Video Encoding in the cloud
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NGCodec Mission

To be market leader in Cloud Video Encoding

- Leverage our own HW acceleration (FPGA/ASIC)
- Provide best VQ, latency, channel density, cost per RU
- Support all major video standards (AVC, HEVC, VP9, AV1)
- Make our solutions look like software encoders
Video is exploding

- Mobile Video traffic

- 66% CAGR

“Video will be 80% to 90% of total IP traffic by 2017”
Cisco VNI 2015

- Source: Cisco VNI Mobile 2015

And each source video requires ~20 encodings

VR / AR need 20x video bandwidth

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Video Encoding Cost Is Growing Rapidly (Capex & Opex)

- Consumption (5x)
- 4K Quality (5x)
- Compression (5x)
- 360 VR (4x)

Number of CPUs (encoding)

- Today: 500x more CPUs
- 2020

Source: NGCodec & industry experts
Current Video Encoding Is 99% on CPUs
AWS EC2 F1 Instance

<table>
<thead>
<tr>
<th>Instance Type</th>
<th>FPGA Cards</th>
<th>vCPUs</th>
<th>Instance Memory (GiB)</th>
<th>SSD Storage (GB)</th>
<th>Enhanced Networking</th>
<th>EBS Optimized</th>
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<tbody>
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NGCodec FPGA Solutions Are Superior

- 10x Lower Cost Encoding
- Highest Video Quality (VQ)

One hour cost on AWS 1080p60 ‘very slow’

Instance cost

Codec cost

$40

$30

$20

$10

$0

$33

$3

10x

FPGA

Intel XEON

NGCodec

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Performance vs x265

- Fewer bits
- Better artifacts

Sweat spot for ABR
Same or better than x265
veryslow
NGCodec’s FPGA Design Process

- **N265**: bit accurate C model written from scratch
- **HLS**: HLS C++ code written from scratch
- **RTL**: RTL code machine generated
Chestnut (HEVC) FPGA Layout
Conclusions

- FPGA are now in many data centers
- Video encoding is a great workload to replace CPUs
- Machine Learning ‘Inference’ is another key application