OCP Data plane Acceleration for Edge Cloud

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

Datacenter portfolio for all deployments from Far Edge to HyperScale

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<th>Edge data centers</th>
<th>Central data centers</th>
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<td>Open Edge</td>
<td>Compact OpenRack or 19” Rack-mount or Open Edge</td>
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<td>Sites</td>
<td>100-1000’s</td>
<td>10-100’s</td>
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<td>Footprint</td>
<td>Smallest</td>
<td>Small</td>
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<td>Power budget</td>
<td>Low</td>
<td>Medium</td>
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<tr>
<td>Distance</td>
<td>20-40 km (&lt;1ms RTT)</td>
<td>200-350 km (4-10 ms RTT)</td>
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<td>Far edge</td>
<td>Aggregated edge</td>
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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: 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)

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 to +45C [ETSI EN300 019-1-3 Class 3.2]
AirFrame open edge server – 1U & 2U Sled
Intel Xeon® SP next gen

Processor (single socket)
- Intel® Xeon® SP, up to 24 cores, 2.4GHz

Chipset
- Intel® C621/C627

Thermal
- Max. CPU TDP support: 205W/1U – 250W/2U
- Multiple redundant dual rotor fans per node; airflow from front to rear/rear to front

Memory
- DIMM slots: 6 typical (8 max)
- DIMM type: 16GB / 32GB / 64GB - DDR4 RDIMM 2933 MHz

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

Storage
- 2x 2.5” Hot-plug bays for SATA/NVMe devices
- 9.5/7mm
- 2x internal M.2 2280 or 22110 devices
- 2x 2.5” Hot-plug bays for SATA/NVMe drives 15mm

Security
- TPM 1.2/2.0

Dimensions, weight*
- 41(1U)/83(2U) x 215x 427mm (H x W x D)
- 3.4 kg / 7.5 lbs.** (1U) 4.7 kg / 10.4 lbs.** (2U)

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

Ultra-small footprint

OPEN INSPIRED™

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Installation Examples
ConnectX-5: Best 10/25/40/50/100G Adapter

- World Class Connectivity and Performance
  - OCP 2.0 & 3.0 Compliant
  - 10, 25, 40, 50, and 100G Ethernet
  - World’s First PCIe Gen4 Adapter
  - 16 lanes of PCIe Gen3 / Gen4, PCIe switch

- Telco/Edge Cloud Features
  - Advanced OVS Offload (ASAP²) and fastest DPDK
  - Programmable packet switching in hardware
  - Hairpin switching, Header rewrite
  - Flexible SRIOV
  - VXLAN/NVGRE/Geneve overlay with encap/decap
  - RoCE over VXLAN

- Fastest Data Path for Cloud Native and NFV
  - Machine Learning, AI, and Big Data offloads
  - Storage offloads, including RDMA and NVMe-oF
Common Operations in Networking

- Most network functions share some data-path operations
  - Packet classification (into flows)
  - Action based on the classification result
- Mellanox NIC can offload both the classification and actions in hardware
Mellanox OVS Offload: Accelerated Switching and Packet Processing (ASAP²)
- Open vSwitch as Standard SDN Control Plane
- OVS data-plane offload to NIC-embedded Switch (eSwitch) – SR-IOV Data Path

Best of Both Worlds: SDN Programmability with Blazing Fast Switching Performance
OVS over DPDK vs. OVS Offload – ConnectX-5

Mellanox OVS Offload (ASAP\textsuperscript{2}) Benefits

- **20X** higher performance than vanilla OVS
- **8-10X** better performance than OVS over DPDK
- **Line rate performance** at 25/40/50/100Gbps

Open Source Enabled – No Vendor Lock-in

- **Adopted broadly** by Linux community & industry
- **Full Community Support** (OVS, Linux, OpenStack)
- **Ecosystem Support** (Nuage/Nokia, Red Hat, ODL, etc.)

**Highest VXLAN throughput & packet rate**
**100% CapEx Savings with Zero CPU Utilization**

- High packet rate with zero CPU utilization
- Zero CPU load!
- 2 Cores @ 100% Load
- 66 MPPS
- 7.6 MPPS

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OCP SUMMIT

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Nuage Networks Virtualized Services Platform (VSP)
SDN automating the Telco Cloud deployments leveraging VXLAN virtual networks
The Need for Telco Cloud NFV Automation

VNFs Have Multiple Networking And Security Requirements

New network service request

00:01
VNF request completed in minutes

NFVI compute and storage
Virtualized, instantly available, easily consumable

Network configuration

Help desk change control

LAN (VLAN-ECMP-BGP-BFD) configuration

Stitching to WAN

VLAN address

IP address

Project coordinator

Security/ QA team

Firewall configuration

The network
Cumbersome, constrained, manual processes, inefficient

Open. Together.
SDN accelerates the pace of networking
Automating Deployment Requirements

New network service request

00:01
VNF request completed in
minutes

NFVI management

Auto-instantiation

SDN controller

Auto-configuration

00:01
Templates

NFV use cases
- Inter-VNFC fabric
- VNF to VNF
- VNF to PNF
- OOB management

NFVI compute and storage
Virtualized, instantly available,
easily consumable

The network
automated, agile and
programmable
Accelerated Dataplane VXLAN Performance

OVS Flows are programmed via tc-flower interface by Nuage Networks VSP (SDN)

**Results:**
- Zero CPU usage for VXLAN tunnels
- Zero packet loss in forwarding app
- T-Rex and TestPMD run in VMs
- 2 active tunneling flows

**System Specs:**
- Mellanox ConnectX-5 NIC (100Gbps)
- RHEL 7.5 Host and Guest
- Mellanox SN2100 Fabric Switch
OVS Offload Availability Status

Open Source Components:
✓ Kernel code is upstream: Kernel 4.8+
✓ OVS code is upstream: OVS 2.8+
✓ OpenStack Release: Queens

Commercial Products:
✓ Mellanox: ConnectX-4 and ConnectX-5
✓ Red Hat: RHEL 7.5 and RHOSP 13 (Tech Preview)
✓ Nuage Networks: VSP 5.4.1
Call to Action

This Project is open to the public and we welcome all those who would like to be involved.

Where to buy:  https://www.opencompute.org/products

Project Wiki with latest specification:  
https://www.opencompute.org/wiki/Telcos/openEDGE

Mailing list:  https://ocp-all.groups.io/g/OCP-Open-Edge

See the Live Demo In Nokia Booth!
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