer (FTL) and pipeline processing to your application and system priorities, often leading to large performance increases and increased video quality. This counters a criticism of silicon-based encoders for lacking upgrade flexibility.

# Designed for the Cloud

## High-density real-time UHD Transcoding

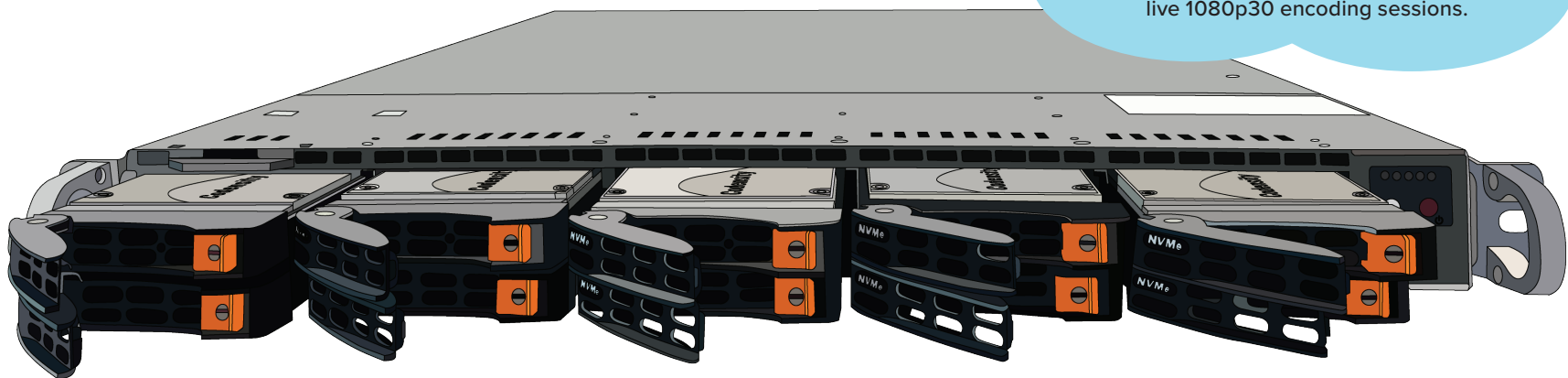
The NETINT T408 Video Transcoder takes full advantage of the video processing capability inside the Codensity G4 ASIC to support H.264 and HEVC live encode and transcode functionality of 4K UHD video in SDR and HDR with HDR10 and other popular high dynamic range standards. By offloading complex encode and decode processing to the Codensity G4 ASIC, the T408 Video Transcoder minimizes host CPU utilization. The result is a significant improvement in real-time transcoding density compared to any software or GPU-based transcoding solution. As many as ten software-based video encoding servers may be replaced for every NETINT Video Transcoding Server that is installed in the data center.

## High power efficiency

Each NETINT T408 U.2 module consumes only 7W of power at full load. This makes the NETINT Video Transcoding Server, the most energy efficient video transcoder available.

## Enterprise NVMe Integration

Available in a U.2 form factor, the T408 offers a simple upgrade path from CPU-based software to ASIC video encoding on any enterprise class server.

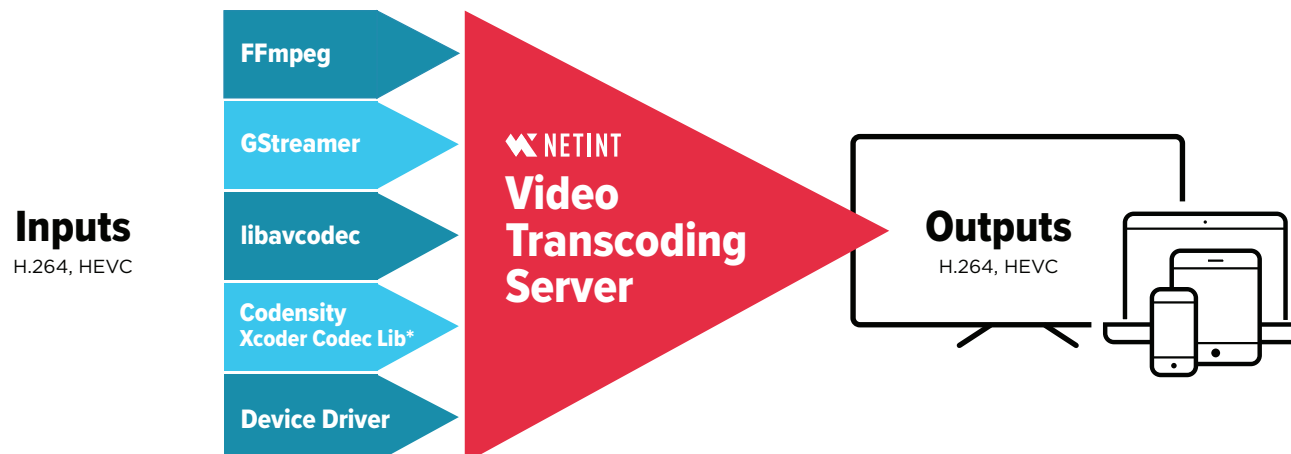


# Simple Integration

Open-source suite of processing tools.

Many video processing and transcoding applications developers are familiar with FFmpeg and GStreamer, two open-source software libraries offering a vast suite of video processing functions. The T408 includes highly efficient FFmpeg and GStreamer compatible SDKs, allowing operators to apply an FFmpeg/libavcodec or GStreamer patch to complete the integration.

The libavcodec patch on the host server functions between the T408 NVMe interface and the FFmpeg and GStreamer software layers, allowing video transcoding applications to achieve quick, significant performance and capacity upgrades.





## Specifications

# Server

Codensity ASIC G4

# Video Transcoding



CPU	AMD EPYC™ 7232P Server Processor
<i>Available CPU Upgrades</i>	AMD EPYC 7543P Server Processor
	AMD EPYC 7713P Server Processor
Memory	4x 16GB DDR4-3200
Storage	400GB M.2 SSD
NVMe Support	10x
PCIe Expansion	Up to 3x PCIe slots
Network Options	Dual 10GBase-T LAN
Power Supply	700W: 100 - 140Vac
	750W: 200 - 240Vac
	750W: 200 - 240Vdc (CCC only)
Transcoders	10x NETINT T408
Transcoding Capacity	Up to 10x 4Kp60 or 80x 1080p30 (HEVC and H.264)
Codec Support	H.264 - Encode/Decode
	HEVC - Encode/Decode

Physical Dimensions	W: 17.2" (437mm), H: 1.7" (43mm), D: 23.5" (597mm)
Rack Size	1U
Weight including 10 Processors	39 lbs (17.69 kg)
Environmental	50 degrees F to 95 degrees F Operating Temperature, 8% to 90% Operating Relative Humidity
Power Requirements	100 - 140Vac / 8 - 6V / 50-60Hz, 200 - 240Vac / 4.5 - 3.8A / 50 - 60Hz
Certifications	RoHS Compliant, UL Approved

AMD EPYC 7232P CPU server variant. *Prices subject to change.*

## Specifications

# Transcoder

Codensity ASIC Technology

## T408



Form Factor	U.2 (SFF-8639)
Interface	PCIe 3.0 x4
Protocol	NVMe
Power Consumption (Typ)	7W
Usage	24/7 Operation
Operation Temperature	0 degrees C to 70 degrees C
RoHS Compliance	Meets requirements of European Union (EU) ROHS Compliance Directives
Product Health Monitoring	Self-Monitoring, Analysis, and Reporting Technology (SMART) commands Temperature Monitoring and Logging
Hardware Interface	Available U.2 slot

	H.264 AVC Encode/Decode	H.265 HEVC Encode/Decode
Profile	CBP / BP / XP / MP / HiP / Hi10P	Main / Main 10
Level	1 to 6.2	1 to 6.2 Main Tier
Min / Max Resolution	Min: 32 x 32 / Max: 8192 x 5120	
Scan Type	Progressive	
Bitrate	64kbit/s to 700Mbit/s	
Software Integration	FFmpeg and GStreamer SDKs	
Capacity	4K @ 60 fps   1080p @ 240 fps	
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions	
Closed Captioning	T408 supports EIA CEA-708 closed captions for H.264 and H.265 encode and decode	
High Dynamic Range (HDR)	T408 supports HDR10 & HDR10+ for H.264 & H.265 encode and decode	
Low Latency	T408 supports sub-frame latency	
IDR Insert	Forced IDR frame inserts at any location	
Flexible GOP Structure	8 presets plus customizable GOP structure	



For more information on NETINT  
encoding solutions, contact us.

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