2005	2007	2008	2009	2010	2012	2013	2014	2014	2016	2017
YOUTUBE	NETFLIX	HULU	TV EVERYWHERE	APPLE TV	SUPER BOWL	MLB.COM AT BAT,	AMAZON FIRE TV	TWITCH	LIVE VIDEO	360 6DoF VR

NGCODEC
NEXT GENERATION VIDEO COMPRESSION

FPGA

Video Encoding in the cloud

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CEO & Co-founder
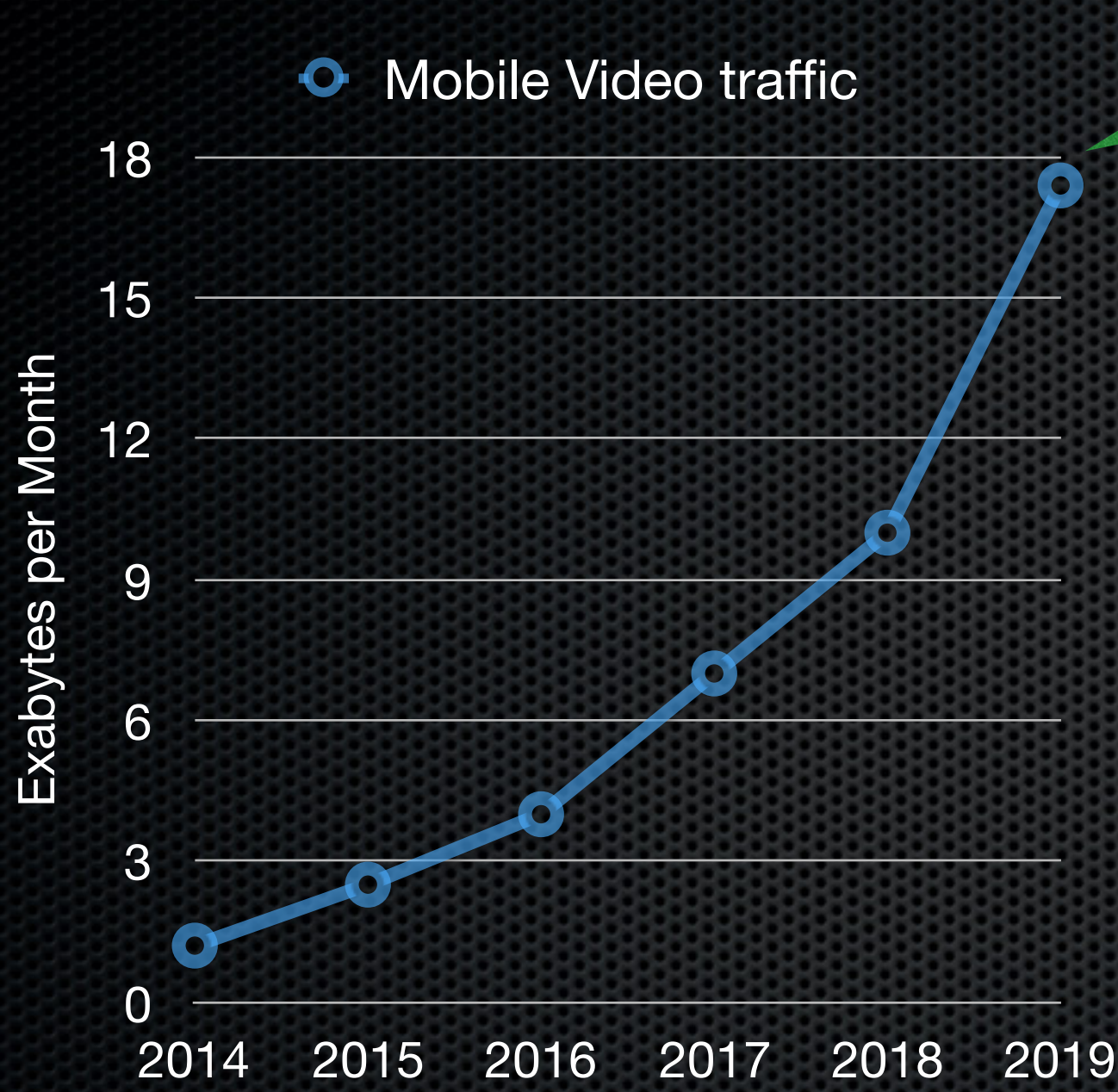
@OlyG

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

XILINX
ALL PROGRAMMABLE™

AMPHION™

V-NOVA

VYUSYNC

Video is exploding

Mobile Video traffic

66% CAGR

Exabytes per Month

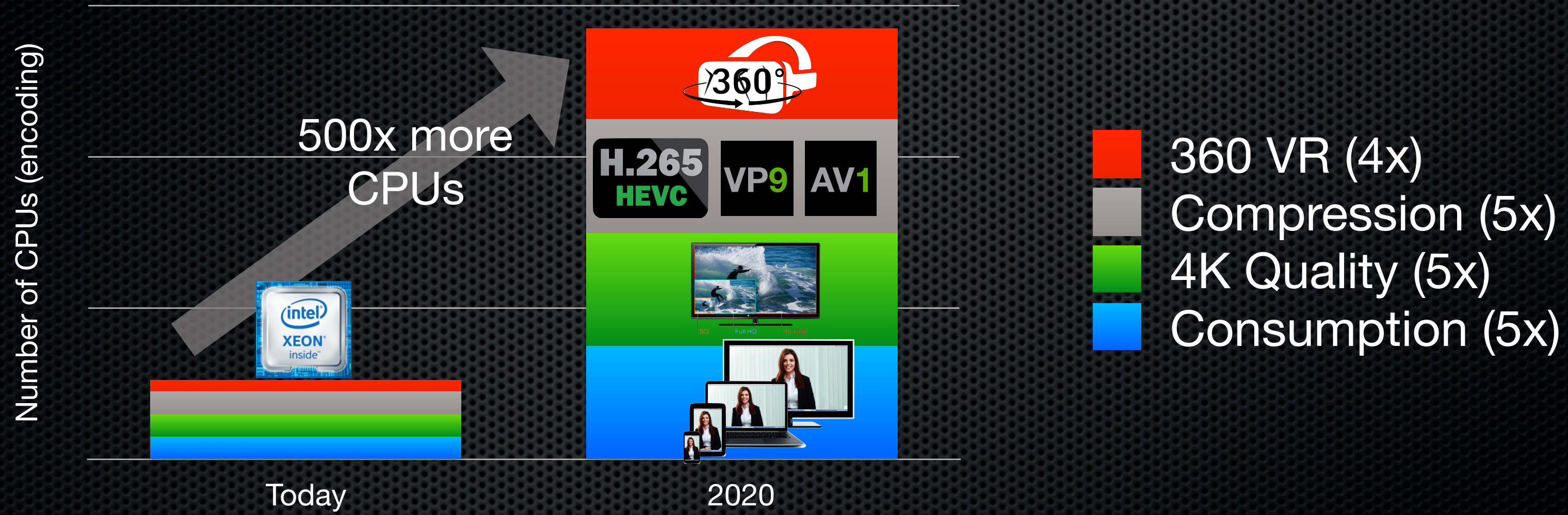18
15
12
9
6
3
0

2014 2015 2016 2017 2018 2019

Source: Cisco VNI Mobile 2015

And each source video requires ~20 encodings

VR / AR
need 20x video bandwidth

Video Encoding Cost Is Growing Rapidly (Capex & Opex)

Number of CPUs (encoding)
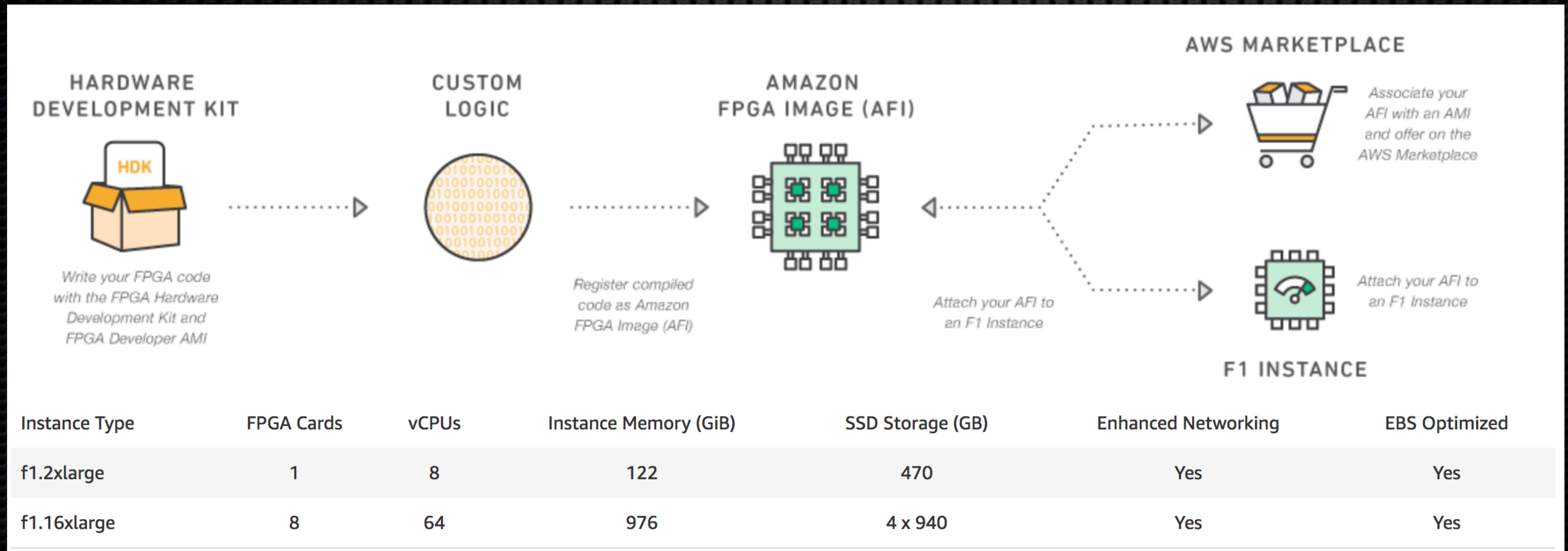
500x more CPUs

Today

2020

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

H.265 HEVC VP9 AV1

Source: NGCodec & industry experts

Current Video Encoding Is 99% on CPUs

Field Programable Cloud | Fixed 3 years before Embedded

Better

Flexibility & Ease of Use

Better

CPU

GPU

FPGA

ASIC

Performance & Power Efficiency

AWS EC2 F1 Instance

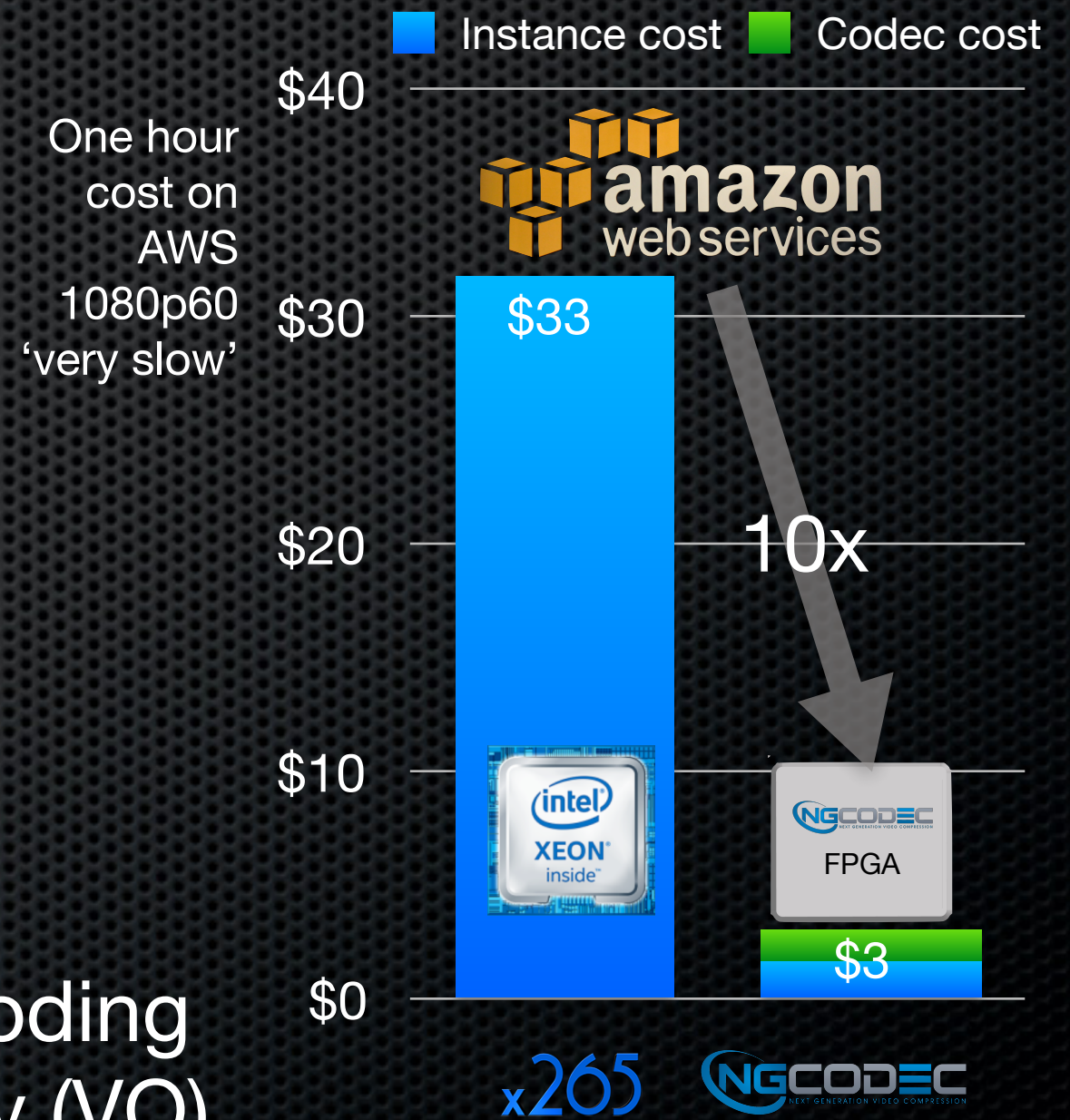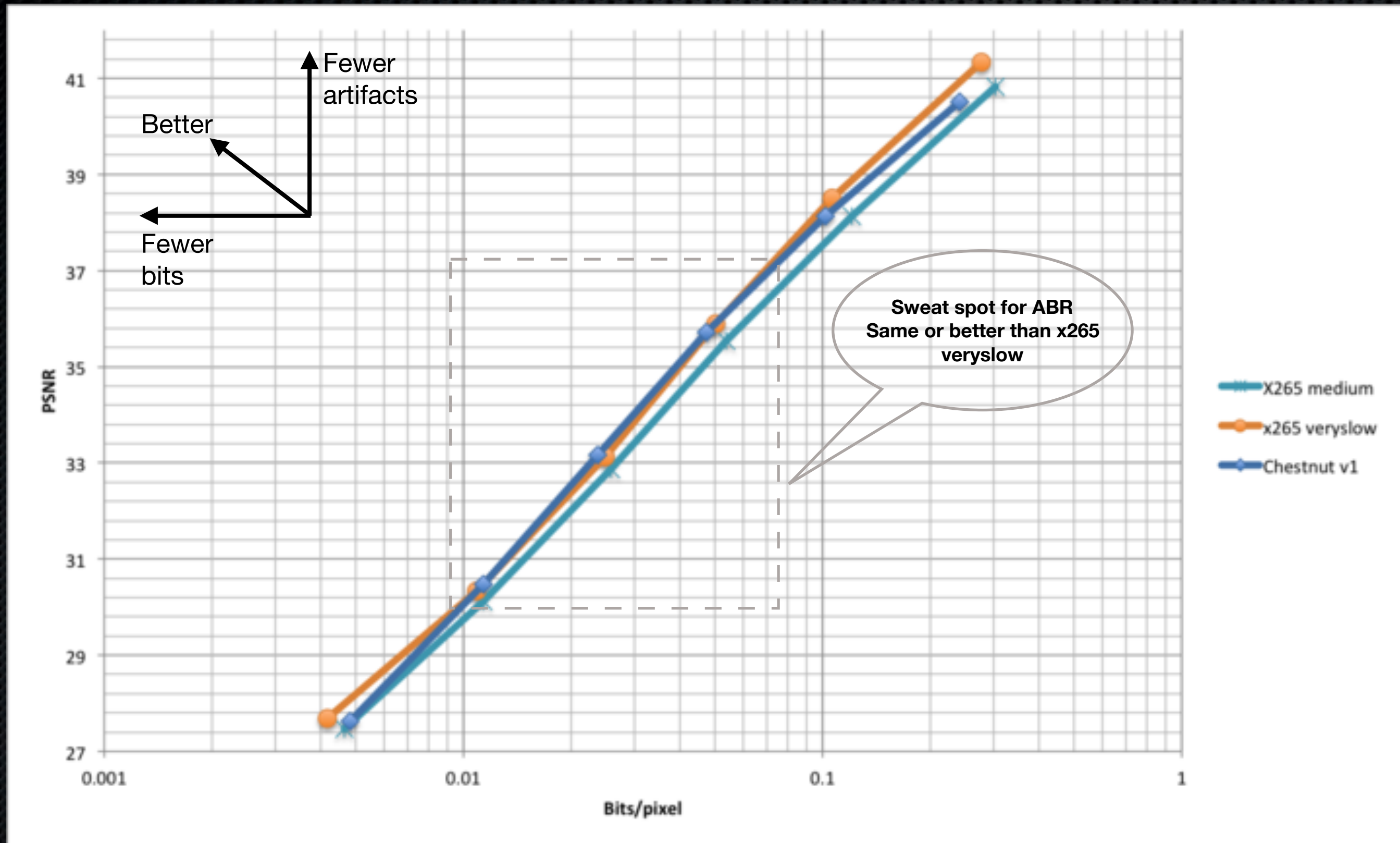| Instance Type	FPGA Cards	vCPUs	Instance Memory (GiB)	SSD Storage (GB)	Enhanced Networking	EBS Optimized
f1.2xlarge	1	8	122	470	Yes	Yes
f1.16xlarge	8	64	976	4 x 940	Yes	Yes
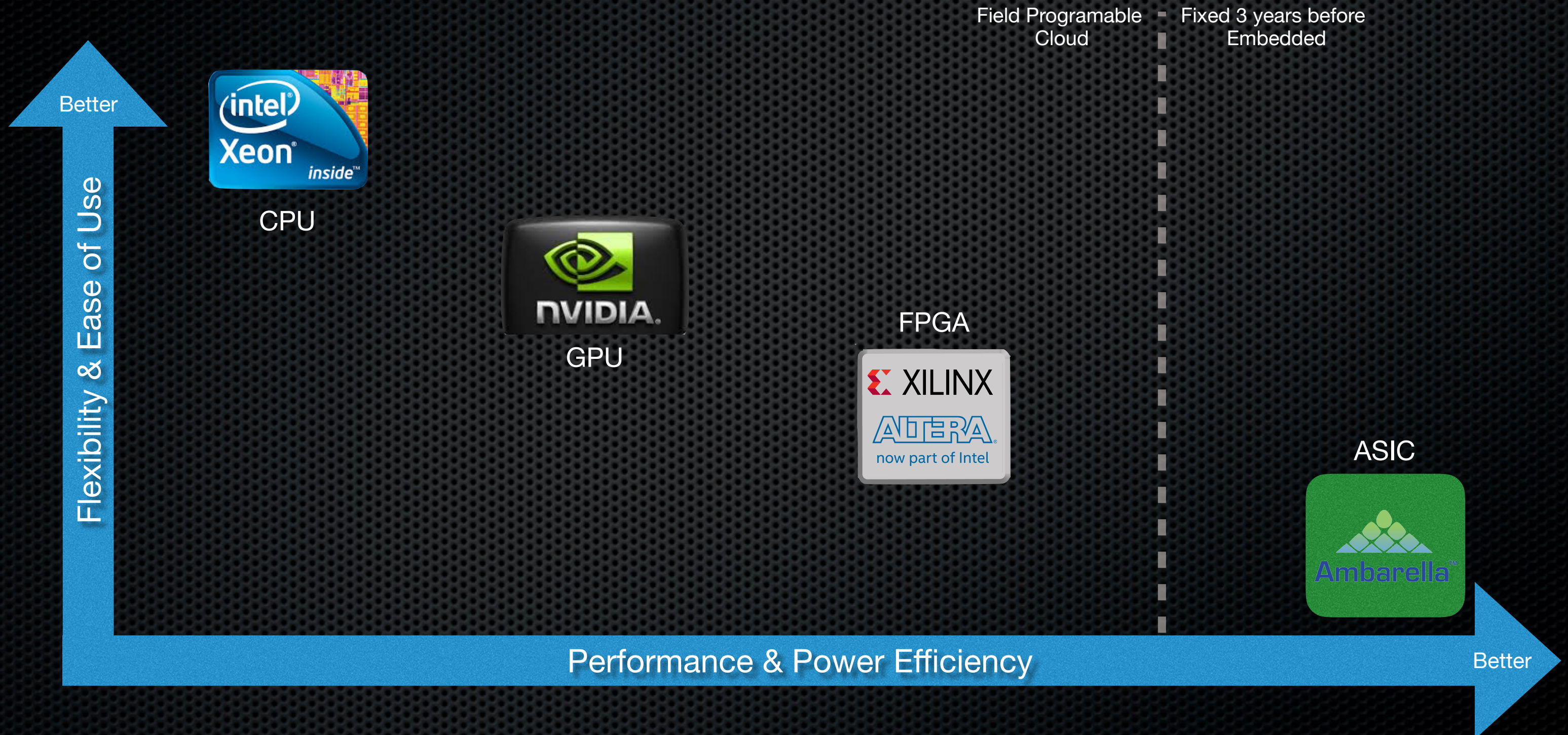
NGCodec FPGA Solutions Are Superior

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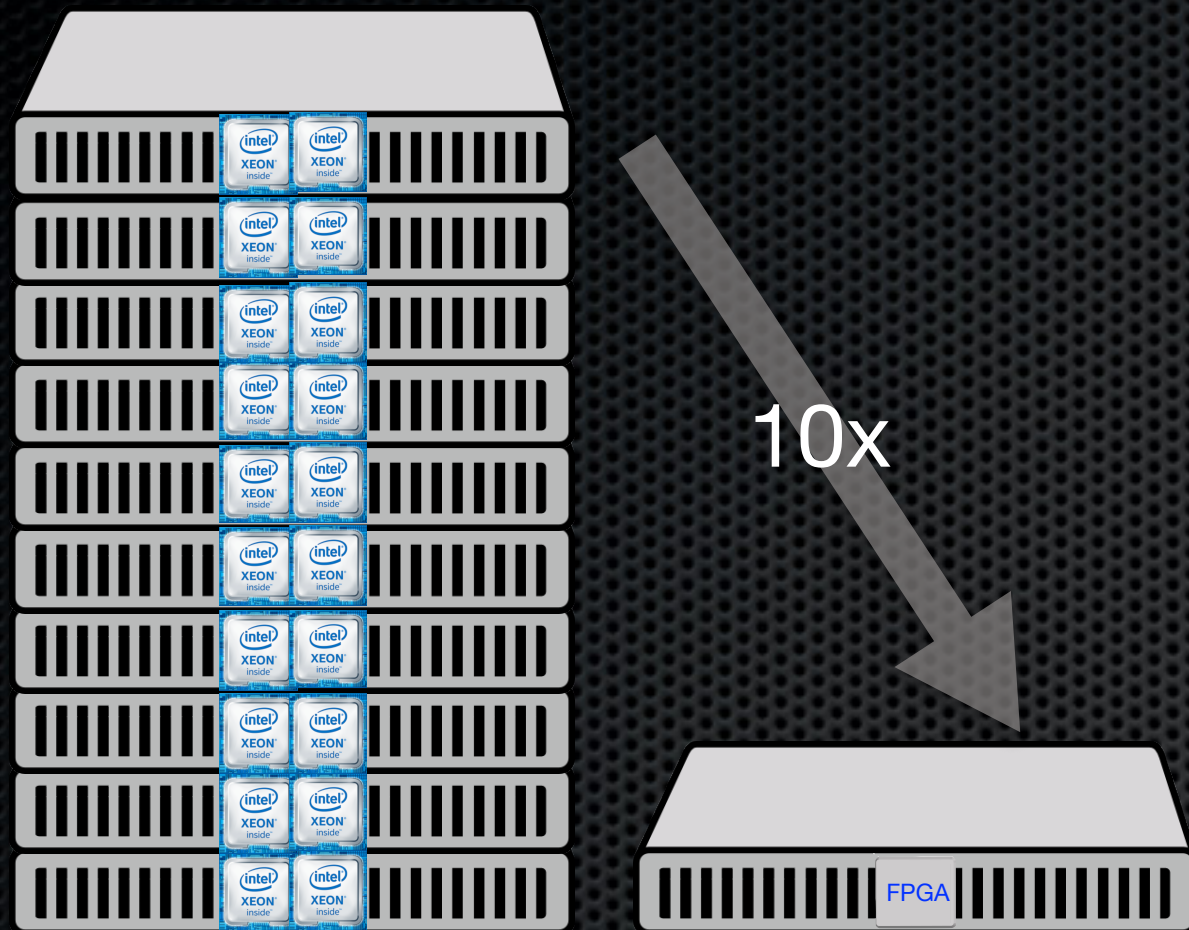
- 10x Lower Cost Encoding
- Highest Video Quality (VQ)

Instance cost   Codec cost

One hour cost on AWS 1080p60 'very slow'

$40

$33

$30

$20

10x

$10

$3

$0

x265   NGCODEC

Performance vs x265

NGCodec's FPGA Design Process

bit accurate C model

written from scratch

HLS C++ code

written from scratch

RTL code machine generated

N265

HLS

RTL
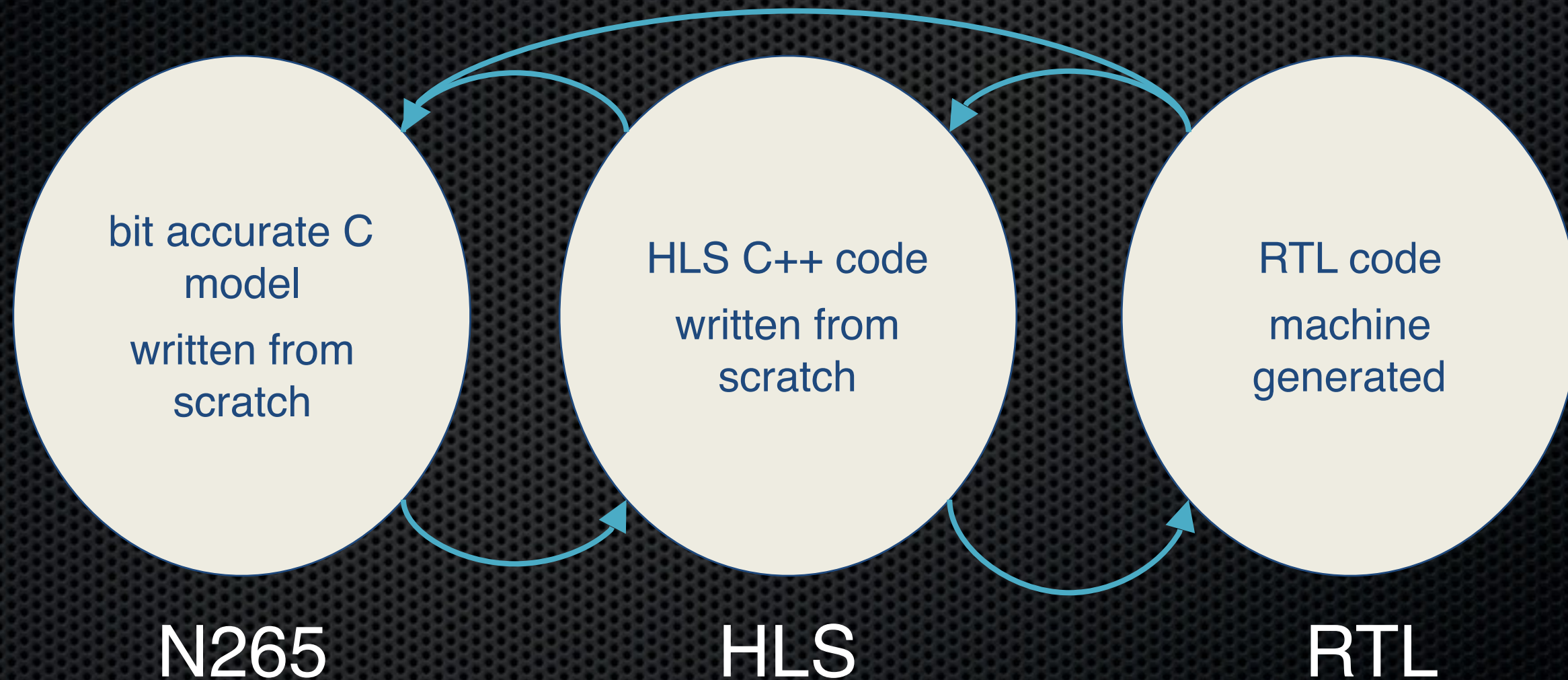
Chestnut (HEVC) FPGA Layout

Motion Estimation

Intra Prediction

Shell – DSA

CABAC

Reconstruct

Mode Decision

Conclusions

SD 480i | Full HD 1080p | 4K UHD 2160p
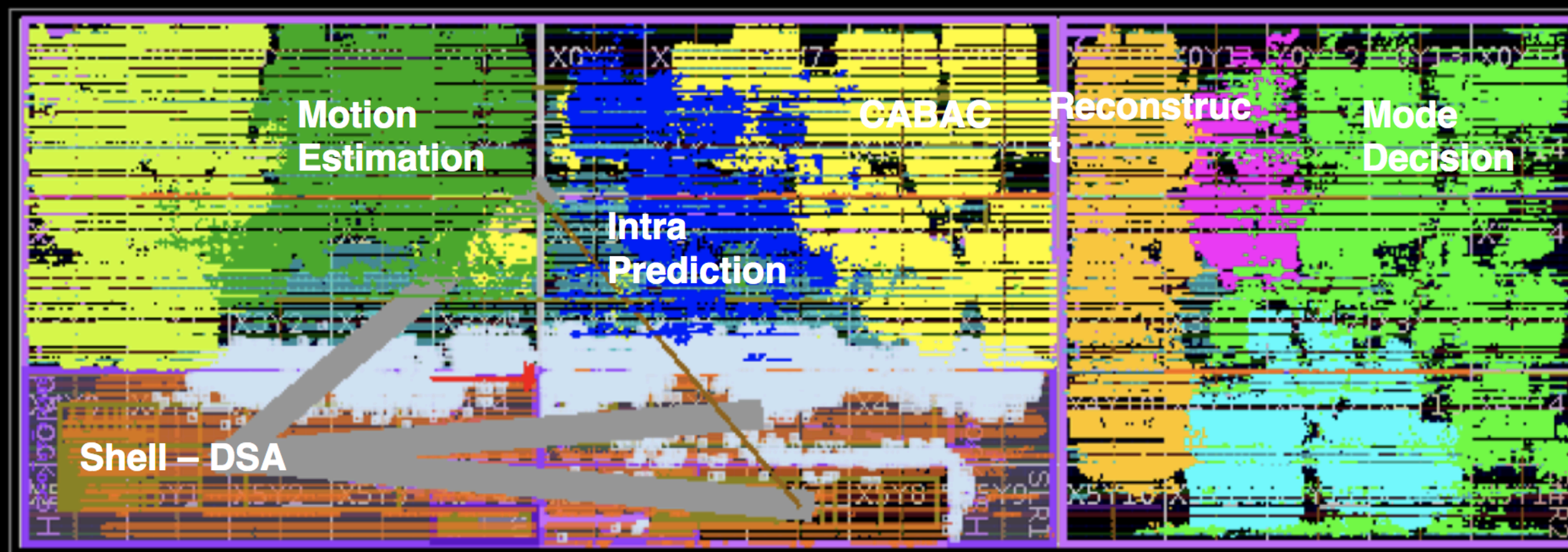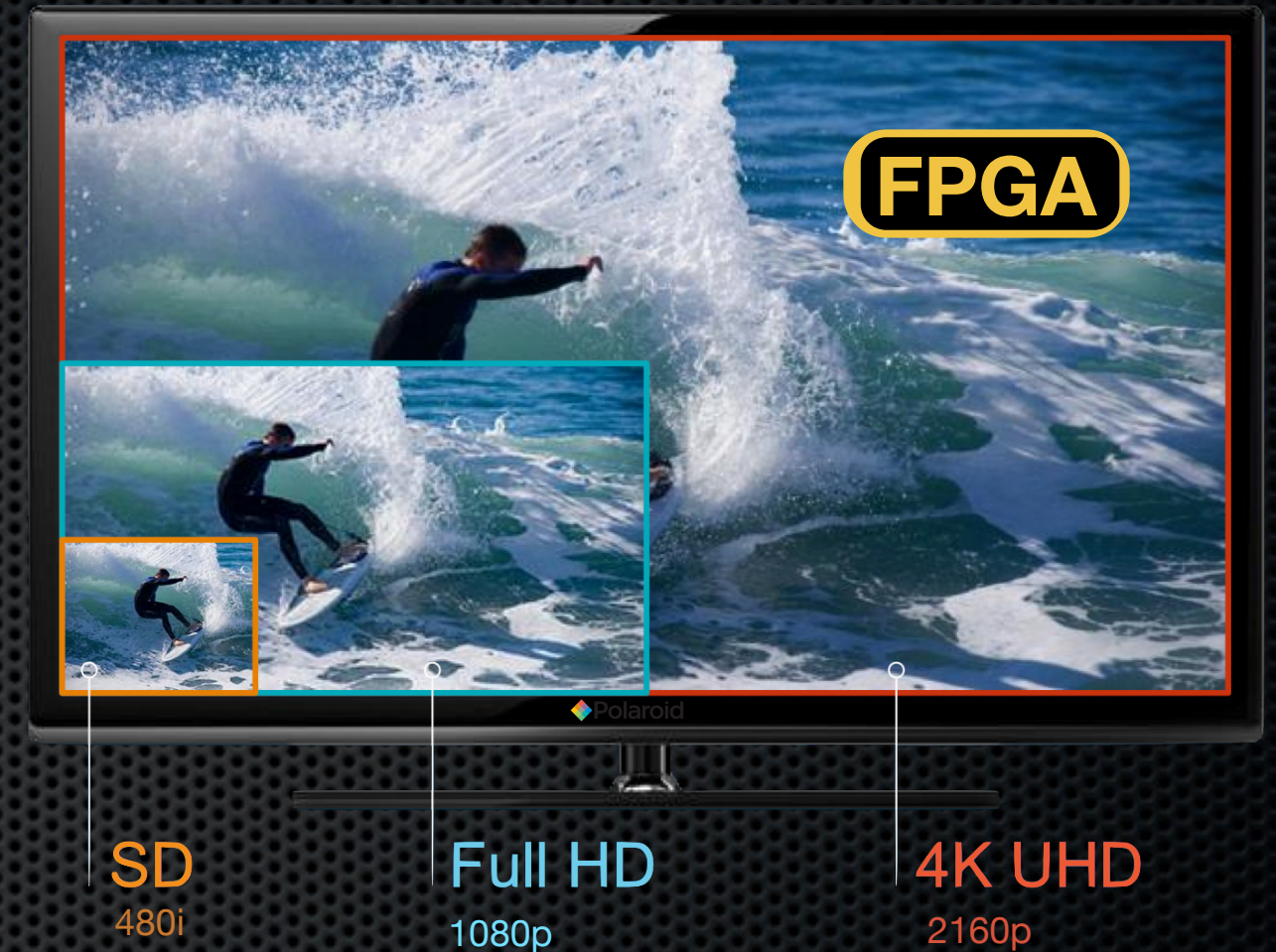
- FPGA are now in many data centers

- Video encoding is a great workload to replace CPUs

- Machine Learning 'Inference' is another key application