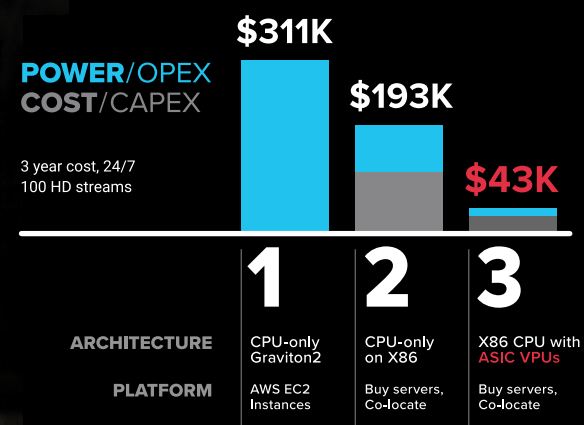


Cut streaming OPEX by 80% with ASICs

Google and Meta did.



All VPU Products



1st Generation VPU			
Modules		Server	
ASIC VPU T408	ASIC VPU T432	G4 VPU Logan	

Performance			
ASIC Codensity chip	G4	G4 (4x)	G4, T408s (10x)
Price	\$300	\$1,200	starting at \$7,000
Form Factor	U.2	AIC, HHHL	1RU Server
Power Consumption	7W	27W	~400W
Real-time Throughput Up to:	8x 1080p30 2x 4Kp30	32x 1080p30 8x 4Kp30	80x 1080p30 20x 4Kp30
Latency	12.8 ms	12.8 ms	12.8 ms
Encode Codecs	H.264, HEVC, YUV		
Decode Codecs	H.264, HEVC, YUV		
Audio Codecs	n/a		
Features			
Artificial Intelligence	n/a	n/a	n/a
New Capped CRF	●	●	●
Flexible GOP	●	●	●
Scaling	○	○	○
Cropping and Padding	○	○	○
Video Overlay	○	○	○
YUV / RGB Conversion	○	○	○
Configurable throughput	n/a	n/a	n/a

● Feature supported on VPU

○ Feature runs on host CPU



2nd Generation Smart VPUs			
Server	Modules		
G5 Smart VPU Quadra	Smart VPU T1U	Smart VPU T1A	Smart VPU T2A

G5, T1Us (10x) starting at \$19,000	G5 \$1,500	G5 \$1,500	G5 (2x) \$2,750
1RU Server	U.2	AIC, HHHL	AIC, HHHL
~500W	17W	20W	40W
320x 1080p30 80x 4Kp30 20x 8Kp30	32x 1080p30 8x 4Kp30 2x 8Kp30	32x 1080p30 8x 4Kp30 2x 8Kp30	64x 1080p30 16x 4Kp30 4x 8Kp30
8 ms	8 ms	8 ms	8 ms
H.264, HEVC, JPEG, YUV, AV1			
H.264, HEVC, JPEG, YUV, VP9			
MP3, AAC-LC, HE-AAC			

150 TOPS	15 TOPS	18 TOPS	36 TOPS
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●

ASIC VPUs are the only way to build a profitable cloud gaming platform



HYPERSCALE PROFITABLY

Overview

VPU Products

Logan
Video Server

Quadra
Video Server

Cloud Gaming

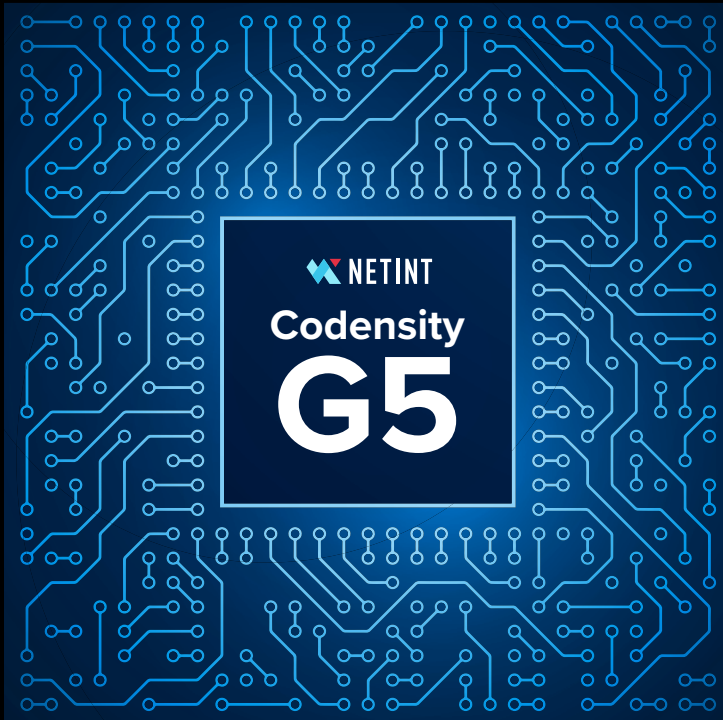
Surveillance

Why ASICs are needed.

Density is a dirty expensive problem

Global corporations spend 20% of their annual OPEX powering data centers.

Our solution.



We designed an ASIC to slash the encoding footprint up to 80%

VPUs solve these problems:

1. Increase density / capacity
2. Reduce costs / consumption
3. AI power your workflow

SMART VPU

NETINT video processing units powered by AI

GPU

NVIDIA T4 graphic processing units

CPU

INTEL SVT encoding software

32 servers

250 servers

1,250

SERVER DENSITY

Servers required to deliver 10,000 concurrent HD streams

SMART VPU

\$ 131 K

GPU

\$ 1.1 M

CPU

\$ 5.8 M

ANNUAL OPERATING COST

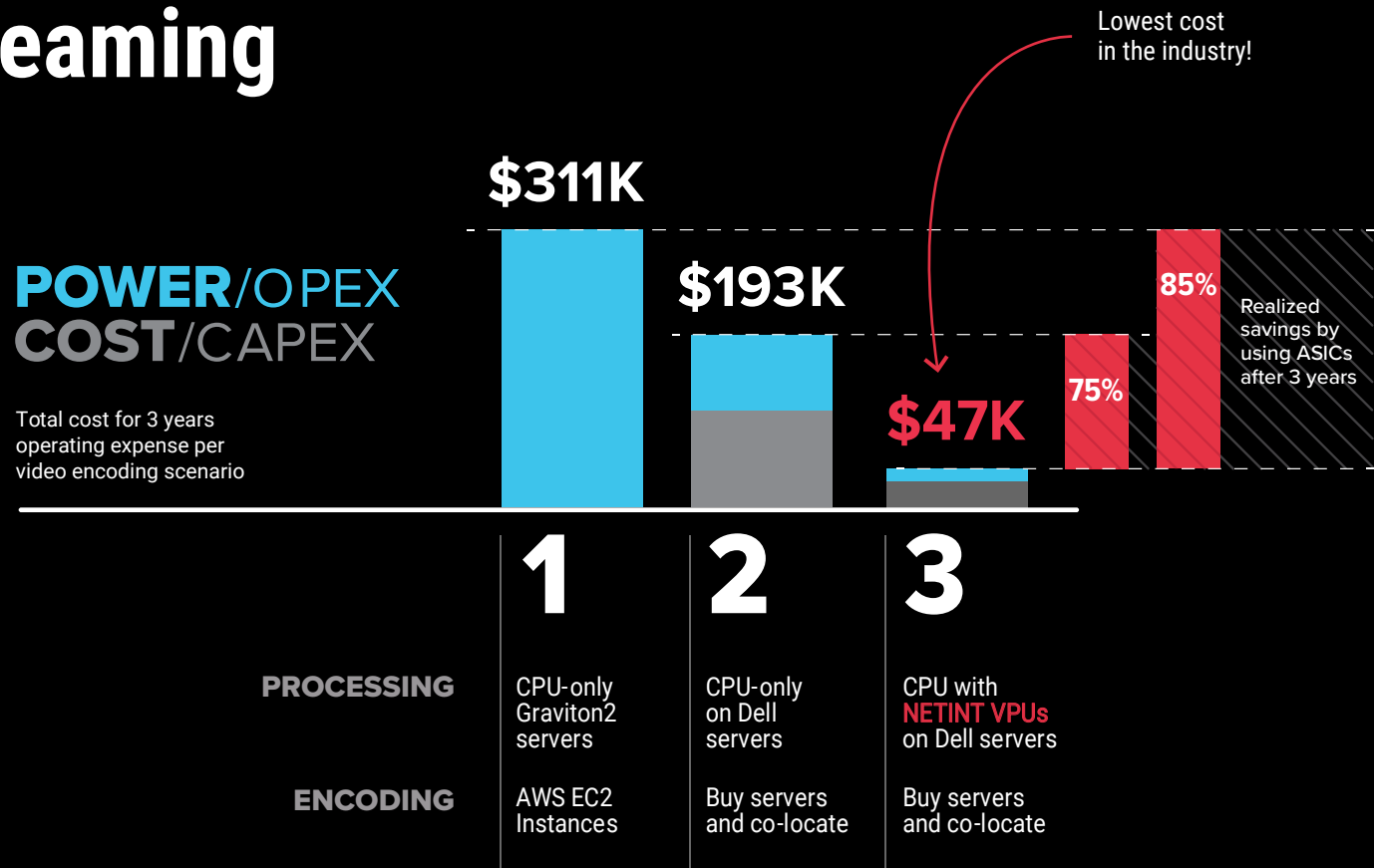
OPEX required to deliver 10,000 concurrent HD streams

This is why Google built a custom chip for YouTube

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

We developed commercial-ready Smart VPU cards for easy drop-in replacement and immediate deployment.

The real cost of live streaming



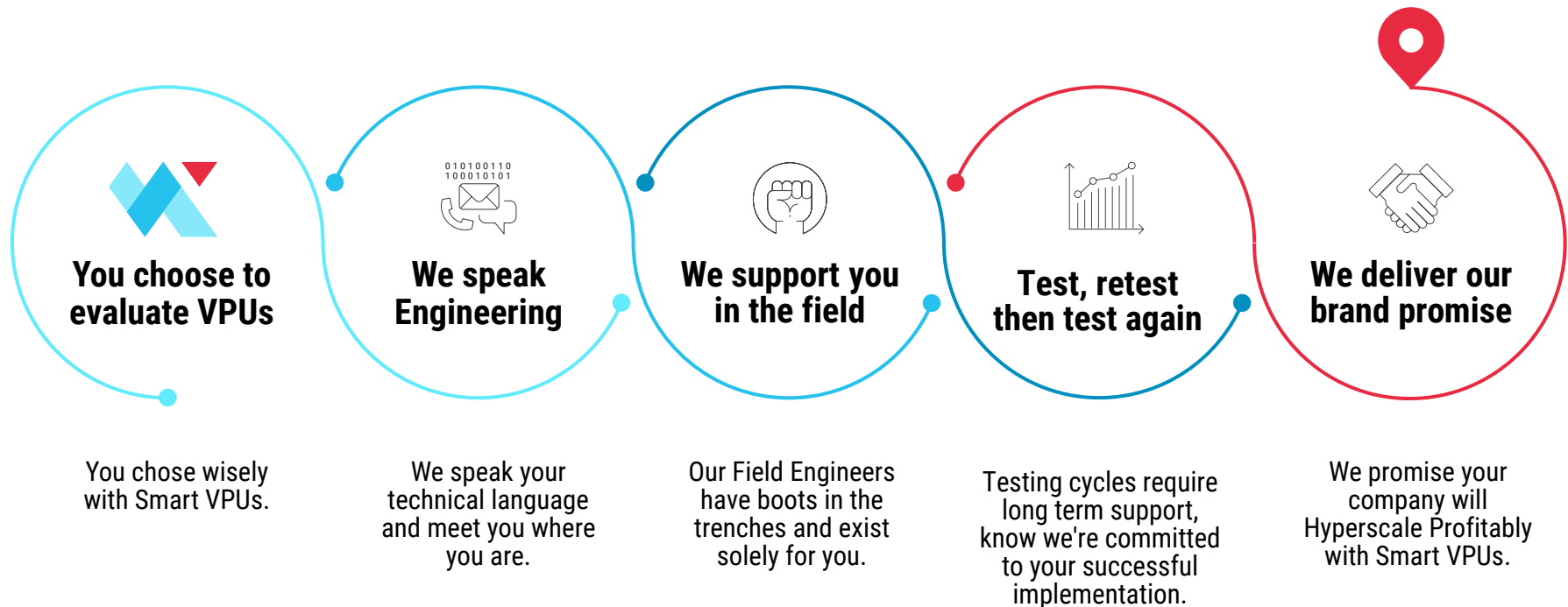
Test assumptions:

- Servers run 100 concurrent five-rung encoding ladders
- x264 very fast preset used for CPU-only processing

Your Buying Journey

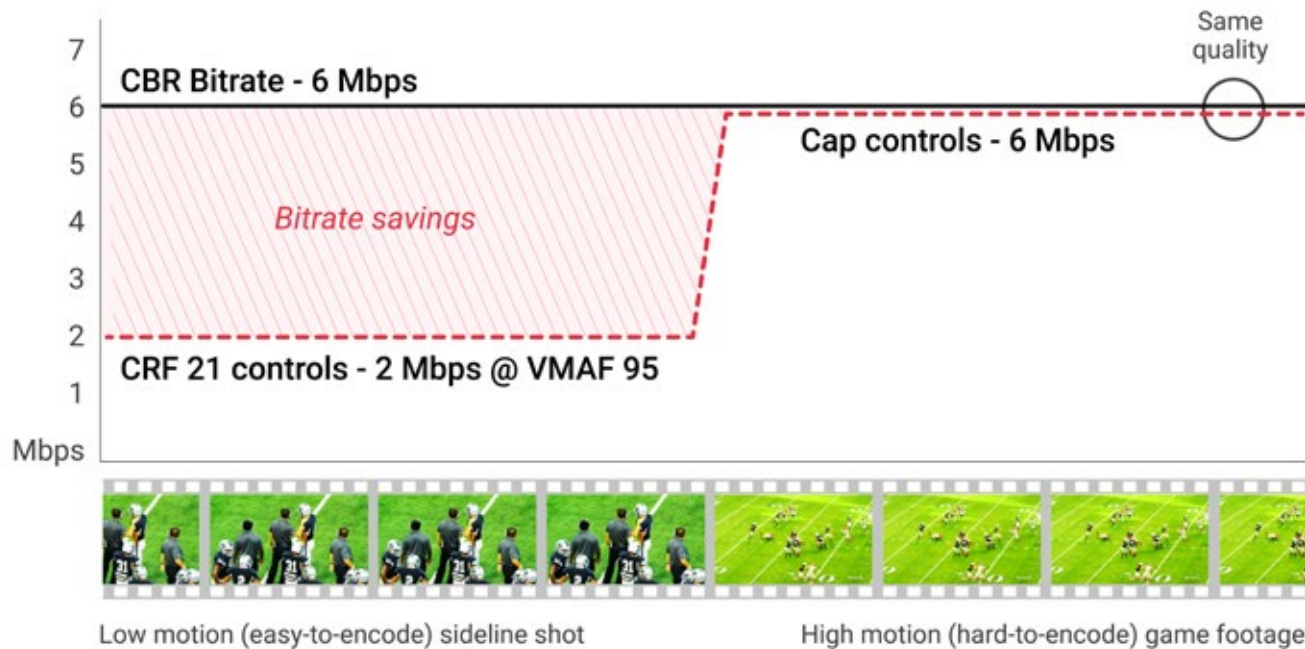
What to expect when evaluating NETINT

We know the typical sales cycle prospective buyers endure is a 12-18 month process and we're prepared to stand beside you and navigate you through. We're demonstrating our commitment to supporting you by heavily investing in this process so you can realize the value in our product and in working with us.



Advanced Encoder Feature: Capped CRF

CRF 21 with a Cap of 6 Mbps *versus* 6 Mbps CBR



VPU Product Specifications



All VPU Products



1st Generation VPU		
Modules		Server
ASIC VPU T408	ASIC VPU T432	G4 VPU Logan

Performance			
ASIC Codensity chip	G4	G4 (4x)	G4, T408s (10x)
Price	\$300	\$1,200	starting at \$7,000
Form Factor	U.2	AIC, HHHL	1RU Server
Power Consumption	7W	27W	~400W
Real-time Throughput Up to:	8x 1080p30 2x 4Kp30	32x 1080p30 8x 4Kp30	80x 1080p30 20x 4Kp30
Latency	12.8 ms	12.8 ms	12.8 ms
Encode Codecs	H.264, HEVC, YUV		
Decode Codecs	H.264, HEVC, YUV		
Audio Codecs	n/a		
Features			
Artificial Intelligence	n/a	n/a	n/a
New Capped CRF	●	●	●
Flexible GOP	●	●	●
Scaling	○	○	○
Cropping and Padding	○	○	○
Video Overlay	○	○	○
YUV / RGB Conversion	○	○	○
Configurable throughput	n/a	n/a	n/a

● Feature supported on VPU

○ Feature runs on host CPU



2nd Generation Smart VPUs			
Server	Modules		
G5 Smart VPU Quadra	Smart VPU T1U	Smart VPU T1A	Smart VPU T2A

G5, T1Us (10x) starting at \$19,000	G5 \$1,500	G5 \$1,500	G5 (2x) \$2,750
1RU Server	U.2	AIC, HHHL	AIC, HHHL
~500W	17W	20W	40W
320x 1080p30 80x 4Kp30 20x 8Kp30	32x 1080p30 8x 4Kp30 2x 8Kp30	32x 1080p30 8x 4Kp30 2x 8Kp30	64x 1080p30 16x 4Kp30 4x 8Kp30
8 ms	8 ms	8 ms	8 ms
H.264, HEVC, JPEG, YUV, AV1			
H.264, HEVC, JPEG, YUV, VP9			
MP3, AAC-LC, HE-AAC			

150 TOPS	15 TOPS	18 TOPS	36 TOPS
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●

T408 VPU

Codensity ASIC G4



Form Factor	U.2 (SFF-8639)
Interface	PCIe 3.0 x4
Power Consumption (Typ)	7W
Usage	24/7 Operation
Operation Temperature	0 - 70°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 & Logging
Video Encoding Standards/Formats	H.264 AVC, CBP / BP / XP / MP / HiP / HiP10 H.265 HEVC, Main / Main 10 YUV
Video Decoding Standards/Formats	H.264 AVC, CBP / BP / XP / MP / HiP / HiP10P H.265 HEVC, Main / Main 10 YUV
Throughput Capacity	8x 1080p30 or 2x 4Kp30
Level	1 to 6.2 Main Tier
Min / Max Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
Software Integration	FFmpeg and GStreamer SDKs and direct integration with LibXcoder API
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions
Closed Captioning	EIA CEA-708 for H.264 and H.265 encode/decode
High Dynamic Range (HDR)	HDR10 & HDR10+ for H.264 & H.265 encode/decode
Low Latency	Sub-frame latency
IDR Insert	Forced IDR frame inserts at any location
Flexible GOP Structure	8 presets plus customizable GOP structure

T432 VPU

Codensity ASIC G4



Form Factor	AIC (HHHL)
Interface	PCIe 3.0 x16 bifurcated to 4x4
Power Consumption (Typ)	27W
Usage	24/7 Operation
Operation Temperature	0 - 70°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 & Logging
Video Encoding Standards/Formats	H.264 AVC, CBP / BP / XP / MP / HiP / HiP10 H.265 HEVC, Main / Main 10 YUV
Video Decoding Standards/Formats	H.264 AVC, CBP / BP / XP / MP / HiP / Hi10P H.265 HEVC, Main / Main 10 YUV
Throughput Capacity	32x 1080p30 or 8x 4Kp30
Level	1 to 6.2 Main Tier
Min / Max Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
Software Integration	FFmpeg and GStreamer SDKs and direct integration with LibXcoder API
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions
Closed Captioning	EIA CEA-708 for H.264 and H.265 encode/decode
High Dynamic Range (HDR)	HDR10 & HDR10+ for H.264 & H.265 encode/decode
Low Latency	Sub-frame latency
IDR Insert	Forced IDR frame inserts at any location
Flexible GOP Structure	8 presets plus customizable GOP structure

Logan Video Server

VPU | Codensity ASIC G4



CPU Options	AMD EPYC™ 7232P Server Processor (8-core)
	AMD EPYC 7543P Server Processor (32-core)
	AMD EPYC 7713P Server Processor (64-core)
Operating System	Ubuntu 20.04.05 LTS
Memory	8x 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 Consumption	~400W
Power Supply	700W: 100 - 140Vac
	750W: 200 - 240Vac
	750W: 200 - 240Vdc (CCC only)
Transcoders	10x NETINT T408
Throughput Capacity	Up to 80x 1080p30 or 20x 4Kp30
Codec Support	H.264 - Encode/Decode
	HEVC - Encode/Decode
	YUV - Encode/Decode
Software Integration	FFmpeg, GStreamer

Physical Dimensions	W: 17.2" (437mm), H: 1.7" (43mm), D: 23.5" (597mm)
Rack Size	1U
Weight	39 lbs (17.69 kg) <i>(fully loaded with 10 T408 VPUs)</i>
Environmental	50 degrees F to 95 degrees F Operating Temperature, 8% to 90% Operating Relative Humidity
Power Inputs	100 - 140Vac / 8 - 6V / 50-60Hz
	200 - 240Vac / 4.5 - 3.8A / 50-60Hz
	200 - 240Vdc / 4.5 - 3.8A (CCC Only)
Certifications	RoHS Compliant, UL Approved

Overview

VPU Products

Logan
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Quadra
Video Server

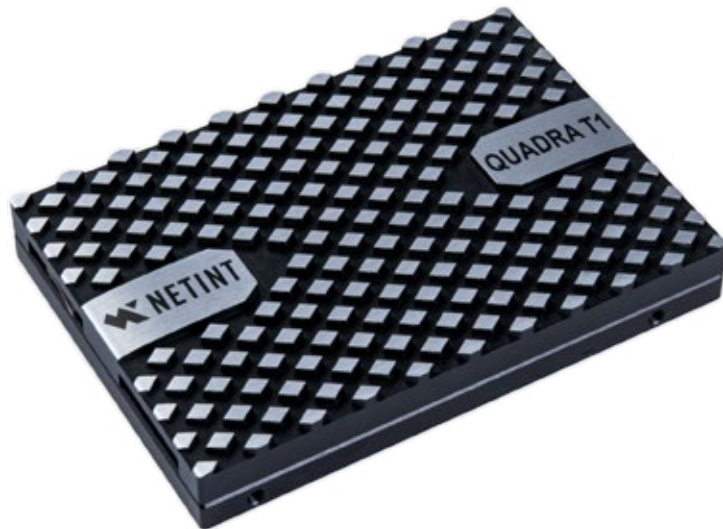
Cloud Gaming

Surveillance



Quadra T1U Smart VPU

AI powered Video Processing Unit | Codensity G5



Form Factor	U.2
ASIC	1x Codensity G5
Interface	PCIe 4.0 x4
Power Consumption (Typ)	17W
Usage	24/7 Operation
Operation Temperature	0 - 50°C
RoHS Compliance	European Union (EU) ROHS Compliance Directives
Product Health Monitoring	Self-Monitoring, Analysis, and Reporting Technology (SMART) commands Temperature Monitoring and Logging
Video Encoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.264 Main, Main 10 JPG YUV 420 8 bit/10 bit encoding AV1 Main
Video Decoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.265 Main, Main 10 VP9 Profile 0, 2 JPEG YUV 420 8 bit/10 bit decoding
Throughput Capacity	Up to 32x 1080p30, 8x 4Kp30, 2x 8Kp30
Audio Codecs	MP3, AAC-LC, HE-AAC
Level	1 to 6.2 Main Tier
Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
Software Integration	FFmpeg SDKs, GStreamer, LibXcoder API integration
AI Deep Neural Network Engines	15 TOPS AI Assisted Encoding
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions
Closed Captioning	EIA CEA-708 for H.264 and HEVC encode/decode
High Dynamic Range (HDR)	HDR10, HDR10+, HLG for H.264 & HEVC encode/decode
Low Latency	Sub-frame latency
IDR Insert	Forced IDR frame inserts at any location
Flexible GOP Structure	8 presets plus customizable GOP structure
Video 2D Processing Engine	Crop & Padding/Scaling/Overlay/YUV & RGB Conversion

Quadra T1A Smart VPU

AI powered Video Processing Unit | Codensity G5



Form Factor	AIC (HHHL)
ASIC	1x Codensity G5
Interface	PCIe 4.0 x4
Power Consumption (Typ)	20W
Usage	24/7 Operation
Operation Temperature	0 - 50°C
RoHS Compliance	European Union (EU) ROHS Compliance Directives
Product Health Monitoring	Self-Monitoring, Analysis, and Reporting Technology (SMART) commands Temperature Monitoring and Logging
Video Encoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.264 Main, Main 10 JPG YUV 420 8 bit/10 bit encoding AV1 Main
Video Decoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.265 Main, Main 10 VP9 Profile 0, 2 JPEG YUV 420 8 bit/10 bit decoding
Throughput Capacity	Up to 32x 1080p30, 8x 4Kp30, 2x 8Kp30
Audio Codecs	MP3, AAC-LC, HE-AAC
Level	1 to 6.2 Main Tier
Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
Software Integration	FFmpeg SDKs, GStreamer, LibXcoder API integration
AI Deep Neural Network Engines	18 TOPS AI Assisted Encoding
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions
Closed Captioning	EIA CEA-708 for H.264 and HEVC encode/decode
High Dynamic Range (HDR)	HDR10, HDR10+, HLG for H.264 & HEVC encode/decode
Low Latency	Sub-frame latency
IDR Insert	Forced IDR frame inserts at any location
Flexible GOP Structure	8 presets plus customizable GOP structure
Video 2D Processing Engine	Crop & Padding/Scaling/Overlay/YUV & RGB Conversion

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Quadra T2A Smart VPU

AI powered Video Processing Unit | Codensity G5



Form Factor	AIC (HHHL)
ASIC	2x Codensity G5
Interface	PCIe 4.0 x4x4
Power Consumption (Typ)	40W
Usage	24/7 Operation
Operation Temperature	0 - 50°C
RoHS Compliance	European Union (EU) ROHS Compliance Directives
Product Health Monitoring	Self-Monitoring, Analysis, and Reporting Technology (SMART) commands Temperature Monitoring and Logging
Video Encoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.264 Main, Main 10 JPG YUV 420 8 bit/10 bit encoding AV1 Main
Video Decoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.265 Main, Main 10 VP9 Profile 0, 2 JPEG YUV 420 8 bit/10 bit decoding
Throughput Capacity	Up to 64x 1080p30, 16x 4Kp30, 4x 8Kp30
Audio Codecs	MP3, AAC-LC, HE-AAC
Level	1 to 6.2 Main Tier
Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
Software Integration	FFmpeg SDKs, GStreamer, LibXcoder API integration
AI Deep Neural Network Engines	36 TOPS AI Assisted Encoding
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions
Closed Captioning	EIA CEA-708 for H.264 and HEVC encode/decode
High Dynamic Range (HDR)	HDR10, HDR10+, HLG for H.264 & HEVC encode/decode
Low Latency	Sub-frame latency
IDR Insert	Forced IDR frame inserts at any location
Flexible GOP Structure	8 presets plus customizable GOP structure
Video 2D Processing Engine	Crop & Padding/Scaling/Overlay/YUV & RGB Conversion

Quadra Video Server

Smart VPU | Codensity Quadra G5



CPU Options	AMD EPYC™ 7232P Server Processor (8-core)
	AMD EPYC 7543P Server Processor (32-core)
	AMD EPYC 7713P Server Processor (64-core)
Operating System	Ubuntu 20.04.05 LTS
Memory	8x 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 Consumption	~500W
Power Supply	700W: 100 - 140Vac
	750W: 200 - 240Vac
	750W: 200 - 240Vdc (CCC only)
Transcoders	10x NETINT Quadra T1U
Encoding Capacity	Up to 20x 8Kp30, 80 4Kp30 or 320x 1080p30
Codec Support	H.264 - Encode/Decode
	HEVC - Encode/Decode
	JPG - Encode/Decode
	VP9 - Decode
	AV1 - Encode
Software Integration	FFmpeg, GStreamer

Physical Dimensions	W: 17.2" (437mm), H: 1.7" (43mm), D: 23.5" (597mm)
Rack Size	1U
Weight	39 lbs (17.69 kg) <i>(fully loaded with 10 T1U VPUs)</i>
Environmental	50 degrees F to 95 degrees F Operating Temperature, 8% to 90% Operating Relative Humidity
Power Inputs	100 - 140Vac / 8 - 6V / 50-60Hz
	200 - 240Vac / 4.5 - 3.8A / 50-60Hz
	200 - 240Vdc / 4.5 - 3.8A (CCC Only)
Certifications	RoHS Compliant, UL Approved

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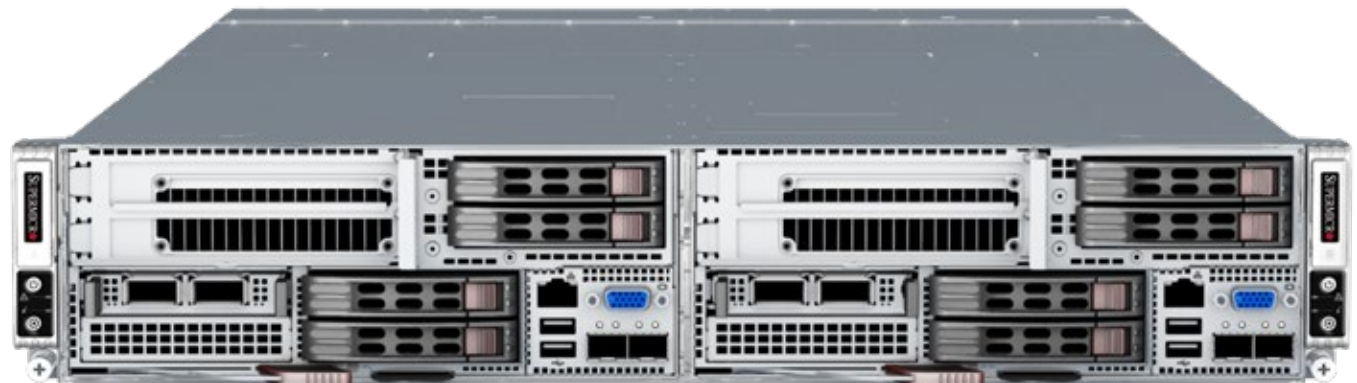
Reference Cloud Gaming Video Server

Smart VPU | Quadra T2A ASIC G5

Supermicro AS-2015CS-TNR server with
2 Quadra T2A Smart VPUs and 1 GPU

- Up to 200x 720p30 cloud gaming sessions
- AV1 / HEVC / H.264 video encoding
- Up to 8K and 60fps

Processor Support	Single AMD Genoa SP5 processors up to 360W (cTDP: 400W)
Memory Capacity	12x DIMM slots, DDR5-4800 memory
Expansion	4x PCIe 5.0 x16 2x AIOM PCIe 5.0x16 slots (OCP 3.0 compliant)
Networking & I/O	1x COM port (rear), 2x USB 3.0 ports (2 rear), 1x VGA port
System Management	Built-in server management tool (IPMI 2.0, KVM/media over LAN) with dedicated LAN port, Root of Trust (ROT) ready
Drive Bays	12x hot-swap 3.5" SATA3 drives or 8 SATA3 + 4NVMe via optional cables 2x M.2 NVMe 2280/22110 slots
System Cooling	3x heavy duty 8cm PWM fans
Power Supply	1200W 1+1 high-efficiency redundant (titanium level)
Dimensions	H: 3.5" x W: 17.2" x D: 25.5"



Logan Video Server

VPU | Codensity ASIC G4



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Logan Video Server

VPU | Codensity ASIC G4

Ultra-high density
encoding capacity

Built on the Supermicro 1114S-WN10RT server platform, server contains ten T408 VPUs.

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



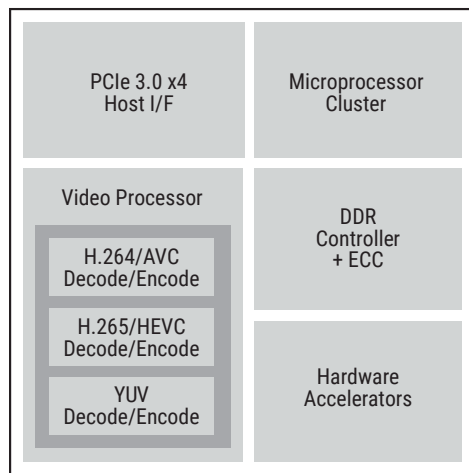
Codensity G4 ASIC VPU

ASIC Video Processing Unit

The Codensity G4 ASIC combines on-chip H.264 and HEVC video encoding, decoding, 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 that increases 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 without sacrificing video quality or latency.



4K UHD Video Transcoding

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. This limits the scalability of CPU and GPU-based encoders, which precipitously drop in throughput when encoding HEVC.

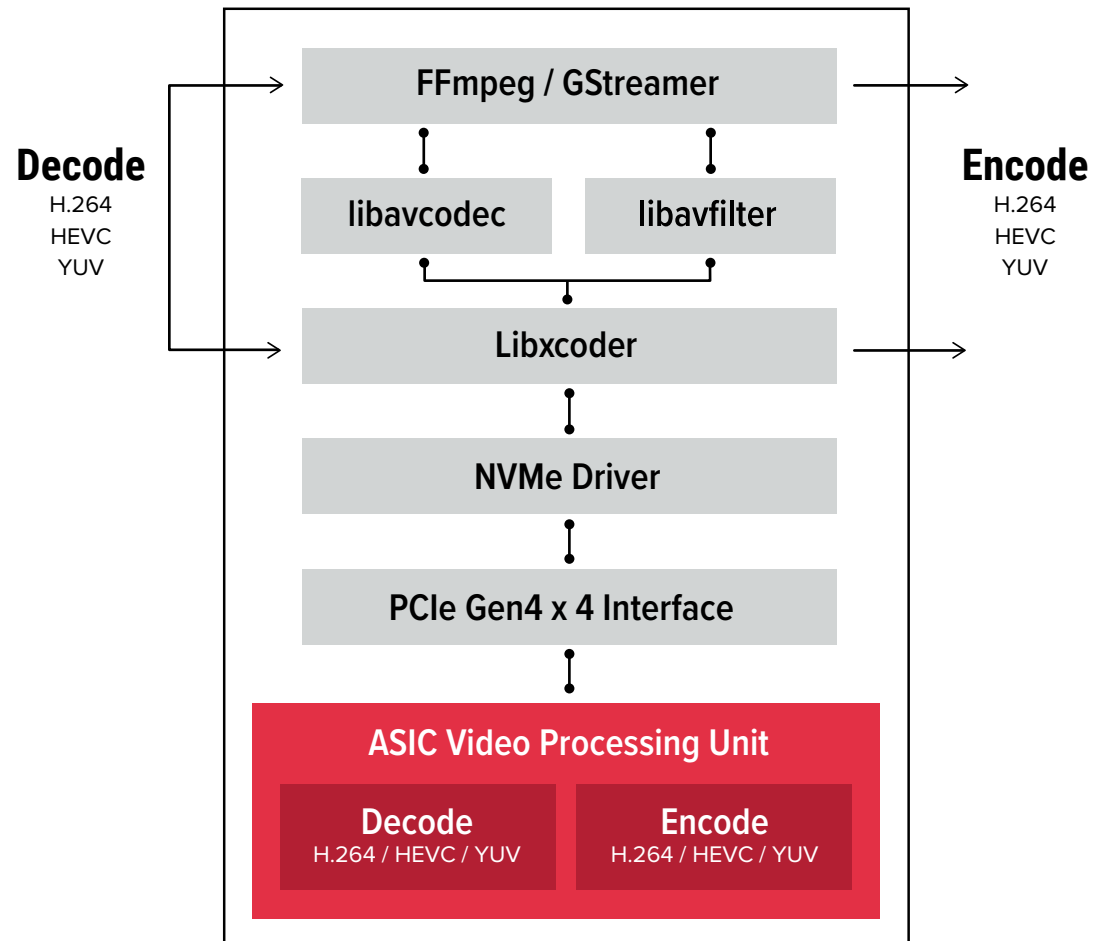
Not so for the Codensity G4 ASIC, which produces nearly identical throughput for both H.264 and HEVC. For both codecs, the Codensity G4 delivers the flexibility and quality of software with the performance of hardware for 4K live transcoding.

Flexible Architecture

The Codensity G4 is built on a programmable microprocessor architecture that optimizes firmware and pipeline processing and enables continual performance and quality improvements. This counters a criticism that silicon-based encoders lack upgrade flexibility.

Logan VPU Workflow

Open-source suite of processing tools.



T408 VPU

Codensity ASIC G4



Form Factor	U.2 (SFF-8639)
Interface	PCIe 3.0 x4
Power Consumption (Typ)	7W
Usage	24/7 Operation
Operation Temperature	0 - 70°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 & Logging
Video Encoding Standards/Formats	H.264 AVC, CBP / BP / XP / MP / HiP / HiP10 H.265 HEVC, Main / Main 10 YUV
Video Decoding Standards/Formats	H.264 AVC, CBP / BP / XP / MP / HiP / HiP10P H.265 HEVC, Main / Main 10 YUV
Throughput Capacity	8x 1080p30 or 2x 4Kp30
Level	1 to 6.2 Main Tier
Min / Max Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
Software Integration	FFmpeg and GStreamer SDKs and direct integration with LibXcoder API
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions
Closed Captioning	EIA CEA-708 for H.264 and H.265 encode/decode
High Dynamic Range (HDR)	HDR10 & HDR10+ for H.264 & H.265 encode/decode
Low Latency	Sub-frame latency
IDR Insert	Forced IDR frame inserts at any location
Flexible GOP Structure	8 presets plus customizable GOP structure

Logan Video Server

VPU | Codensity ASIC G4



CPU Options	AMD EPYC™ 7232P Server Processor (8-core)
	AMD EPYC 7543P Server Processor (32-core)
	AMD EPYC 7713P Server Processor (64-core)
Operating System	Ubuntu 20.04.05 LTS
Memory	8x 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 Consumption	~400W
Power Supply	700W: 100 - 140Vac
	750W: 200 - 240Vac
	750W: 200 - 240Vdc (CCC only)
Transcoders	10x NETINT T408
Throughput Capacity	Up to 80x 1080p30 or 20x 4Kp30
Codec Support	H.264 - Encode/Decode
	HEVC - Encode/Decode
	YUV - Encode/Decode
Software Integration	FFmpeg, GStreamer

Physical Dimensions	W: 17.2" (437mm), H: 1.7" (43mm), D: 23.5" (597mm)
Rack Size	1U
Weight	39 lbs (17.69 kg) <i>(fully loaded with 10 T408 VPUs)</i>
Environmental	50 degrees F to 95 degrees F Operating Temperature, 8% to 90% Operating Relative Humidity
Power Inputs	100 - 140Vac / 8 - 6V / 50-60Hz
	200 - 240Vac / 4.5 - 3.8A / 50-60Hz
	200 - 240Vdc / 4.5 - 3.8A (CCC Only)
Certifications	RoHS Compliant, UL Approved

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Logan Video Server: Transcoding with Scaling

This table details the H.264 and HEVC output at the specified resolutions and frame rates; and the associated cost per stream. All inputs are scaled to the designated targets. Though the host CPU performs the scaling in these tests, **Note CPU utilization remains exceptionally low, reducing power costs and carbon emissions.**

Input	Output	Codec		FFmpeg	FFmpeg Low Delay	GStreamer	GStreamer Low Delay
4Kp30	1080p30	AVC > AVC	Instances	20	20	20	20
			CPU Usage	25.7	24.1	2.4	2.5
		AVC > HEVC	Instances	20	20	20	20
			CPU Usage	25.6	23.7	2.5	2.4
		HEVC > AVC	Instances	20	20	20	20
			CPU Usage	24.8	25.6	2.4	2.5
		HEVC > HEVC	Instances	20	20	20	20
			CPU Usage	24.2	25.2	2.4	2.6
1080p30	720p30	AVC > AVC	Instances	80	80	80	80
			CPU Usage	30.2	30.6	11.2	11.7
		AVC > HEVC	Instances	80	80	80	80
			CPU Usage	30.6	30.8	11.3	11.6
		HEVC > AVC	Instances	90	90	90	90
			CPU Usage	34.5	34.4	12.8	13.2
		HEVC > HEVC	Instances	90	90	90	90
			CPU Usage	35.4	35.1	12.8	13.1

Logan Video Server: Encoding Ladders

This table shows the number of full encoding ladders produced by the server and the cost per ladder for that output. Note the low CPU usage, despite all lower resolution rungs being scaled by the host CPU.

Input	Output	Codec		FFmpeg	FFmpeg Low Delay	GStreamer	GStreamer Low Delay
1080p30 - 5 Ladders	1080p30 @ 5Mbps	AVC > AVC	Instances	30	9	30	30
	1080p30 @ 3.5Mbps						
	720p30 @ 2Mbps						
	540p30 @ 1Mbps		CPU Usage	31.6	8.7	7.8	8.8
	360p30 @ 600kbps						
1080p30 - 4 Ladders	1080p30 @ 3.5Mbps	AVC > HEVC	Instances	26	14	28	28
	1080p30 @ 1.8Mbps						
	720p30 @ 1Mbps		CPU Usage	20.9	10.4	6.4	7.0
	360p @ 500kbps						
4Kp30 - 6 ladders	4Kp30 @ 12Mbps	AVC > HEVC	Instances	3	NA	7	7
	2Kp30 @ 7Mbps						
	1080p30 @ 3.5Mbps						
	1080p30 @ 1.8Mbps		CPU Usage	13.2		6.7	6.8
	720p30 @ 1Mbps						
	360p30 @ 500kbps						

Logan Video Server: Power Consumption

One of the key strengths of ASIC-based transcoders is ultra-low power consumption, which reduces OPEX and carbon emissions. You see this in the power figures, **particularly the Watts/Output, which are orders of magnitude lower than comparable figures for CPU-based transcoding.**

Operation	# Streams	Watts / Stream
Transcode 720p HEVC > HEVC, low delay	150	2.1
Scale 1080p > 720p HEVC to AVC, low delay	90	3.4
Five-rung AVC ladder, low delay	30	10.8

Quadra Video Server

Smart VPU | Quadra ASIC G5



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Smart VPU | Codensity Quadra G5 ASIC

Ultra-high density, low
cost and powered by AI

Built on the Supermicro 1114S-WN10RT server platform, server contains ten Quadra T1U VPUs.

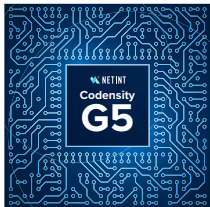
- HEVC, H.264 and AV1 video encoding
- HEVC, H.264, and VP9 video decoding
- Up to 8K resolution
- 10-bit HDR



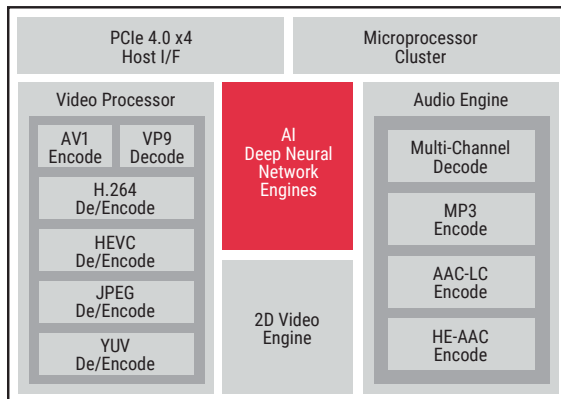
Codensity G5 Smart VPU

ASIC Video Processing Unit, powered by AI

The Codensity G5 architecture uniquely combines on-chip AV1, H.264 and HEVC video encoding and AI processing engines to deliver scalability for metaverse, live streaming, and interactive applications.



The core of NETINT's Codensity technology is an in-house built ASIC that increases encoding density compared to CPU-based software encoding. This density increase expands the number of channels that can be encoded without increasing the rack footprint. This reduces power and HVAC costs to deliver a lower TCO without sacrificing video quality or latency.



8K UHD Video Encoding

The Codensity G5 ASIC enables up to 8K video transcoding using the HEVC and H.264 codecs (AV1 is limited to 4K). Advanced codecs like AV1 and HEVC deliver superior quality to H.264 with up to a 60% reduction in bitrate, but when produced by CPU-only encoders, can require up to 10x the processing power, limiting throughput severely. HEVC and AV1 output with the Codensity G5 ASIC should be similar to H.264, making 4K and 8K live resolutions affordable and scalable for the first time.

Flexible Architecture

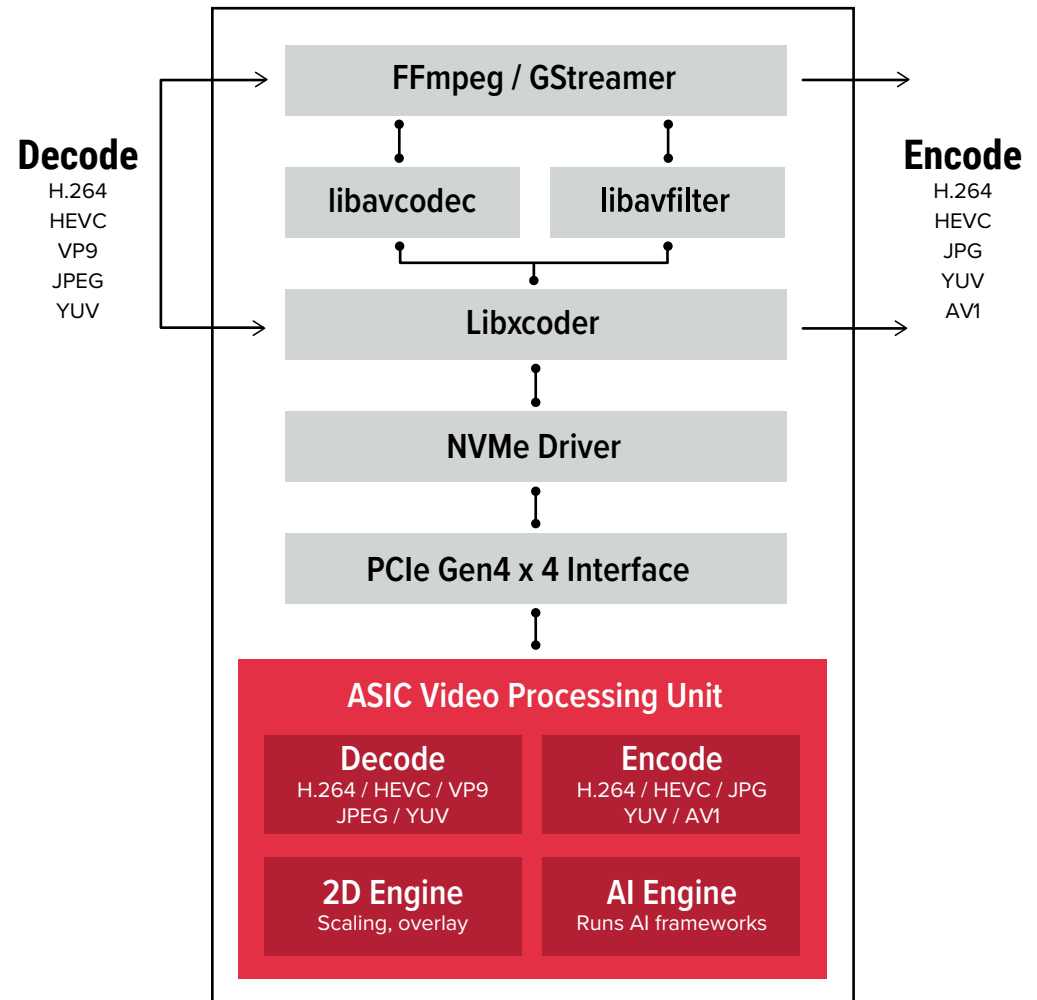
The Codensity G5 is built on a programmable microprocessor architecture to optimize the firmware and pipeline processing for improved performance and increased video quality. This counters a criticism that silicon-based encoders lack upgrade flexibility.

AI Engine

Two Deep Neural Network engines capable of up to 18 TOPS (trillion operations per second) enable object detection, classification, and segmentation to provide additional data to the encoding engine for image quality improvement and content-adaptive rate control for advanced performance and functionality. Seamlessly integrated for region-of-interest (ROI) encoding and background replacement. Additional features to be released.

Quadra VPU Workflow

Open-source suite of processing tools.



Quadra T1U Smart VPU

AI powered Video Processing Unit | Codensity G5



Form Factor	U.2
ASIC	1x Codensity G5
Interface	PCIe 4.0 x4
Power Consumption (Typ)	17W
Usage	24/7 Operation
Operation Temperature	0 - 50°C
RoHS Compliance	European Union (EU) ROHS Compliance Directives
Product Health Monitoring	Self-Monitoring, Analysis, and Reporting Technology (SMART) commands Temperature Monitoring and Logging
Video Encoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.264 Main, Main 10 JPG YUV 420 8 bit/10 bit encoding AV1 Main
Video Decoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.265 Main, Main 10 VP9 Profile 0, 2 JPEG YUV 420 8 bit/10 bit decoding
Throughput Capacity	Up to 32x 1080p30, 8x 4Kp30, 2x 8Kp30
Audio Codecs	MP3, AAC-LC, HE-AAC
Level	1 to 6.2 Main Tier
Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
Software Integration	FFmpeg SDKs, GStreamer, LibXcoder API integration
AI Deep Neural Network Engines	15 TOPS AI Assisted Encoding
Region of Interest (ROI)	ROI enables the quality of some regions to be improved at the expense of other regions
Closed Captioning	EIA CEA-708 for H.264 and HEVC encode/decode
High Dynamic Range (HDR)	HDR10, HDR10+, HLG for H.264 & HEVC encode/decode
Low Latency	Sub-frame latency
IDR Insert	Forced IDR frame inserts at any location
Flexible GOP Structure	8 presets plus customizable GOP structure
Video 2D Processing Engine	Crop & Padding/Scaling/Overlay/YUV & RGB Conversion

Quadra Video Server

Smart VPU | Codensity Quadra G5



CPU Options	AMD EPYC™ 7232P Server Processor (8-core)
	AMD EPYC 7543P Server Processor (32-core)
	AMD EPYC 7713P Server Processor (64-core)
Operating System	Ubuntu 20.04.05 LTS
Memory	8x 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 Consumption	~500W
Power Supply	700W: 100 - 140Vac
	750W: 200 - 240Vac
	750W: 200 - 240Vdc (CCC only)
Transcoders	10x NETINT Quadra T1U
Encoding Capacity	Up to 20x 8Kp30, 80 4Kp30 or 320x 1080p30
Codec Support	H.264 - Encode/Decode
	HEVC - Encode/Decode
	JPG - Encode/Decode
	VP9 - Decode
	AV1 - Encode
Software Integration	FFmpeg, GStreamer

Physical Dimensions	W: 17.2" (437mm), H: 1.7" (43mm), D: 23.5" (597mm)
Rack Size	1U
Weight	39 lbs (17.69 kg) <i>(fully loaded with 10 T1U VPUs)</i>
Environmental	50 degrees F to 95 degrees F Operating Temperature, 8% to 90% Operating Relative Humidity
Power Inputs	100 - 140Vac / 8 - 6V / 50-60Hz
	200 - 240Vac / 4.5 - 3.8A / 50-60Hz
	200 - 240Vdc / 4.5 - 3.8A (CCC Only)
Certifications	RoHS Compliant, UL Approved

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Cloud Gaming Video Server

NETINT Smart VPU™ ASIC Video Processing Units
Supermicro X13 GrandTwin™ Server

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Logan
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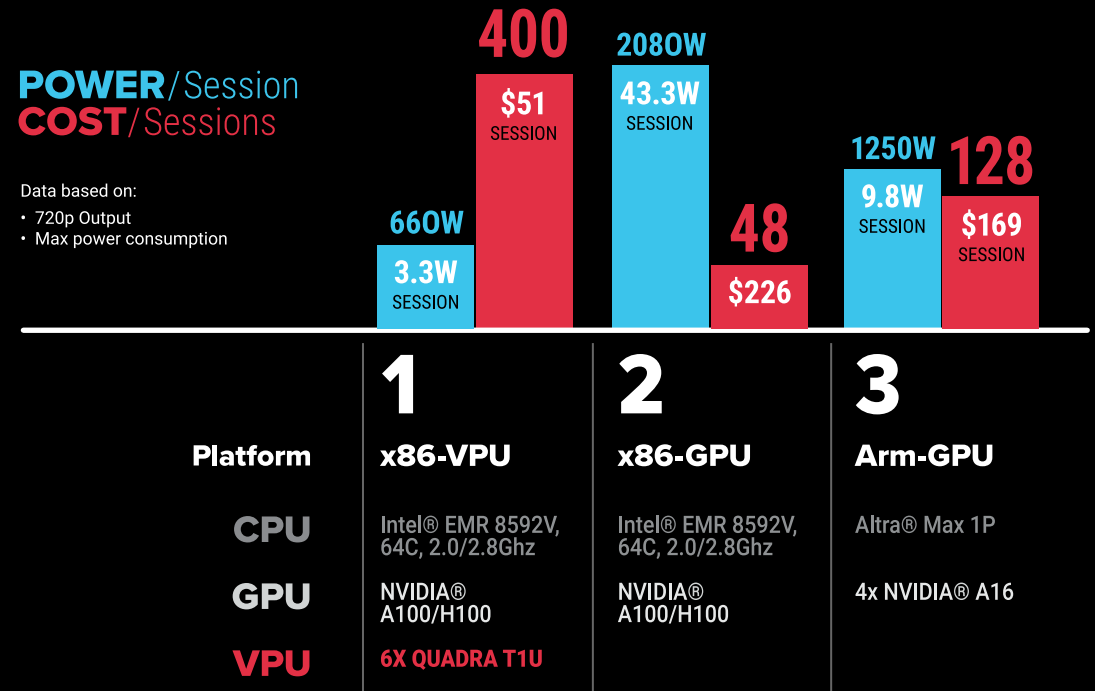
Quadra
Video Server

Cloud Gaming

Surveillance

Head to head comparison

Power and cost comparison across 3 encoding scenarios.



SOURCE: bit.ly/ASIC_CloudGaming

Smart VPUs for Cloud Gaming

400 Gamers per Session

Unprecedented highest streaming density per session delivers +40x increase compared to software.

Lowest Cost

The industry's most cost efficient server platform with ultra-low CAPEX and OPEX costs.

Wide Range of Formats

Encode up to 20x 4Kp30 live streams and supports a variety of formats in AV1, HEVC and H.264.

Ultra Responsive Latency

Peer-to-peer DMA integration with popular GPUs for the lowest possible latency (8ms) between rendering engine and encoder.

Easily Scalable

Simple drop-in upgrade path with enterprise NVMe integration on any x86 or Arm-based server.

Video 2D Processing Engines

Cropping, padding and scaling for encoding ladder generation, image composition, video overlay, YUV and RGB conversion.



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400 gamers in a single session

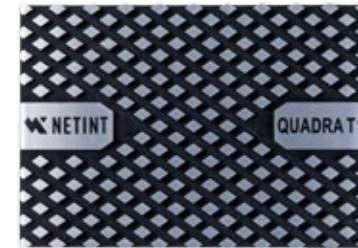
NETINT with Supermicro now delivers highest gaming density ever!

NETINT Quadra T-series modules are the world's first Smart VPUs that support AV1. With the embedded AI and 2D engines, it can support AI enhanced video encoding, region of interest, and content adaptive encoding. Supermicro X13 GrandTwin server is an AI accelerator. Together, these two super powers provide a powerful cloud gaming platform enabling streaming providers unprecedented high throughput with ultra-low latency to expand services and scale profitably.

- By offloading complex encoding and video processing to the Smart VPU, host CPU utilization is minimized resulting in a substantial increase in concurrent session density.
- Supermicro has a multi-node architecture optimized for NETINT's single-processor performance. Their resource saving architecture with modular design makes their platform cost effective.

The Cloud Gaming Video Server delivers up to 80% CAPEX reduction and 97% OPEX reduction compared to relevant competitive platforms.

NETINT Quadra
T1U Smart VPU

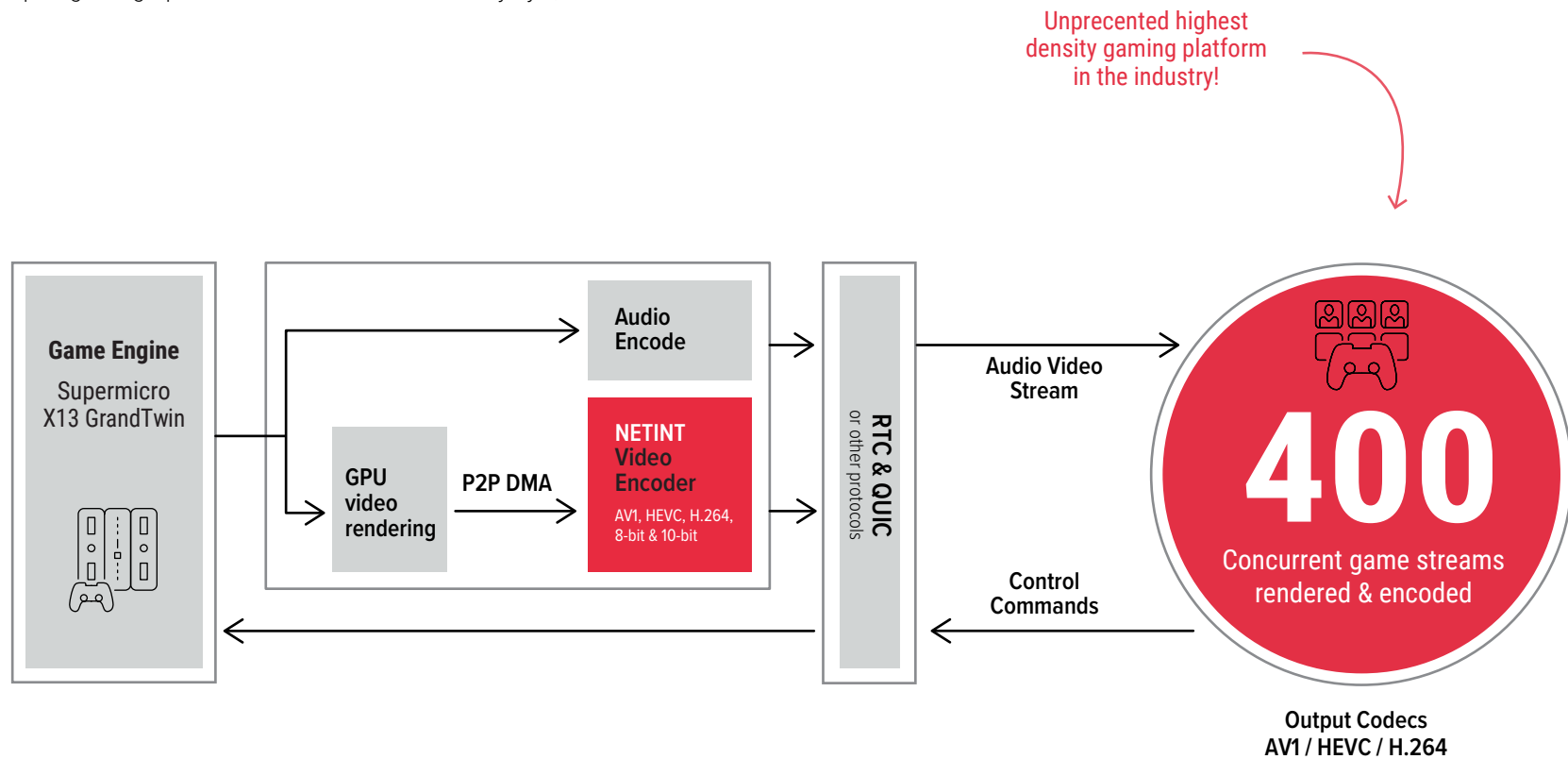


Supermicro
GrandTwin
2U2N GPU



Simple architecture

The Cloud Gaming Video Server leverages P2P DMA for live rendering of complex game graphics encoded in ultra-low latency by Quadra Smart VPUs.



Reference Cloud Gaming Video Server

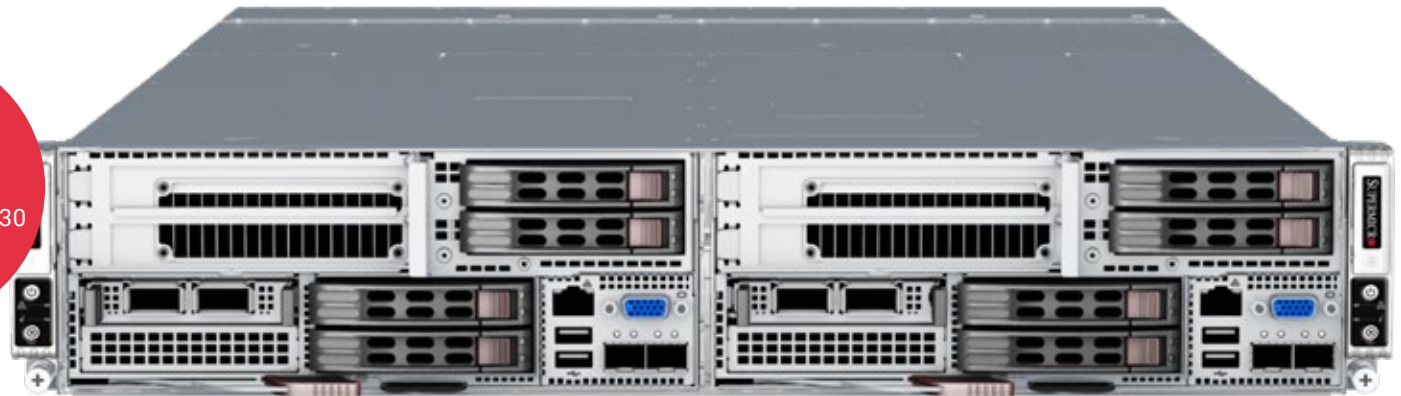
Smart VPU | Quadra T2A ASIC G5

Supermicro AS-2015CS-TNR server with
2 Quadra T2A Smart VPUs and 1 GPU

- Up to 400x 720p30 cloud gaming sessions
- AV1 / HEVC / H.264 video encoding
- Up to 8K and 60fps

Processor Support	Single AMD Genoa SP5 processors up to 360W (cTDP: 400W)
Memory Capacity	12x DIMM slots, DDR5-4800 memory
Expansion	4x PCIe 5.0 x16 2x AIOM PCIe 5.0x16 slots (OCP 3.0 compliant)
Networking & I/O	1x COM port (rear), 2x USB 3.0 ports (2 rear), 1x VGA port
System Management	Built-in server management tool (IPMI 2.0, KVM/media over LAN) with dedicated LAN port, Root of Trust (ROT) ready
Drive Bays	12x hot-swap 3.5" SATA3 drives or 8 SATA3 + 4NVMe via optional cables 2x M.2 NVMe 2280/22110 slots
System Cooling	3x heavy duty 8cm PWM fans
Power Supply	1200W 1+1 high-efficiency redundant (titanium level)
Dimensions	H: 3.5" x W: 17.2" x D: 25.5"

Up to
400
simultaneous 720p30
gaming sessions



Quadra T2A Smart VPU

AI powered Video Processing Unit | Codensity G5



Form Factor	AIC (HH HL)
ASIC	2x Codensity G5
Interface	PCIe 4.0 x4x4
Power Consumption (Typ)	40W
Usage	24/7 Operation
Operation Temperature	0 - 50°C
RoHS Compliance	European Union (EU) ROHS Compliance Directives
Product Health Monitoring	Self-Monitoring, Analysis, and Reporting Technology (SMART) commands Temperature Monitoring and Logging
Video Encoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.264 Main, Main 10 JPG YUV 420 8 bit/10 bit encoding AV1 Main
Video Decoding Standards/Formats	AVC/H.264 Baseline, Main, High, High 10 HEVC/H.265 Main, Main 10 VP9 Profile 0, 2 JPEG YUV 420 8 bit/10 bit decoding
Throughput Capacity	Up to 64x 1080p30, 16x 4Kp30, 4x 8Kp30
Audio Codecs	MP3, AAC-LC, HE-AAC
Level	1 to 6.2 Main Tier
Resolution	32 x 32 to 8192 x 5120
Scan Type	Progressive
Bitrate	64kbit/s to 700Mbit/s
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Surveillance Video Processing

Smart VPU | Quadra ASIC G5

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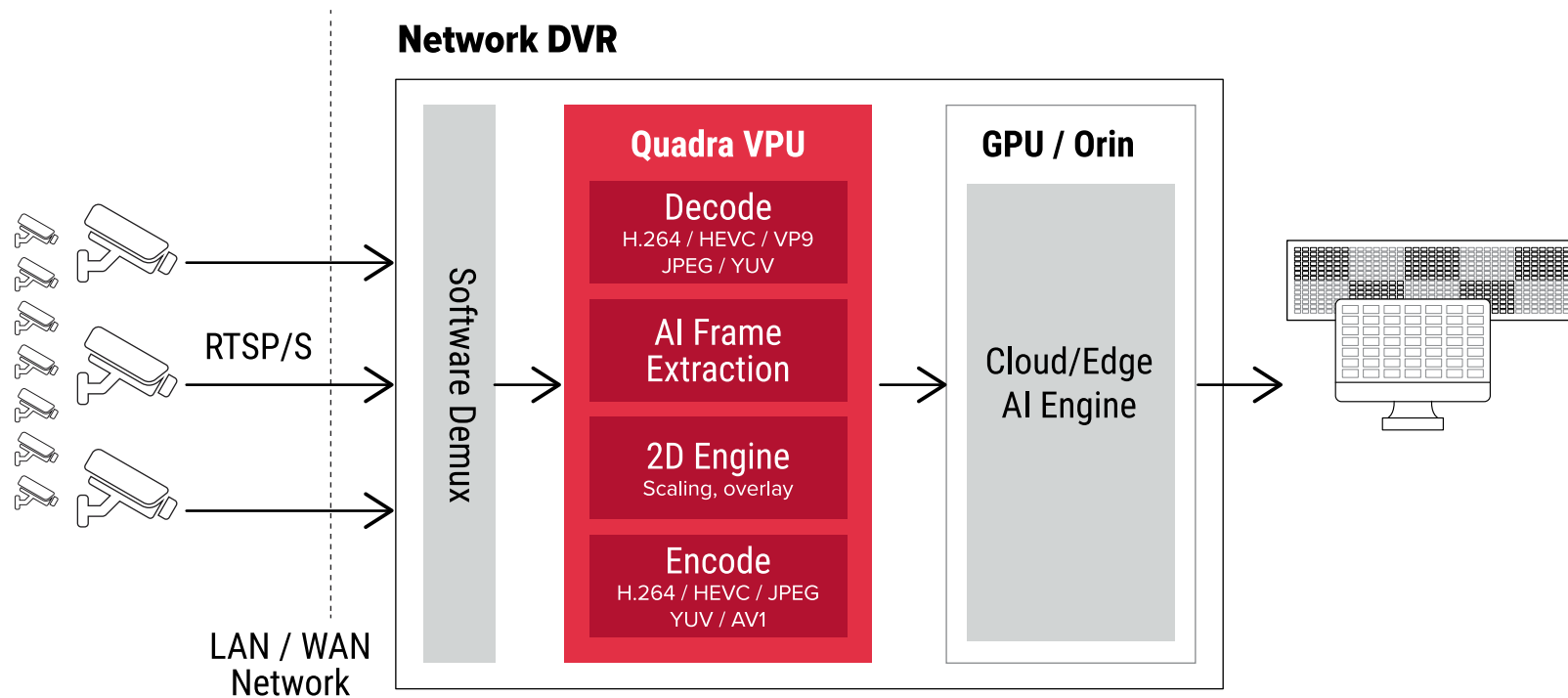
Cloud Gaming

Surveillance



Ultra dense decoding

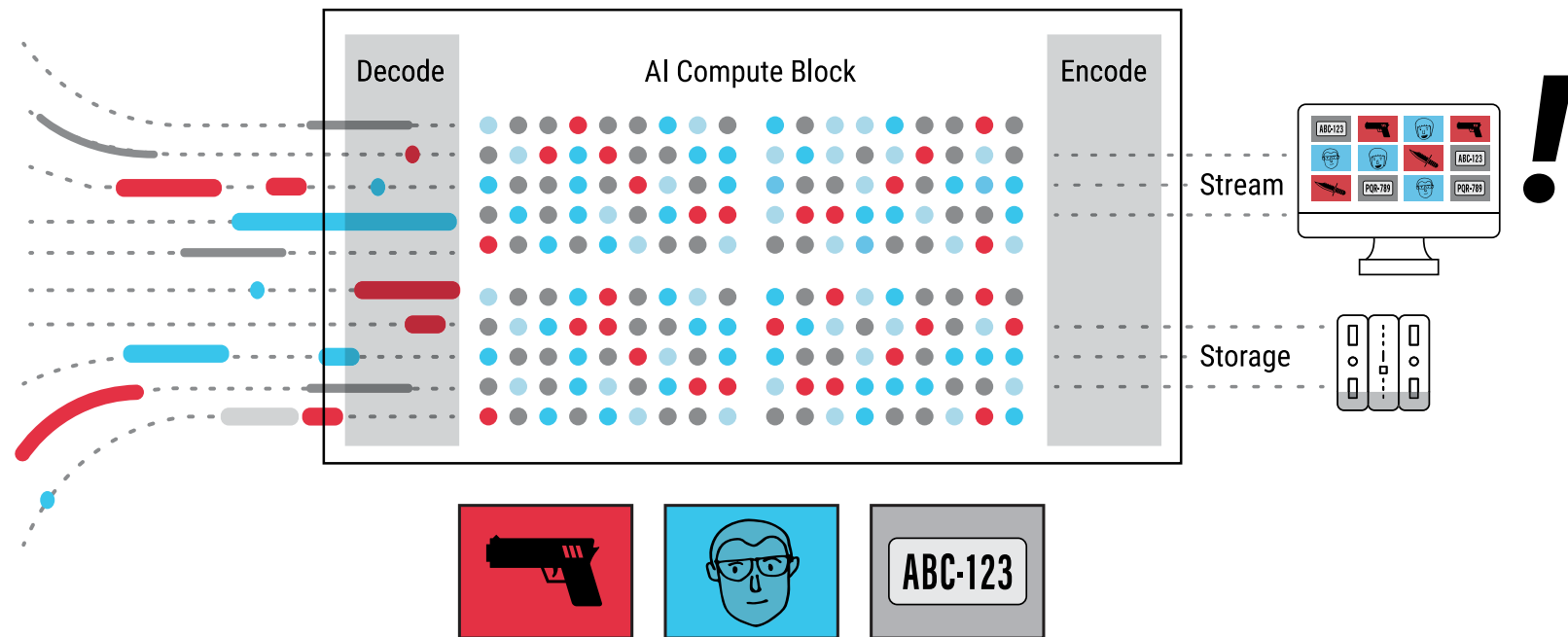
For video walls





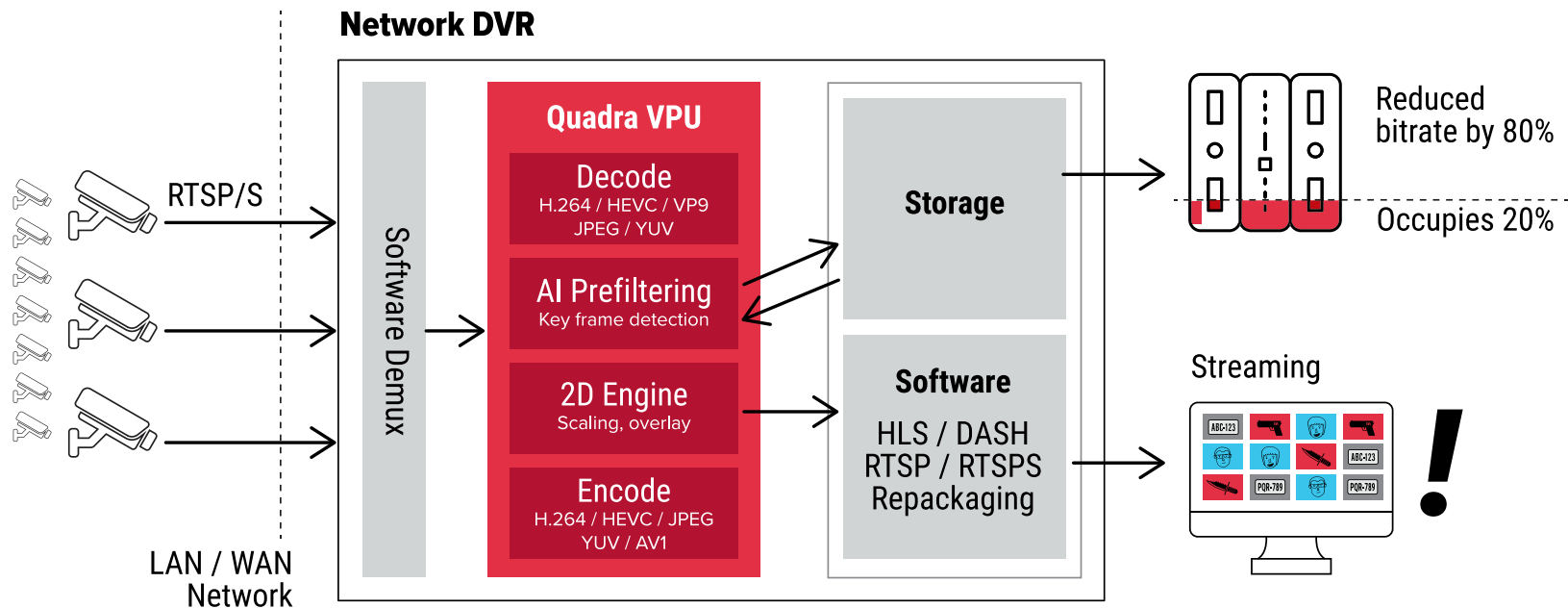
AI powered warning alerts

Key frame detection AI filter captures priority content by scanning every 10th frame.



80% more server storage





Intelligent compression quadruples bandwidth



Security Application: Quadra Modules

AI powered Video Processing Unit | Codensity G5



	Quadra T1U	Quadra T1A	Quadra T2A
Form Factor	U.2	AIC (HHHL)	AIC (HHHL)
ASIC	1x 	1x 	2x  
Power	17 Watts	20 Watts	40 Watts
Video Encoding Standards/Formats	Encoder: H.264, HEVC, JPG, YUV, AV1 Decoder: H.264, HEVC, VP9, JPG, YUV Audio: MP3, AAC-LC, HE-AAC		
Decoding Throughput	Up to 48x 1080p30		Up to 96x 1080p30
Encoding Throughput	Up to 32x 1080p30		Up to 64x 1080p30
AI Capacity	15 TOPs	18 TOPs	36 TOPs



NETINT is a proud member of the Security Industry Association.



Overview

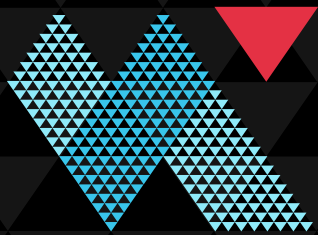
VPU Products

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For more information on NETINT
encoding solutions, contact us.

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