
# Efficient Computing at the edge with Arm for SEBA

Tina Tsou, Enterprise Architect, Arm, tina.tsou@arm.com

Shai Tsur, Sr. SW Ecosystem Manager, Arm, shai.tsur@arm.com

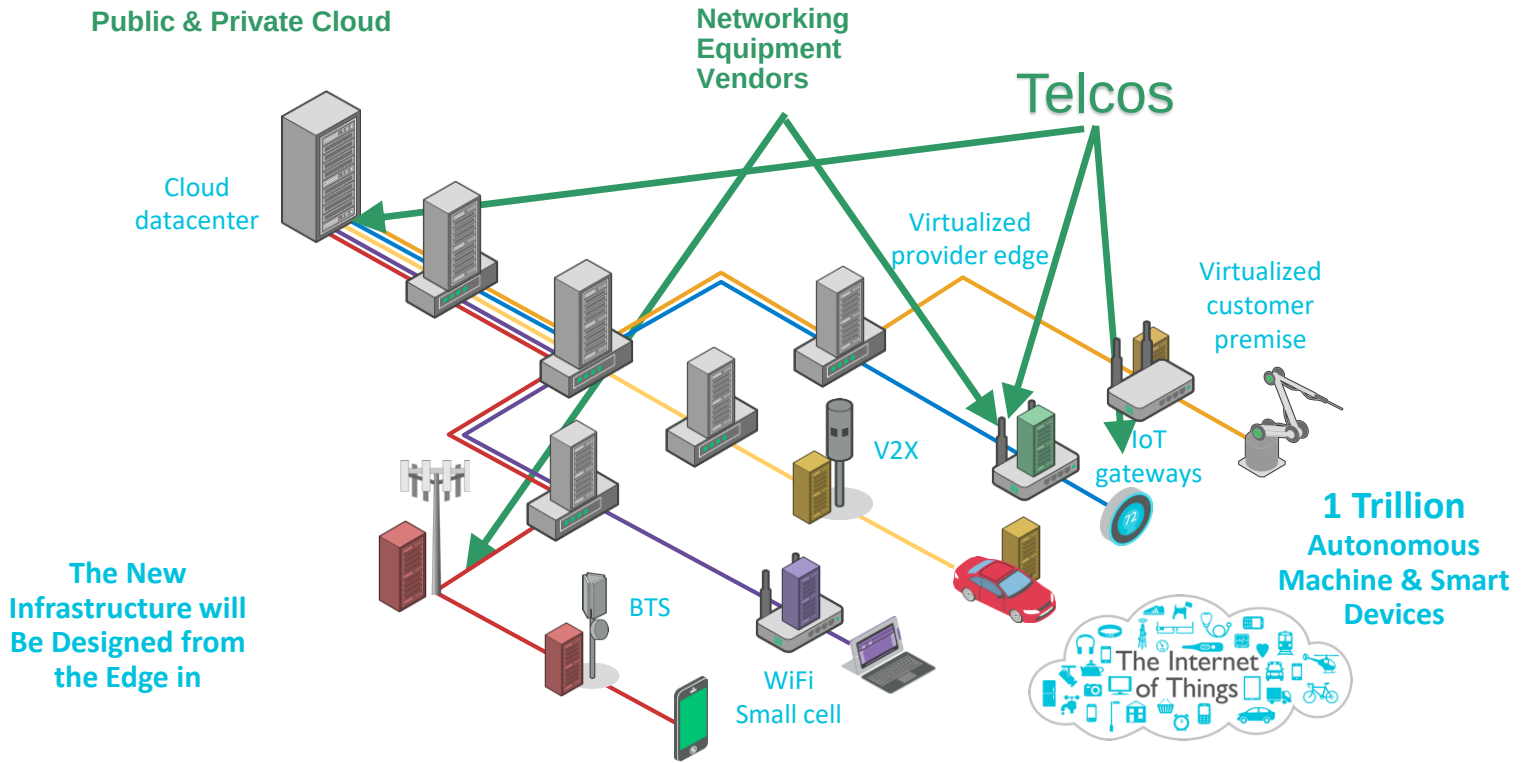
Friday September 13, 2019 2:00pm - 2:30pm

Broadband Access (SEBA & VOLTHA)

# Agenda

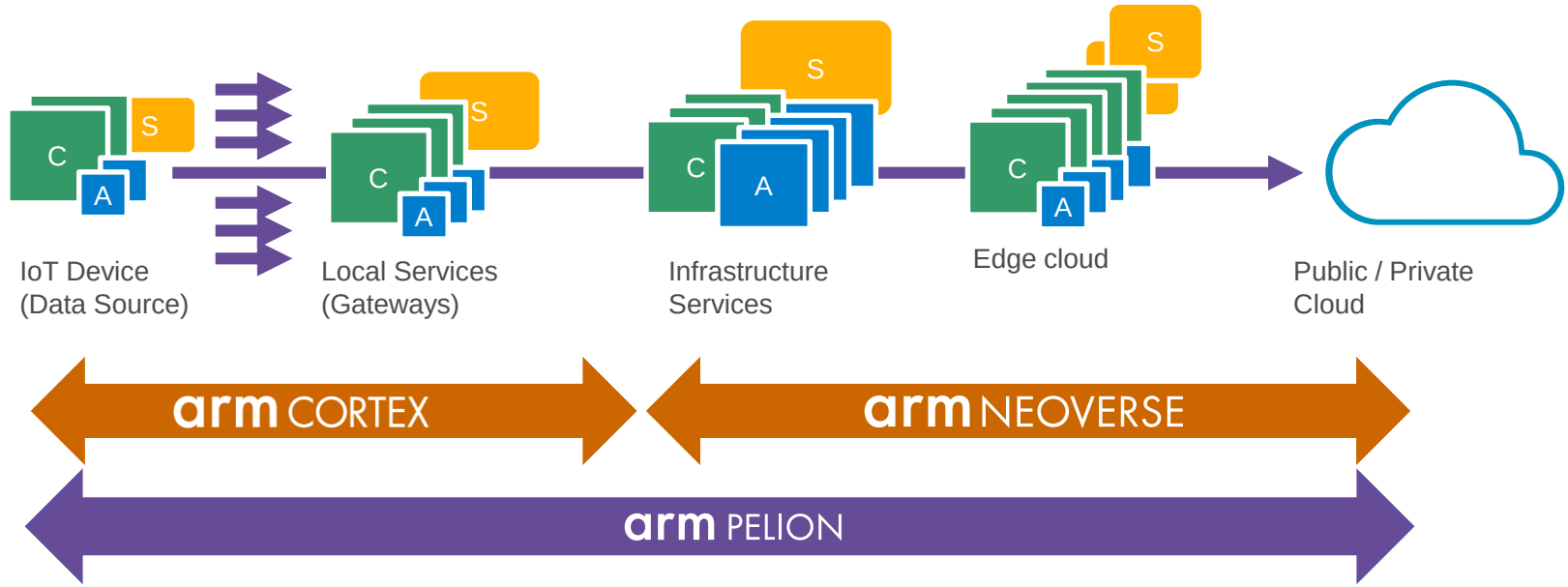
- SEBA introduction
- Arm activity in SEBA
- Key Challenges
- Arm solutions
- Akraino SEBA User Story
- Summary

# Arm Ecosystem Spans the Network from Endpoint to Cloud



# Arm is uniquely positioned in “device-to-cloud”

Edge computing – necessary to handle the massive upstream data

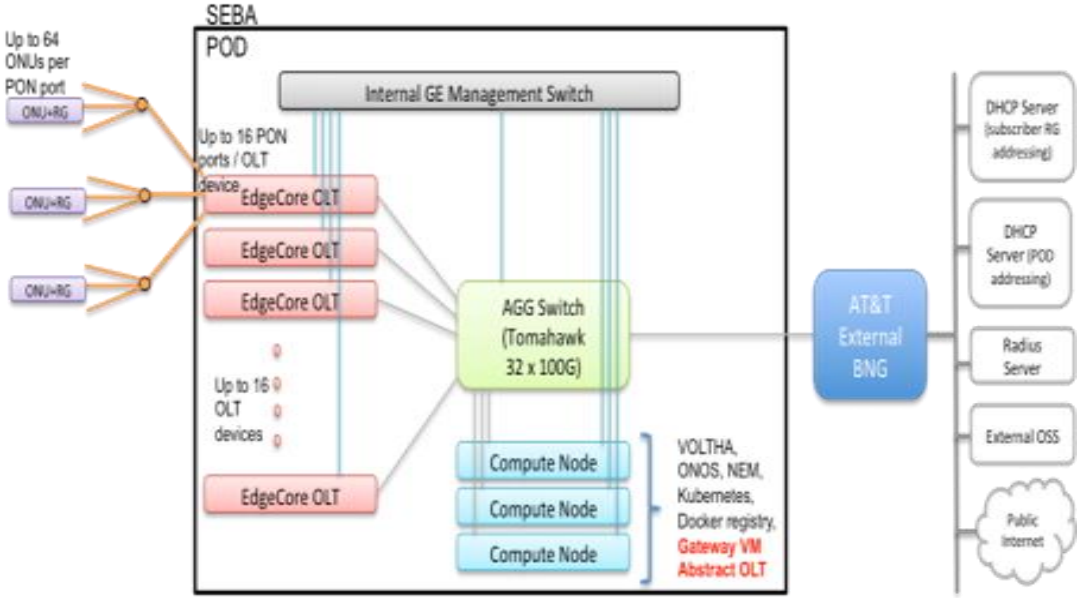


# SEBA – Introduction

- Allows operators to run vOLT access & aggregation applications at locations at thousands of edge locations
- Automates installation of a standardized set of hardware to expedite deployment
- Deployment model has to scale to thousands of locations
- Site is a self contained, pre-integrated solution containing network elements, compute nodes, and software components
- Container-based solution with multiple containers running VOLTHA, ONOS, NEM, etc
- Each site can support up to 16 OLT and 16,384 subscribers

# Arm activities on SEBA

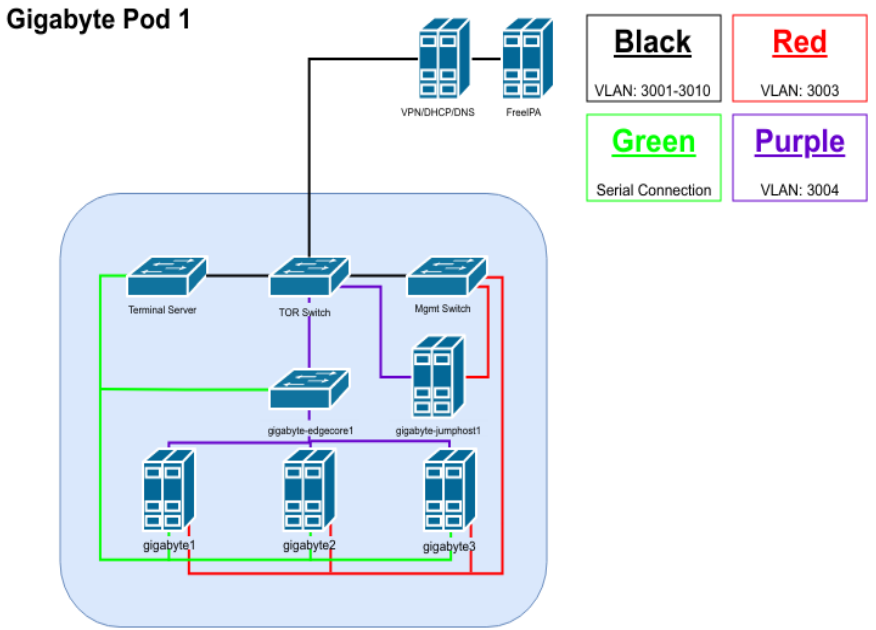
- Arm co-chairing Akraino TSC
- Arm ecosystem is leading SEBA Validation on Arm work stream within Akraino
- Integrating SEBA with Integrated Edge Cloud (IEC) family of blueprints
- Arm leading multi-arch brigade within ONF SEBA group
- SEBA demo on Ampere servers in ONS NA 2019



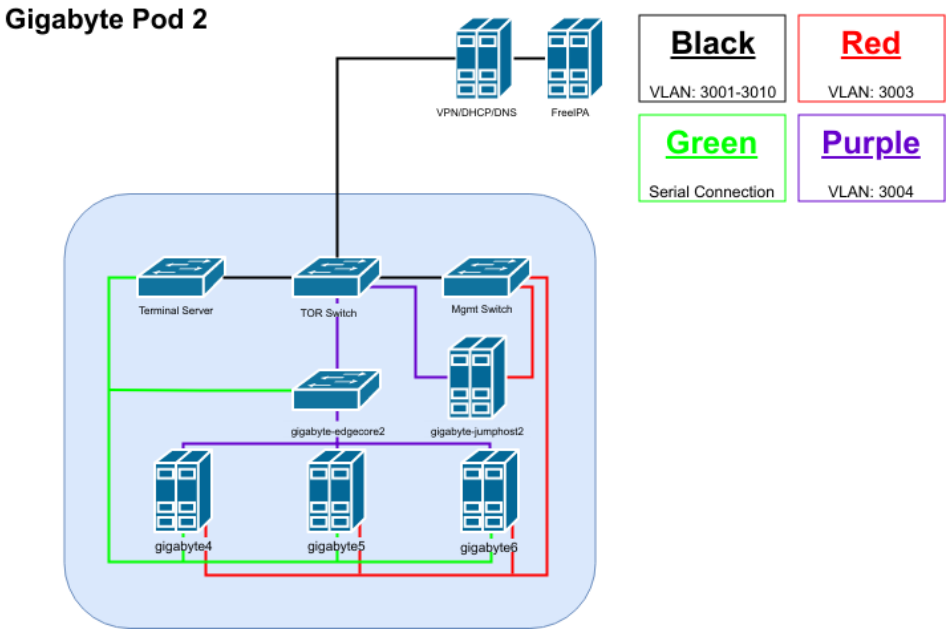

| SEBA Validation on Arm | SEBA ONS 2019 |
|---|---|

# Akraino Community Lab

## ThunderX2 Pod 1




## ThunderX2 Pod 2



# Key Challenges for SEBA

- Remote deployment at thousands of edge locations
  - Need automated installation of a standardized set of hardware to expedite deployment
- Power consumption is restricted to less than 1 kW and includes NEBS compliance and 48V DC
  - Need multi-core CPU solutions that can deliver competitive performance per watt

# Arm solutions

- The Arm ecosystem provides wider set of solutions to optimize the SEBA use cases
- Arm ecosystem of SoC partners provides multiple HW solutions to match the use case to power/performance/area needs
  - Optimized TCO performance/watt
  - Marvell and Ampere provide solutions for SEBA
- SEBA leverages Arm work in Integrated Edge Cloud (IEC) blueprint family in Akraino:
  - Better latencies for end users: < 20 ms at optimal Edge Zone
  - Less load on network since more data can be processed locally
    - The desired network connection are above 10Gbit/s which may meet most requirements
  - Fully utilize the computation power of the edge device
    - Small deployment: Less than 10 W for the SoC
    - Medium deployment: less than 100 W for the SoC

# Diversity - broad SoC design options with Arm

| | | |
|---|---|---|
| **Arm IP** | High performance CPUs<br>Data plane CPUs<br>CMN Fabric<br>Other IP | **Arm Architectural design**<br><br>Custom Arm High performance CPU<br>Custom Fabric & IP |
| **Accelerators** | ML, on-die FPGA<br>Networking, security, encryption<br>Video, Custom | |
| **Memory** | DDR, HBM, Flash, Storage Class memory | |
| **IO** | PCIe, CCIX, 100G+ ethernet | |
| **Foundry** | TSMC 7FF, Samsung 7LPP, UMC | |
| **Common Software Platform and Ecosystem<br>Arm Architecture v8.x-A** | | |

Configurable:

Cache size, core count

SIMD width

Tiered acceleration:

Local cluster, global,

Off-chip

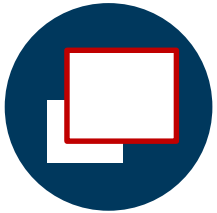
# Arm Neoverse

arm NEOVERSE

The cloud to edge infrastructure foundation for a world of 1T devices

- High performance, secure IP and architectures
- Diverse solutions and ecosystem
- Scalable from hyperscale to the edge

# Ampere At The Edge



## Scalable

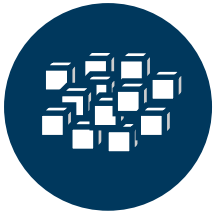
8-32 Cores
8 Memory Channels
42 lanes PCIe IO

## Powerful

Large cores
High single thread performance

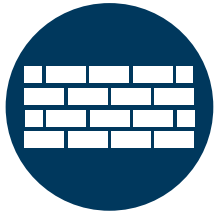
## Efficient

Most energy efficient high performance CPU



## Supported

Linux, Windows
Hypervisors
Stacks

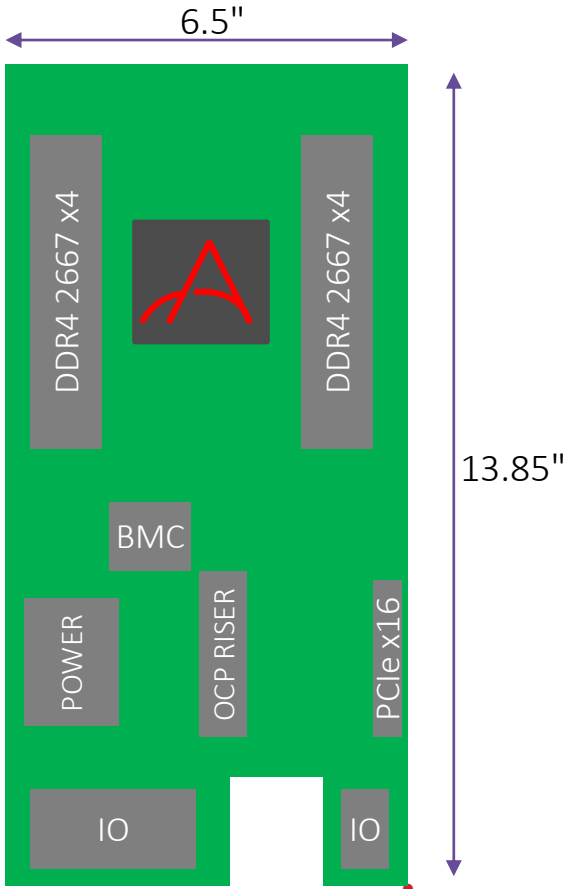


## Reliable

Long life cycle
High temperature

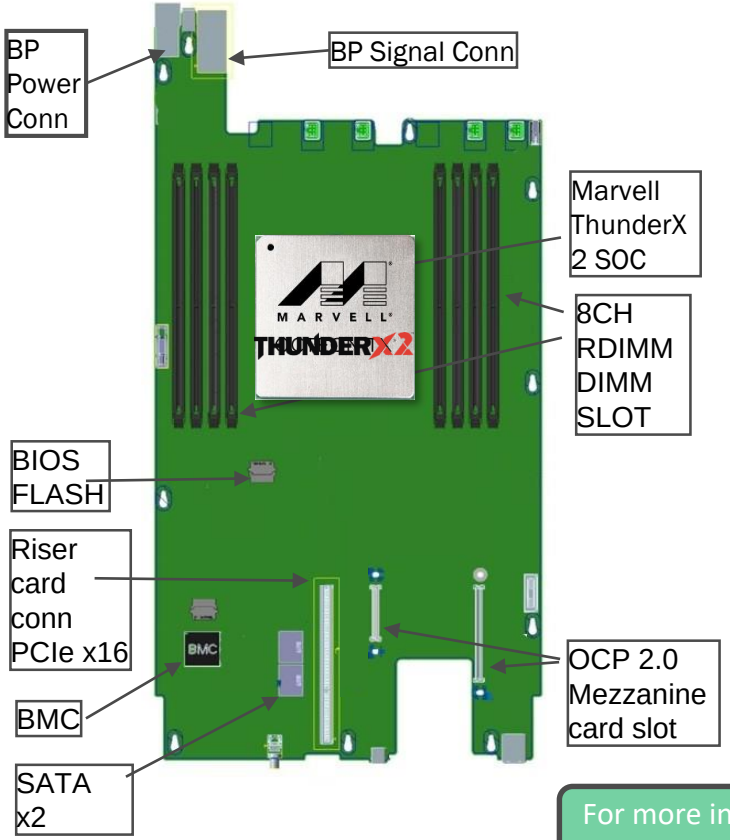
# Ampere OpenEdge Compute Platform

| | |
|---|---|
| **Overview** | • Compatible with OCP OpenEdge Chassis CPU sled<br>• 32 and 16 core SKUs<br>• 32bit and 64bit Support |
| **Processor** | • 32 / 16 Ampere ARMv8 64-bit CPU cores 3.3 GHz Turbo<br>• 32 KB L1 I-cache, 32 KB L1 D-cache per core<br>• Shared 256 KB L2 cache per 2 cores<br>• 32MB globally shared L3 cache<br>• TSMC 16 nm FinFET |
| **Memory** | • 8x 72-bit DDR4-2667 channels<br>• Up to 16 DIMMs and 1 TB/socket<br>• ECC, ChipKill, and DDR4 RAS features |
| **I/O** | • OCP Mezzanine v2 (Conn. A/B) 10/40/100 GbE NIC<br>• 1 x16 PCIe slot<br>• 2 x M.2 x4 NVME<br>• 4 x SATA3<br>• 2 x USB 2.0 |
| **Power** | • 125W TDP 32 cores<br>• 85W TDP 16 cores<br>• Advanced Power Management |
| **Performance** | • SPECrate2017_int_peak: 68<br>• SPECint_rate2006 (peak): 502 |
| **Availability** | • Sample Q419<br>• MP Q120 |




Contact sales@amperecomputing.com for further details

# 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<br>2.2GHz in nominal mode, 2.5Hz in Turbo mode. |
| **Chipset** | SoC |
| **Memory** | 8 x DIMM slots support/8 channel<br>DDR4 2666 MT/s @ R-DIMM with 1DPC configuration |
| **LAN** | 1G Base-T to backplate<br>1 x Management LAN 10/100/1G |
| **VGA / VRAM** | Integrated in BMC |
| **BMC** | ASPEED AST2500 |
| **Expansion Slot** | 1 x PCIe x16 (@Gen 3 x16)<br>1x OCP mezzanine PCIe (@Gen 3 x16)(TYPE 1 P1,P2,P3,P4 NCSI support) |
| **Storage** | 2 x SATA(6Gb/s)<br>Optional PCIe M.2 on riser |
| **Rear IO Connector** | 2 x USB3.0<br>1 x ID Button, System RST BTN; PWR BTN, |

For more information please refer to
https://www.marvell.com/server-processors

# Akraino SEBA User Story

- As a Service Provider, I want to setup SEBA environment so that I can use ONF SEBA platform
- As an Administrator, I want to validate HOST OS environment so that I can install Kubernetes/SEBA
- As an Administrator, I want to validate Software environment so that I can install Kubernetes/SEBA
- As an Administrator, I want to validate Virtual Machines for my Kubernetes/SEBA environment so that I can validate environment
- As an Administrator, I want to validate services for my Kubernetes/SEBA environment so that validate working environment

# Summary

SEBA solves both residential access and wireless backhaul and is optimized such that traffic can run “fastpath” straight through to the backbone without requiring VNF processing on a server, for users of virtual broadband access (XGS-PON which is a higher bandwidth, symmetric version of GPON), run applications of Virtual broadband access – vOLT access and aggregation for 5000 edge locations.

Arm enables development in SEBA

Multiple Arm solutions for optimized SEBA deployments

For more details, please visit

https://www.lfedge.org/2019/04/12/arm-at-the-edge-telco-and-iot-akraino-blueprints-debut-at-ons-2019/?from=timeline&isappinstalled=0

SDN Enabled Broadband Access (SEBA) for Telco Appliance Blueprint Family


# Thank You

## Follow Up Links:

SDN Enabled Broadband Access (SEBA) for Telco Appliance Blueprint Family