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OCP SUMMIT

Telecom &
openEdge

Open Edge Deployments

Mika Hatanpää, Head of R&D, Nokia

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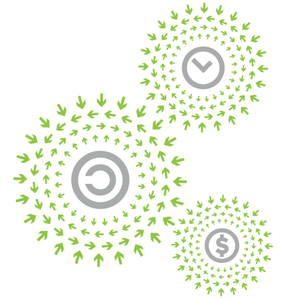

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Open Edge Deployments

TELCO

- Edge data center facilities are often limited in terms of space, power and cooling. Due to the limitations, requirements of an edge data center solution are different from classical data centers.
- In this presentation I will share information about edge data center solutions, including for example:
  - Open edge server specifications and design
  - Requirements for open edge rack solution
  - Open edge deployment scenarios

Specifications

Design Files

AirFrame open edge server

OPEN ACCEPTED™ OPEN INSPIRED™

The Nokia AirFrame open edge server, is the first x86 solution built and tailored to fully support edge cloud deployments. The ultra-small footprint provided by the solution is complemented with a real-time, OPNFV compatible, OpenStack distribution built to provide the performance and low latency required by solutions like Cloud RAN.

More information:
https://networks.nokia.com/products/airframe-open-edge-server

OCP Marketplace:
https://www.opencompute.org/products?refinementList%5Bsolution_provider%5D%5B0%5D=Nokia&page=1

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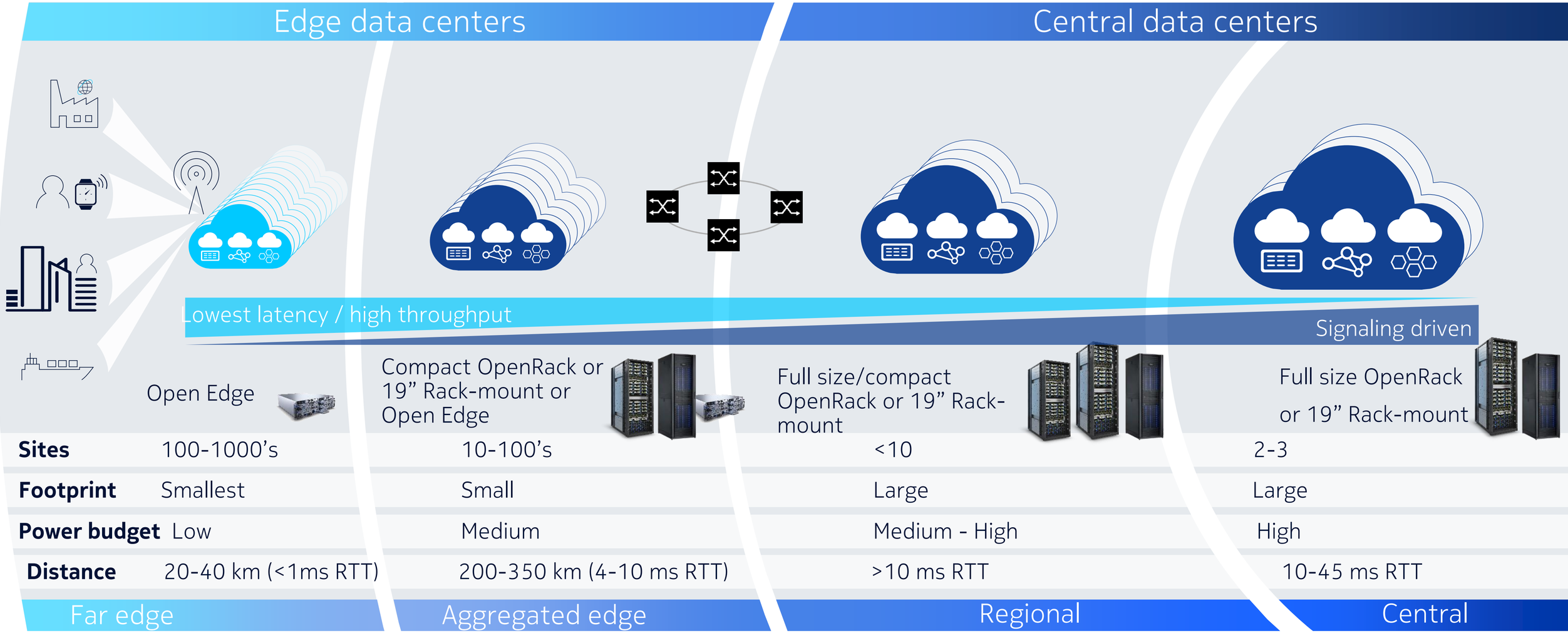
Edge Datacenter Solution Need

Managing the lowest latency/cost trade off with a layered architecture

Characteristics of Telco NFV data centers



Challenges in bringing the data center to the edge
Managing the trade offs

Efficient capacity

CENTRALIZED DATA CENTERS

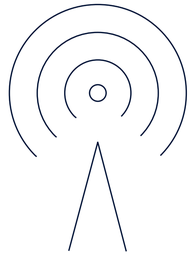
Cost efficiency

New business potentials

Low latency & efficient transport

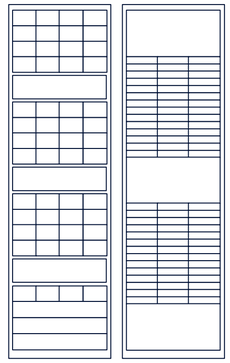
EDGE DATA CENTERS

Challenges in addressing new opportunities today



Radio sites

… no space for traditional data center HW



Classical data center HW

… not designed for edge use

Managing the lowest latency/cost trade off with a layered architecture
First data center solution designed for the edge

Edge data centers

Far edge

Content stays close to the end user

Enables lowest latency

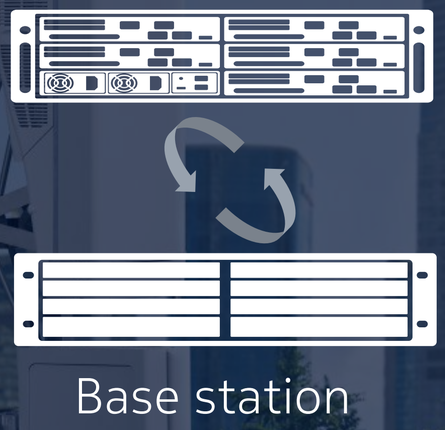
No need to send big data towards the core network

Saves backhaul NW resources

A compact data center with a base station form factor Edge Cloud Capabilities in any radio site

Adding compute capabilities to a base station site

Reuse existing site solutions



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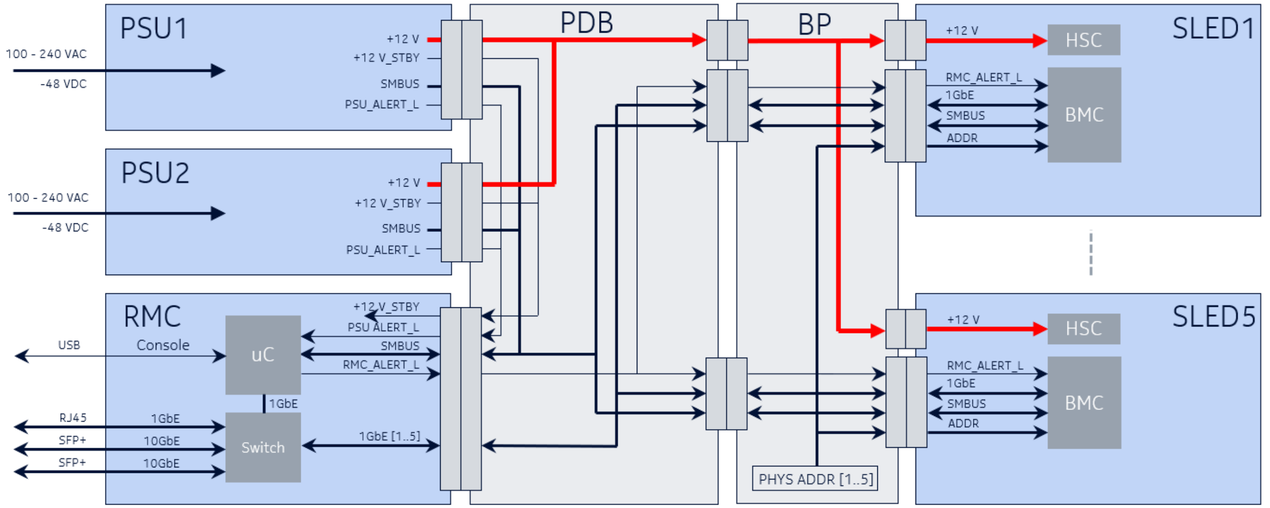
openEdge server design

Open edge chassis overview

Key specifications

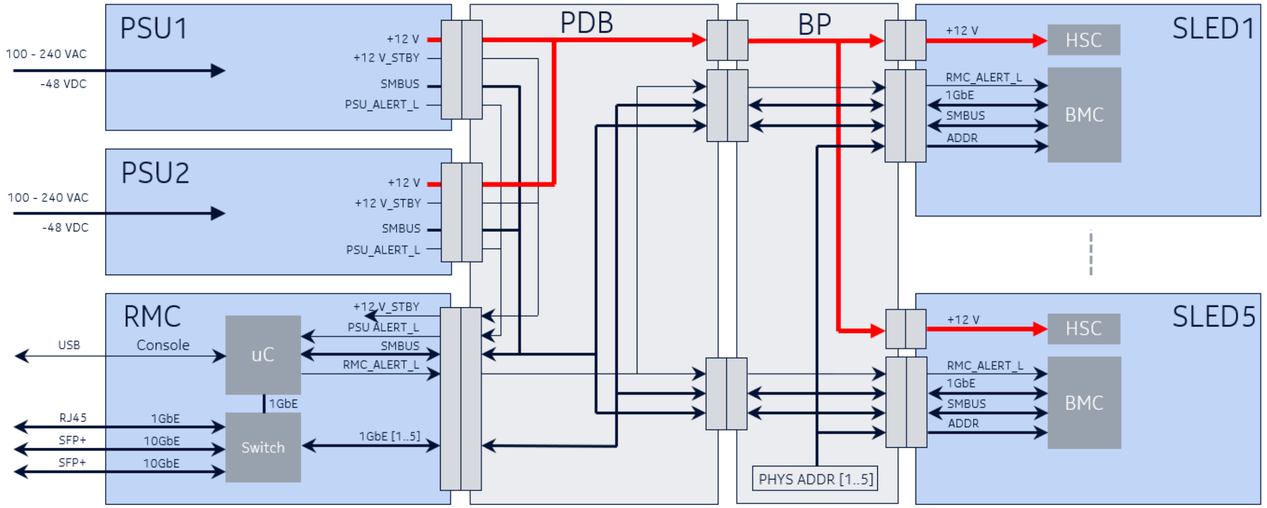
- 3U, 19” mountable (EIA-310 compatible)
- 130.6 x 440 x 430 mm (H x W x D)
- 1U and 2U, half width sleds are supported
- Redundant, centralized power supply
  - 2000 W max power feed capacity, 80+ Platinum
  - AC (100..127/ 200..240 VAC) and DC (-48 VDC) options
- Sled power feed capacity 400 W (1U sled), 700 W (2U sled), 12 VDC



Open edge chassis overview

Key specifications

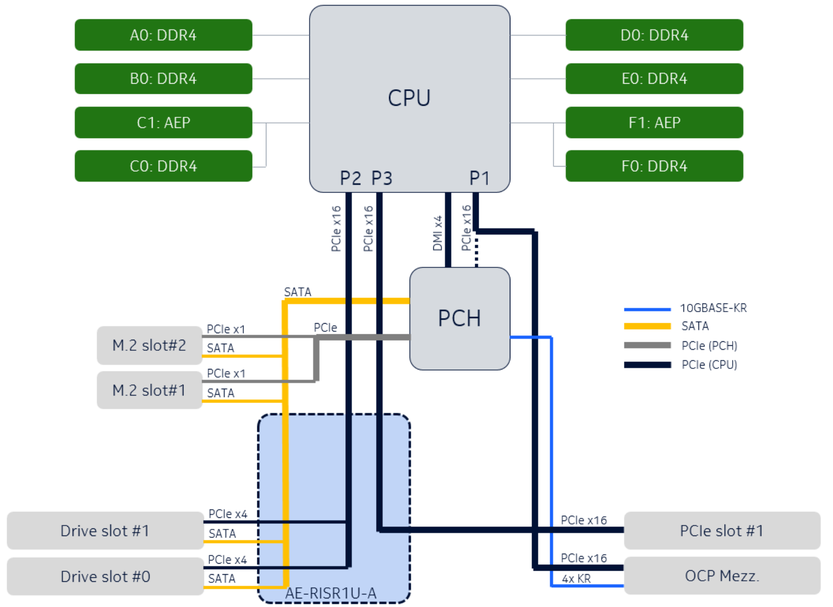
- Cooling: Fan units are part of sled solution
  - Air flow direction configurable: front to rear/rear to front
- Chassis management controller (RMC)
  - PSU management (control, sensors, ..)
  - Management Ethernet interface to sleds
    - 1 GE to all sleds via backplane
    - 1x 1 GE (RJ45) + 2x 10 GE (SFP+) front panel interface for external connectivity and chaining of multiple chassis
- Power distribution board and chassis backplane provide connectivity between RMC, sleds and PDUs



Server sled, 1U

Key specifications

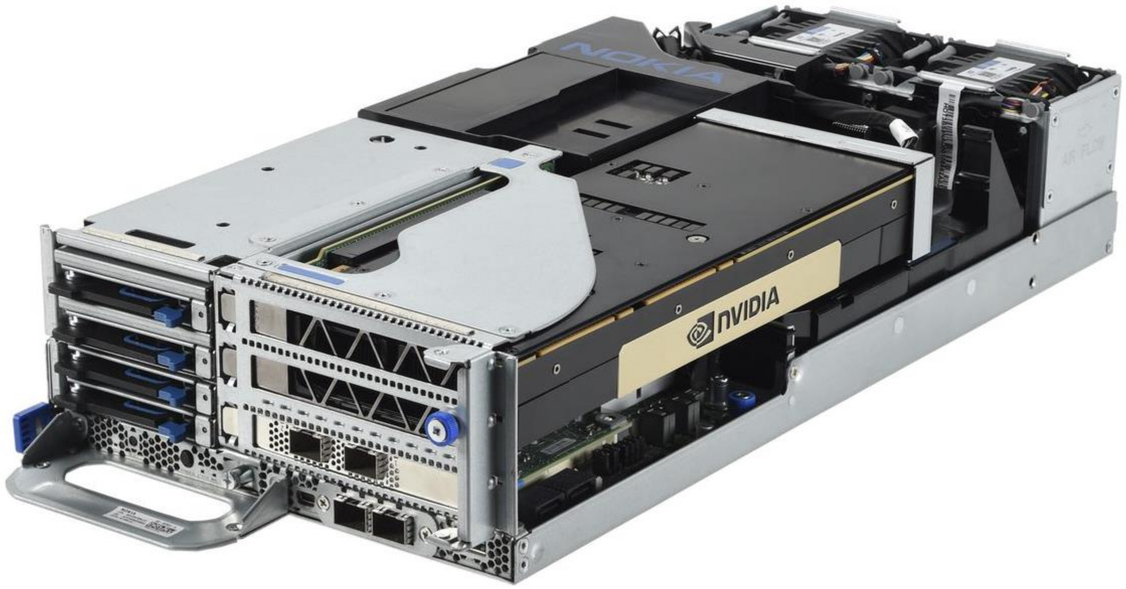
- 1U, half width
- 215 mm x 41 mm x 423 mm (W x H x D)
- Power consumption 400 W, max
- Single-socket CPU, Intel® Xeon® Scalable Family, Thermal Design Power (TDP): max. 205 W
- PCH options: Intel C621, C627 (with QAT)
- Memory: 6 x DDR4-2933 + 2 x Intel Optane
- Single riser for disks and add-in cards
- Extension slots
  - PCIe x16, FHHL, 75 W
  - OCP Mezzanine 2.0, PCIe x16
- Storage
  - 2 x hot-plug SSD, SATA/NVMe, 2.5 ”, 7/9.5 mm
  - 2 x M.2 SSD, SATA/NVMe, 2280/22110

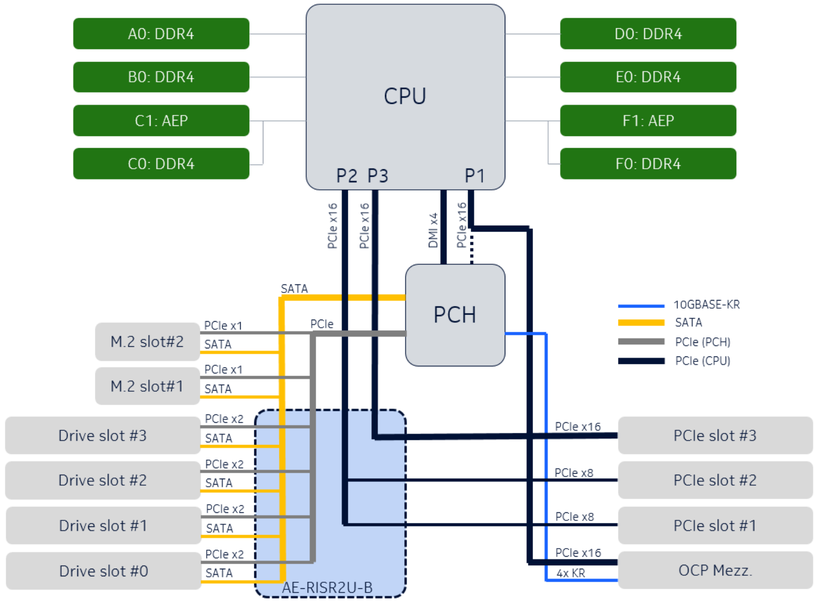


Server sled, 2U

Key specifications

- 2U, half width
- 215 mm x 83.6 mm x 423 mm (W x H x D)
- Power consumption 700 W, max
- Single-socket CPU, Intel® Xeon® Scalable Family, Thermal Design Power (TDP): max. 250 W
- PCH options: Intel C621, C627 (with QAT)
- Memory: 6 x DDR4-2933 + 2 x Intel Optane
- Single riser for disks and add-in cards
- Extension slots
  - 1 x PCIe x16, FHFL, dual-wide, 300 W max
  - 1-2 x PCIe x8, FHHL, 75 W max
  - OCP Mezzanine 2.0, PCIe x16
- Storage
  - 2 x hot-plug SSD, SATA/NVMe, 2.5 ”, 7/9.5 mm
  - 2 x hot-plug SSD, SATA/NVMe, 2.5 ”, 7/9.5/15 mm
  - 2 x M.2 SSD, SATA/NVMe, 2280/22110





Nokia plan for contribution to OCP foundation

- Nokia has contributed Open edge server chassis specification and design files for OCP accepted™ recognition.
- The contribution has been accepted by the Open Compute Telco/openEdge workgroup and OCP incubation committee earlier this week.

- Telcos/openEdge Wiki page: https://www.opencompute.org/wiki/Telcos/openEDGE
- Open edge server chassis specification: http://files.opencompute.org/oc/public.php?service=files&t=78ab9d63552390b715c473ddad62e5b3&download
- Open edge server chassis design files: http://files.opencompute.org/oc/public.php?service=files&t=a7a304edca2ce8b587198587c28f30cc&download
- Open edge server specification: http://files.opencompute.org/oc/public.php?service=files&t=ada3b7aabae6f81ae73c00a30ea6fa5a&download

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openEdge server and rack configurations

openEdge server and rack configurations
Configuration use case examples

Server configurations

- Cloud RAN (with accelerators)
  - Efficient single socket design optimizes CPU core performance (no NUMA impact)
  - Server sled design allows usage of high power Radio L1 baseband accelerators
  - OpenEDGE server chassis enables also standalone sled based acceleration and switching HW solutions
- MEC (Multi-access edge computing with AI/ML acceleration)
  - For MEC AI/ML use cases openEDGE server supports up to 300W FHFL accelerators and GPGPUs in 2U form factor
  - Server hosts high bandwidth low latency NVMe U.2 bays for local storage

Rack configurations

- Indoor
  - Shallow depth allows openEDGE chassis usage in typical 600x600mm racks, and even in smaller racks.
  - In order to allow rack installation against each other or against wall reverse cooling is possible.
- Outdoor
  - Small footprint allows openEDGE chassis usage in small outdoor cabinets.
  - High energy efficiency together with low power consumption allows use in harsh environmental conditions

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openEdge indoor rack requirements

openEdge indoor rack requirements

Compact and generic solution is needed in remote sites

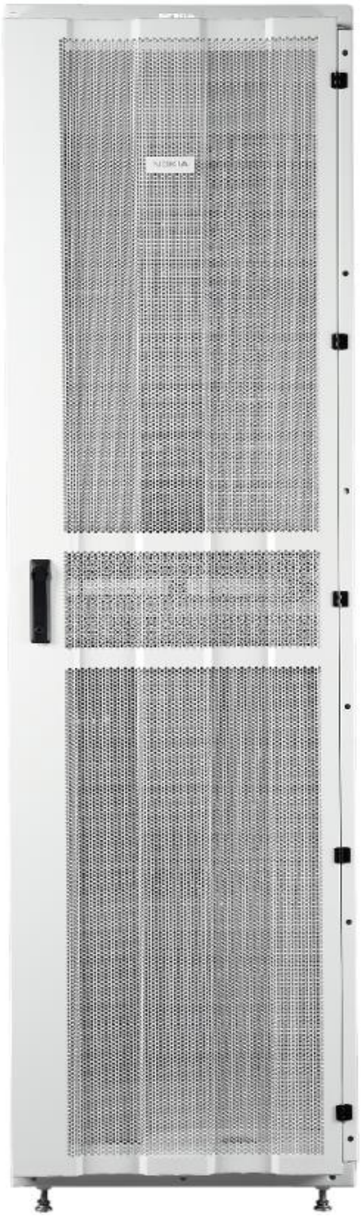
- 19” EIA-310 compatible
- Rack depth starting from 450 mm, typical 600 mm
- Air flow options: support for front-to-rear, rear-to-front airflow
- Various power feed options
  - solution for various voltage levels and geographical areas; support for -48V DC, 200/208 VAC, 230VAC, 400 VAC; single phase, three phase, 50/60 Hz, different power levels (requires several different kinds of PDUs/PSUs).

Operating conditions

- Operating temperature range: -5 C ...+45 C [ETSI EN300 019-1-3 Class 3.2], short term : -5 C to +55 C [GR-63-CORE]
- Operating humidity: 5% to 95%
- Seismic tolerance [NEBS GR-63-CORE seismic zone 4]
- Special rack solutions supported for more extreme environments, e.g. outdoor

Serviceability

- Front access for easy serviceability
- Front cabling, in some use cases amount of cabling can be high, requiring larger rack footprint
- Rear access is not always possible
- Tool less serviceability
- Door opening direction shall be reversable



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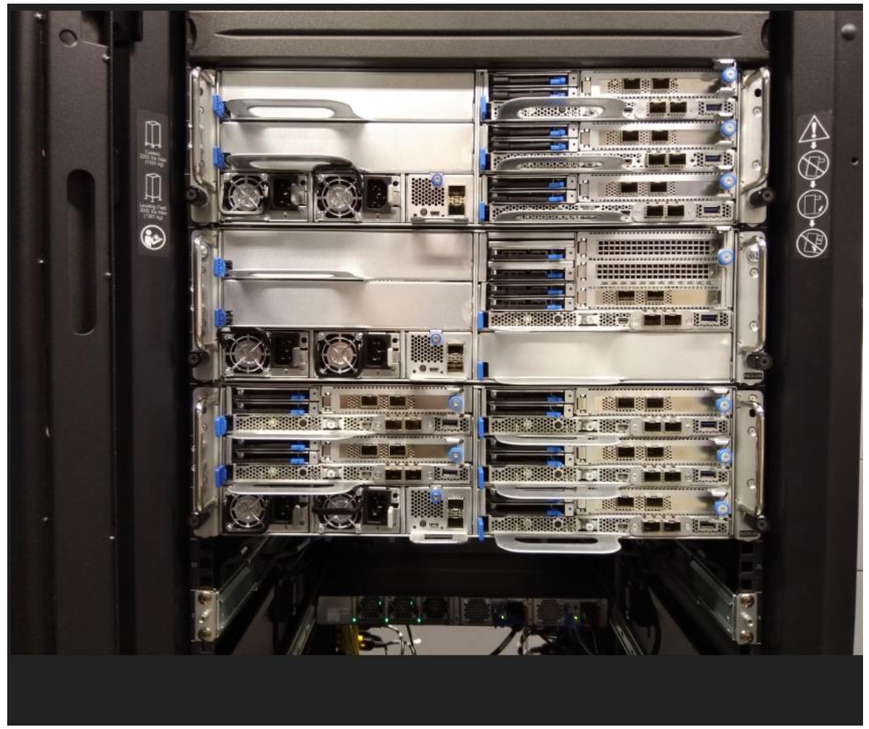
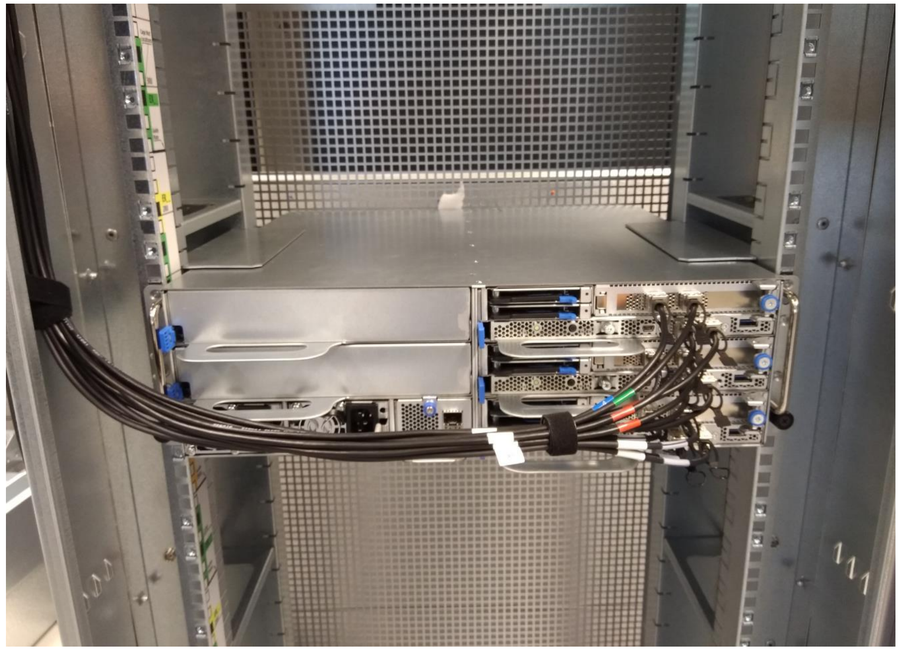
openEdge deployment use cases

Installation examples

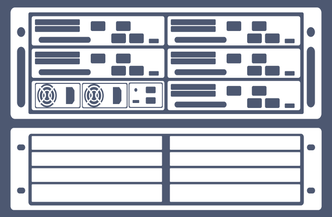




Possible Far Edge Use Cases
Reuse existing BBU/Cellsite Cabinet Options

Intersection Case Configuration

openEDGE server

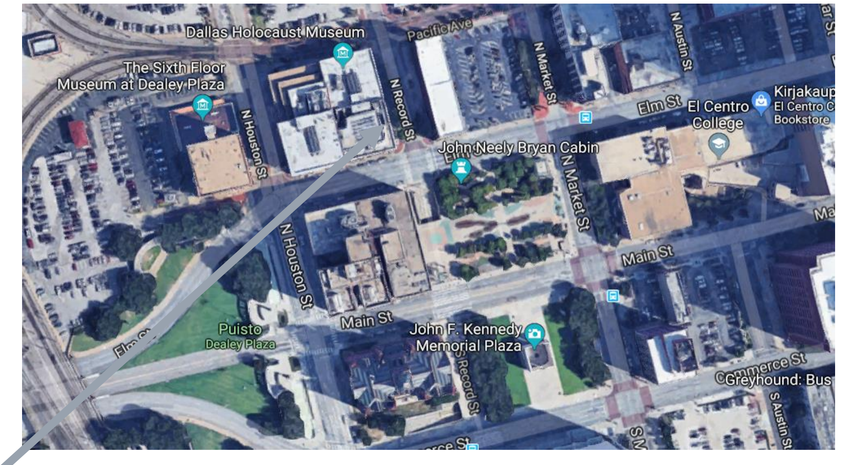


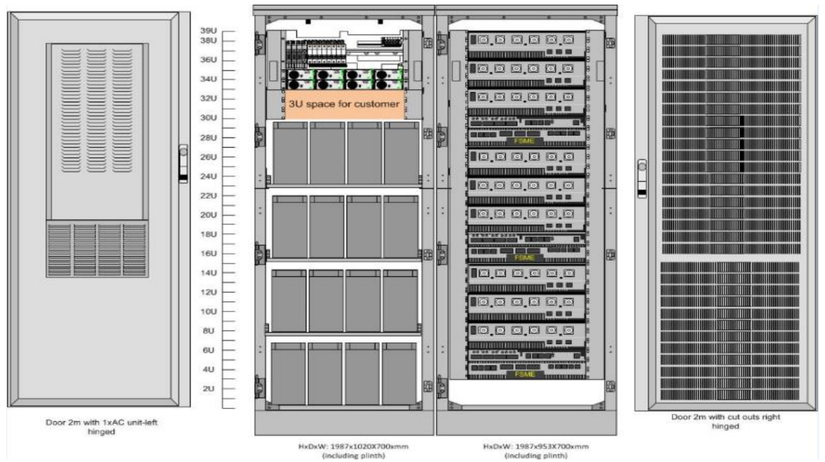
Adding compute capabilities to a base station site

Reuse existing site solutions

Base station

Block Case Configuration





Outdoor cabinet

Dual/Street Cabinet Solution

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Summary

Open Edge Deployments
Summary

- New use cases are driving the need to move computing capacity from classical centralized data centers towards the edge of the networks.
- Requirements of edge data center deployments are different from classical data centers.
- In this presentation I we have shared information about
  - Edge data center deployment scenarios
  - Open edge server specification and design files
  - Requirements for a open edge rack solution
  - Examples of configurations and deployments

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Call to Action

- openEDGE subproject has been established under OCP Telco project.
- The Open Edge project shall create 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.
- It is expected that participants in this project is will be across the entire ecosystem, including Telco Service Providers (adopters), OCP solution providers (suppliers), ODM/OEM manufacturers, and key technology providers.
- In order to ensure that existing relevant expertise in the OCP is utilized and to make sure that the wider OCP community informed about Edge Computing, the project will solicit input by providing technical presentations to the other OCP projects/committees especially the Rack and Power, Server, and Networking projects.
- This Project is open to the public and we welcome all those who would like to be involved.

- Where to buy: https://networks.nokia.com/products/airframe-open-edge-server
- Project Wiki with latest specification: https://www.opencompute.org/wiki/Telcos/openEDGE
- Mailing list: OCP-Open-Edge@OCP-All.groups.io

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Thank You!

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