openEDGE ecosystem opportunities

Mike Moore
Nokia
Nokia’s Status and Contributions to OCP

- Nokia is a Platinum Member of OCP
- Nokia hold 2 project chairs in OCP (Telco and openEDGE)
- At the last OCP Summit, Nokia presented in 6 sessions and had 2 live demos running in 2 different locations
- Nokia’s contributions to the OCP are
  - Contributing the openEDGE Server as an Inspired Design: [http://files.opencompute.org/oc/public.php?service=files&t=ada3b7aabae6f81ae73c00a30ea6fa5a&download](http://files.opencompute.org/oc/public.php?service=files&t=ada3b7aabae6f81ae73c00a30ea6fa5a&download)
  - Contributed Nokia’s ORv2 Telco optimized Server Design: [https://www.opencompute.org/documents/nokia-telco-enhancedopenrack-server-specification](https://www.opencompute.org/documents/nokia-telco-enhancedopenrack-server-specification)
  - Contributed Nokia’s ORv2 Seismic Rack Kit and Certification: [http://files.opencompute.org/oc/public.php?service=files&t=69e0a59035da52ca5bfd56376607df16](http://files.opencompute.org/oc/public.php?service=files&t=69e0a59035da52ca5bfd56376607df16)
Overview of openEDGE Chassis

First x86 solution designed to fully support edge / far-edge cloud deployments

**ARCHITECTURE**
- 19" compatible: fits in any 600mm cabinet
- Compact form factor: 3RU 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

**DIMENSIONS**
- 130.6 (3RU) x 440 x 430 mm (H x W x D)
- Ca. 12.0 kg / 26.5 lbs. (Chassis with PSU’s and RMC)

**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)

**Environmental**
- Full NEBS compliancy, seismic zone 4 [GR-63-Core, GR-1089-Core]
- Extended operating temperature range: -5°C..+45°C [ETSI EN300 019-1-3 Class 3.2]

**COMMODITY**
- support on server sleds
- Memories, disks and NICs from common AirFrame portfolio
Network enhancements use cases at the edge
Starting points to incrementally realize the target over time

RAN Cloudification & Evolution to 5G

Latency, bandwidth, and security critical use cases (IoT, MEC)

Fixed Access Network Transformation

Public/Private Cloud and open ecosystem for innovation moving to Edge

Virtualized & distributed IP Edge

BNG vEPC 5GCN VAS
## openEDGE Ecosystem Status

### openEDGE product evolution

- **April** openEDGE was announced at NFV World Congress
- Planning began for openEDGE contribution to OCP and sub-committee formation

- **Working Demo shown at Amsterdam Summit**
- **Draft Specifications Released**
- **Commercial Availability Achieved**

- **First Commercial Contract**
- **F2F Design Workshop held in Mountain View**
- **V1.2 of the Chassis Specification granted as “OCP Accepted”**

- Wiwynn announces intent to product openEDGE Chassis and Server Blades

- **ARM-based sled under development**
- **Battery Backup Unit under development**
- **2nd HW Vendor announces plans to adopt openEDGE Chassis/Sleds**

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<thead>
<tr>
<th>2-3Q18</th>
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Nokia AirFrame 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
  - 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
Nokia AirFrame 1U and 2U Server Sled Contributions

Key Specifications

- 1U/2U, half width
- Power consumption
  - 400W (1U)
  - 700W (2U)
- 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 (1U)
  - 1 x PCIe x16, FHFL, dual-wide, 300 W max (2U)
  - 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 (2U)
  - 2 x M.2 SSD, SATA/NVMe, 2280/22110
WIWYNN EP100 Platform

The Platform Is Based on the OpenEDGE Project with OCP Ingredients

- 3U Short-depth Chassis with Flexible Nodes for Far Edge Environment
- OpenRMC Development Platform for System Management
- Host COTS Sleds for Various 5G Applications
- Pooled Power Supply for Energy Efficiency & Utilization
- Will be Available with Software Development Kits
### WIWYNN EP100 Platform

The Platform Is Based on the OpenEDGE Project with OCP Ingredients

<table>
<thead>
<tr>
<th>Spec</th>
<th>1U Half-width, 2U Half-width, 1U Full-width for Various Computing Power. New Features Added-on, such as Switch, Storage, etc.</th>
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<tbody>
<tr>
<td>Flexible Node</td>
<td>Power, Storage Bay, OCP Mezz 3.0 NIC, PCIe Card, USB, Debug</td>
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<tr>
<td>Front I/O Interface</td>
<td>Fit to both AC-in and DC-in power supply systems</td>
</tr>
<tr>
<td>Power Supply</td>
<td>3U 19” Rack Mount System; 440 x 430 x 130.6 (mm)</td>
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</table>
ASUS 3U5N Spec & Chassis Dimension

Model | 3U5N: Per Sled /Node
--- | ---
Processor | Intel® Xeon® D processor Scalable family (up to 110W)
Memory Type | 8 x DIMM DDR4 2666 RDIMM/LRDIMM (2 DIMM per Channel)
Memory Size | 4GB, 8GB, 16GB, 32GB (RDIMM) 32GB, 64GB, 128GB (LRDIMM)
Expansion Slot (Available) | 1 x PCI-E Gen3 x16 (HH,HL) 1 x OCP 2.0 Gen3 x 8
Front I/O | 1 x USB 2.0 port 4 x 10 GbE SFP+ LAN ports 2 x SFP+ LAN ports via OCP 2.0 add on card
Networking | Intel® X722 + Mgmt Lan (via RMC 10G SFP+)
HDD/ ODD Bay/ M.2 | Front: 2 x 2.5” 15mm HDD (SATA, SAS, NVMe) Onboard: 2 x M.2 (Up to 22110, SATA & PCIe)
PSU | 1+1 1600W -48VDC, or 2200W AC 80+ Platinum Redundant CRPS
Server Management | ASMB8-iKVM Onboard
Dimension | 130.5mm(H) x 440mm(W) x 430mm(D); standard 3RU short.
Weight (Full System) | 20KG (TBD)
ASUS OpenEdge Compute Sled

- AirMax VS2 for signal
- HCI for power
- 2x M.2 sticks
- SATA / NVME Hybrid
- 4 high efficiency counter-rotating fans
- 8x DDR-4 RDIMM
- DDR-4/2400, up to 512GB max
- Xeon D 2100 series (Skylake)
- Default SKUs (options between):
  - D-2123IT: 4-Cores / 2.2GHz / 60W / no QAT
  - D-2146NT: 8-Cores / 2.3GHz / 80W / with QAT
  - D-2187NT: 16-Cores / 2.0GHz / 110W / with QAT
- Low Profile Full length PCI-e G3N 3x16 Slot
  - Designed for single width Accelerators such as nVidia’s T4 GPU
- 2x 15mm 2.5” U.2 SATA / NVME Hybrid
- 4x 10Gb SFP+ from CPU
- OCP 2.0 mezzanine (options include 2x25Gb QSFP)
- 2200W AC 1+1
- 1600W -48V DC 1+1
Marvell Open Edge ARM Server Board Detail

<table>
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<tr>
<th>Feature</th>
<th>Specification</th>
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<tr>
<td>Form factor</td>
<td>Proprietary (407.95 x 205.8 mm)</td>
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<tr>
<td>Processor</td>
<td>Marvell ThunderX2 CPU with up to 32 cores, 128 threads</td>
</tr>
<tr>
<td>Support</td>
<td>2.2GHz in nominal mode, 2.5GHz in Turbo mode.</td>
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<tr>
<td>Chipset</td>
<td>SoC</td>
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<tr>
<td>Memory</td>
<td>8 x DIMM slots support/8 channel</td>
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<td>DDR4 2666 MT/s @ R-DIMM with 1DPC configuration</td>
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<tr>
<td>LAN</td>
<td>1G Base-T to backplane</td>
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<td>1 x Management LAN 10/100/1G</td>
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<tr>
<td>VGA / VRAM</td>
<td>Integrated in BMC</td>
</tr>
<tr>
<td>BMC</td>
<td>ASPEED AST2500</td>
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<tr>
<td>Expansion Slot</td>
<td>1 x PCIe x16 (@Gen 3 x16)</td>
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<td>1x OCP mezzanine PCIe (@Gen 3 x16)(TYPE 1 P1,P2,P3,P4 NCSI support)</td>
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<tr>
<td>Storage</td>
<td>2 x SATA(6Gb/s)</td>
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<td>Optional PCIe M.2 on riser</td>
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<tr>
<td>Rear IO Connector</td>
<td>2 x USB3.0</td>
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<td>1 x ID Button, System RST BTN; PWR BTN,</td>
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OnF Connect
Inventus Power openEDGE BBU proposal

- Open Edge 1U Battery Backup sled - Address #1
  - 1U High x 215mm W x 427.5mm D
- Hot swappable and integrated charging from 12V bus
- Power / Current / Voltage
  - Power: 1600W continuous (400W per sled, 4 sleds supported)
  - Current: 133A continuous (max)
  - Voltage: 12V regulated output – direct to backplane
- 3-5 minutes of continuous power output (all 4 sleds powered)
- 5+ Year life (Derating curve specified)
- -5 to 45C Nominal Operation Temperature Range
- Premium Tier 1 power cells – designed for BBU application
- Communication / Fuel Gauging / Monitoring built in
  - SMBus (SDA, SCL) / Digital and Analog Pins: ALERT, PRSNT and PD (Physical Address)
- Future Product Extension – Expanded Temperature Range
Flex openEDGE 2000W AC and DC Power Supplies

- FlexPower is introducing a pair of AC and DC input, 2000W power supplies for the OCP Open Edge Server chassis

- These high efficiency power supplies will support 1+1 redundant, hot-plug operation and include versions for both airflow directions

- Chassis Dimensions 40mm x 73.5mm x 265mm (H x W x D)
- 12.0V Main Output Current Rating
  - 167A (2000W)
- 12.0V Standby Current Rating
  - 3.5A (42W)
- Ripple & Noise
  - 120mV with 20MHz bandwidth limiting
- Operating Temperature Range
  - Minimum operating ambient: -5°C
  - Maximum operating ambient: +55°C for full load (Normal airflow)
  - +40°C for full load (Reverse airflow)
  - Non-operating ambient: -40°C to +70°C
- Humidity
  - Up to 95% relative humidity (non-condensing)

AC input model
Samples available now
Production Q2 2020

- Input Voltage - 90-264Vac (47-63Hz)
- Input Connector – C14

DC input model
Samples available Q4 2019
Production Q3 2020

- Input Voltage - 40-72Vdc
- Input Connector – Amphenol C10-753786-000
Summary

- openEDGE is a platform that is designed for high performance Edge/Far Edge applications
  - VRAN
  - MEC
  - IoT/URLLC
- Open ecosystem encourages OCP community involvement to create additional deployment options and minimize vendor lock-in
- Design being released to the community and available for download: https://www.opencompute.org/wiki/Telcos/openEDGE
- Looking to expand the openEDGE ecosystem with additional contributions from vendors and customers
Thank You

Follow Up Links:
https://www.opencompute.org/