Open Community Hardware Designs Used with ONF Reference Designs

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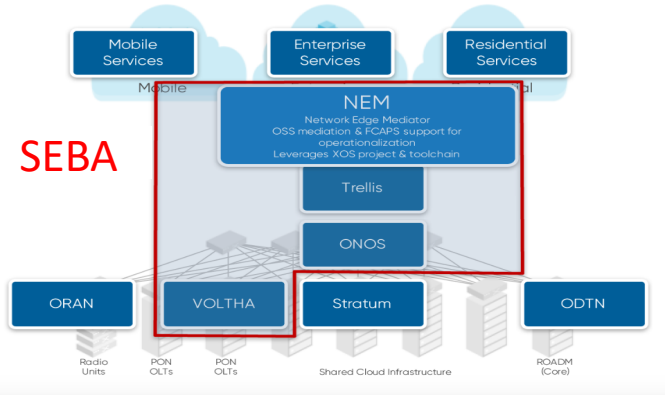
What are “Open” hardware designs?

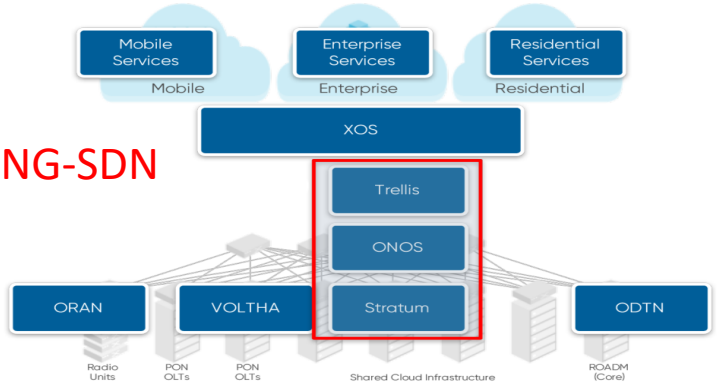
- Open Hardware designs are contributions to an Open Source community
  - Open Compute
  - Telecom Infra Project
- Open Hardware designs can differ in contribution collateral
  - Specification only i.e. OCP inspired
  - Specification and complete design files i.e. OCP Accepted
- ONF has been leveraging Open Hardware designs for ~5 years !

ONF Designs

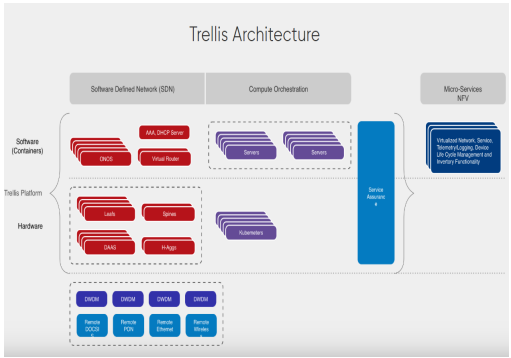
SEBA



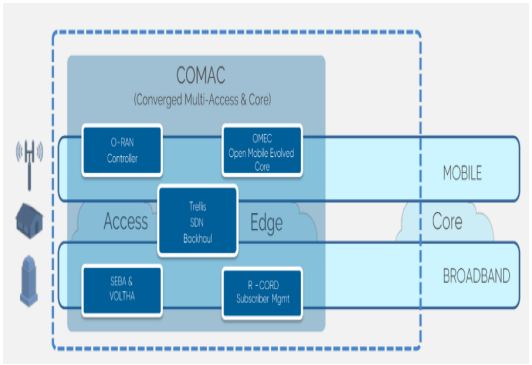
NG-SDN



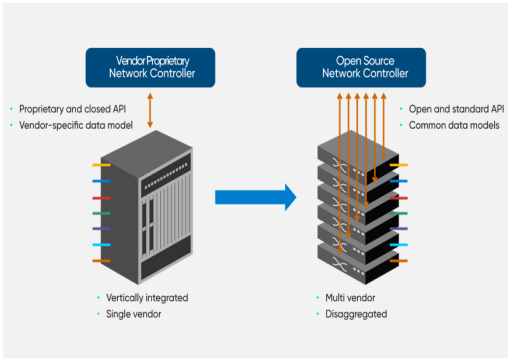
Trellis



COMAC

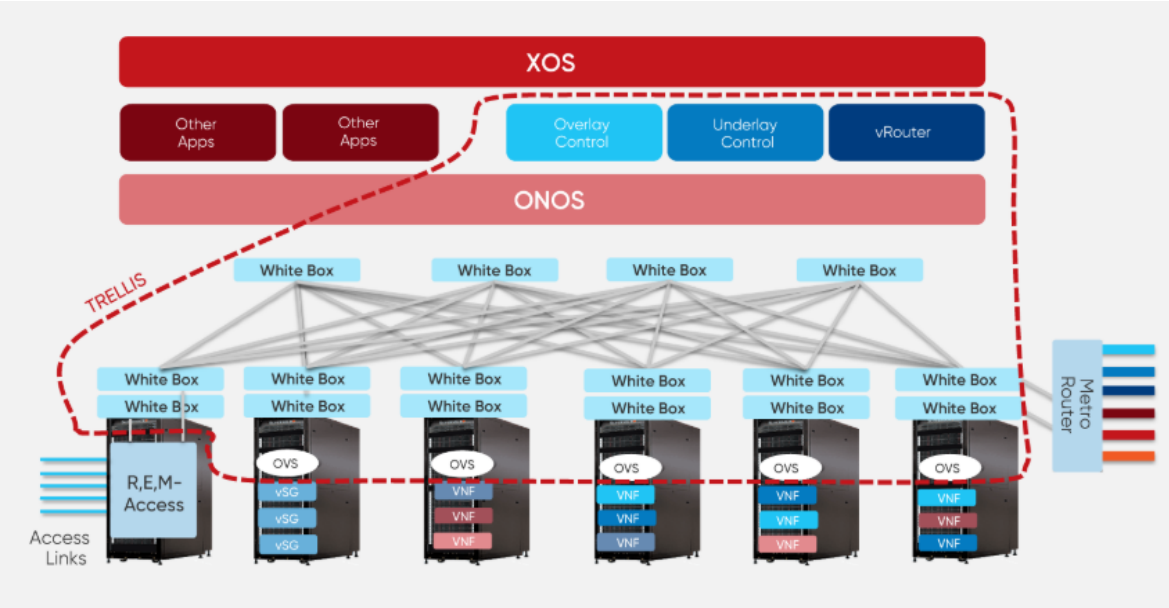


ODTN

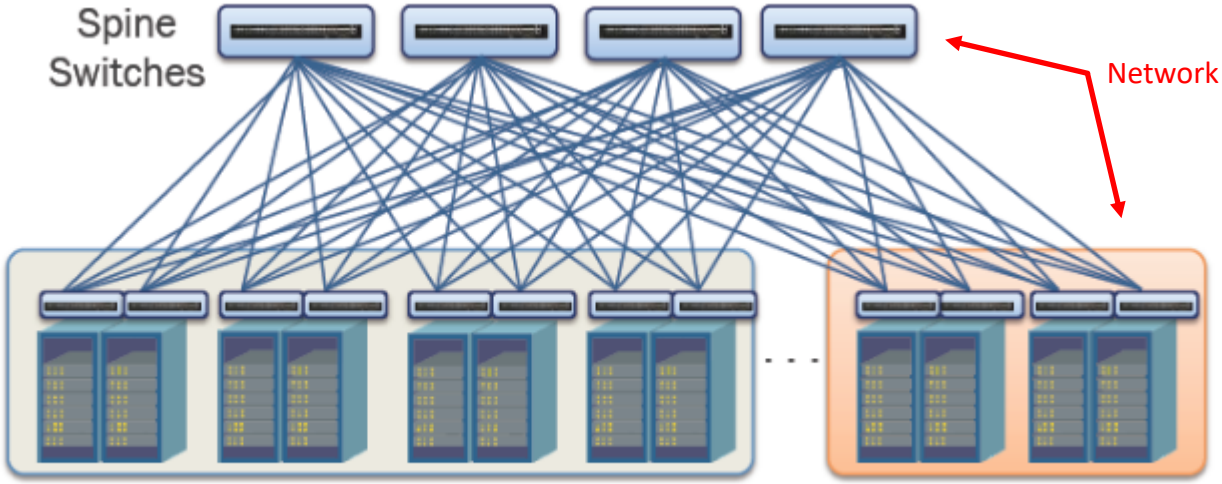


ONF Trellis building block

- Trellis is common in most ONF reference designs
- Trellis contains generic Leaf/Spine fabric, Compute nodes, Controller, and networking functions



Where are Open hardware designs used today with ONF Trellis?



Network Switches used here

Compute used here

Network “Access” devices used here

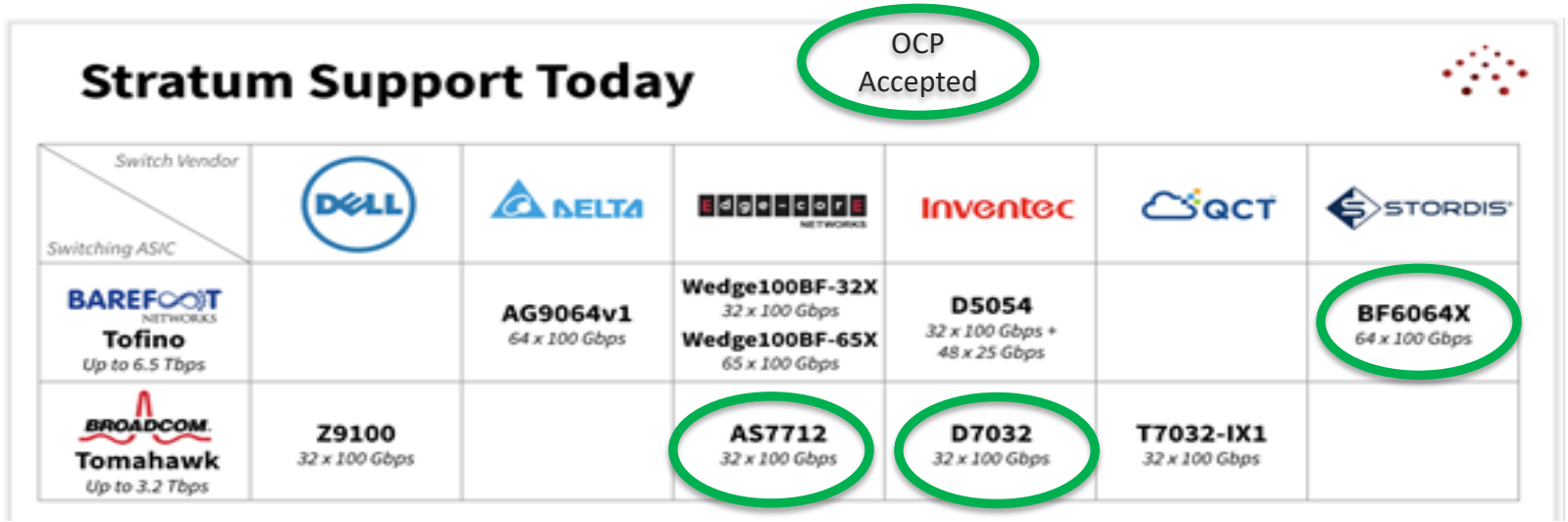
Network Switches for Trellis today

Switches used for the Leaf/Spine architecture historically following Data Center (OCP Networking group) type of products

"Recommended" Switches

- **1G/10G models (with 40G uplinks**)
  - **OCP Accepted™** EdgeCore AS5712-54X
  - **OCP Accepted™** EdgeCore AS5812-54X
  - QuantaMesh T3048-LY8
  - Delta AG7648
  - Inventec D6254
- **25G models (**with 100G uplinks)
  - **OCP Accepted™** EdgeCore AS7712-32X (with 25G breakout cable)
  - QuantaMesh BMS T7032-IX1/IX1B (with 25G breakout cable)
  - Inventec D7054Q28B
- **40G models**
  - **OCP Accepted™** EdgeCore AS6712-32X
- **100G models**
  - **OCP Accepted™** EdgeCore AS7712-32X
  - QuantaMesh BMS T7032-IX1/IX1B
  - **OCP Accepted™** Inventec D7032Q28B (verified by Inventec)
- **400G models**
  - Future

Network Switches for Stratum



Additional Switch support soon to come!

Network Switch software package

- Base software package used for Trellis Switches
  - ONIE (OCP)
  - Open Network Linux (OCP)
  - Redfish Baseline Management Profile (OCP)
  - OpenFlow implementation to match OF-DPA
  - Support of Stratum (ONF)

Open OCP switches available

- *Here is a list of available 35+ switches from the OCP Networking group wiki*
  - *https://www.opencompute.org/wiki/Networking/SpecsAndDesigns*
  - *OCP Marketplace*
  - https://www.opencompute.org/products

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1 Hardware Specs
- 1.1 Accepted Hardware
  - 1.1.1 Agema AG6248C-POE - 48 port 1G, 2x10G - access switch
  - 1.1.2 Alpha Networks - SNX-60x0-486F - 48-port 10G SFP+ & 6-port 40G QSFP+ - Leaf Switch
  - 1.1.3 Alpha Networks - SNQ-60x0-320F - 32x40Gb QSFP+ Leaf/Spine Switch
  - 1.1.4 Alpha Networks - 48x10GT, 2x40G QSFP+, 4x100G QSFP28 - Leaf Switch
  - 1.1.5 Alpha Networks - SNH-60A0-320F - 32x100G QSFP28 - Leaf/Spine Switch
  - 1.1.6 Broadcom/Interface Masters Open Leaf and Spine Switch specification
  - 1.1.7 Cavium Wedge 100C - 32x100G (based on Facebook Wedge 100)
  - 1.1.8 Edgecore Networks AS4610 - 30 or 54 port 1G with/without POE - access switch
  - 1.1.9 Edgecore Networks AS5712-54X - 48-port 10G SFP+ & 6-port 40G QSFP+ - Leaf Switch
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  - 1.1.11 Edgecore Networks AS6712-32X - 32-port 40G QSFP+ - Leaf/Spine Switch
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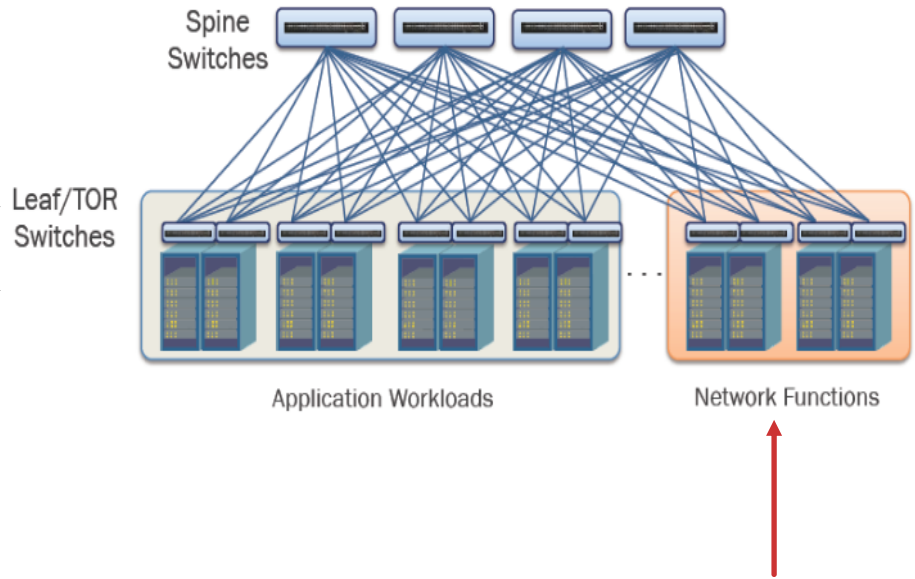
- 1.2 Inspired Hardware
  - 1.2.1 Agema AGC5648S - 48 port 25G, 6x100G - switch using Jericho+
  - 1.2.2 Agema AG5648v1 - 48 port 25G, 6x100G - switch using Tomahawk+
  - 1.2.3 Agema AG7648C - 48 port 10G BT, 6x40G - switch using Trident II
  - 1.2.4 Agema AG9032V1 - 32x100G - switch using Tomahawk
  - 1.2.5 Agema AGC7648A - 48 port 10G, 6x100G - switch using Qumram-MX

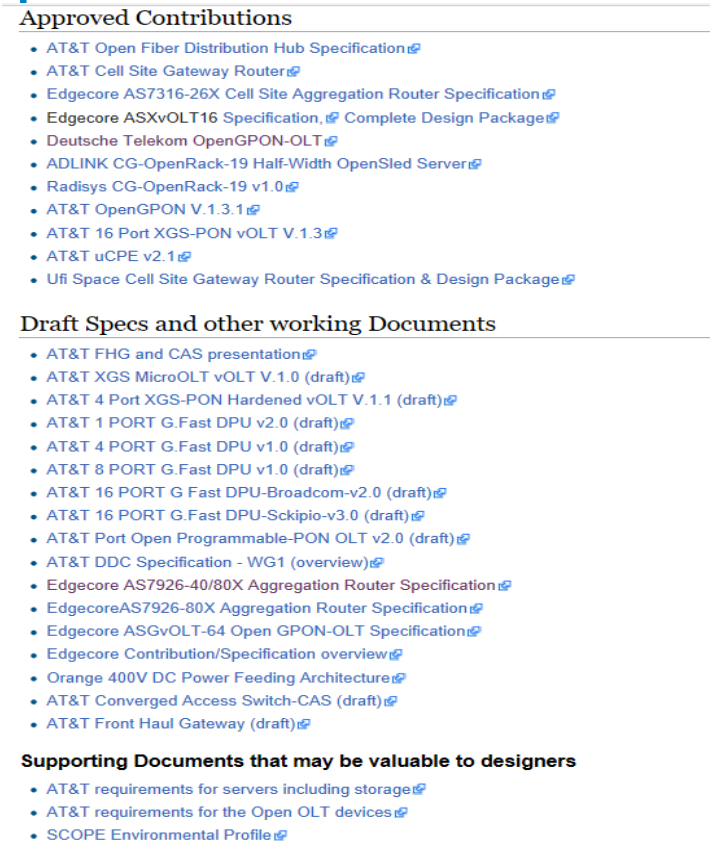
Network access devices used for Trellis/SEBA

- **OCP Accepted™** *Edgecore AS5900-54 – Series of Metro Ethernet Switch(s)*
- **OCP Accepted™** *Edgecore ASXvOLT16 – OpenXGS-PON OLT*
- **OCP Accepted™** *Edgecore ASGvOLT64 – OpenGPON OLT*



Open OCP Telco access products

- Here is a list of the contributions from the OCP Telco wiki
  - https://www.opencompute.org/wiki/Telcos#Specs_and_Designs
- OCP Marketplace
  - https://www.opencompute.org/products



Approved Contributions

- AT&T Open Fiber Distribution Hub Specification
- AT&T Cell Site Gateway Router
- Edgecore AS7316-26X Cell Site Aggregation Router Specification
- Edgecore ASXvOLT16 Specification, Complete Design Package
- Deutsche Telekom OpenGPON-OLT
- ADLINK CG-OpenRack-19 Half-Width OpenSled Server
- Radisys CG-OpenRack-19 v1.0
- AT&T OpenGPON V.1.3.1
- AT&T 16 Port XGS-PON vOLT V.1.3
- AT&T uCPE v2.1
- Ufi Space Cell Site Gateway Router Specification & Design Package

Draft Specs and other working Documents

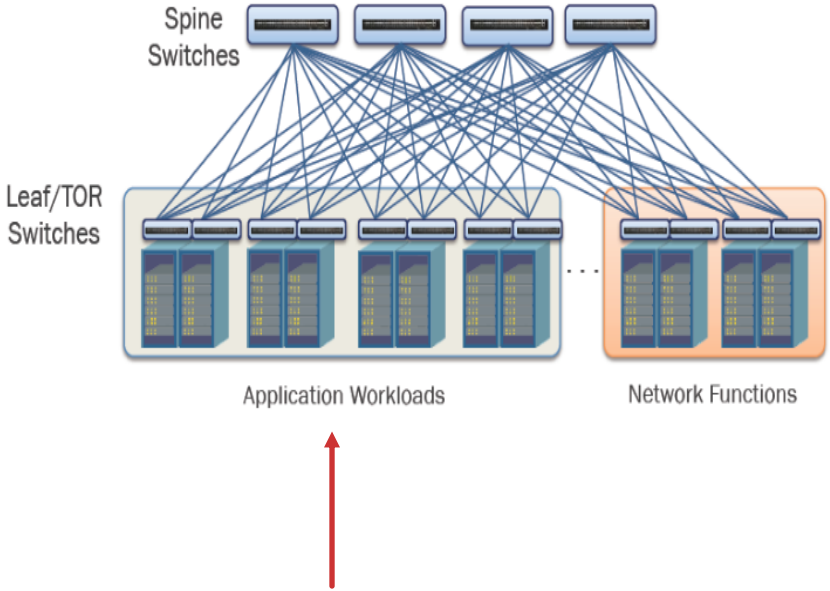
- AT&T FHG and CAS presentation
- AT&T XGS MicroOLT vOLT V.1.0 (draft)
- AT&T 4 Port XGS-PON Hardened vOLT V.1.1 (draft)
- AT&T 1 PORT G.Fast DPU v2.0 (draft)
- AT&T 4 PORT G.Fast DPU v1.0 (draft)
- AT&T 8 PORT G.Fast DPU v1.0 (draft)
- AT&T 16 PORT G Fast DPU-Broadcom-v2.0 (draft)
- AT&T 16 PORT G.Fast DPU-Sckipio-v3.0 (draft)
- AT&T Port Open Programmable-PON OLT v2.0 (draft)
- AT&T DDC Specification - WG1 (overview)
- Edgecore AS7926-40/80X Aggregation Router Specification
- EdgecoreAS7926-80X Aggregation Router Specification
- Edgecore ASGvOLT-64 Open GPON-OLT Specification
- Edgecore Contribution/Specification overview
- Orange 400V DC Power Feeding Architecture
- AT&T Converged Access Switch-CAS (draft)
- AT&T Front Haul Gateway (draft)

Supporting Documents that may be valuable to designers

- AT&T requirements for servers including storage
- AT&T requirements for the Open OLT devices
- SCOPE Environmental Profile

Compute used in Trellis

- Many OCP choices available depending on workload needs.
  - **OCP Inspired™** QuantaGrid D51B-1U server *(2x Intel E5-2630 v4 10C 2.2GHz 85W, 64GB of RAM 2133MHz DDR4, 2x 500GB HDD, and a 40 Gig adapter)*
- *OCP Server Wiki page*
  - *https://www.opencompute.org/wiki/Server/Working*
- *Over 40 options available on the OCP Marketplace*
  - https://www.opencompute.org/products



Other product/technology opportunities from OCP

Data Center Facility

The Datacenter Facility Project maximizes mechanical performance and thermal and electrical efficiency.

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Hardware Management

The Hardware Management Project incorporates a set of existing tools and best practices for remote machine management.

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High Performance Computing (HPC)

The HPC Project is focused on developing a fully open, heterogeneous computing, networking and fabric platform optimized for a multi-node processor.

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Networking

The Open Computer Networking Project aims to facilitate the development of network hardware and software - together with trusted project validation and testing.

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Open System Firmware (Incubation)

The Open System Firmware Project aims to create and deploy, at scale, an open source hardware platform initialization and OS load firmware optimized for web-scale cloud hardware.

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Rack & Power

The focus of the Rack & Power Project Group is on rack standards, integrating into the datacenter infrastructure.

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Security (Incubation)

The Security Project creates designs and specifications to enable software security for all IT gear through collaboration with the wider Open Compute community.

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Server

The OCP Server Project provides standardized server system specifications for scale computing.

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Storage

The Storage Project scope is on chassis and sleds, components and peripherals, networked enabled storage and compatibility solutions.

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Telco

The OCP Telco Project enlists the telecom industry and suppliers who are seeking to use datacenter infrastructure to deliver IT services.

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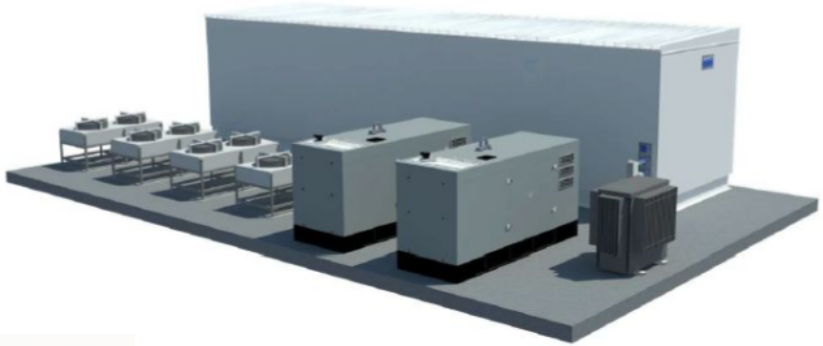
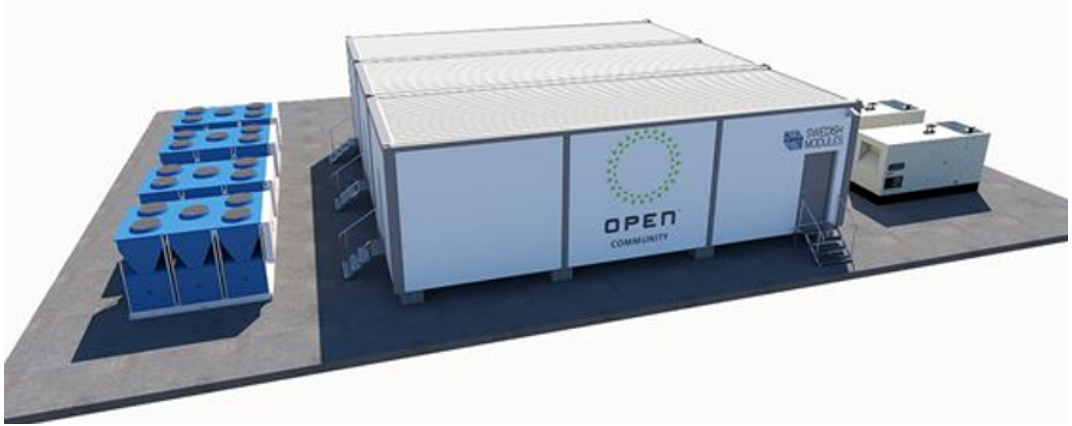
OCP Carrier grade rack

- OCP CG-Open Rack-19 Rack and Sled
  - Full and half width sleds
  - Power interconnections
  - In-Rack interconnection of sleds for data plane and management

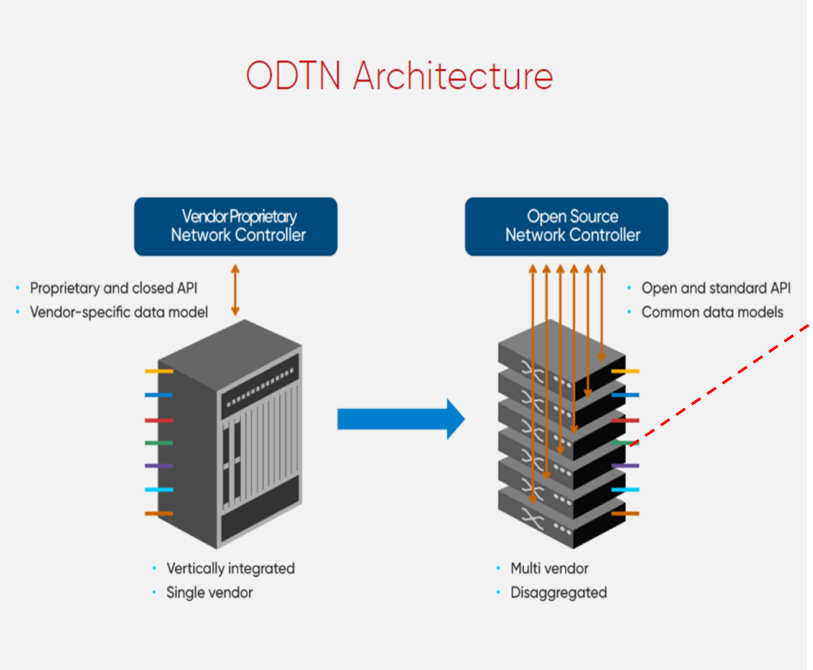
OCP Datacenters

- Single 90KW Datacenters
- Modular 300KW Datacenters
  - Overall construction, Racks, Cooling, and Power all specified and ready to purchase !





Open hardware devices used in ONF ODTN



Edgecore “Cassini” Packet Transponder

- Hardware Contribution TIP
- Software Support
  - ONIE (OCP)
  - Open Network Linux (OCP)
  - Redfish (OCP Baseline)
  - SONiC (OCP)

Next Steps

- If you're a carrier get involved in Open Compute and specify your product needs !
- If you're a vendor participate and contribute your specifications and products to Open Compute!
- If you are an integrator choose products for your solution that carry the OCP Logo available on the OCP Marketplace!
- https://www.opencompute.org/products?refinementList%5Bcategory%5D=&refinementList%5Bsolution_provider%5D=&page=1

Thank You