

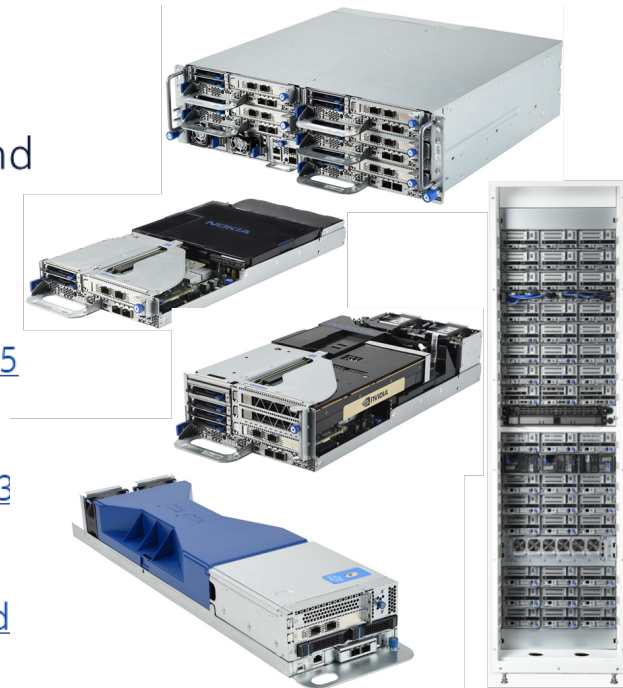


openEDGE ecosystem opportunities

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
 - Contributed the openEDGE Chassis as an Accepted Design:
<http://files.opencompute.org/oc/public.php?service=files&t=abb5e6bb618abaa2f194aab9a1ebe922&download>
 - Contributing the openEDGE Server as an Inspired Design:
<http://files.opencompute.org/oc/public.php?service=files&t=ada3b7aabee6f81ae73c00a30ea6fa5a&download>
 - Contributed Nokia's ORv2 Telco optimized Server Design:
<https://www.opencompute.org/documents/nokia-telco-enhanced-openrack-server-specification>
 - Contributed Nokia's ORv2 Seismic Rack Kit and Certification:
<http://files.opencompute.org/oc/public.php?service=files&t=69e0a59035da52ca5bfd56376607df16>



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Overview of openEDGE Chassis

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

Ultra-small footprint



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

Environmental

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

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

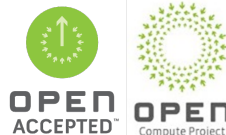
- 2N redundant AC & DC power supplies
- Power fed to sleds through backplane
- 400W per 1U sled

MANAGEMENT

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

COMMODITY

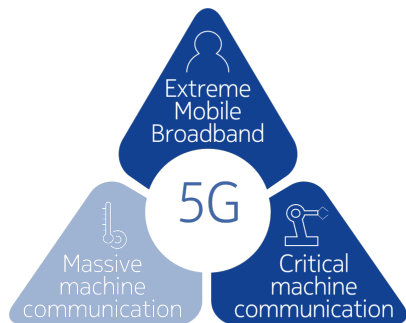
- support on server sleds
- Memories, disks and NICs from common AirFrame portfolio



Network enhancements use cases at the edge

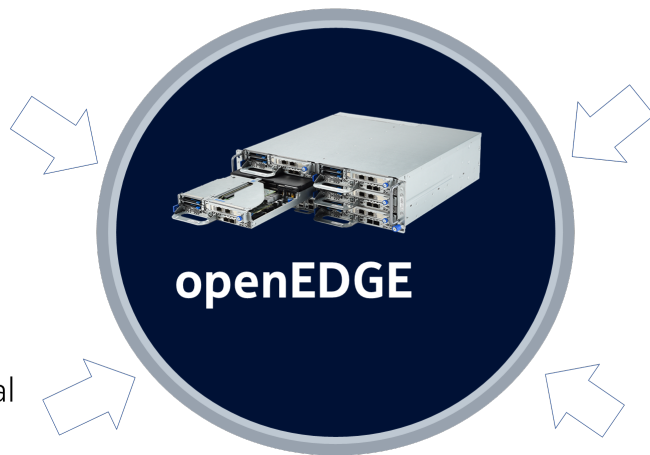
Starting points to incrementally realize the target over time

RAN Cloudification & Evolution to 5G



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

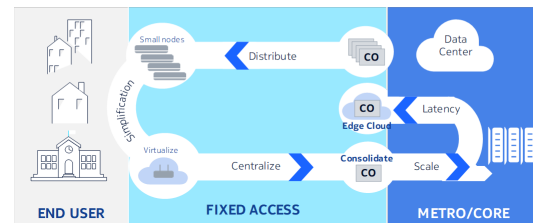
Local content	Local data routing	Local data processing	Local network functions
Live VR with 4K video and full stereo audio	100x faster delivery of real time video	Interactive AR-based wayfinding	Local (Temporary) eMBMS for high density locations
8x acceleration of cloud-based enterprise apps	Assured end-to-end latency < 20ms	80-90% elimination of upstream IoT data	Full survivability based on local EPC components



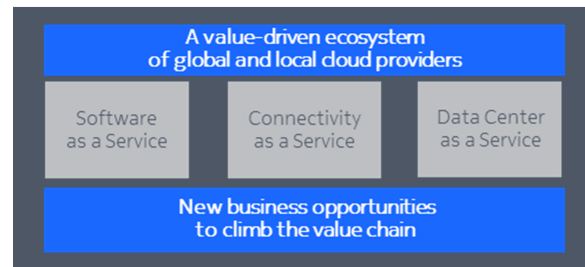
Virtualized & distributed IP Edge



Fixed Access Network Transformation



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



openEDGE Ecosystem Status

openEDGE product evolution

<ul style="list-style-type: none">• April openEDGE was announced at NFV World Congress• Planning began for openEDGE contribution to OCP and sub-committee formation	<ul style="list-style-type: none">• Working Demo shown at Amsterdam Summit• Draft Specifications Released• Commercial Availability Achieved	<ul style="list-style-type: none">• First Commercial Contract• F2F Design Workshop held in Mountain View• V1.2 of the Chassis Specification granted as “OCP Accepted”	<ul style="list-style-type: none">• Wiwynn announces intent to product openEDGE Chassis and Server Blades	<ul style="list-style-type: none">• ARM-based sled under development• Battery Backup Unit under development• 2nd HW Vendor announces plans to adopt openEDGE Chassis/Sleds
2-3Q18	4Q18	1Q19	2Q19	3Q19

openEDGE Planned Contributors



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ACCEPTED™ INSPIRED™

NOKIA

arm



inVENTUS
POWER



flex™

ASUS®



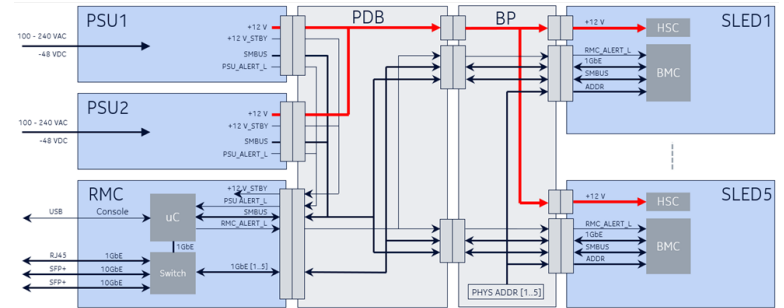
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Nokia AirFrame Chassis Overview

- 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

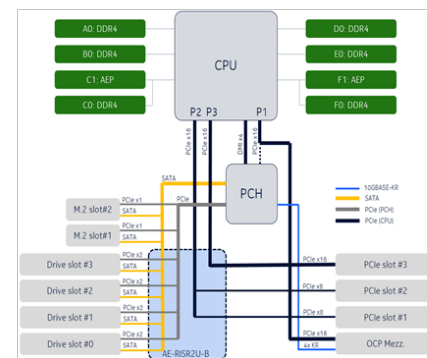
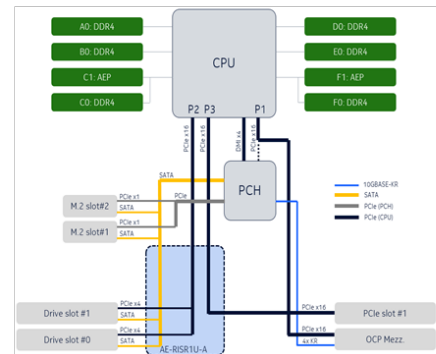
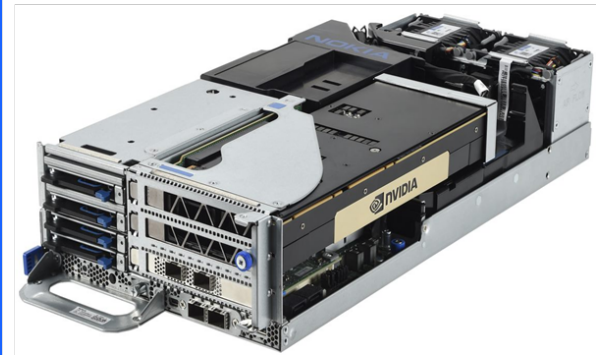


Nokia AirFrame 1U and 2U Server Sled Contributions



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

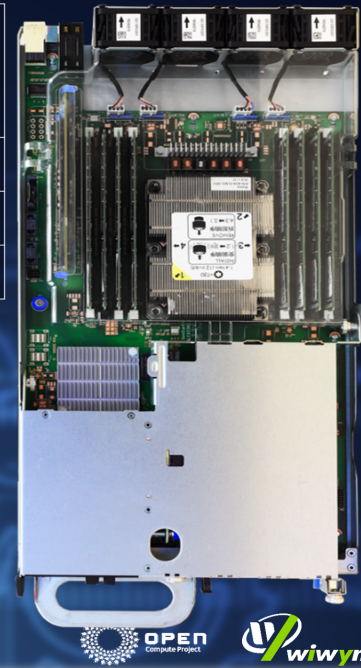


WIWYNN EP100 Platform

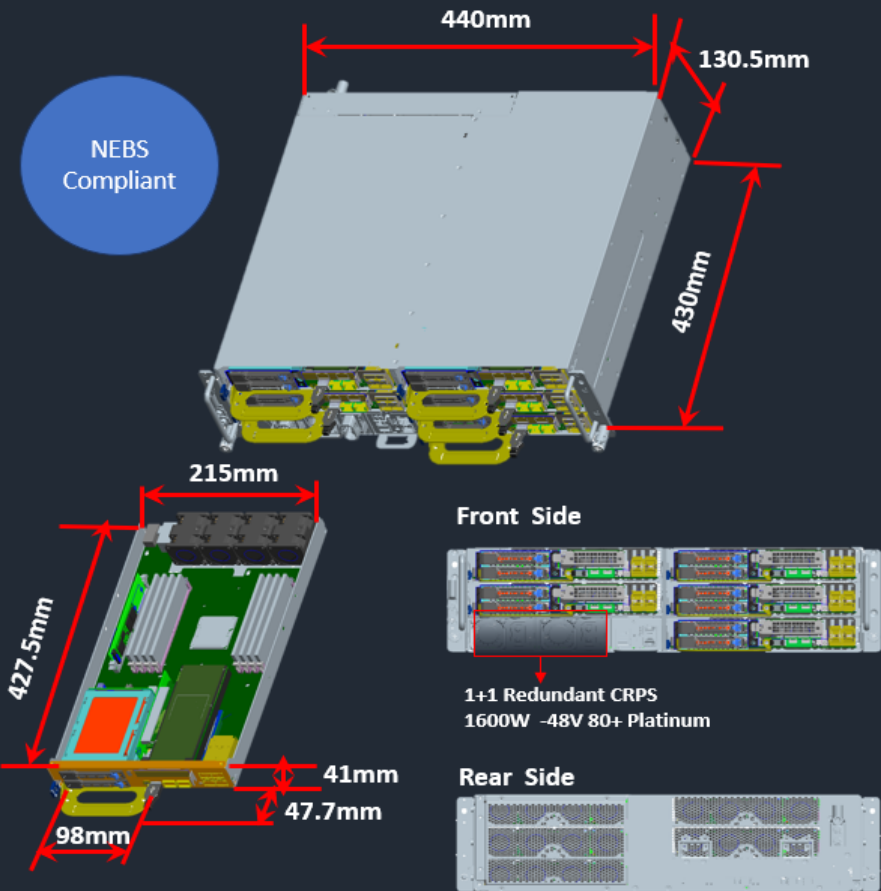
The Platform Is Based on the OpenEDGE Project with OCP Ingredients

SPEC

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

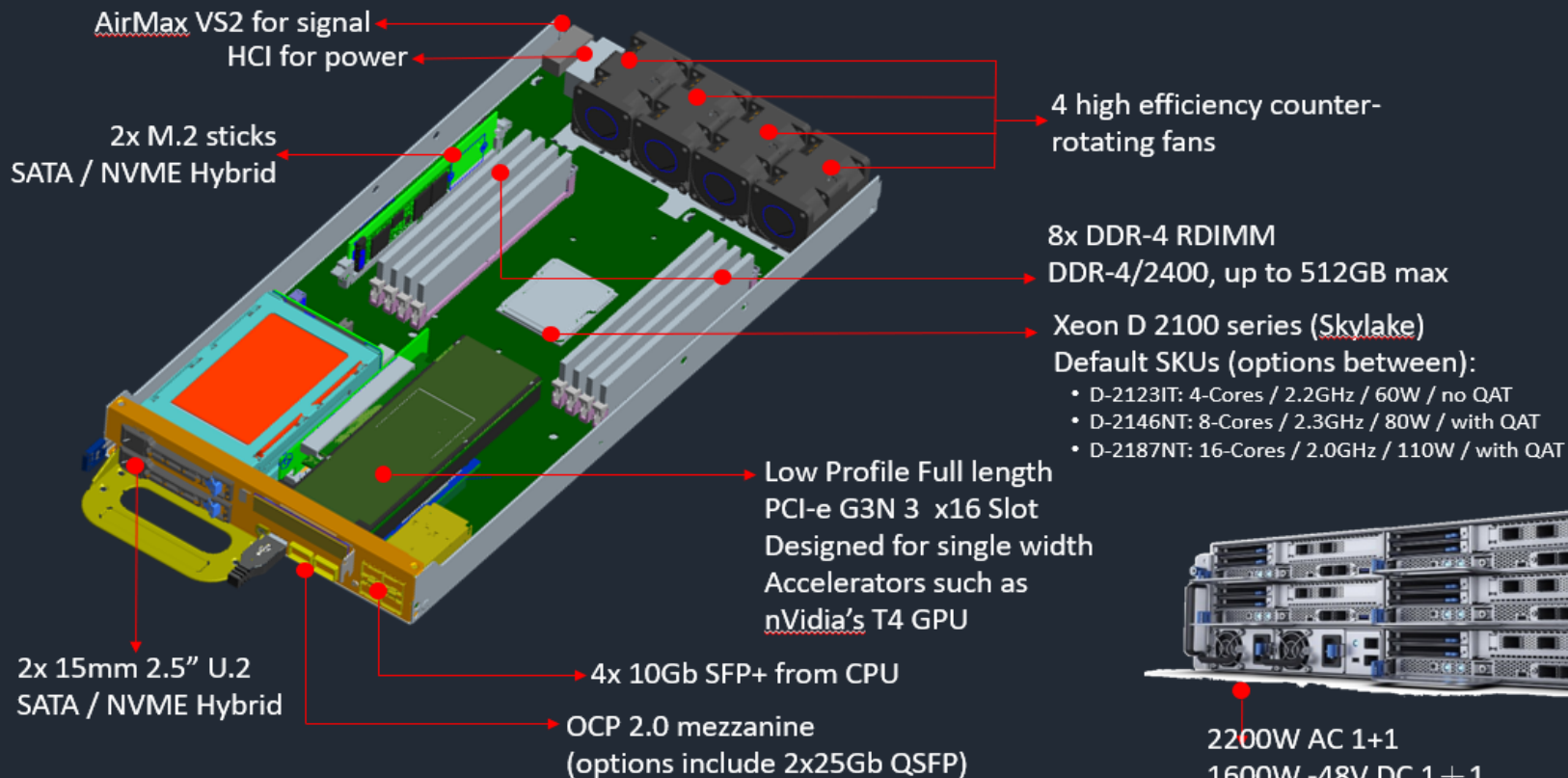


ASUS 3U5N Spec & Chassis Dimension

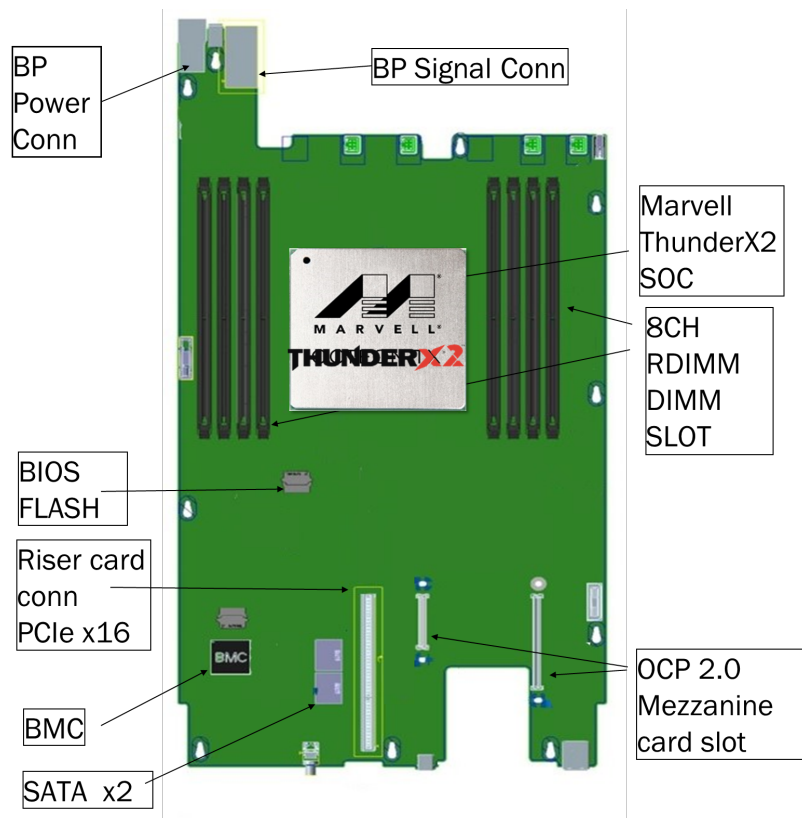


Model	3U5N: Per Sled /Node
Processor	Intel® Xeon® D processor Scalable family(up to 110W)
Memory Type	8 x DIMM DDR4 2666 RDIMM/LRDIMM (2 DIMM per Channel)
Memory Size	4GB, 8GB, 16GB, 32GB (RDIMM) 32GB, 64GB, 128GB (LRDIMM)
Expansion Slot (Available)	1 x PCI-E Gen3 x16 (HH,HL) 1 x OCP 2.0 Gen3 x 8
Front 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	ASMB9-iKVM Onboard
Dimension (W x H x D)	130.5mm(H) x 440mm(W) x 430mm(D); standard 3RU short.
Weight (Full System)	20KG (TBD)

ASUS OpenEdge Compute Sled



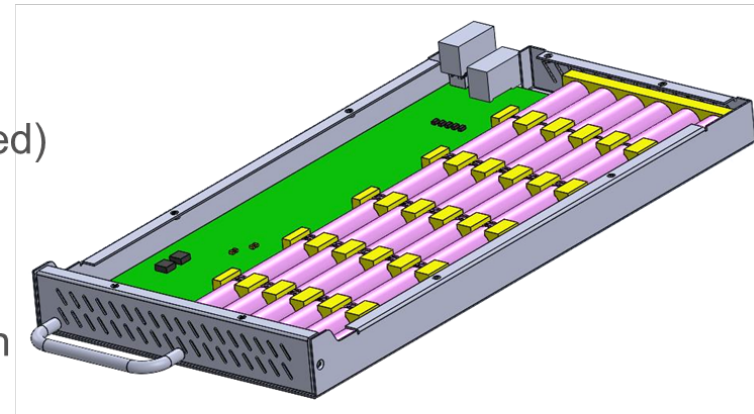
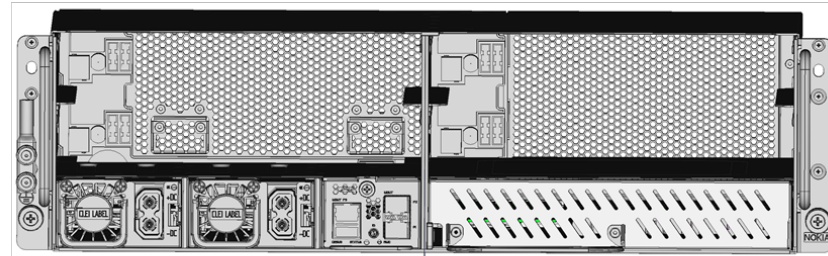
Marvell Open Edge ARM Server Board Detail



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

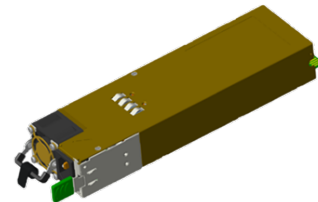
Inventus Power openEDGE BBU proposal

- 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



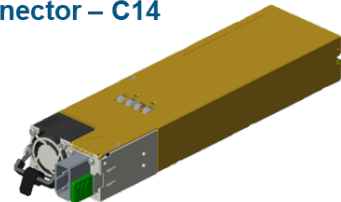
Flex openEDGE 2000W AC and DC Power Supplies

- 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:

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