Nokia AirFrame open edge server – 5G performance in compact size
First data center solution designed for far edge
Managing the lowest latency/cost trade off with a layered architecture
First data center solution designed for the edge

<table>
<thead>
<tr>
<th></th>
<th>Edge data centers</th>
<th>Central data centers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sites</strong></td>
<td>100-1000’s</td>
<td>~3</td>
</tr>
<tr>
<td><strong>Footprint</strong></td>
<td>Smallest</td>
<td>Large</td>
</tr>
<tr>
<td><strong>Power budget</strong></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Far edge</strong></td>
<td>Rackmount or OCP</td>
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</tr>
<tr>
<td><strong>Aggregated edge</strong></td>
<td>Rackmount or OCP</td>
<td></td>
</tr>
<tr>
<td><strong>Regional</strong></td>
<td>Rackmount or OCP</td>
<td></td>
</tr>
<tr>
<td><strong>Central</strong></td>
<td>Rackmount or OCP</td>
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</table>

Lowest latency / high throughput

Signaling driven

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Edge data centers

- Content stays close to the end user
  - Enables lowest latency

Central data centers

- No need to send the data towards the core network
  - Saves backhaul NW resources

- Sites: 100-1000's
- Footprint: Smallest
- Power budget: Low

- Far edge
  - AirFrame Open Edge Server

- Aggregated edge
  - Rackmount or OCP
  - Medium

- Regional
  - Rackmount or OCP
  - High

- Central
  - Rackmount or OCP
  - High

- Central data centers
  - 10-100's
  - Small
  - Few
  - Large

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AirFrame open edge server: 5G performance in compact size
First x86 solution designed to fully support edge / far-edge cloud deployments

ARCHITECTURE
• 19” compatible: fits in any 600mm cabinet
• Compact form factor: ranging from 2RU to 5RU high chassis
• Sleds either 1RU or 2RU high
• Fully front-operated (cabling, open rack-like tool less serviceability)
• Support for high end accelerators
• High availability: No SPOFs, redundant fans, hot swap storage
• Redundant fans; air flow configurable front to rear/rear to front

POWER
• 2N redundant AC & DC power supplies
• Power fed to sleds through backplane
• 400W per 1U sled

MANAGEMENT
• All sleds managed through single interface in RMC unit
• On board BMC (in server sleds)

DIMENSIONS
• 133.5 (3RU) x 444 x 460 mm (H x W x D)
• Ca. 20.0 kg / 44.1 lbs. (Chassis with PSU’s and RMC)

COMMODITY
support on server sleds
• Memories, disks and NICs from common AirFrame portfolio

Environmental
• Full NEBS compliance, seismic zone 4 [GR-63-Core, GR-1089-Core]
• Extended operating temperature range: -5C..+45C [ETSI EN300 019-1-3 Class 3.2]
AirFrame open edge server – 1U
Intel Xeon® SP next gen

Processor (single socket)
- Intel® Xeon® SP, 20 cores, 2,5GHz (tbd)

Chipset
- Intel® C621/C627

Thermal
- Max. CPU TDP support: 205W
- Four redundant dual rotor fans per node; air flow front to rear/rear to front

Management
- IPMI v2.0 Compliant, on board BMC
- Access through RMC unit

Memory
- DIMM slots: 6 typical (8 max)
  - DIMM type: 16GB / 32GB - DDR4 RDIMM 2933 MHz

Storage
- 2x 2,5” Hot-plug bays for NVMe and SATA devices
  - 9,5/7mm; SATA SSDs: 480GB, 960GB, 1,92TB 3dwpd
  - 2x internal M.2 2280 (and/or 22110) devices: 480GB 1dwpd

Expansion Slots
- 1x PCIe Gen3 x8 OCP mezzanine car: Mellanox ConnectX-5, 2x 25GE SFP28
  - 1x PCIe Gen3 x16 FHHL PCIe card: Mellanox ConnectX-5, 2x 25GE SFP28

Dimensions, weight*
- 44 x 210 x 430 mm (H x W x D)
- 6.0 kg / 13.2 lbs.

Security
- TPM 1.2/ 2.0

*) Preliminary information; **) Server node with typical commodity

Ultra-small footprint
Open real-time cloud infrastructure SW – for high performance requirements
Time-to-market advantage with latest stable OpenStack for continuous delivery

Performance
- Real-time kernel and hypervisor
- Networking acceleration

Availability
- Carrier grade high availability incl. auto recovery
- Sub-second reaction time in the case of failures

Scalability
- From single node to multi-rack clouds
- Single pane of glass operability
AirFrame Data center: Scalable compute from central to the edge

**Deployability at the far edge**

- Fits to existing radio sites
- Scales depending on processing capacity needs
- Bringing OCP benefits to edge deployments

AirFrame open edge server

**Scalability**

- **OpenRack v2 compliant high density server and storage systems (21”)**

- **Rackmount server and storage systems for standard 19” racks**

- **AirFrame OpenRack**
  Open Compute Project (OCP) compliant hardware for larger datacenter capacities

- **AirFrame rackmount**
  Fit for various datacenter use cases with flexible scalability
## AirFrame products - technical positioning

<table>
<thead>
<tr>
<th></th>
<th>OpenEdge server</th>
<th>Open rack design</th>
<th>Rackmount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Form factor</strong></td>
<td>3U - 19” - any 600 rack</td>
<td>20U - Open rack design</td>
<td>1U/2U -19” - deep racks</td>
</tr>
<tr>
<td><strong>Scalability</strong></td>
<td>1 CPU up to 50 CPU</td>
<td>ca.20 CPUs...Hyperscale DC</td>
<td>Case dependent</td>
</tr>
<tr>
<td><strong>CPU architecture</strong></td>
<td>Intel® Xeon® SP 1-socket</td>
<td>Intel® Xeon® SP 2-socket</td>
<td>Intel® Xeon® SP 2-socket</td>
</tr>
<tr>
<td><strong>Connectivity</strong></td>
<td>Upto 4x 25GE per server</td>
<td>Upto 4x 25GE per server</td>
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</tr>
<tr>
<td><strong>Storage</strong></td>
<td>In-server</td>
<td>Centralized; In-server</td>
<td>Variety of options</td>
</tr>
<tr>
<td><strong>Power design</strong></td>
<td>Efficiency in wide scalability</td>
<td>PUE optimized</td>
<td>Server centric</td>
</tr>
<tr>
<td><strong>Environmental design</strong></td>
<td>NEBS, Extended temp range</td>
<td>NEBS</td>
<td>NEBS</td>
</tr>
<tr>
<td><strong>Open design, OCP compatibility</strong></td>
<td>OCP principles applied</td>
<td>Full OCP</td>
<td></td>
</tr>
<tr>
<td><strong>Front serviceability only</strong></td>
<td>Full</td>
<td>Full</td>
<td></td>
</tr>
<tr>
<td><strong>Acceleration</strong></td>
<td>Radio / other</td>
<td></td>
<td></td>
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### Summary

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<tr>
<th>Designed for low latency and high throughput</th>
<th>Infrastructure SW built for real-time applications</th>
<th>Highest performance with acceleration for demanding workloads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on OCP design principles</td>
<td>Superior serviceability</td>
<td>Works in harsh environments (NEBS, seismic)</td>
</tr>
</tbody>
</table>
a) 4G or WiFi
slow

b) UE-A
fast

Wifi router for local access to MEC VIP running on Nokia Real-Time Cloud Infrastructure

Internet

Nokia Real-Time Cloud Infrastructure

- Data & Management SW
- Compute+Storage
- Compute+Storage
- Power and HW mgmt
- Controller+Compute
- Controller+Compute
- Controller+Compute

ECA