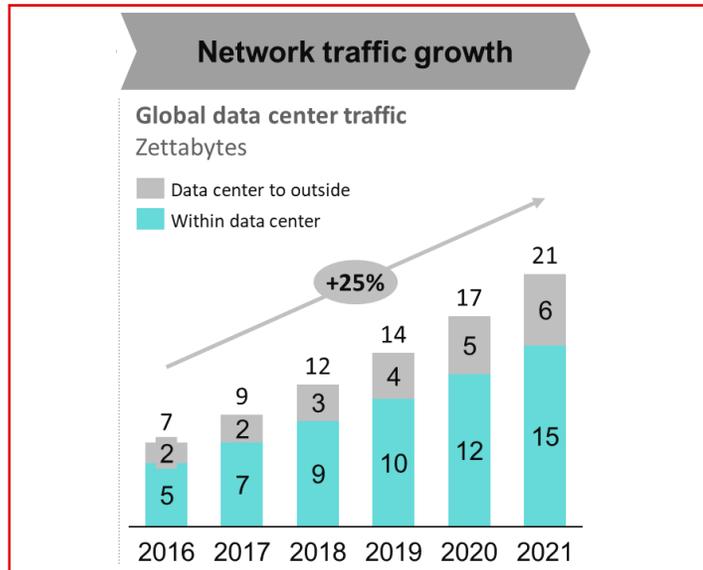




# **Xilinx Alveo U25 SmartNIC Platform Launch Press and Analyst Briefings**

# Networking Crisis in the Data Center



Explosion of Network Traffic in the Data Center



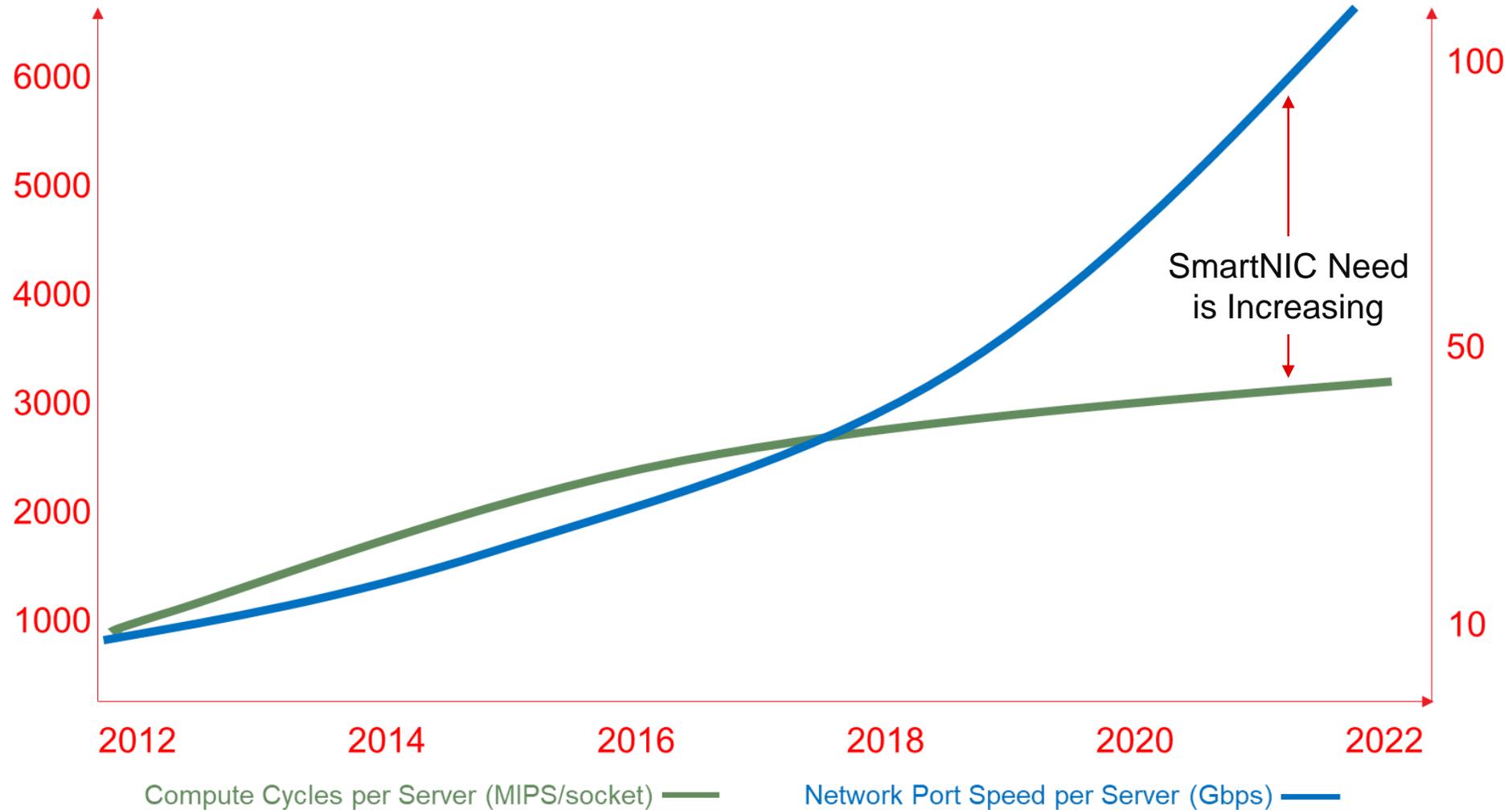
Significant Compute Resources Dedicated to Networking

>80%

Cloud Server Nodes don't have SmartNIC access Today

Networking offload is hard to implement today

# Port Speeds Outstripping Moore's Law



# Announcing Industry's First Comprehensive SmartNIC Platform

True convergence of network, storage, and compute acceleration functions on a single platform

Bump-in-the-wire network, storage, and compute offload and acceleration

Powered by new Line of Powerful Alveo™ SmartNICs

Starting with Alveo U25 SmartNIC

Delivers range of turn-key accelerated applications

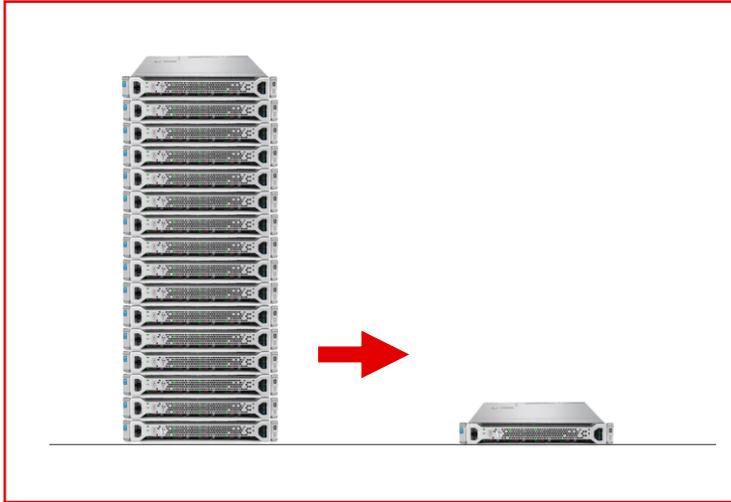
Open vSwitch, IPSEC, .....

Fully Programmable

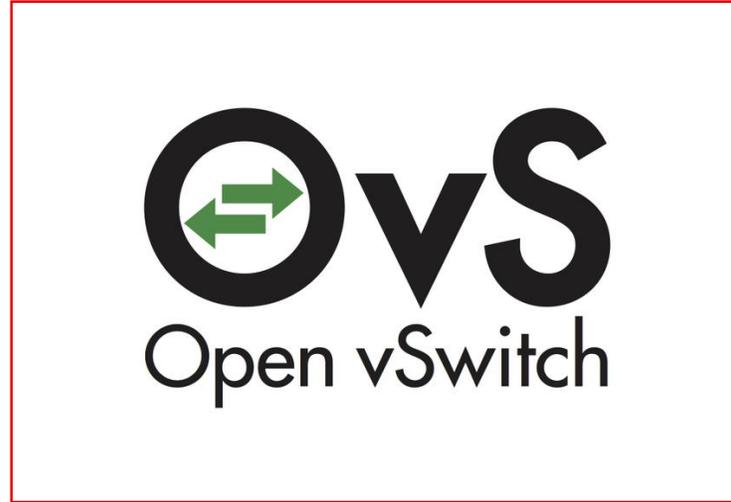
With Xilinx Vitis™ Unified Development Environment



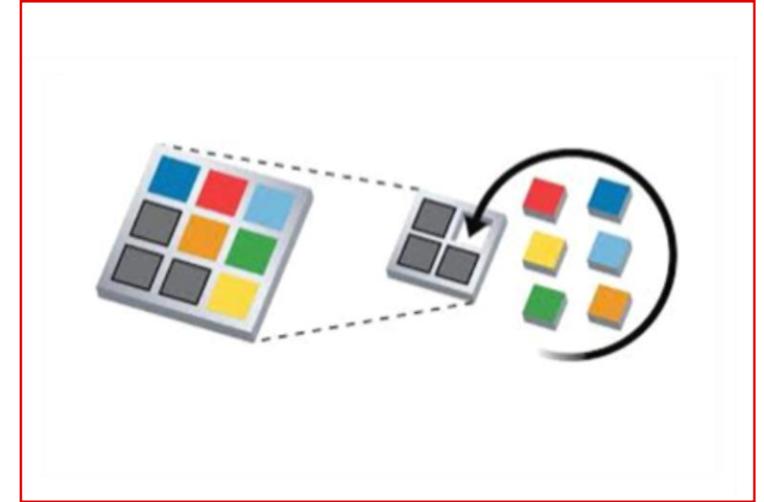
# Why Xilinx SmartNIC Platform Matters



Simplified and lower cost data center infrastructure



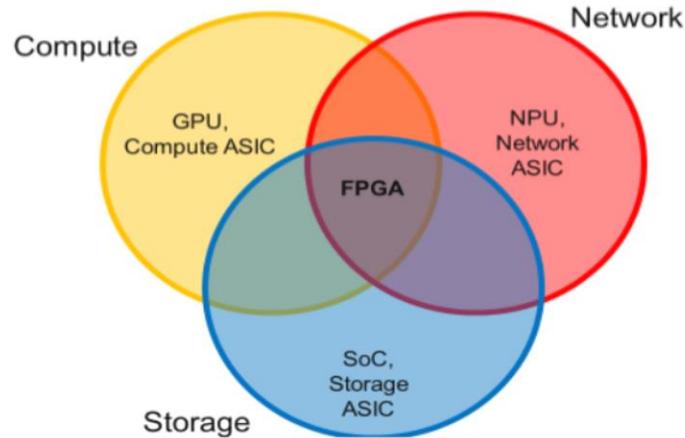
Turnkey applications that cover a broad set of compute problems



Optimize or extend functionality leveraging programmability and IP plugins

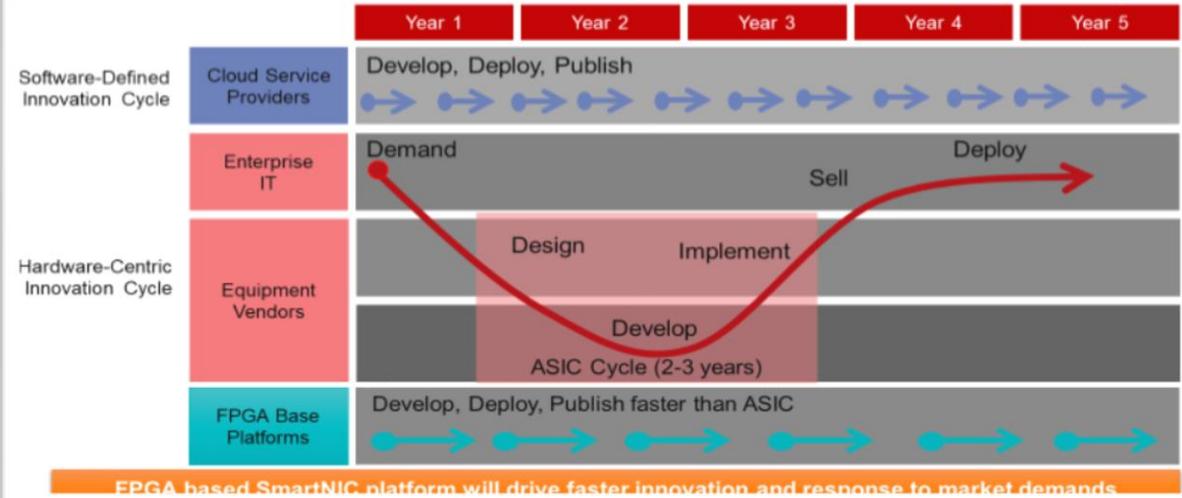
# Core Attributes of Xilinx FPGA SmartNIC Platform

Great for Network, Storage, and Compute

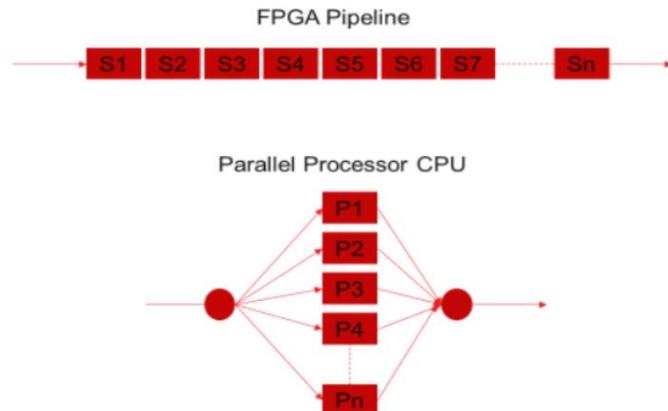


FPGAs Are Uniquely Positioned to Handle the Widest Range of Data Center Workload – the only Technology that Occupies all 3 Circles in the Venn Diagram

Development at the Speed of Software



Performance/Watt is 10x better than SoCs



- One packet per processing stage
- Pipeline has enough stages to process entire data plane
- High Degree of Parallelism (1000's)
- Can complete one packet per clock cycle – 300Mpps at 300Mhz

- One packet per Processor CPU
- One CPU takes 100's-1000's of cycles to process a single packet
- Low Degree of Parallelism (8-16)
- Throughput proportional to number of instructions/pkt divided by clock cycle time times the number of cores
- 32Mpps for 16 core processor @2Ghz

Cloud Ready

- New Functions can be developed and loaded while the FPGA is running existing functions
- Functions can be connected and combined dynamically
- For Cloud Operators this means they have less downtime and they can scale out with ease



# Alveo U25 SmartNIC Adapter Features

## Hardware

- 2x 10/25G ports
- 2x PCIe Gen3x8
- SFP28 Direct Attach Copper | SR Optical, Form Factor: HHHL

## Acceleration | Low Latency

- Onload®
- TCP Direct
- Netdev and DPDK Poll Mode Drivers

## Baseline NIC Features

- Stateless and Tunneling Offloads
- LSO/TSO, RSS, Checksum
- SR-IOV, Multiqueue, NetQueue
- 2048 vNICs support

## Storage

- NVMe™/TCP (kernel + user space)

## Timing & Monitoring

- PTP

## FPGA

- 520K+ LUTs
- Quad ARM A53 Processor Complex
- 6GB DDR4 SDRAM

## FPGA Bump-In-The-Wire Acceleration

- OVS, Encryption, Security ACLs, DPI, etc
- Machine Learning, Video Transcoding, Data Analytics

## OS Support

- Linux

## Manageability and Pre-boot

- PXE, UEFI w/ HII
- MCTP SMBus, MCTP PCIe, and PLDM
- Secure Firmware Upgrade

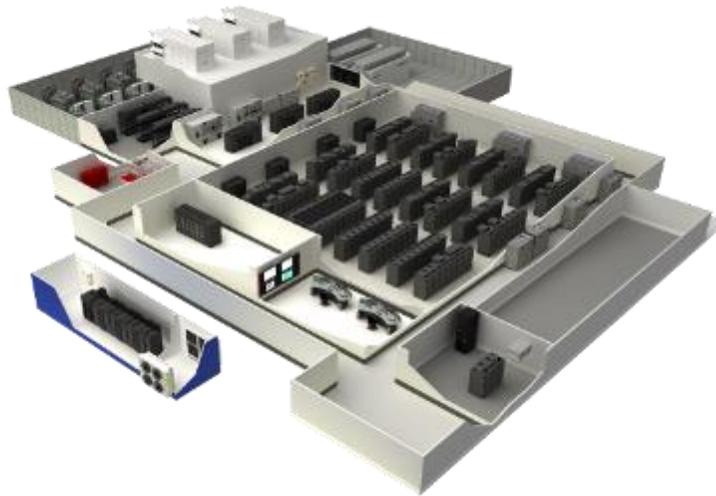


# Built on Solarflare Technology

Ultra high performance chips, adapters cards, software and turnkey systems



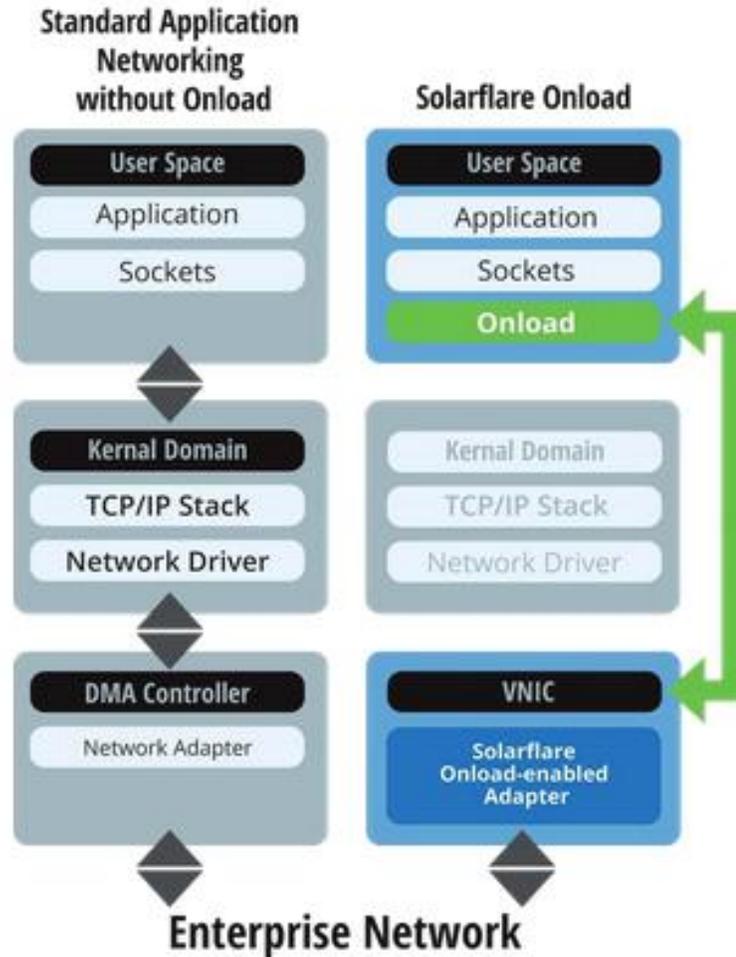
Deployed in enterprise, telco and cloud data centers



For the world's most demanding customers



# Onload Technology on every Alveo SmartNIC



## > Why Onload?

- >> Applications utilizing kernel based networking, are limited in efficiency due to:
  - Large numbers of memory copies
  - Lots of context switching
  - High interrupt rate, and lock contention.
- >> Onload eliminates Linux networking stack penalties, allowing your application to deliver greater transactions per second (TPS)

## > How Onload Delivers

- >> Onload bypasses the kernel and operates in user-space, freeing up CPU cycles for the main application
- >> Direct connection between applications and networks
- >> Onload enables fast connect and disconnect times allowing for greater connectivity, supporting industry-standard TCP/IP stack.

## > Seamlessly integrates into existing infrastructures:

- >> Binary compatible with industry-standard POSIX interfaces APIs
- >> No software modifications needed – Install and Go

## > Improves Latency and Performance

- >> Reduced latency by 80% compared to standard kernel methods
- >> Near zero jitter
- >> Improves TCP based application performance by up to 400%

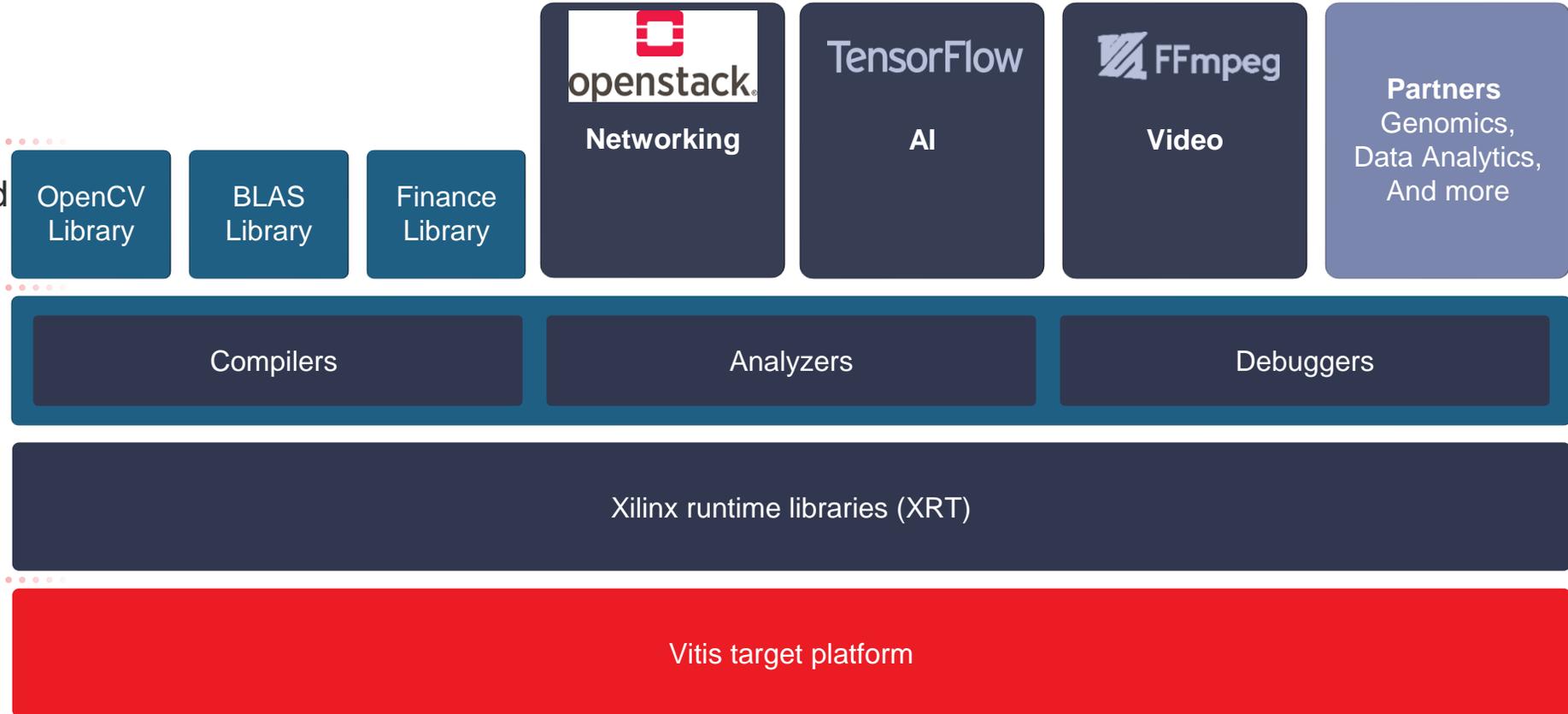
# SmartNIC Platform Stack

Python, C++, C, P4, RTL

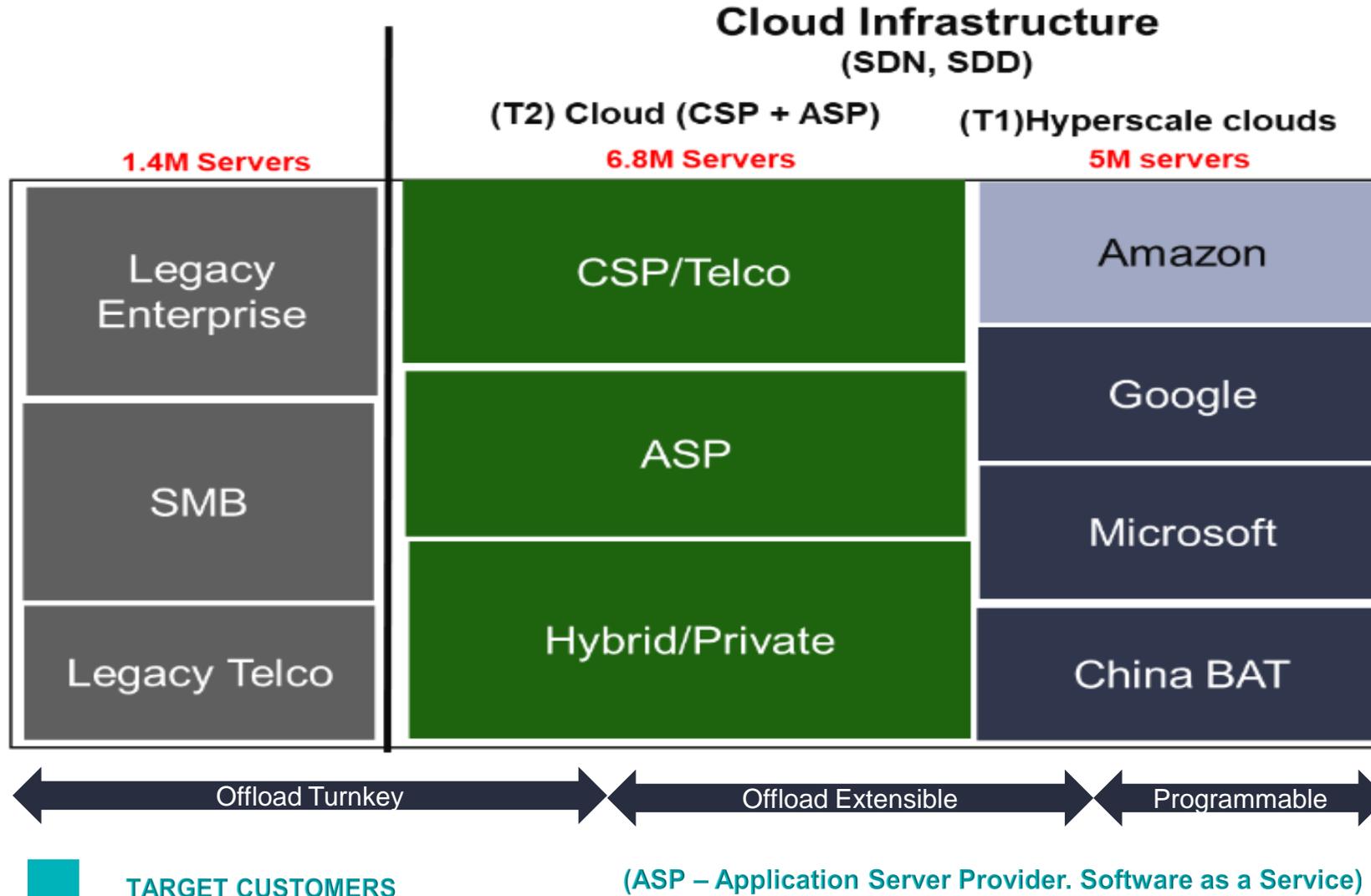
Domain-specific development environment

Vitis accelerated libraries

Vitis core development kit



# Target End Users



# New OCP Form Factor Base Products

# New XtremeScale™ X2562

## First OCP 3.0 Form Factor Ethernet Adapter



# X2562 | 10/25GbE OCP 3.0 SFP28 Network Adapter

## Hardware

- 2x 10/25G ports
- OCP 3.0
- SFP28 Direct Attach Copper | Optical support, AOC (future)
- Intelligent Auto Negotiation

## Acceleration | Low Latency

- Onload (with PLUS SKU)
- TCP Direct (with PLUS SKU)
- DPDK Poll Mode Driver

## Virtualization

Stateless and Tunneling Offloads  
SR-IOV, Multiqueue, NetQueue  
2048 vNICs support

## Storage

NVMe/TCP kernel  
NVMe/TCP user space compatible

## Security

ServerLock™ compatible

## Timing & Monitoring

- PTP (with PLUS SKU)
- Hardware timestamping
- SolarCapture™ Pro

## Manageability and Pre-boot

- PXE, UEFI w/ HII
- MCTP SMBus, MCTP PCIe VDM, NC-SI and PLDM
- Secure Firmware Upgrade

## OS Support

- Linux, VMware, Windows

## Availability

- Limited Sampling Now; GA: Q2-2020
- X2562, X2562-PLUS SKUs

## Target Solutions (Application):

- Fintech (ET/HFT)
- Software Load Balancer
- Message Brokers
- In Memory DB
- WEB/App Hosting
- Content Delivery Networks
- DNS / Routers

# OpenCompute Accelerator Module (OAM)

## Reference Architecture

# World's First FPGA Based OpenCompute Accelerator Module (OAM) Reference Architecture



- ▶ Powerful Virtex<sup>®</sup> UltraScale+<sup>™</sup> FPGA with 8GB of HBM Memory
- ▶ Seven 25Gbps x8 Links Enable Rich Inter-module System Topologies
- ▶ Compliant with Open Accelerator Infrastructure (OAI)



---

**Thank You**

