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Accelerating Communication Services™

Telecom Open Rack Concept

OCP Telco WG

May 23, 2016

Concept & Philosophy

TD MP SC EP PS

- **Leverage current good ideas from Open Compute Project as a base model**

- **Update and optimize for telecom-oriented central offices, data centers & equipment practices**

- **Do not constrain with rigid backwards compatibility, but allow easy adaptation of existing COTS elements (OCP-contributed and others)**

- **Use agile-style approach to create deployable system instantiations and iterate quickly**

- **Collaborate tightly with customers all along the way**

- **Work closely with interested partners**

- **Create something useful, share, evolve, and expand**

Broad Requirements

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- **Physical**
  - Suitable for CO retrofit and new telco data center environments with standard and readily available dimensions
  - 19" rack width with 450mm equipment aperture
  - Standard "RU" spacing
  - 1000 to 1200mm cabinet depth, supporting GR-3160 floor spacing dimensions

- **Content/workload**
  - Heterogeneous compute and storage servers
  - Range of brawny and wimpy processing elements and storage technologies
  - Half and full rack width sleds, xRU high (2U typical)
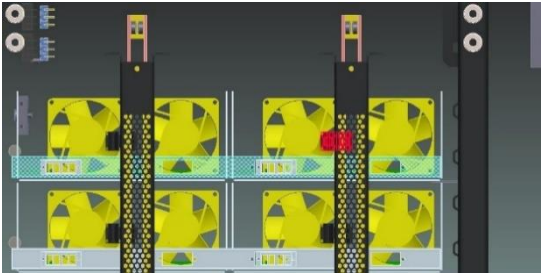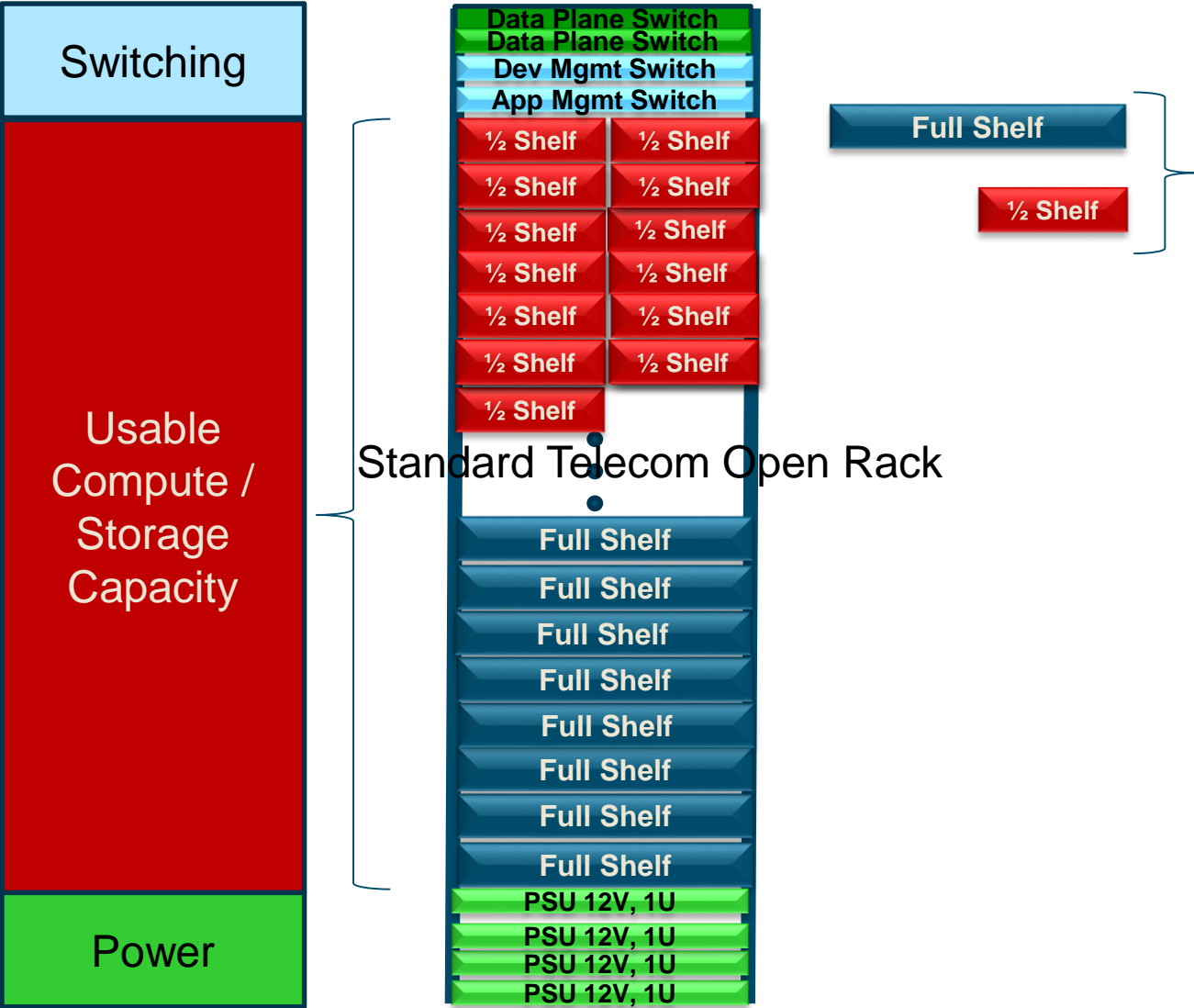
- **Management**
  - Ethernet based OOB management network connecting all nodes via a TOR management switch
  - Optional rack level platform manager

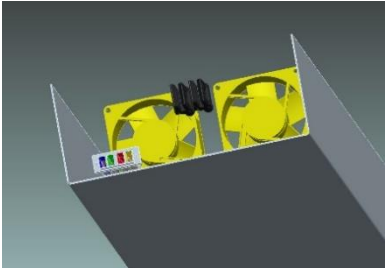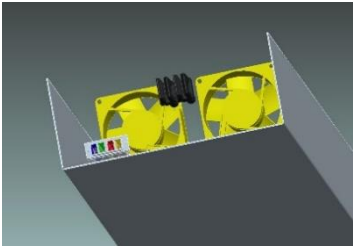- **Networking/Interconnect**
  - One or more Ethernet TOR networking switches for I/O aggregation to nodes
  - Fiber cables, cabled from the rear, blind-mate with flexible interconnect mapping. Front cabled solutions also acceptable.
  - Environment & Power Seismic & acoustic CO environmental requirements applicable
  - Safety and other certification standards also applicable
  - NEBS optional (L1/L3)
  - AC (200-250V) or DC (-48V) power to the rack.
  - Wide range of power consumption per rack – scalability required (from 5 to 35kW); typical deployments at 7-15kW.
  - Dual 12V (nominal) DC power bus bar for nodes; other options possible in future

Telecom Open Rack Block Diagram

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Switching

Usable Compute / Storage Capacity

Power

Data Plane Switch
Data Plane Switch
Dev Mgmt Switch
App Mgmt Switch

½ Shelf	½ Shelf
½ Shelf	½ Shelf
½ Shelf	½ Shelf
½ Shelf	½ Shelf
½ Shelf	½ Shelf
½ Shelf	½ Shelf
½ Shelf	

Full Shelf

½ Shelf

Standard Telecom Open Rack

Full Shelf
Full Shelf
Full Shelf
Full Shelf
Full Shelf
Full Shelf
Full Shelf
Full Shelf
PSU 12V, 1U
PSU 12V, 1U
PSU 12V, 1U
PSU 12V, 1U

Note: Note not drawn to scale

Vertical 12VDC bus bar in frame mates with power connector located on sled

4 x optical fiber ports via blind mate rear connector to sled

4

Example Optical Connections to Sleds

Example System Configuration

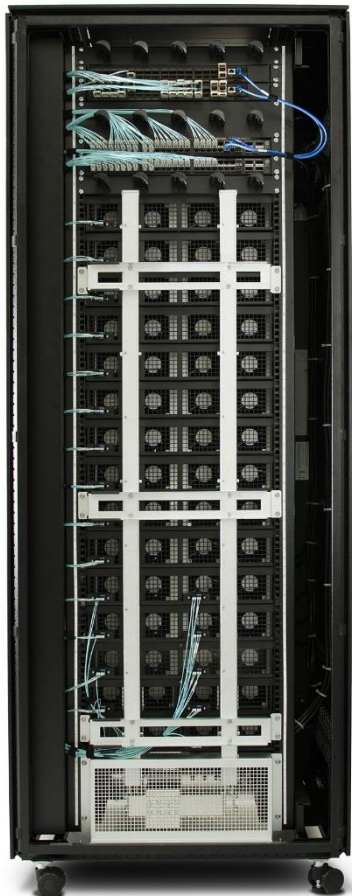| Component Description		Description
Rack Standard		19", 42U Telco Rack with vertical DC power bus-bars
Data-plane Switch		1U switch, 32x 40Gb or 96x 10Gb + 8x 40Gb
Management-plane Switch		1U switch, 48x 1Gb + 2x 10g
Compute or Storage	Server PBA	Dual socket Xeon server
	Server	10GbE NIC Dual port, 10Gb, 10GBASE-SR
	Server	Server 1Gb NIC Dual port, 1Gb, 1000BASE-SR, 1 or both connected to server BMC
	CPU	2 or more Xeon processors
	RAM	256GB (16 x 16GB)
	Storage	boot & app Boot SSD, 1 or more application SSDs
	Storage Bulk	2 or more HDD with high-capacity controller

Designed and Integrated Solution

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Optimized Rack → Industry Leading Density → Integrated and Supported Open Source Software → DCEngine

Modular Sled Architecture

Up to 152 Xeon Processor

+ ▮ **+** ▮ **= DCEngine**

Up to 3 PB Storage

Rocket
Core OS
openstack CLOUD SOFTWARE
ꓚNOS Open Network Operating System
ubuntu

Current Collaboration & Ecosystem

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- ## Verizon
  - Provided guidance with early engagement and overall feature/functional requirement

- ## Intel
  - IA compute technology & servers
  - Intel ® Rack Scale Architecture (management SW)

- ## ON.Lab
  - Integration of open and collaborative CORD (Central Office Re-architected as a Datacenter) projects

- ## Pentair
  - Cabinet, rack, mechanicals, and adaptations

- ## Cavium
  - ARM-based compute server technology

Example Future Integration in Half-Width Geometry
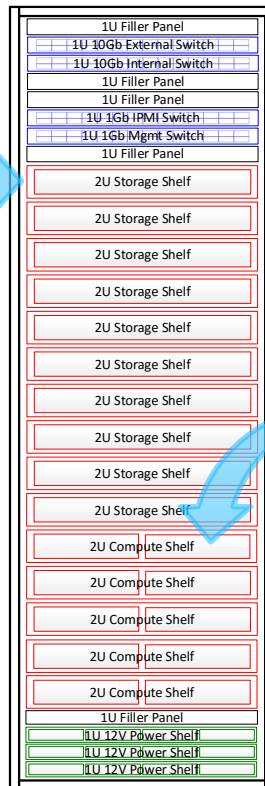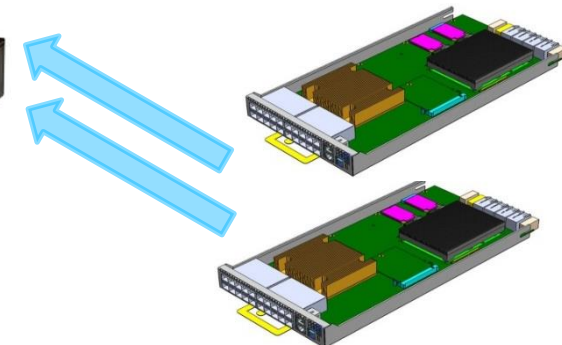
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- **ADLink: MICA Platform**
  - Optimized for smaller nodes for Mobile Edge Computing applications
  - 2-4U enclosure, 19" wide, 600-900mm deep, AC or DC power → easily accommodated in full rack position
  - Cabled Front I/O → remain as-is (independent), or re-oriented for rear connection to TOR aggregation switches
  - Management stand alone or subtended to rack manager

As a complete 2U 19" Sub-System

Or as server PCBAs within a Sled

1U Filler Panel
1U 10Gb External Switch
1U 10Gb Internal Switch
1U Filler Panel
1U Filler Panel
1U 1Gb IPMI Switch
1U 1Gb Mgmt Switch
1U Filler Panel
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Storage Shelf
2U Compute Shelf
2U Compute Shelf
2U Compute Shelf
2U Compute Shelf
2U Compute Shelf
1U Filler Panel
1U 12V Power Shelf
1U 12V Power Shelf
1U 12V Power Shelf

Next Steps

TD MP SC EP PS

- **Specification complete, contribution in progress**

- **Contribute concept basically "as is", with appropriate modularity for future derivations and some genericizing to broaden appeal and usability**

- **Collaborate with Telco-WG members and others to define architectural evolution and inclusion of alternate/compatible designs**

- **Continue to evolve Radisys products and contribute key innovations back to the OCP community**

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