

OPEN POSSIBILITIES.

Next Generation Open Edge server development



OCP
GLOBAL
SUMMIT

NOVEMBER 9-10, 2021

Next Generation Open Edge server development

Samuli Toivola, Lead HW architect, Nokia
Craig White, Product Architect, Nokia

OPEN POSSIBILITIES.



OPEN
PLATINUM™



Abstract

Nokia has contributed the initial Open edge chassis as OCP accepted product and as part of Open edge solution Nokia has also contributed 1U and 2U server sleds as OCP inspired products already in initial server release of 2018 .

In this presentation we will describe the key requirements and design concept proposals for future generation(s) of Open Edge server developments to continuously bring significant performance boost in running various real-time applications at the edge.

Key focus in this presentation is show our thinking what is required when target is taking maximum advantage of processor and other semiconductor technology development and at the same time maintain 100% compatibility with other Open Edge ecosystem components like 2U/3U chassis, power supplies, RMC module and other sled types like Open Edge switch sled.



EDGE

OPEN POSSIBILITIES.



Open Edge server key objectives



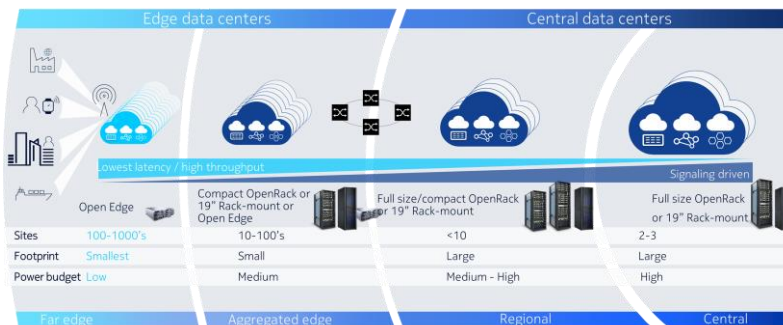
EDGE

Edge site requirements

- Limited floor space -> small form factor
- Varying thermal conditions -> extended temperature range
- Varying types of power feed -> DC, AC, 3-phase, 1-phase with PDUs
- Limited power feed capacity -> system scalability from one chassis to multiple racks
- Accelerator support (e.g. vRAN/ MEC)

OCP design principles

- Centralized power feed
- Front access
- Tool-less maintenance
- Vanity free design



OPEN POSSIBILITIES.



Environmental and regulatory compliancy



EDGE

Operating conditions

- Operating temperature range: -5 C to +45 C [ETSI EN300 019-1-3 Class 3.2]
- Short term operating temperature: -5 C to +55 C [GR-63-CORE]
- Operating humidity: 5 % to 95 %

EMC

- EN300386
- FCC CFR47 15 (class A), CISPR 22/32 (class A) CISPR 24
- GR-1089-CORE, and more

Safety

- IEC 62368-1:2014
- GR-1089-CORE (electrical safety, grounding and bonding)

Seismic tolerance

- GR-63-CORE (Zone 4)

Acoustic noise

- GR-63-CORE (equipment room criteria)

Fire resistance

- GR-63-CORE (shelf level criteria)

OPEN POSSIBILITIES.



Commodity development



EDGE

Processor development forecast

- Rapidly increasing core count, starting from 28 cores Cascade Lake (2019 design) and expected to be about two times more in 2022/2023 platforms
- Fast TDP increase because of increased core count and faster IO
- PCIe development PCIe Gen3 → Gen4 → Gen5 that means 4x lane speed

DDR Memory performance evolution

- From DDR4 with 2933MT/s (2019) to DDR5 with 5200MT/s (2022)

OCP NIC evolution

- New OCP NIC v3 SFF gives hot-swappable high-performance option for NIC cards
- Allows high power NIC/ accelerator usage in OCP slot

Storage evolution

- SSD/NVMe technology with dense E1.S EDSFF devices

OPEN POSSIBILITIES.



Open Edge Server sled variants



EDGE

There should be available two server form factors for different use cases:

- 1U server sled enables a denser solution in terms of core count and system memory but has less space for I/O and storage.
- 2U server provides more storage and I/O options due to increased height. Also, full length, dual width processing units, such as HW accelerators and GPGPUs, should be supported in the 2U sled.

OPEN POSSIBILITIES.



Open Edge Server motherboard



EDGE

Design shall support high TDP CPU's for minimum 300W

PCIe technology to PCIe Gen 5 in high throughput use cases:

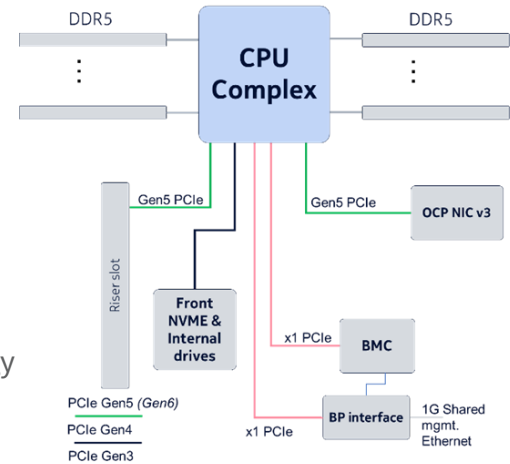
- PCIe slots with x16 connectivity
- OCPv3 SFF slots with x16 connectivity
- PCIe gen 4 can still be used for storage interfaces
- PCIe gen 3 can be used for motherboard legacy resources

DDR Memory

- To maintain best possible memory speed 1DPC design is preferred
- DIMM slot for available memory channels should be populated
- Design shall support highest memory speeds of selected processor technology

Storage devices minimum requirements

- Dual E1.S EDSFF devices for 1U server sled
- Six E1.S EDSFF devices for 2U server sled
- Dual M.2 for internal operating system storage devices



OPEN POSSIBILITIES.



Server cooling and power



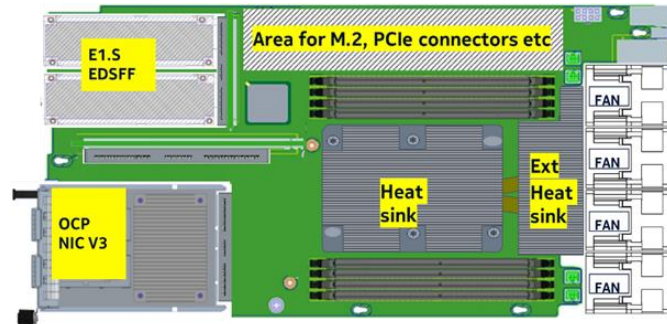
EDGE

Airflow targets with fans at maximum speed

- 1U server sled 100CFM
- 2U server sled 160CFM
- Maximized CPU heat sink performance using extended heat sink
- Both Front to Rear and Rear to Front airflow options shall be supported

Power budget targets for server

- 1U server sled 500W continuous power
- 2U server sled 800W continuous power



OPEN POSSIBILITIES.



Chassis configuration options



EDGE

The Open edge chassis supports flexible configuration of two dimensions of sleds, 1U and 2U. One 2U sled can be installed in place of two 1U sleds. 1U sleds in the top row have support brackets on the inner sides of the chassis. When a 2U sled is installed, the support brackets are removed. Removal and installation is tool-less.

Supported configurations in 3U chassis are

- 5x 1U
- 3x 1U + 1x 2U
- 1x 1U + 2x 2U

Supported configurations in 2U chassis are

- 3x 1U
- 1x 1U + 1x 2U



OPEN POSSIBILITIES.



Chassis level configurations



EDGE

- Sled level maximum power will increase because of higher power CPU's, PCIe bus evolution and introduction of DDR5 memory technologies.
- Power level of single server configuration can be from 200W up to 500W(1U) or up to 800W(2U).
- Table shows few possible example configurations using 2000W PSUs and either 3U or 2U Open Edge chassis

Configuration	1U sled power	2U sled power	Total Power	Notes
3U Chassis 1x 1U + 2x 2U	500W	750W	2000W	Minor limitation for average power needed
3U Chassis 4x 1U + 1 filler sled	500W	NA	2000W	1 sled place left empty
3U Chassis 5x 1U	400W	NA	2000W	Average power limited to 400W
2U chassis 1x1U + 1x2U	500W	800W	1300W	No limitations
2U Chassis 3x1U	500W	NA	1500W	No limitations

OPEN POSSIBILITIES.



Summary

- Key focus in future server sled designs shall be taking maximum advantage of processor and other semiconductor technology development and at the same time maintain 100% compatibility with other Open Edge ecosystem components like 2U/3U chassis, power supplies, RMC module and other sled types like Open Edge switch sled.
- Sled level maximum power will increase because of higher power CPU's, PCIe bus evolution and introduction of DDR5 memory technologies. In new generations of server design shall tolerate high power components and be able to cool those in harsh environmental conditions.
- There are wide variety of Open Edge use cases and power level of single server configuration can be from 200W up to 500W(1U) or up to 800W(2U). System level configuration rules and flexible use of 2U and 3U chassis enables continuation with existing chassis and power distribution designs.
- In coming generations OCP NIC V3 enables higher networking bandwidths and dense EDSFF E1.S allows high performance storage in limited physical real estate.



EDGE

OPEN POSSIBILITIES.



Product Info



OPEN
ACCEPTED™



OPEN
INSPIRED™



OPEN
Compute Project
SOLUTION PROVIDER®

Links to existing products:

Nokia: <https://www.nokia.com/networks/products/airframe-open-edge-server/>

Open edge server specification: <http://files.opencompute.org/oc/public.php?service=files&t=c2dc2bee9f5228eb84104b3662497263&download>

OCP Marketplace: <https://www.opencompute.org/products>

OPEN POSSIBILITIES.



Call to Action

- Join regular Edge sub-project calls (under Telco project)
- Planned timeline for contribution of white paper including key requirements for future servers is by 2H2021
- Project Wiki page containing latest specifications: <https://www.opencompute.org/wiki/Telcos/Edge>
- Open edge mailing list: <https://ocp-all.groups.io/g/OCP-Edge>

OPEN POSSIBILITIES.



Thank you!



NOVEMBER 9-10, 2021