



# Open. Together.

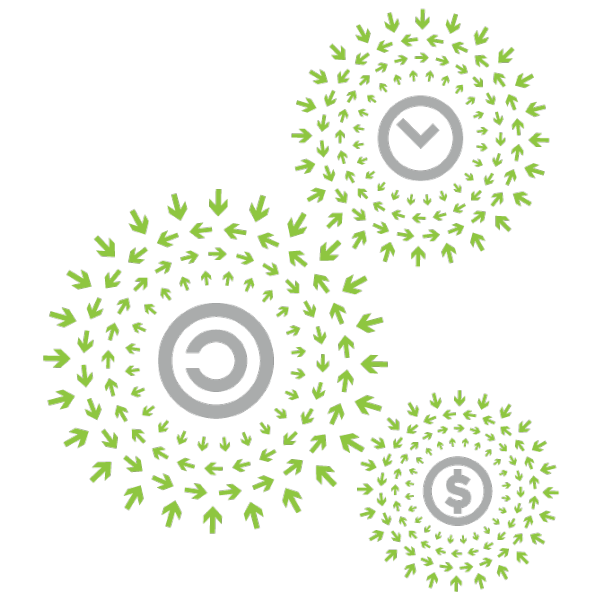


**OCP**  
REGIONAL  
SUMMIT

openEDGE

# openEDGE on Arm Architecture

Dong Wei, Arm Fellow, Arm Inc.



**OPEN**  
PLATINUM™



Open. Together.

# openEDGE



TELCO

The Open Edge project creates specifications, standards, support documentation and reference designs which will enable global adoption of the Open Edge Computing chassis which meets the requirements of Telco Providers.

## Released Specifications

- OCP Open Edge Chassis Specification v1.2
- CPU ISA Architectural Agnostic

## Under Community Review

- OCP Open Edge Server Specification v0.1
- Currently only references Intel Purley Platform
- Would like to enable Arm-based Open Edge servers



Specifications

# LF Edge, Unifying Open Source Edge IoT, Telco, Cloud, Enterprise

## The Linux Foundation Launches New LF Edge to Establish a Unified Open Source Framework for the Edge

*More than 60 global founding members across enterprise, IoT, telecom and cloud collaborate on open source framework for edge computing and future of IoT*

**SAN FRANCISCO, January 24, 2019** – [The Linux Foundation](#), the nonprofit organization enabling mass innovation through open source, today announced the launch of LF Edge, an umbrella organization to establish an open, interoperable framework for edge computing independent of hardware, silicon, cloud, or operating system. LF Edge is initially comprised of five projects that will support emerging edge applications in the area of non-traditional video and connected things that require lower latency, faster processing and mobility.

LF Edge includes **Akaino Edge Stack, EdgeX Foundry, and Open Glossary of Edge Computing**, formerly stand-alone projects at The Linux Foundation and new projects **EVE (Edge Virtualization Engine), Home Edge**.

Jan  
2019

## LF Edge Momentum continues with Project EVE seed code, project demonstrations at IOT World and new members

- *IOT OnPrem Edge Virtualization Engine seed code contributed by Zedada to LF Edge*
- *Four new members join existing community of 70+ LF Edge organizations*
- *LF Edge on Display at IoT World, with Akraino Edge Stack, EdgeX Foundry and Project EVE demonstrations*

**SANTA CLARA, Calif. – IoT World – May 14, 2019** – [LF Edge](#), an umbrella organization within the Linux Foundation that aims to establish an open, interoperable framework for edge computing independent of hardware, silicon, cloud, or operating system, today announced continued project momentum. [Project Edge Virtualization Engine \(EVE\)](#) receives initial seed code from LF Edge founding member [ZEDEDA](#), as the community showcases a range of edge/IoT application demonstrations, from connected cars to wind turbines, on-site at IoT World.

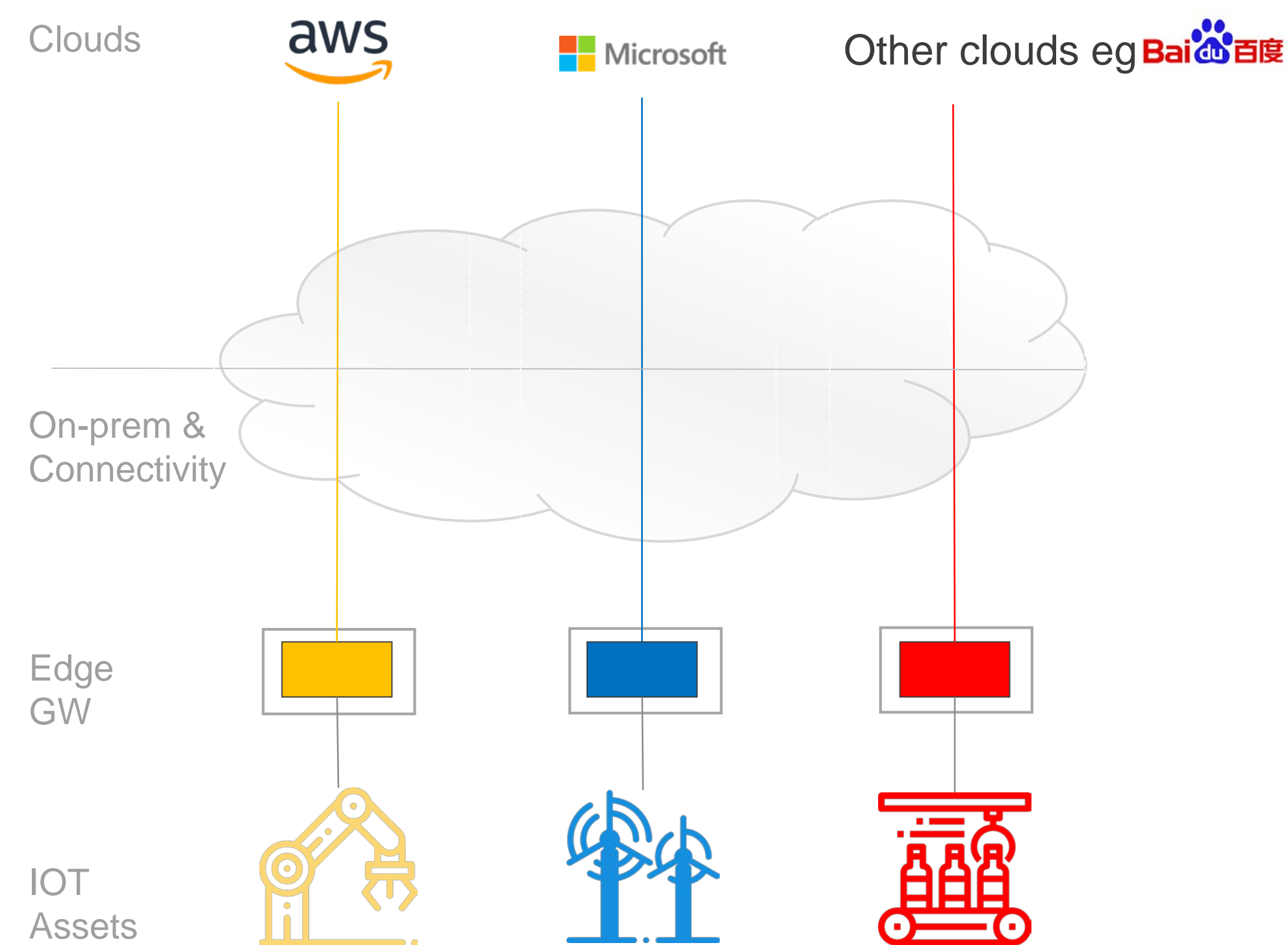
Additionally, LF Edge welcomes new Associate and Liaison member organizations Industrial Internet Consortium (IIC), the LIONS Center at the Pennsylvania State University, OTAinfo, and University of New Hampshire's Interoperability Lab (UNH-IOL).

May  
2019

# Open Source LF Edge

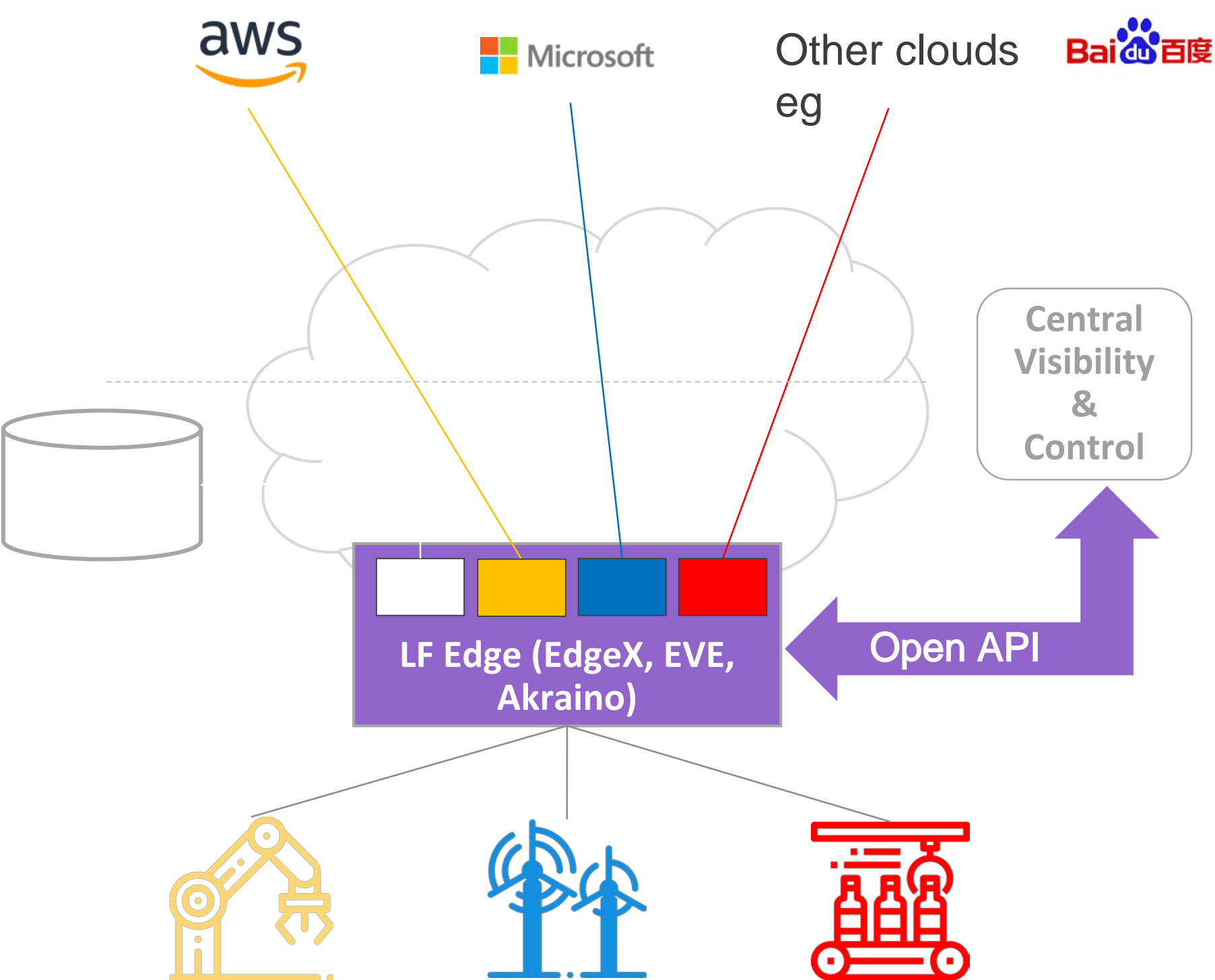
## IloT Today

Vertical data silos & platform lock-in  
Data/edge sovereignty & control issues  
Hardware-defined & unmanaged edge

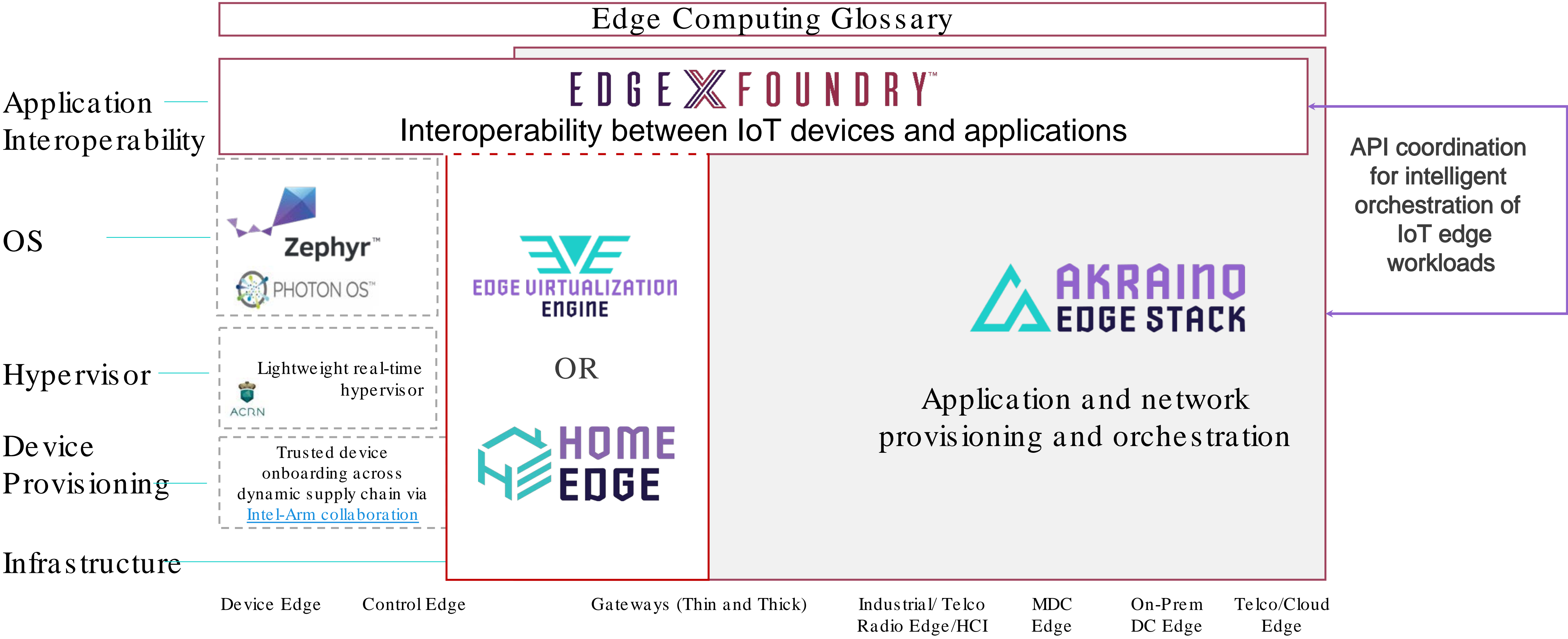


## IloT with LF Edge

Open IoT data architecture, no lock-in  
Data & edge belong to the enterprise  
Software-defined & ubiquitous edge



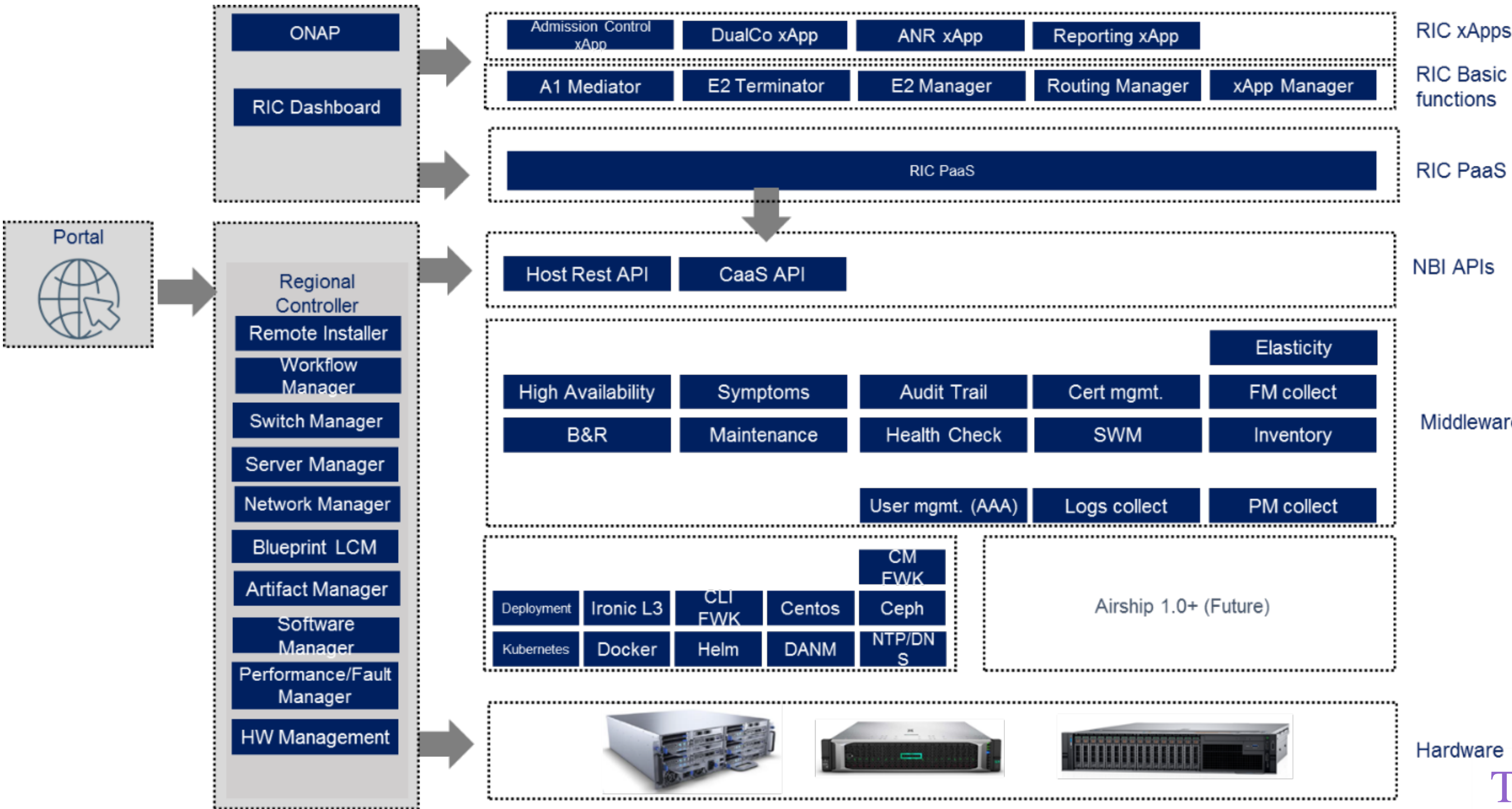
Scope of LF Edge



# Akraino R1 Blueprint: Radio Edge Cloud



## Radio Edge Cloud for 5G use cases



### Purpose/Features

- Telco- grade edge cloud platform for near-real time container workloads .
- Integrated with open-source RAN Intelligent Controller (RIC) – helps deploy customized, tailored apps with Zero touch
- Automated CD pipeline testing the full software stack

Target Industry: Telco 5G, Enterprise

\* Target architecture shown here and the fully installable building blocks is in R1

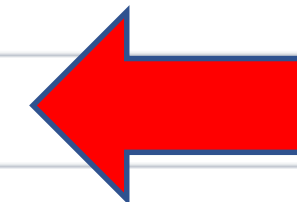
# Telco Appliance Blueprint

The Radio Edge Cloud blueprint is member of the Telco Appliance blueprint family which is designed to provide a fully integration tested appliance tuned to meet the requirements of the RAN Intelligent Controller (RIC).

## Radio Edge Cloud (REC) Use Cases

- Radio Intelligent Controller (RIC) or Virtual Radio Access Network (vRAN)

Case Attributes	Description
Type	New
Blueprint Family - Proposed Name	Telco Appliance
Use Case	RIC vRAN
Blueprint proposed Name	Radio Edge Cloud
Initial POD Cost (capex)	
Scale & Type	x86 OCP Open Edge servers x 6
Applications	RIC
Power Restrictions	
Infrastructure orchestration	Airship Redfish ONAP
SDN	OVS-DPDK
Workload Type	Containers
Additional Details	Submitter to provide additional use case details



# Arm is working with partners to enable openEDGE servers



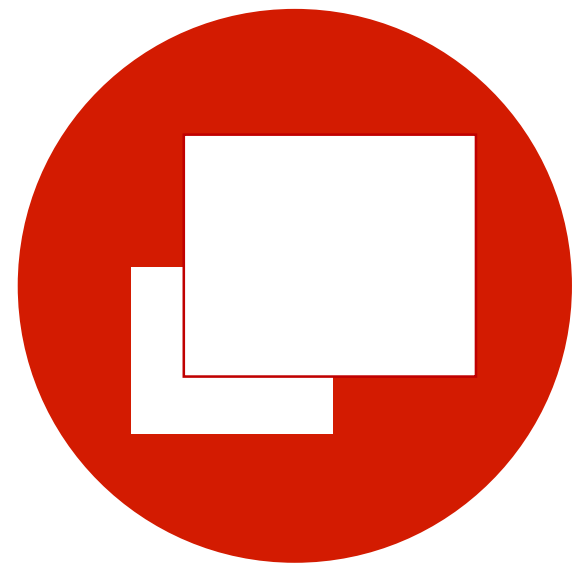
TELCO

Operators are proposing new features for OCP OpenEdge, also work on multiple instruction set architecture including Arm architecture, powered by Arm ecosystem partners like Ampere, Broadcom and Marvell.



Specifications

# Why Ampere At The Edge?



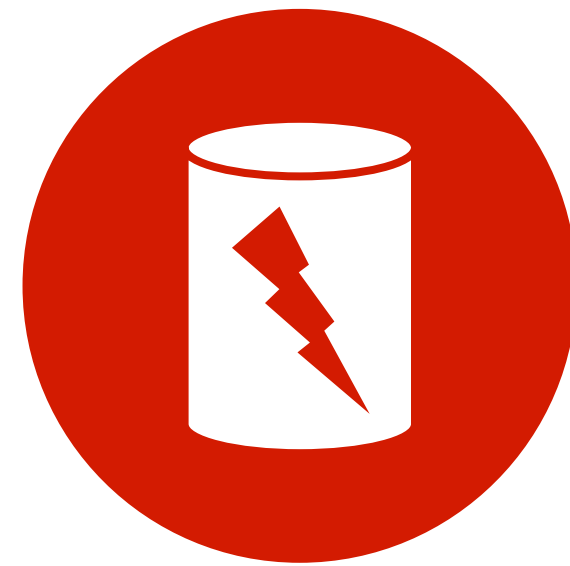
## Scalable

8-32 Cores  
8 Memory Channels  
42 lanes PCIe IO



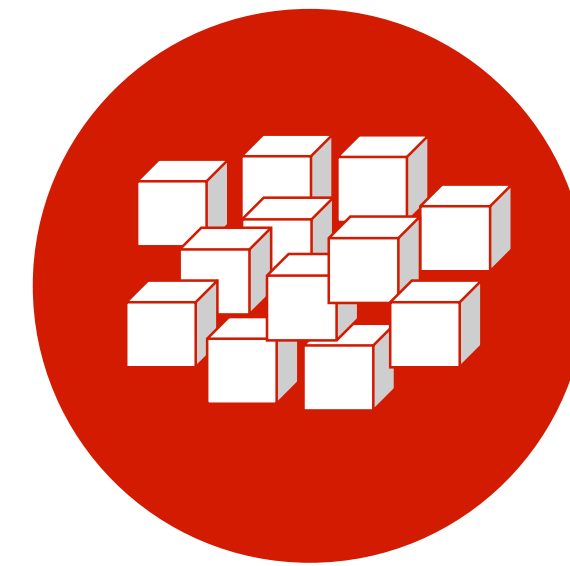
## Powerful

Large cores  
High single thread  
performance



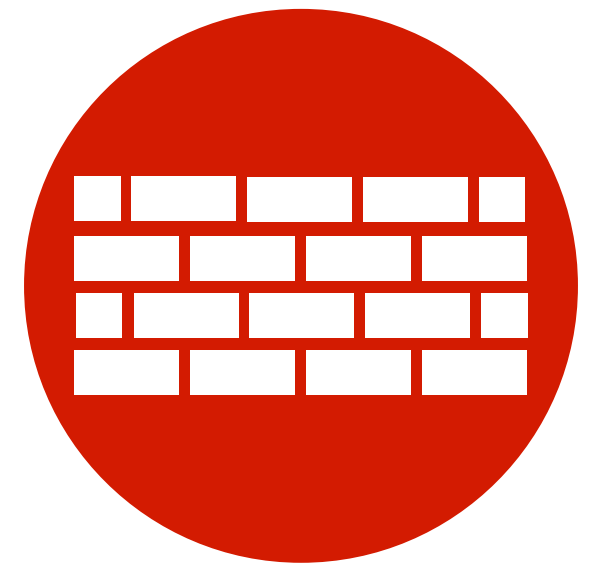
## Efficient

Most energy efficient  
high performance CPU



## Supported

Linux, Windows  
Hypervisors  
Stacks



## Reliable

Long life cycle  
High temperature

# Ampere OpenEdge Compute Platform



## Overview

- Compatible with OCP OpenEdge Chassis CPU sled
- 32 and 16 core SKUs
- 32bit and 64bit Support

## Processor

- 32 / 16 Ampere ARMv8 64-bit CPU cores 3.3 GHz Turbo
- 32 KB L1 I-cache, 32 KB L1 D-cache per core
- Shared 256 KB L2 cache per 2 cores
- 32MB globally shared L3 cache
- TSMC 16 nm FinFET

## Memory

- 8x 72-bit DDR4-2667 channels
- Up to 16 DIMMs and 1 TB/socket
- ECC, ChipKill, and DDR4 RAS features

## I/O

- OCP Mezzanine v2 (Conn. A/B) 10/40/100 GbE NIC
- 1 x16 PCIe slot
- 2 x M.2 x4 NVME
- 4 x SATA3
- 2 x USB 2.0

## Power

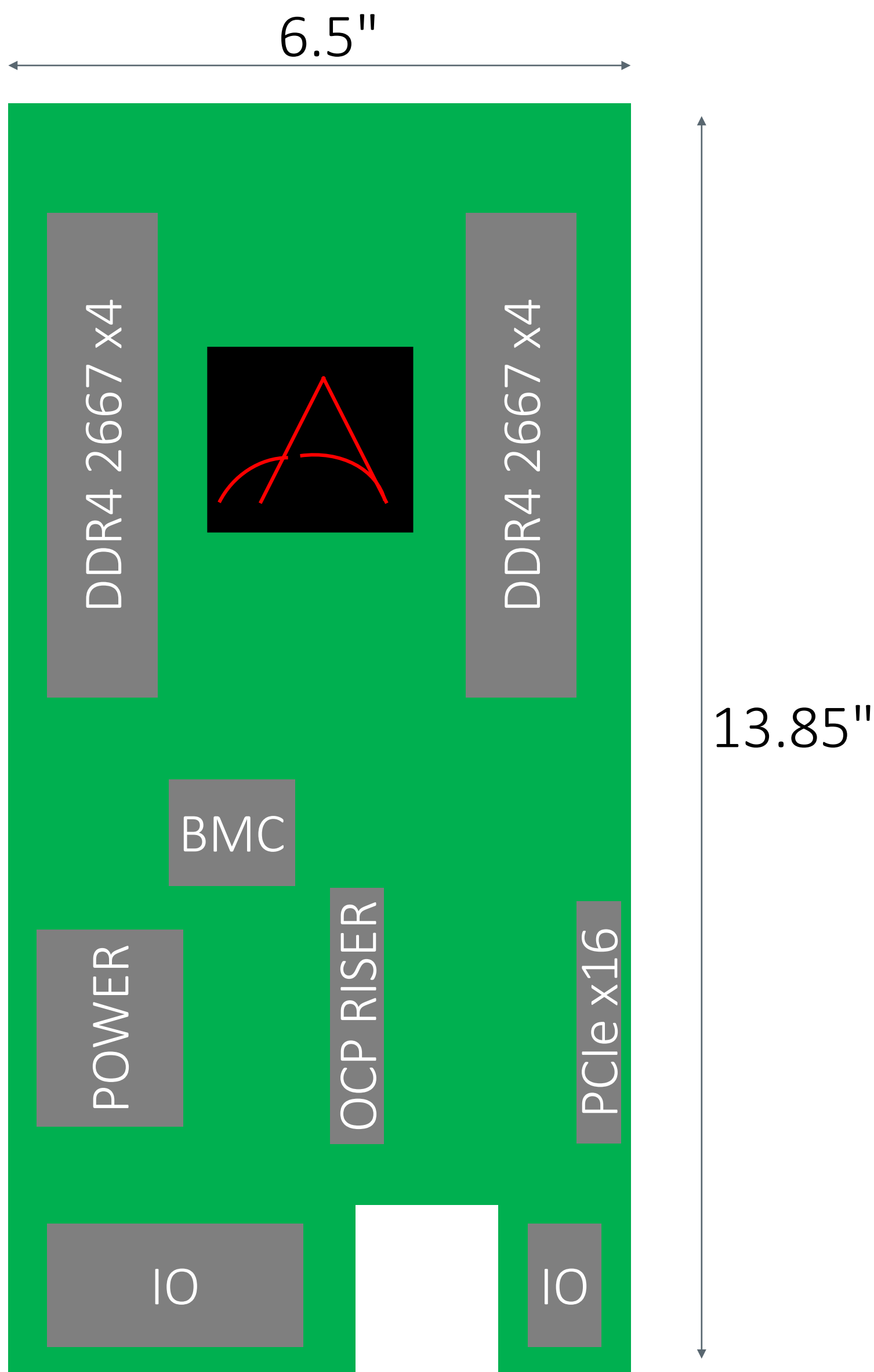
- 125W TDP 32 cores
- 75W TDP 16 cores
- Advanced Power Management

## Performance

- SPECrate2017\_int\_peak: 68
- SPECint\_rate2006 (peak): 502

## Availability

- Sample Q419
- MP Q120



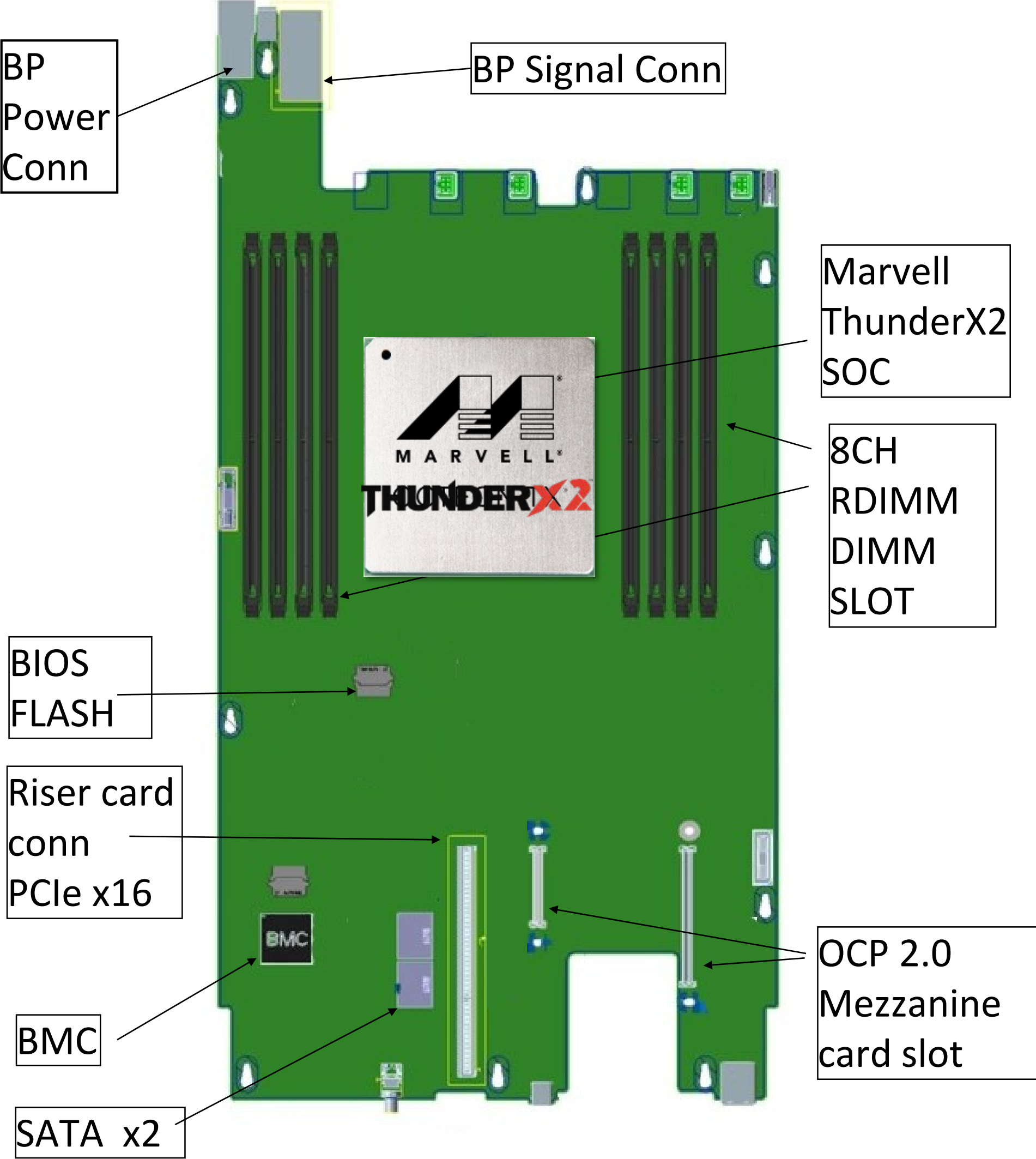
Contact [sales@amperecomputing.com](mailto:sales@amperecomputing.com) for further details



M A R V E L L<sup>®</sup>

OpenEdge proposal with  
ThunderX2

# Marvell Open Edge ARM Server Board Detail



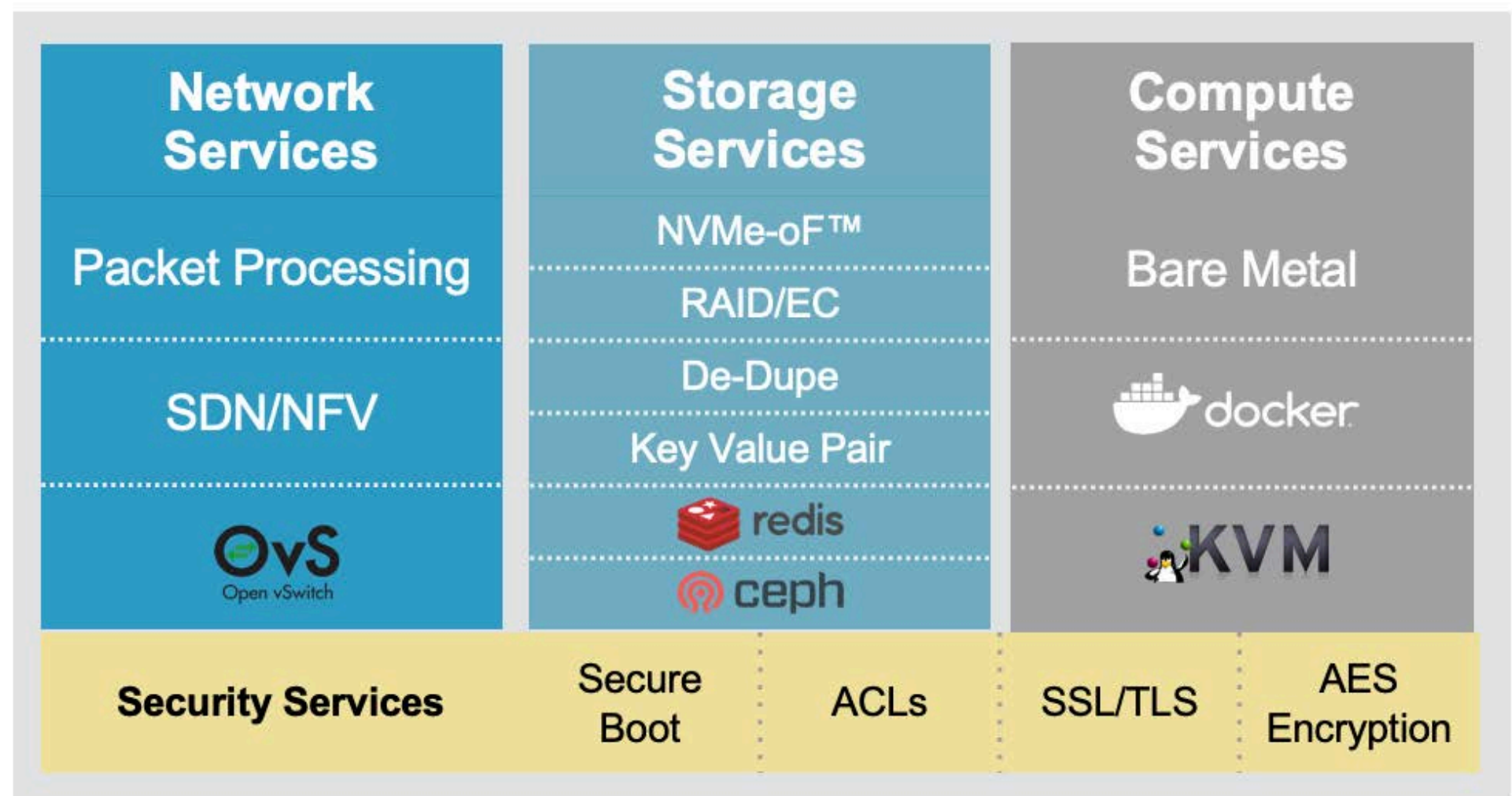
Feature	Specification
Form factor	Proprietary ( 407.95 x 205.8 mm)
Processor Support	Marvell ThunderX2 CPU with up to 32 cores, 128 threads 2.2GHz in nominal mode, 2.5GHz in Turbo mode.
Chipset	SoC
Memory	8 x DIMM slots support/8 channel DDR4 2666 MT/s @ R-DIMM with 1DPC configuration
LAN	1G Base-T to backplate 1 x Management LAN 10/100/1G
VGA / VRAM	Integrated in BMC
BMC	ASPEED AST2500
Expansion Slot	1 x PCIe x16 (@Gen 3 x16) 1x OCP mezzanine PCIe (@Gen 3 x16)(TYPE 1 P1,P2,P3,P4 NCSI support)
Storage	2 x SATA(6Gb/s) Optional PCIe M.2 on riser
Rear IO Connector	2 x USB3.0 1 x ID Button, System RST BTN; PWR BTN,



# Broadcom's Stingray and OpenEdge



# SmartNIC Offload Services for OpenEdge Applications Today



## OpenEdge Server with Stingray SmartNIC:



## Stingray SmartNIC Platform:

8x A72 3Ghz Cores  
2x25Gbe or 1x100G  
16GB DDR4 (2 Channels)

## Hardware Accelerators:

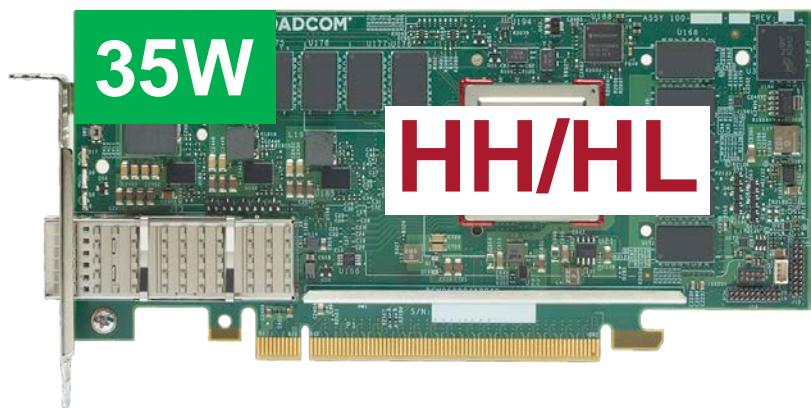
Packet Processing  
Crypto  
RAID/EC/De-Dupe

## Stingray Offload Capacity with OpenEdge:

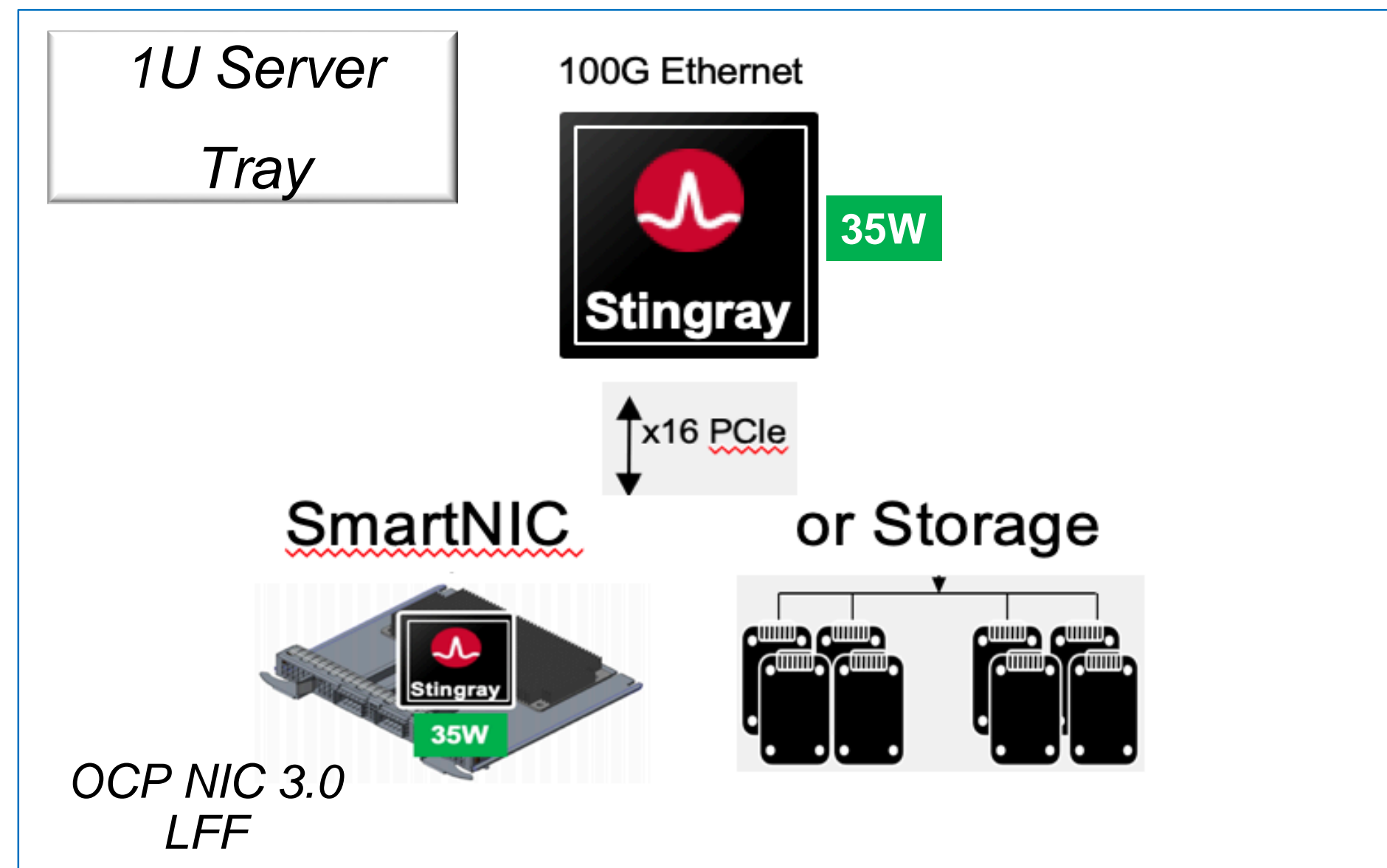
Stingray Resources	Offload Capacity
Arm A72 3Ghz Cores	40 3Ghz Cores
Network / Storage Bandwidth	250Gb/s (2x25G) or 500Gb/s (1x100G)
Crypto Engine (90 Gb/s)	450 Gb/s
Packet Processing (90 Mpps)	450 Mpps

**Onload**  
Appliance Functions

**...Offload**  
Server Overheads



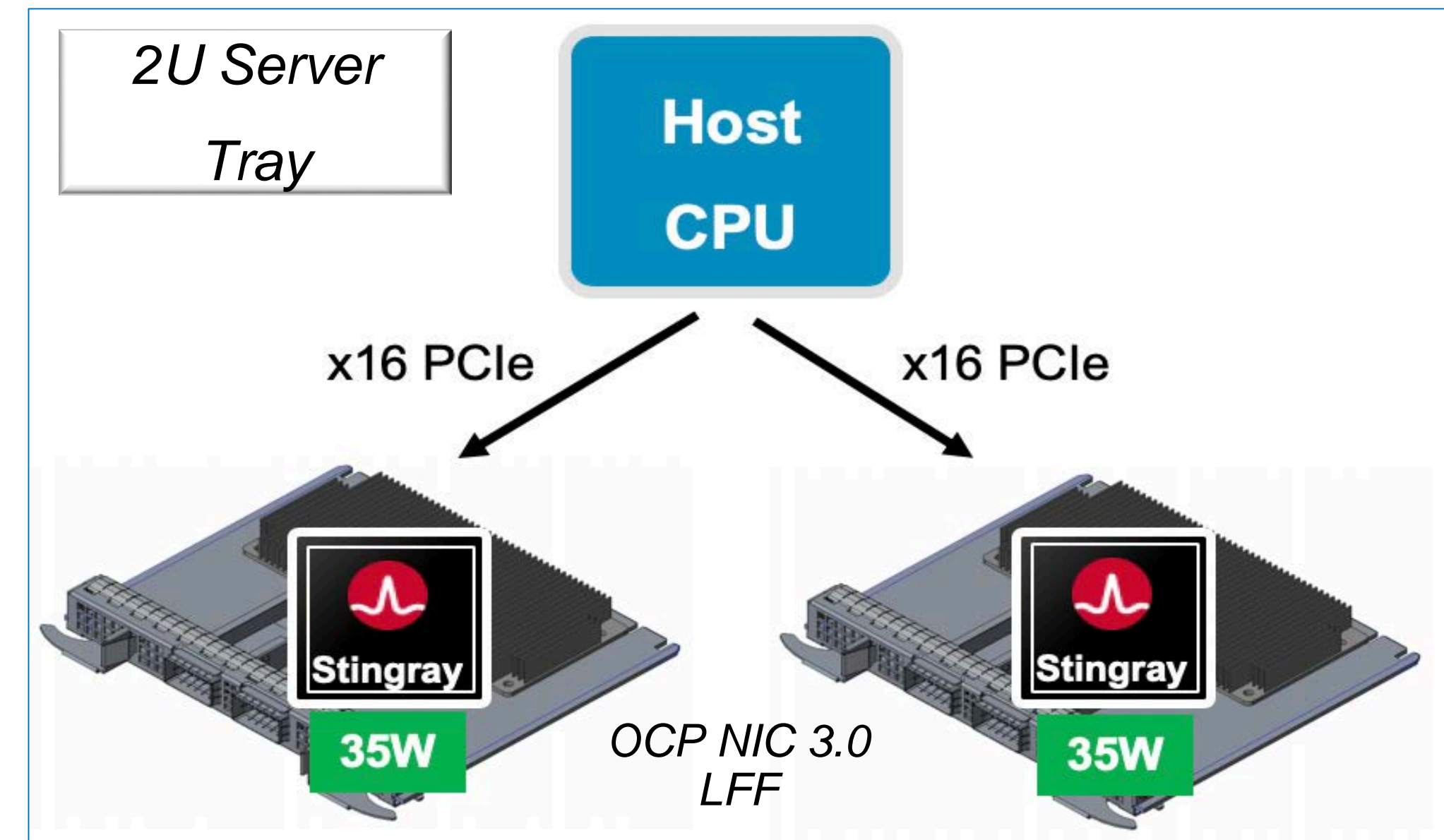
# OpenEdge Stingray SmartNIC 1U/2U Tray Concepts



 BROADCOM®

## Appliances:

- Real-Time Edge Storage Trays or
- Low Power Server + Plus SmartNIC



 BROADCOM®

## High Density Server:

- Virtual Network Functions
- Packet Processing & Security

# Call to Action

- Collaborate between Arm and Arm Partners and openEDGE to
  - Cover Arm in the Open Edge Server Specification
  - Where to find additional information (URL links)

OCP openEDGE Project: <https://www.opencompute.org/wiki/Telcos/openEDGE>

Akraino REC Blueprint: <https://wiki.akraino.org/pages/viewpage.action?pageId=6128402>



# Open. Together.

OCP Regional Summit  
26–27, September, 2019