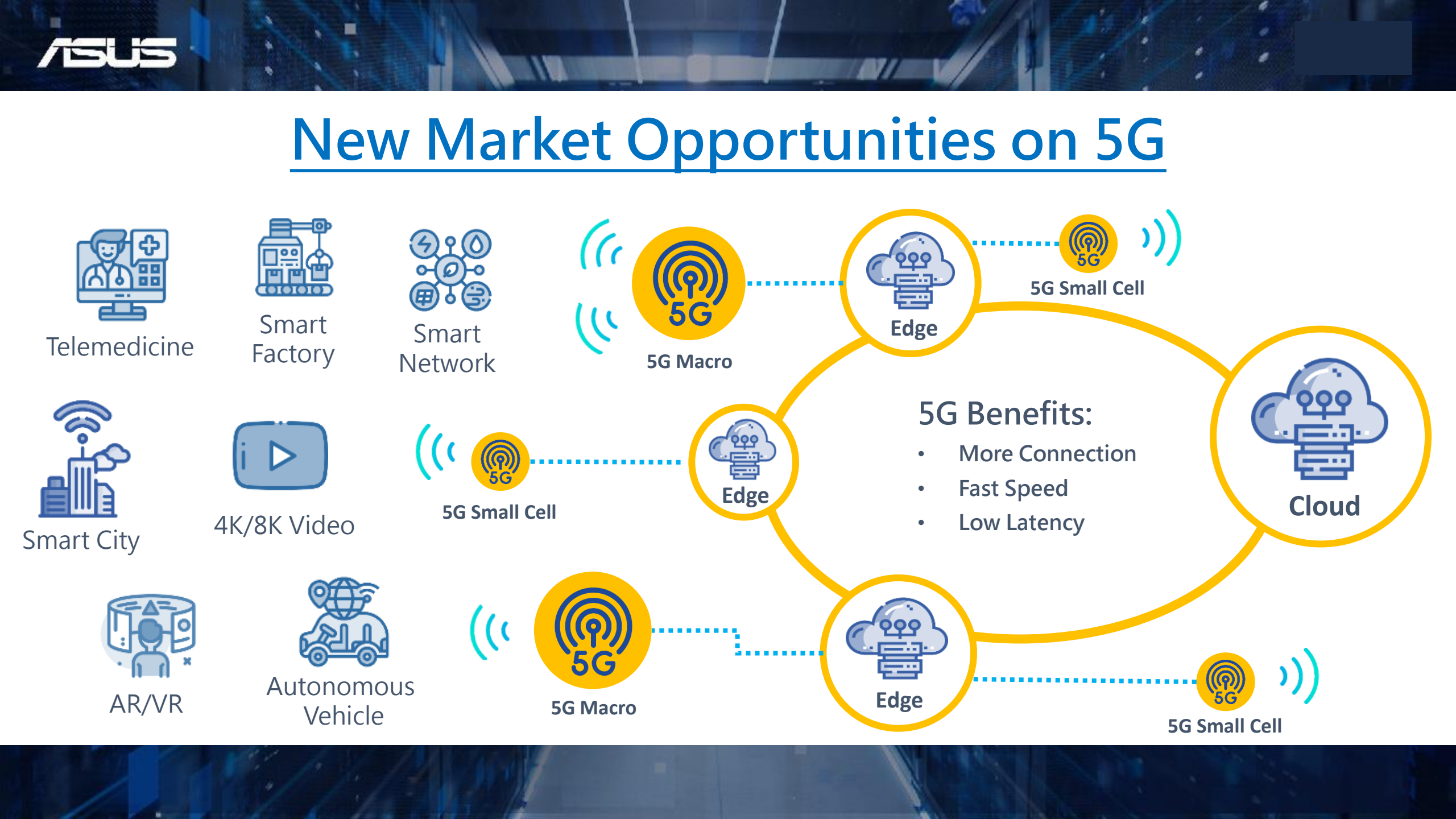
How ASUS, Intel, and Silicom position edge products into 5G architecture

Presenters:

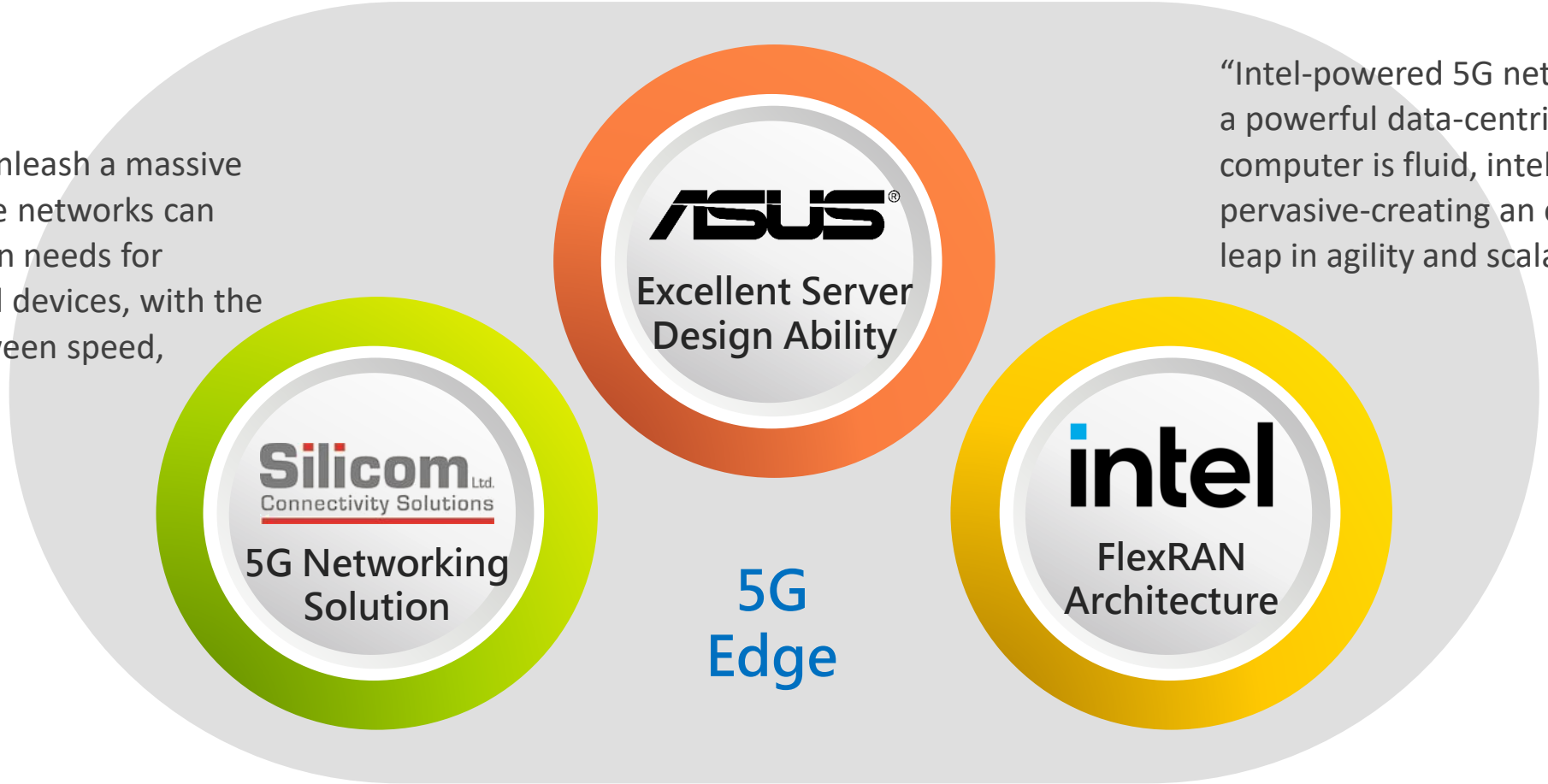
- Alber Wu, Server Business unit, Division Director, ASUS
- Oren Benisty, EVP Strategic Sales, Silicom

New Market Opportunities on 5G



3-Way Cooperation for 5G Edge

"5G is expected to unleash a massive IoT ecosystem where networks can serve communication needs for billions of connected devices, with the right trade-offs between speed, latency and cost."



"Intel-powered 5G networks deliver a powerful data-centric future where computer is fluid, intelligent, and pervasive-creating an evolutionary leap in agility and scalability."

Open RAN Server Joint Design

Distributed	Centralized	
RAN	vRAN, vEdge, vCore	vCore

RRU
Split-7.2x

CPRI, xRAN FH
Fibre

DU/CU Sever

- ✓ Smaller and compact chassis
- ✓ Front access design
- ✓ NEBS compliance

Rack Mount
L3 PDCP
Mobile Core

Intel Network-optimized Processors

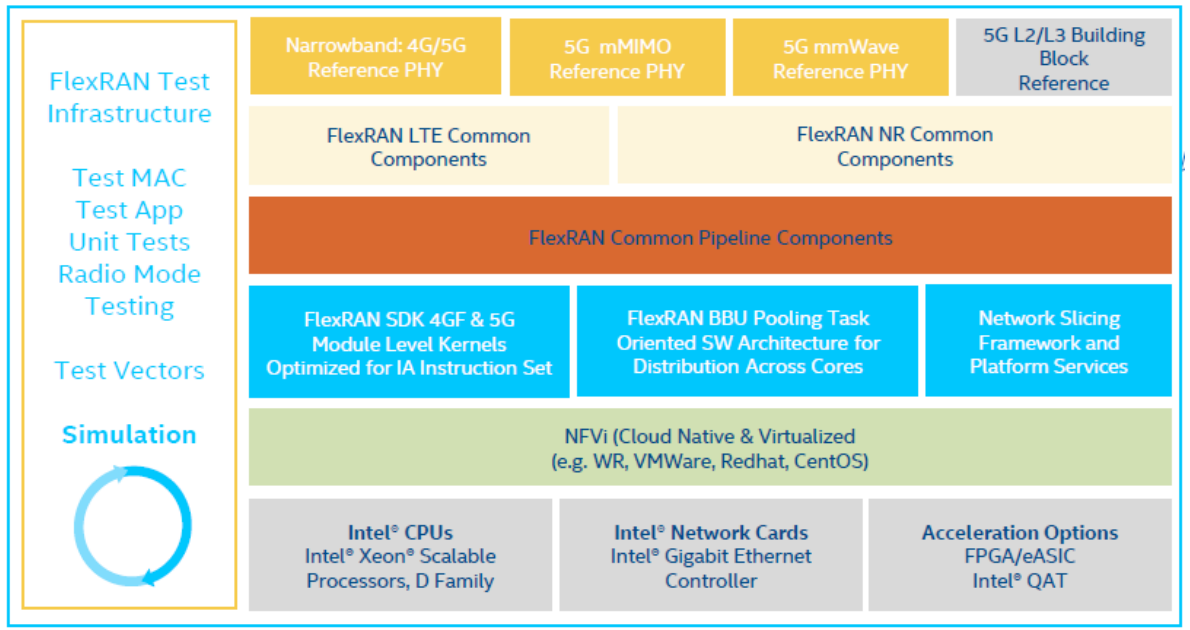
Intel Networking Adapters

Silicom Time Sync Technology
Fronthaul Data Transfer Accuracy

Silicom FEC Technology
Fronthaul Data Acceleration

Intel 5G Solutions

FlexRAN Architecture



"Intel 5G Solutions Distribute the Power and Intelligence of the Data Center from Cloud to Network to Edge"

Intel Processors

Intel Networking

Intel Optane

Intel Acceleration

Intel Select Solution

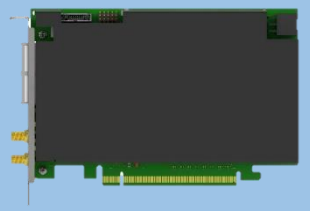
Silicom 5G PCIe cards for 4G/5G

Silicom ACC

- FEC Ac
- Su
- S
-

Silicom 5G SmartNIC

- FPGA Arria10/AgileX and MAC
- L1 Acceleration
- Time Sync 1588/SyncE
- OCXO for Hold Over
- 8 port 10G/25G or 2*100G
- GNSS receiver – Grand Master
- Boundary / Transparent mode
- BMCA – Best Master Clock Algorithm
- Support O-RAN LLS C1/C2/C3/C4



me Sync (STS)

gorithm

/C3/C4

Distributed Unit

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ASUS Server Core Competency

Performance

Green Computing

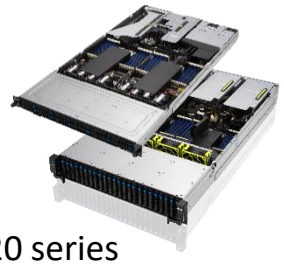
Thermal Optimized

Security

Reliability

Server Management

ASUS Servers From Cloud to Edge

RAN	Edge	Regional	Data Center Mobile Core
DU/CU for vRAN/Open RAN	**Edge**	**Core Network / Cloud**	
5G RAN, NFV, AI Inference	**Edge Computing, AI Inference, MEC, CDN**	**Cloud computing, AI Training, Visual Computing, CDN**	
Short-depth Servers Progressing 1U DU/CU Server	**Computing Servers**  RS700/RS500 series  RS720/RS520 series	**Multi-node Servers**  RS720Q series  RS720/RS520 series RS700/RS500 series	
Multi-node Servers Progressing EG3050 series	**AI Servers**  ESC4000 series	**AI Servers**  ESC4000 series  ESC8000 series	

ASUS Servers Proposed for Cloud and Edge

Next Gen **AST2600** BMC Hardware	**Performance Tuning** Setup & Deploy via BMC	**Balanced Design** between Two CPUs
Next Gen **ASMB 10** BMC Software	**PCIe 4.0** Twice Fast Speed	**PFR** option for BIOS / BMC Protection
Water Cooling Open-Loop Solution Ready	**OCP 3.0** Up to 200Gbps	More Storage Bays and **All NVMe** Support

Rack Servers for Cloud Computing & Edge Computing

RS700/RS500 series

RS720/RS520 series

RS720Q series

GPU Optimized Servers for AI Training & AI Inference

ESC4000 series

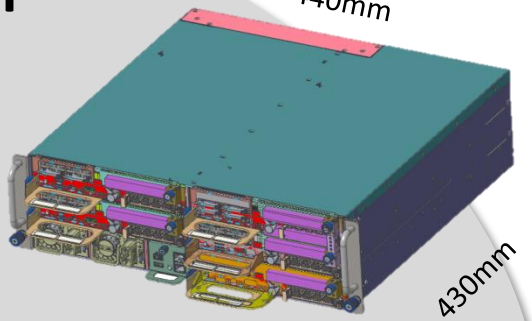
ESC8000 series

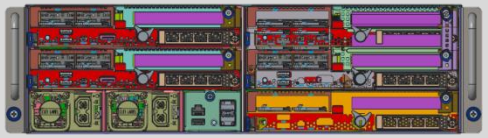
ASUS Servers Proposed For 5G Edge

RAN

ASUS EG3050 5G Edge Server

- Compact short-depth design
- High power efficiency
- All-in-One architecture with:
  - Intel Xeon-SP processor
  - OCP3.0 NIC
  - FPGA/GPU acceleration
  - Low latency NVMe





Front –Access including PSUs

OPEN Compute Project®

ASUS 1U DU/CU Server

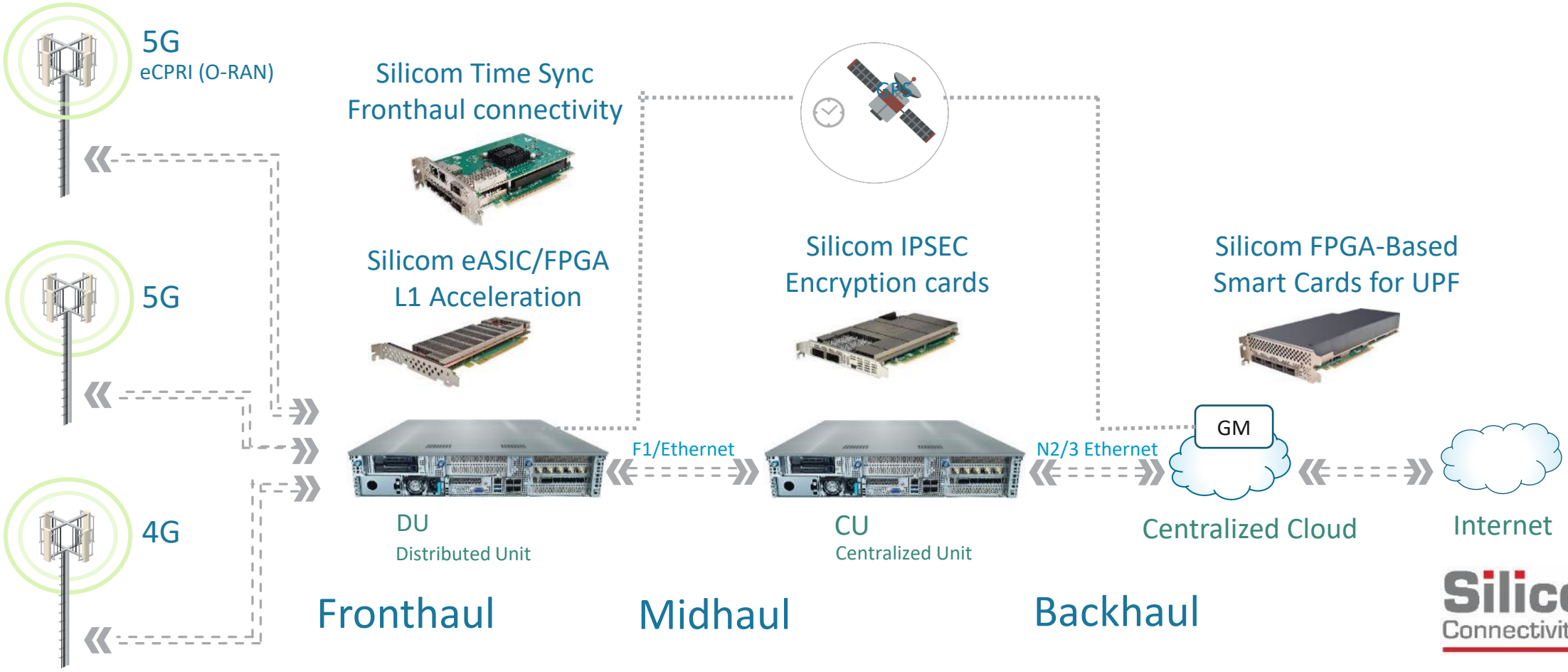
- 1-socket Intel Xeon-SP processor
- Smaller and compact chassis
- Front access design
- DC/AC-IN PSU support
- Critical environment temperature
- NEBS compliance

Progressing

ASUS Provides High Availability FW to Support 5G Server

Redundant FW Support	1. Redundant FW (BIOS/BMC) support 2. Recover from failure components and remote update lowering overall downtime
BMC	1. ASUS BMC support WEBUI, IPMI, Redfish protocols for efficient management 2. OpenBMC supported 3. Diagnostic tool for remote debug and maintenance
PFR	1. Platform Firmware Resiliency supported 2. Check FW authentication to prevent malicious FW 3. Compliant with NIST regulation
Performance Tuning	1. Performance Tuning bundled in BIOS, easy to set for different workloads 2. Targeting to deliver best-fit portfolios
Telco Solution Compliance	1. RedHat Linux/Realtime compliance 2. Wind River studio cloud platform compliance WNDRVR Red Hat

Silicom and ASUS Together to Offer The Perfect Solution to Accelerate 5G Market



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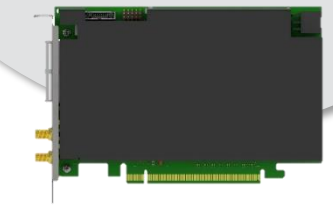
Silicom 5G PCIe cards for 4G/5G

Silicom 5G SmartNIC

- FPGA Arria10/AgileX and MAC
- L1 Acceleration
- Time Sync 1588/SyncE
- OCXO for Hold Over
- 8 port 10G/25G or 2*100G
- GNSS receiver – Grand Master
- Boundary / Transparent mode
- BMCA – Best Master Clock Algorithm
- Support O-RAN LLS C1/C2/C3/C4



Silicom ACC100 (Pomona Lake)

- FEC Acceleration (LDPC -5G/Turbo-4G)
- Support DPDK/BBDEV
- Standard/Extended Temp versions
- BMC for Remote Management

Distributed Unit

Silicom Time Sync (STS)

- E810 Drivers
- Time Sync 1588 and SyncE
- 4, 8 and 12 ports -1G/10G/25G
- GNSS receiver – Grand Master
- Boundary / Transparent mode
- Hold Over 4 to 8 hours
- BMCA – Best Master Clock Algorithm
- Support O-RAN LLS C1/C2/C3/C4

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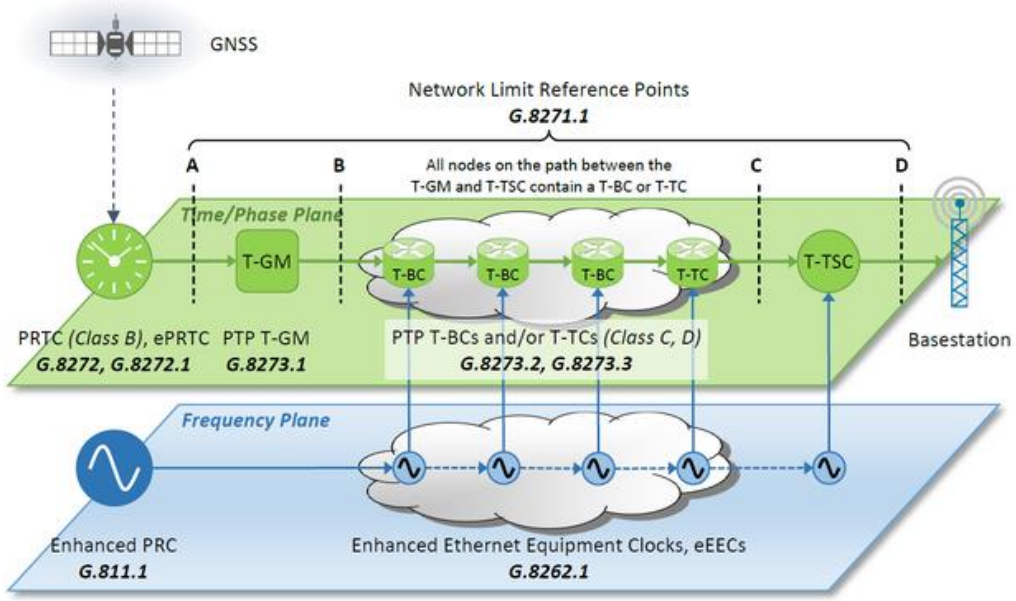
Time Synchronization Standards of STS

- Support 1588/PTP over IPv4 / IPV6, IEEE1588v2
- Support SyncE /ITU-T G.8262
- T-BC/T-TSC Boundary Clock and TSC Slave Clock /G.8273.2
- T-GM Grand Master /G.8273.1 per G.8275.1 PTP Profile
- PRTC Primary Reference Time Clock Class B/G.8272
- OC Own Clock(Master / Slave) – Class C(Stratum 3e)
- BMCA - Best Master Clock Algorithm (OCXO, SyncE, GNSS, 1588)
- Support for 1.5usec TIE at <12 Hours Hold Over
- Software 1588 Stack and Servo SW in x86



STS1 – Silicom® Time Synchronization #1

Time Sync NIC with 1588 and SyncE

Supported Time Synchronization

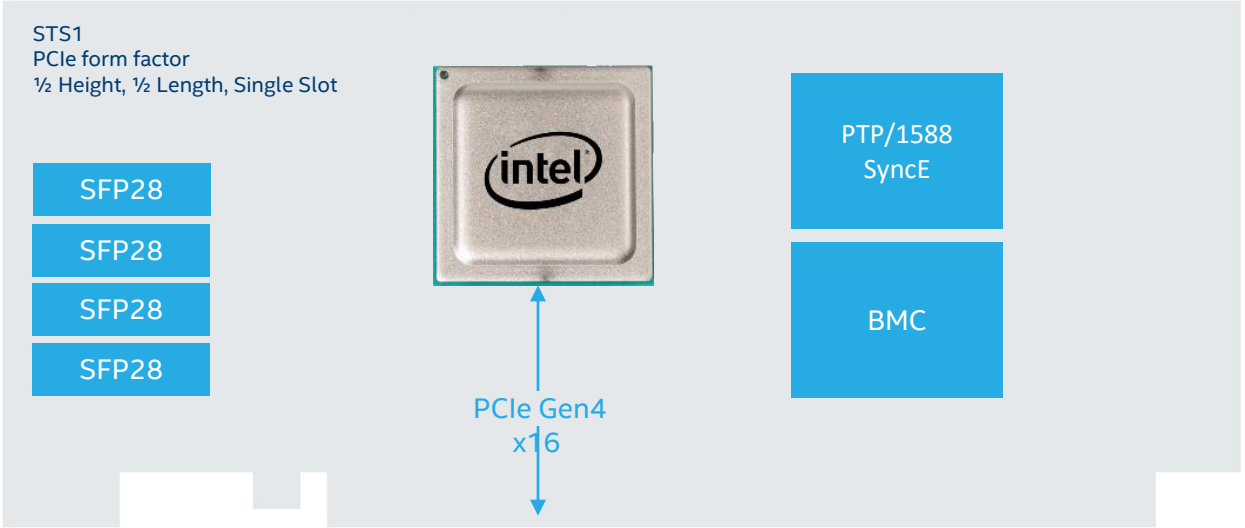
- PTP/1588
- SyncE
- 1PPS and 10Mhz Input
- Boundary Clock
- Grand Master/PRTC; using external GNSS Receiver
- 1PPS Output and 10Mhz Input/output - Optional

Built with Intel® E810-CAM1

- PCIe Gen 4 x16
- 4x SFP28 – 25GbE and 10GbE
- BMC for monitoring and control over PCIe SMBus
- ½ Height, ½ Length PCIe card
- Standard Temp (0°C to +45°C)
- Optimized for ~28W TDP(w/o optics)

Ordering P/N

- PE425G4TSI81L-XR - Standard Temp (0˚C to +45˚C)



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STS2 – Silicom® Time Synchronization #2

Time Sync NIC with 1588 and SyncE

Supported Time Synchronization

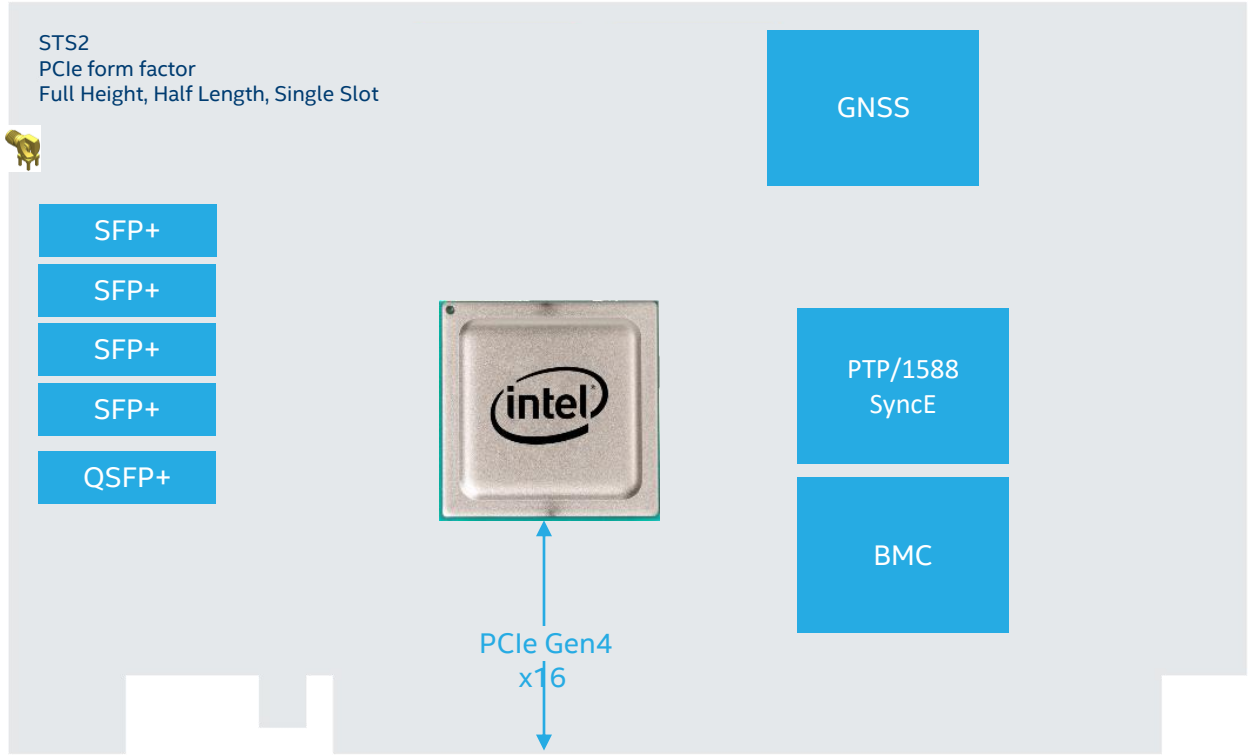
- PTP/1588
- SyncE/G.8262
- Boundary Clock
- Grand Master/PRTC; GNSS Receiver on board
- GNSS Antenna Input
- 1PPS Output and 10Mhz Input/output - Optional

Built with Intel® E810-CAM2

- PCIe Gen 4 x16
- 4x SFP+;1x QSFP+; 10GbE
- BMC for monitoring and control over PCIe SMBus
- Full height , ½ Length PCIe card
- Standard Temp (0°C to +45°C)
- Optimized for ~42W TDP(w/o optics)

Ordering P/N

- P410G8TS81-XR - Standard Temp (0˚C to +45˚C)



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Silicom® eASIC® Pomona Lake

FEC offload for vRAN

Supported through Intel® DPDK, BBDEV

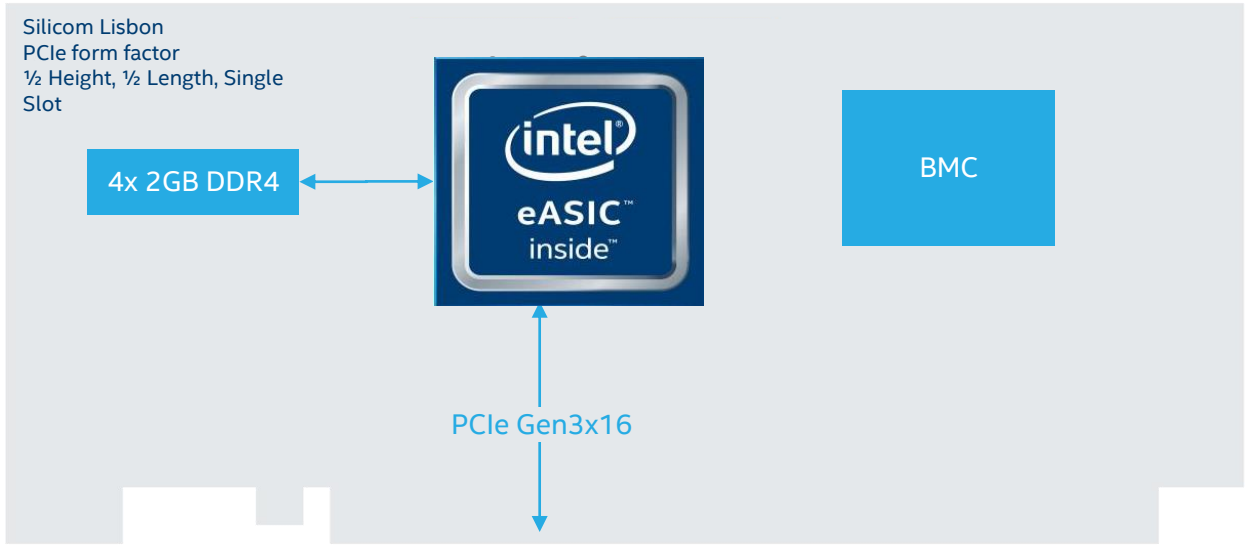
- FEC Offload

Built with Intel® Mount Bryce

- Turbo(4G) and LDPC(5G)
- Lookaside Accelerator
- Part of FlexRAN L1 SW, Version 20.08
- PCIe 3.0 x16
- BMC for monitoring and control
- ½ Height , ½ Length, PCIe
- OCP2.0 SFF
- Standard and Industrial Temp (-20°C to +55°C)
- Optimized for ~40W TDP

Ordering P/N

- P3iMB-M-P1 - Standard Temp (-5˚C to +45˚C)
- P3iMB-M-P2 - Extended Temp (-20˚C to +55˚C)
- O3iMB-P2 – OCP 2.0 SFF Extended Temp (-20˚C to +55˚C)



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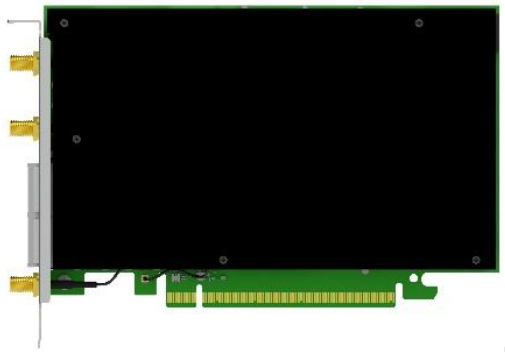
Silicom® FPGA SmartNIC - Oakham

Smart NIC For Comms Service Providers



High performance networking acceleration card

Programmable through Intel® DPDK

Accelerated Workloads

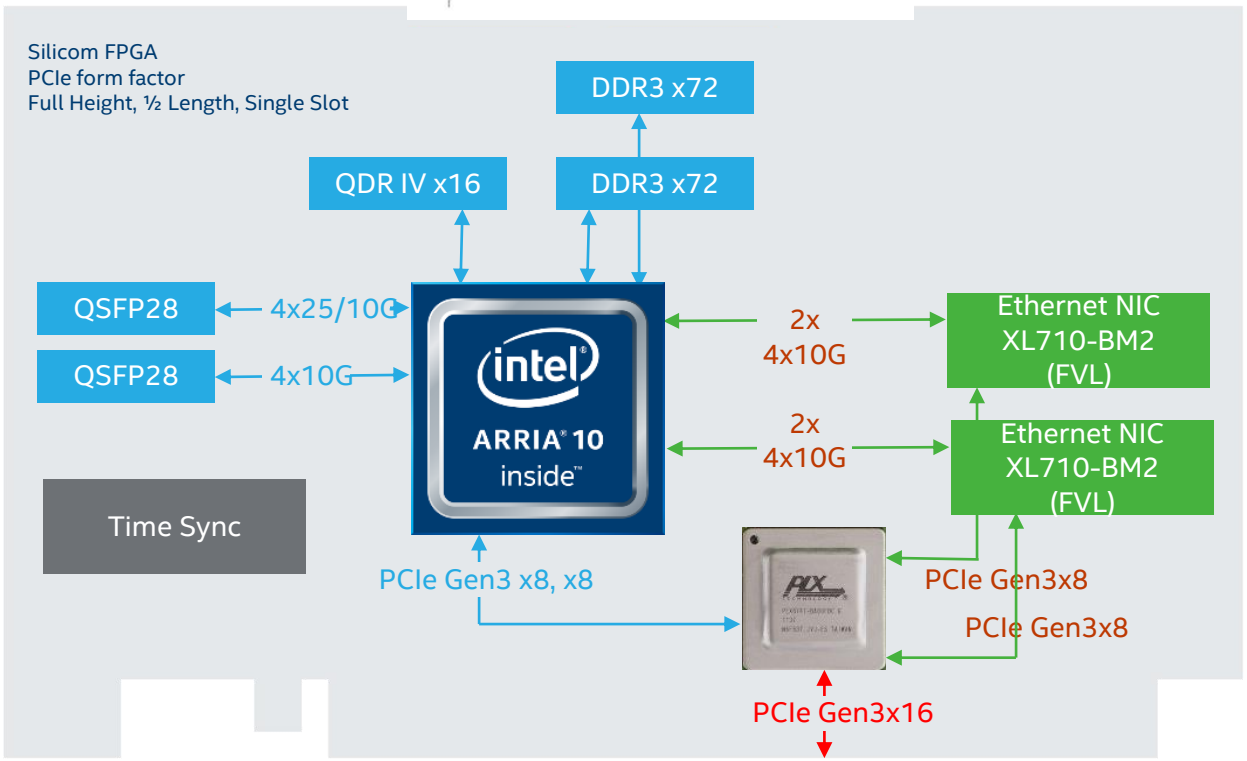
- vRAN

Built with Intel® Aria 10 GT FPGA

- High speed Ethernet support : 10G and 25G
- PCIe Gen 3 x16
- 4GB DDR4 memory
- 1588, SyncE and GNSS
- BMC for monitoring and control (PLDM)
- ½ length, full height
- Optimized for ~75W TDP

Supports Dual Intel® Ethernet Controller XL710

- Extensive OS support and easier system integration
- Dual 40Gbps pipeline



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Thank you!

For more information, please contact with:

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