



# 2019 OCP Taipei Workshop

**OPEN**

Compute Project

**The evolution of open networking from data center to service providers and enterprise deployments - solutions and contribution to OCP and Cross Pollination across ALL OPEN COMMUNITIES from Edgework Networks**

October 23, 2019

*George Tchapanian*

*CEO Edgework Networks*



*Consume. Collaborate. Contribute.*

- Briefly: What is Open – Disaggregated Networking?
  - Open Networking Value Proposition
- Why “More of” Open Networking?
  - **Open Communities and Cross Pollination**
- Why Edgecore Networks – Who are we?
  - Edgecore Open Networking Value Proposition
  - **Edgecore Open Networking Evolution into Telecom / MSO**
  - **New** (samples) Open Products and Solutions  
Introduction from Edgecore
- Q&A

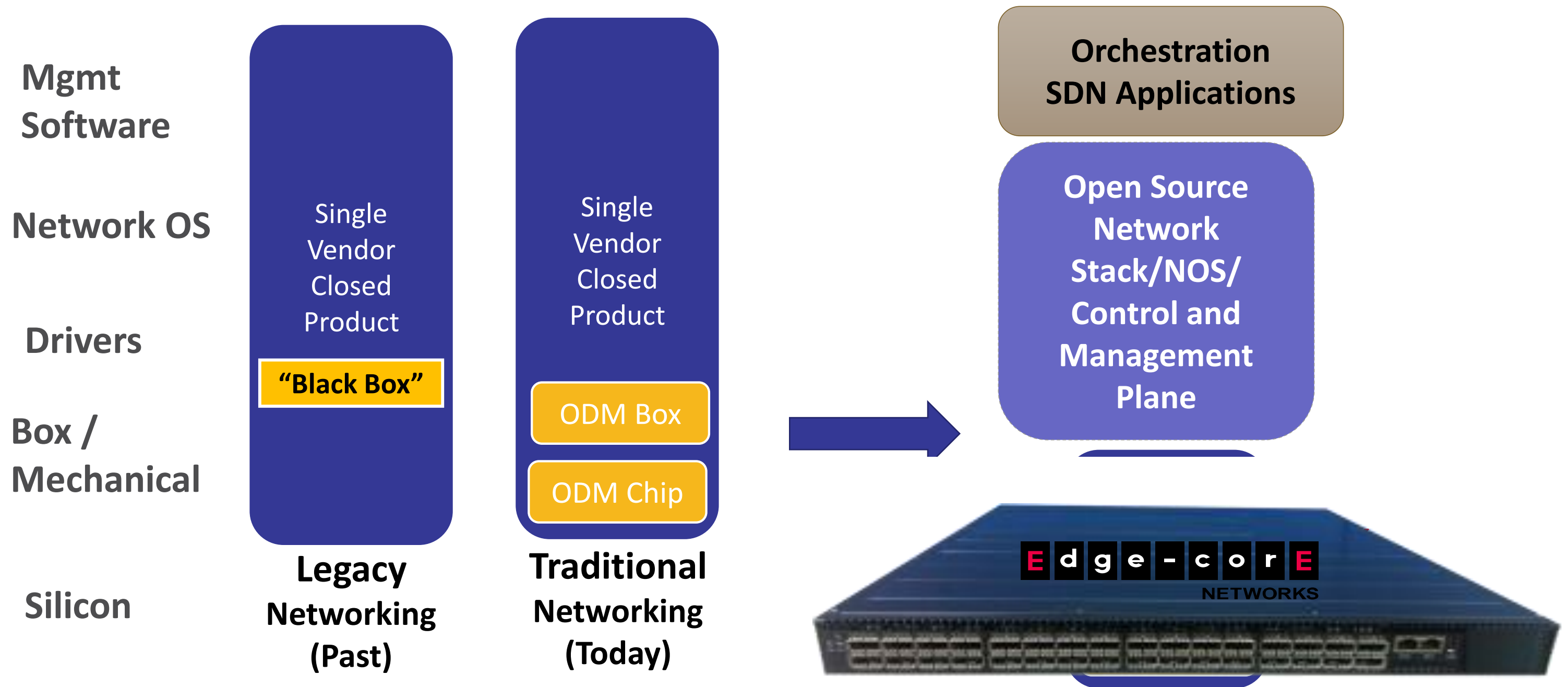
## Presentation Flow

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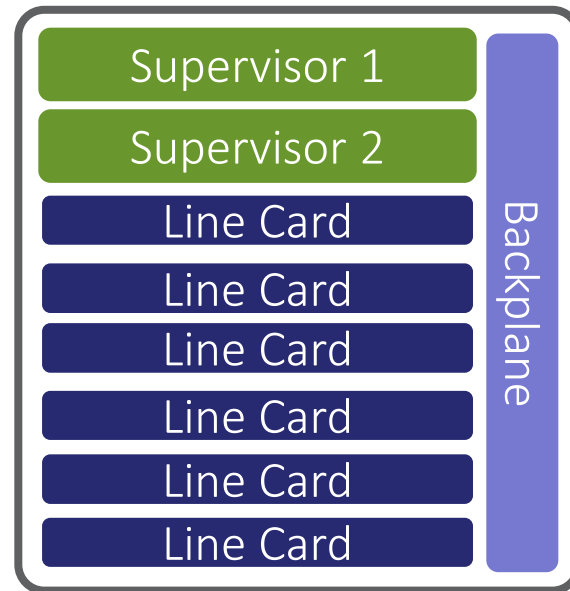


Switch components  
**Ecosystem & OCP  
Solutions**

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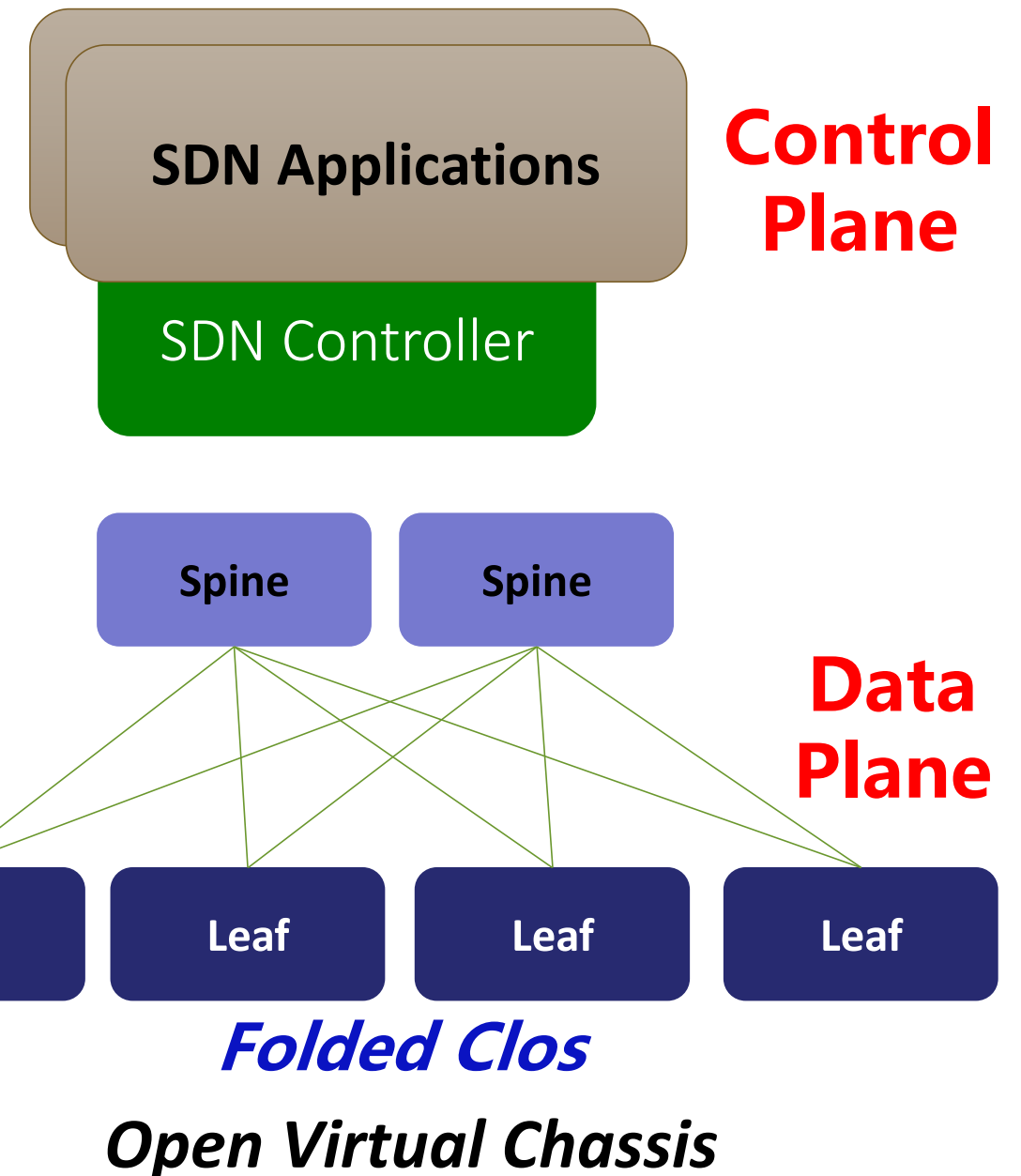


## Proprietary Chassis



- Proprietary Stack (ASIC, HW, SW)
- Expensive
- Complex /Slow
- Scale UP
- Vendor Lock In

**30%-50% Lower Cost**



# Cost Reduction ....and more!

**Edge-core**<sup>®</sup>  
NETWORKS

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- **Hyperscale Cloud Service Providers** adopt open networking at massive scale
  - Open hardware
  - Third party software & Ecosystem: 1) in-house, 2) open source, 3) commercial and 4) OEMs
- **Telecom – MSO and Enterprises** are following
- **Complex networks** built from smaller / flexible – Modular / simpler building blocks
- **Faster feature velocity** delivering greater business value
- **Supply chain flexibility**
- **Quicker and more agile refresh and upscaling cycles**
- **Business (service and operations) innovation and agility**
- **Rapidly developing ecosystem, faster innovation supporting Telco and Enterprises**
  - OCP, ONF, TIP, LF
  - Many commercial software partners / suppliers – includes incumbent OEMs porting to open and OCP hardware
- **Addresses Data / BW Explosion (and 5G Needs) and increasing Infrastructure Cost and low Profit margins → reduce TCO → lower CAPEX and OPEX**

**Open Networking–Value Proposition** **Edge-core**<sup>®</sup>  
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- **AI, VR, & Edge Computing in 5G Era**
- The adoption of **5G, AI, VR, Edge Computing, and Cloud Computing**, will drive new expectations for more bandwidth and the mandates:
  - **always-on,**
  - **zero to no latency**
  - **high quality network and,**
  - **High quality apps and services,**
- Which will lead to operational efficiency (OPEX reduction) and boost **ultra-low latency** and **intelligent applications**.
- To honor the promise of 5G with the right CAPEX, it is vital to have the proper compute infrastructure in place, aligned to the right strategy, such as: **Openness, Whitebox, Disaggregation, Automation,** etc.



**! Explosive Bandwidth  
Requirements Ahead !**

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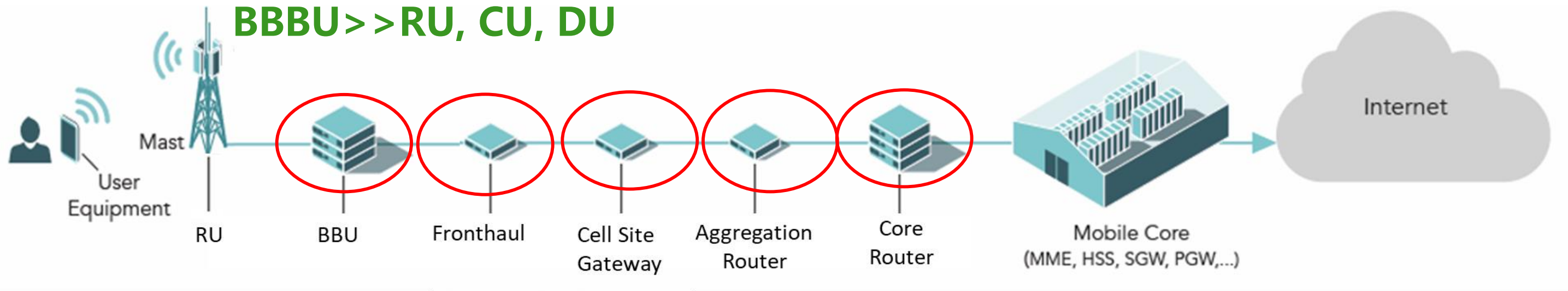
Core >> 400G... +

Aggregation >> 100/400G

Cell Site Gateway >> 10/25G/100G

Fronthaul >> RoE

BBU >> RU, CU, DU



# What upgrades are needed for 5G ?

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- Openness
- Disaggregation
- Open HW - Whitebox
- Open SW – Commercial or Open Source
- Automation
- OCP Work Groups / Community DevOps

## Open Community



## Active Community Members



upgrades be delivered  
?



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# OCP Community Work .... At Work !

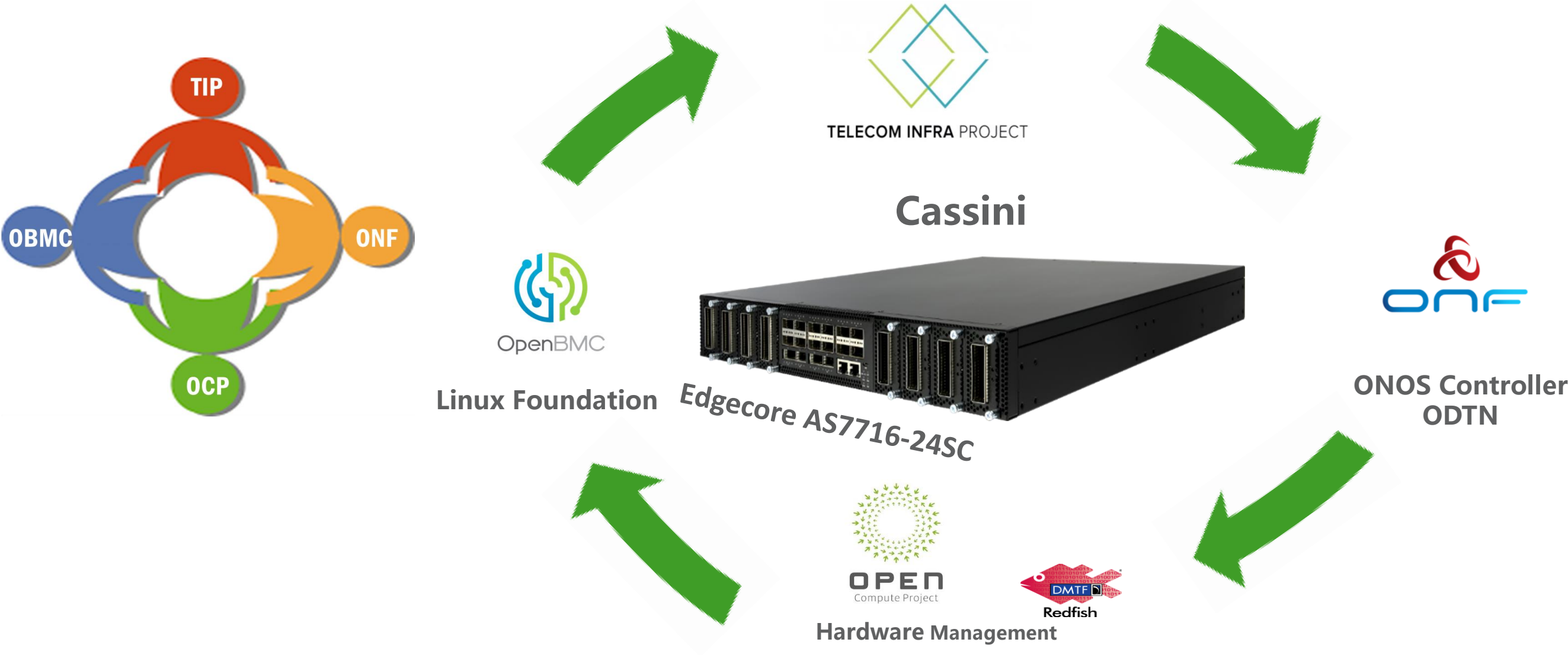
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Cross Pollination = “A sharing or interchange of knowledge, ideas, etc., as for mutual enrichment;



# Open Communities and Cross Pollination

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- VP Technology, Jeff Catlin on Incubation Committee
- CEO, George Tchapanian co-chair of OCP Taiwan
- 1<sup>st</sup> & leading contributor to Network Group
- Designs for new use cases in Telco Project
- Support all OCP Software/Firmware



- CEO, George Tchapanian on ONF Board
- Member since 2014, Partner since 2018
- Edgecore hardware basis for CORD
- Contributing to all four (4) ONF Reference Designs

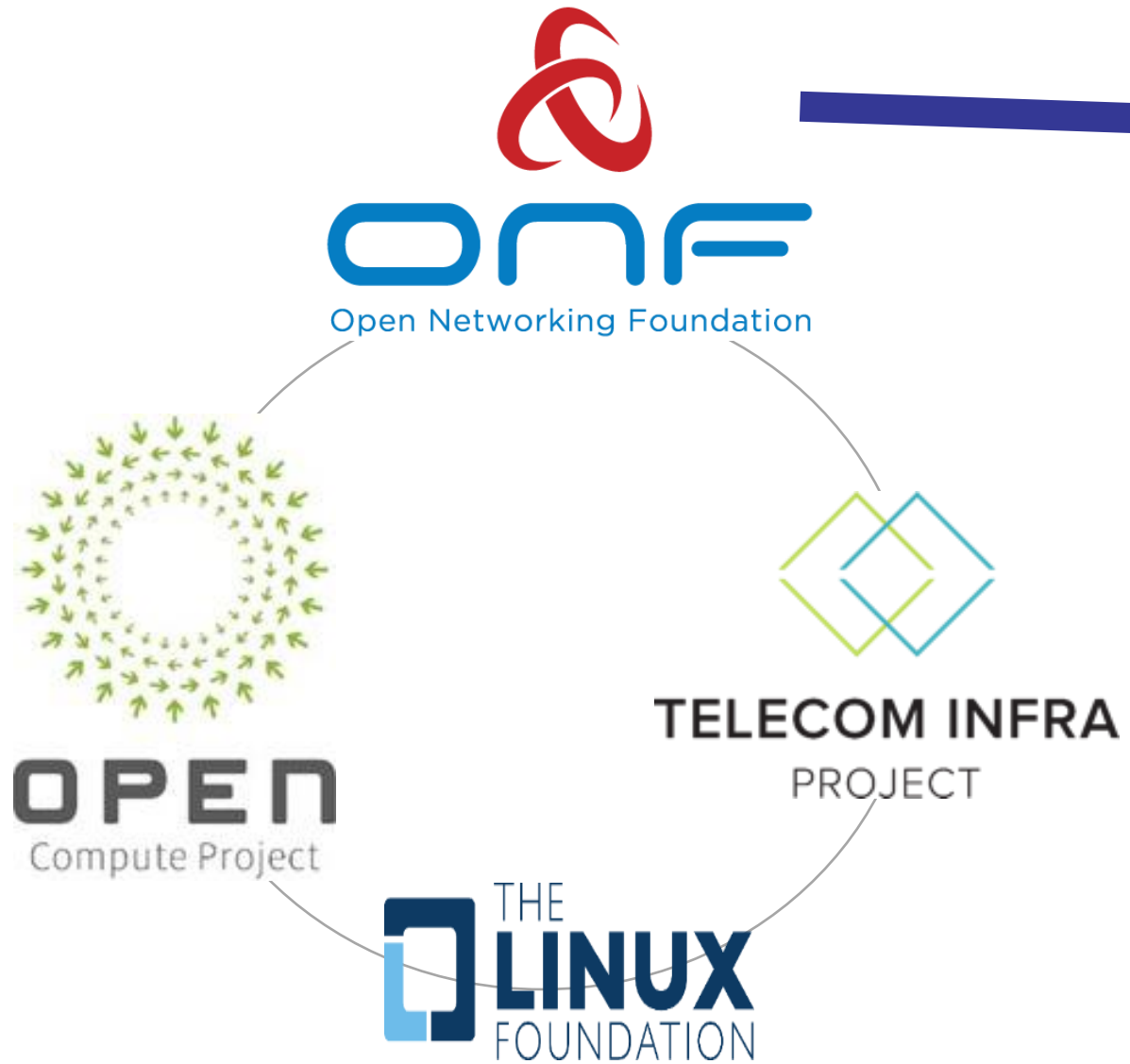


- Active Member
- Contributed Cassini packet transponder
- Integrating optical technology; leading partners
- 1<sup>st</sup> contributor to DCSG (TIP) project, Cell Site Gateways

# Leadership in Open Networking Community

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# Open Networking Community

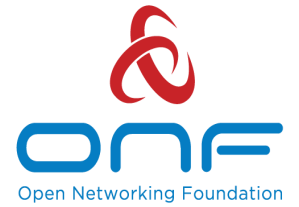
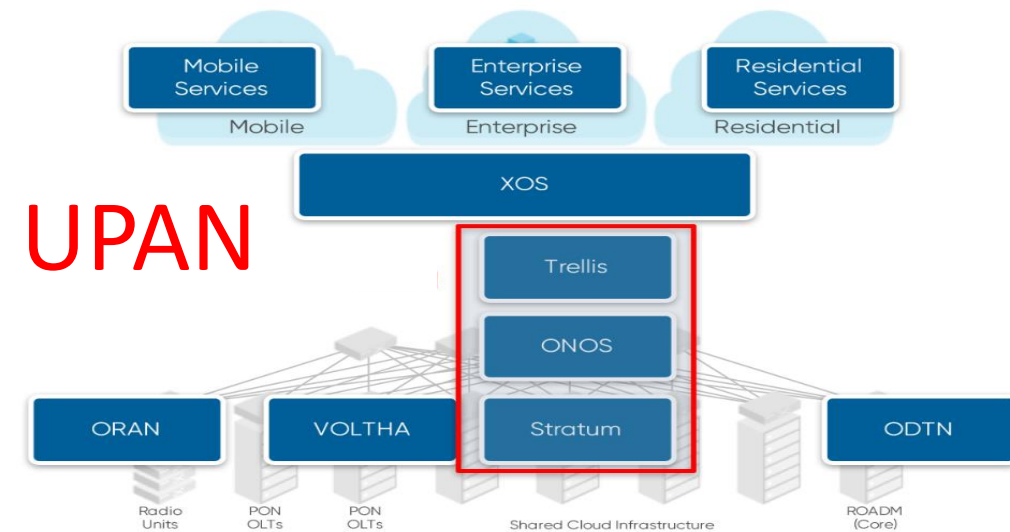
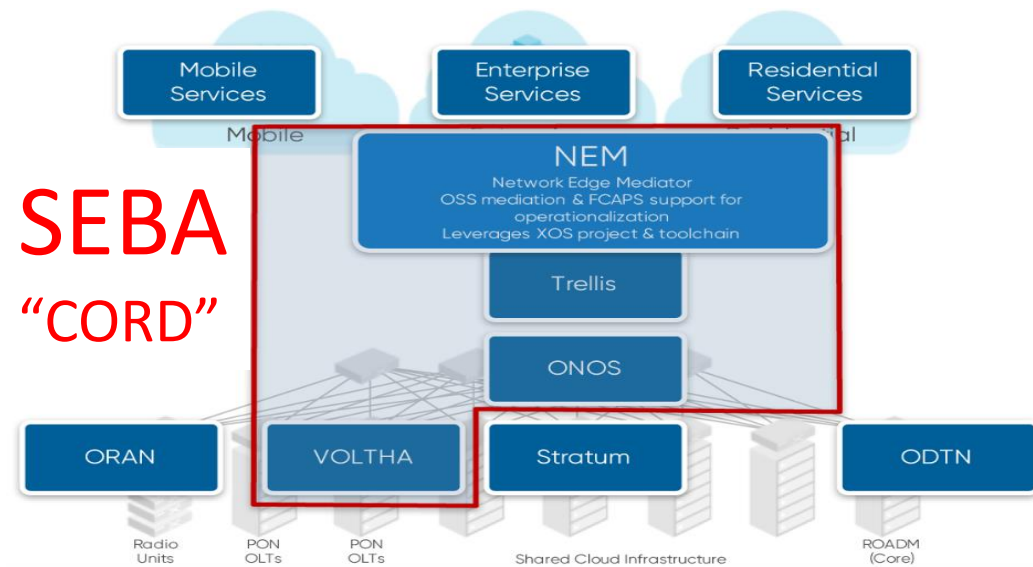
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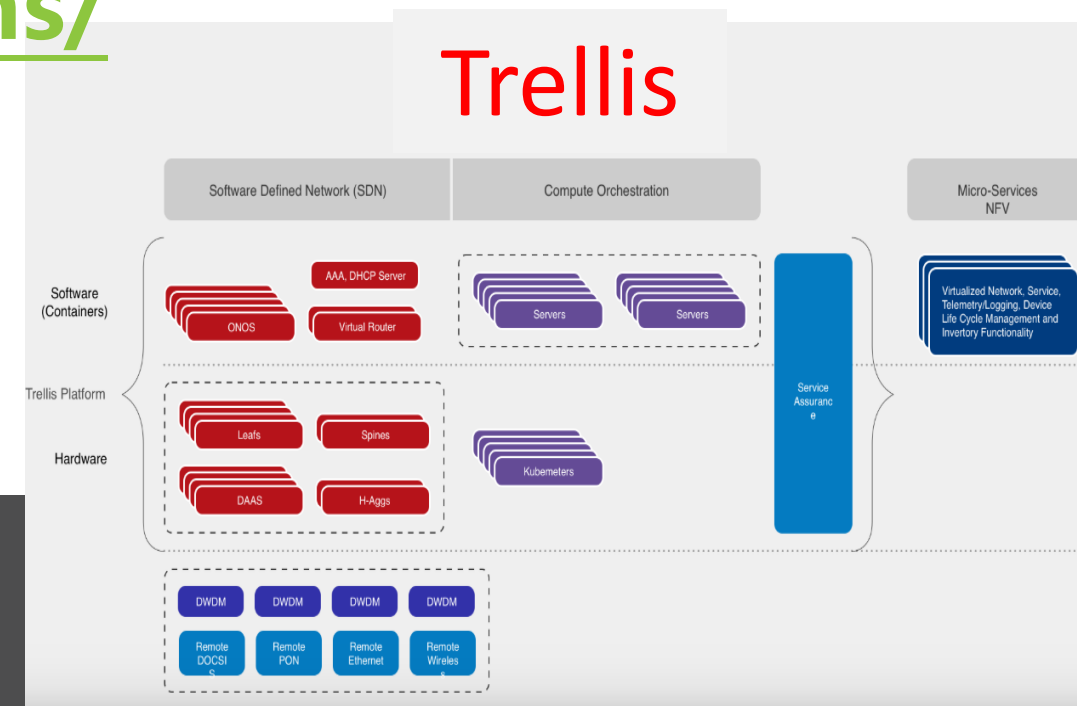
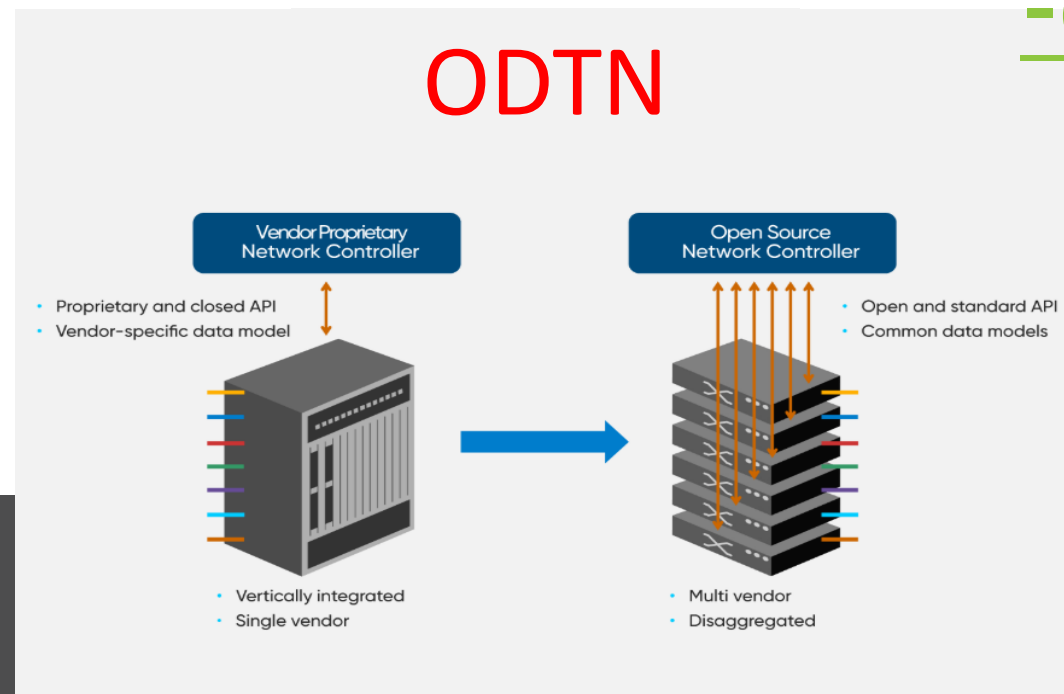
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<https://www.opennetworking.org/reference-designs/>



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## Accton Technology

- Leading Network ODM: Systems, networking, and OEM customers (Tier 1 OEMS)
- Founded 1988, IPO Taiwan 1995
- 4,000 + employees worldwide, > 700 network engineers, R&D Centers
- Volume manufacturing in China and Taiwan (TAA Compliant)
- One Stop Shop!



## Edgecore Networks

- Brand Business; wholly owned subsidiary of Accton
- Go-to-market business to network operators – Data Center, Telecom, and Enterprise
- Manages customer, partner and open community relationships
- Leading contributor of network designs to OCP, TIP and LF Active participant

**Accton**  
Making Partnership Work

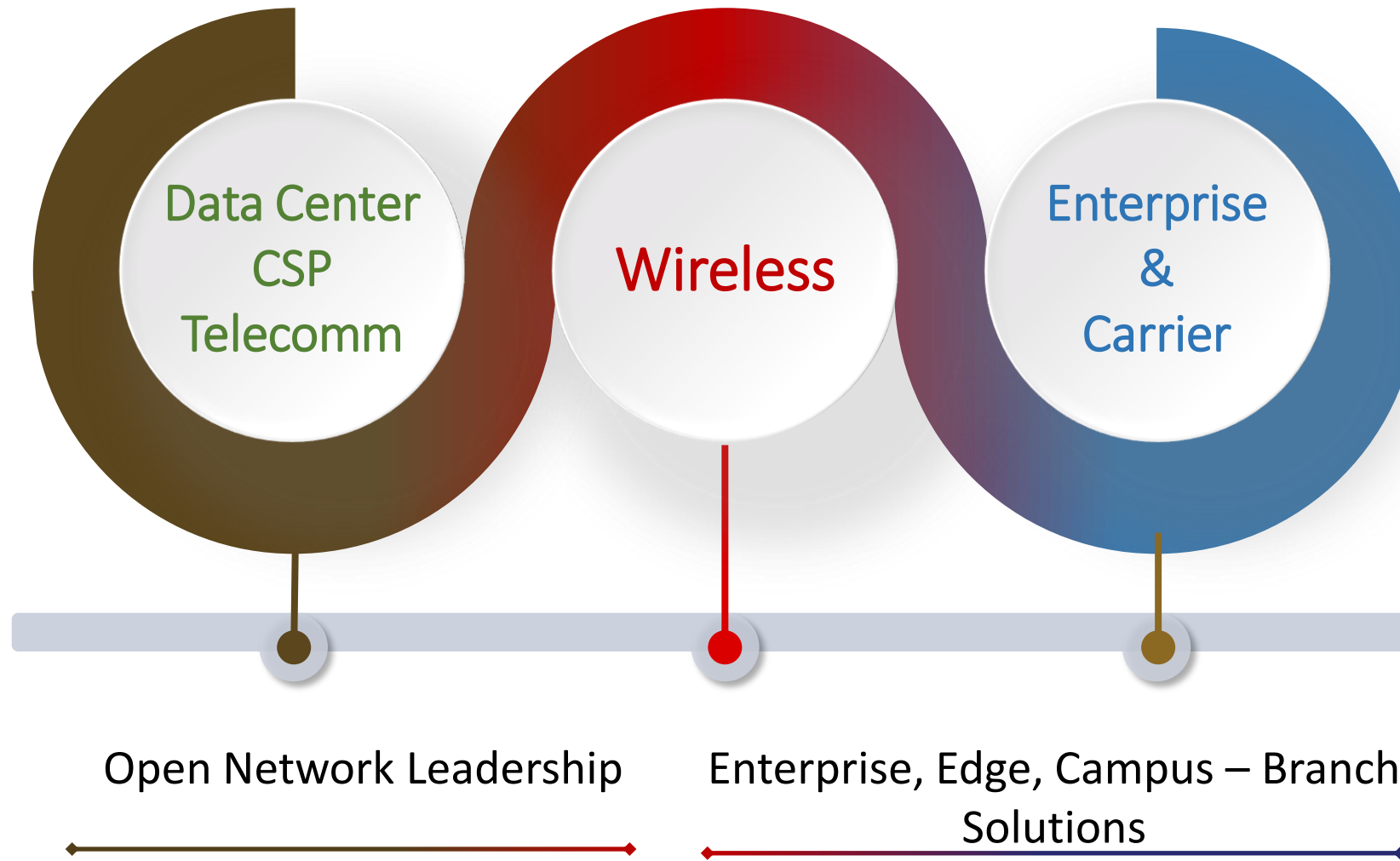


**> 10M Ports Shipped 2018**

**Accton Technology and Edgecore Networks**

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# Edgecore Product Segments

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- Open Hardware Leadership
- Open Software Value / Enablement Leadership (Ecosystem Partnership)
- System – Solution Integration and Support (Ecosystem Partnership)

Edgecore Open Networking



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**StrataDNX Qumran/Jericho**

Scale Out, Converged, Carrier Grade

**StrataXGS Trident**

Programmable, Feature Rich, DC and Enterprise

**StrataXGS Tomahawk**

Massive BW Hyperscale Fabrics

**XGS-PON- Maple**

**Fronthaul-5G- Monterrey**



**Tofino**

Programmable, P4 Language



**Edgecore Silicon Focus**



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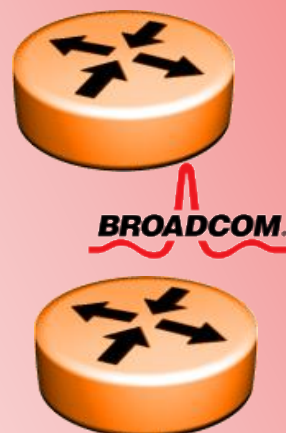


5G Switch



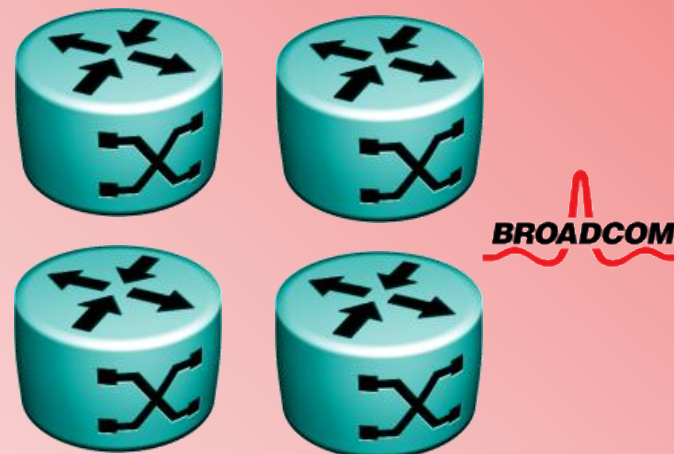
Fronthaul

Cell Gateway



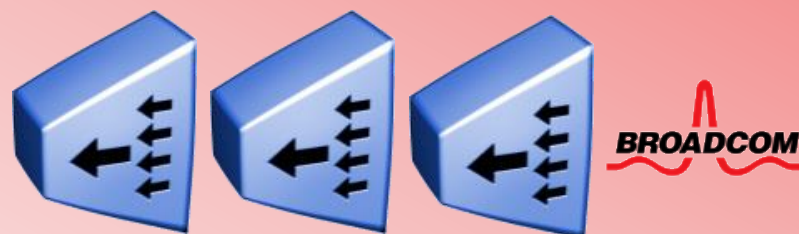
Backhaul

High Scale Deep Buffer Switch



Aggregation/Core

PON OLTs



Wireline Access

Leaf/Spine & Edge



Nephos

DC and Enterprise

Optical Packet Transponder



Data Center Interconnect

# Edgecore Technology Focus - Places in the Network

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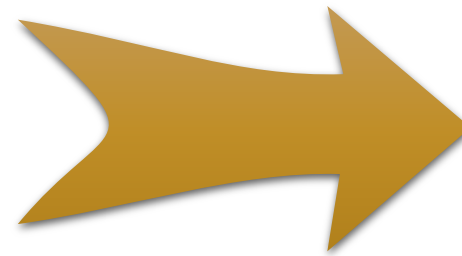
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**Leverage & Migrate:**

## Data Center, CSP & Enterprises:

Leaf and Spine Fabrics  
1G, 10G, 40G, 100G to 400G  
DCI – Packet Transponder



## Telecom / MSO:

Edge Switches - Deep Buffer Large TCAM

Open OLTs, XGS-PON and GPON

Cell Site Gateways – OCP and TIP

Fronthaul / Backhaul Switches

Aggregation Routers

Core Routers



# Edgecore Open Networking for Telecom / MSO

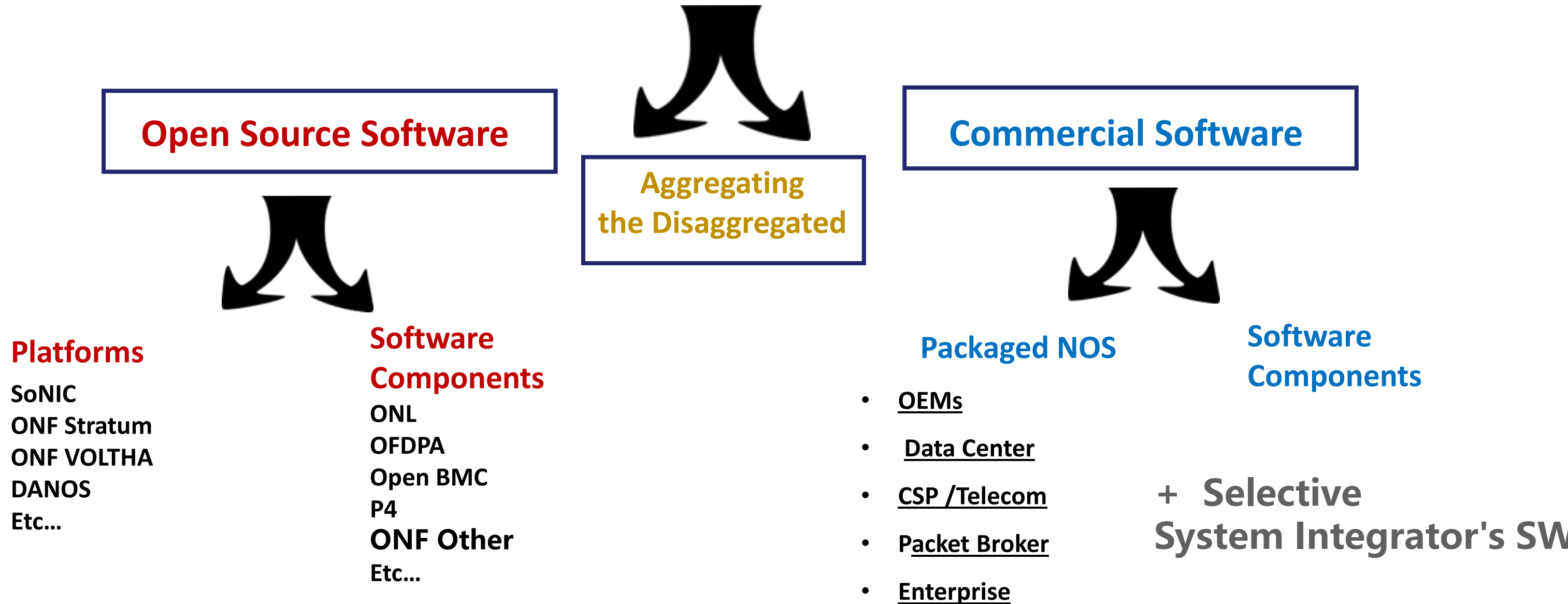
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# Open Network Hardware: whitebox, bare metal, disaggregated



Software Paths in  
Open Networking





## OCP-Accepted™ Designs & Products

- 1G Rack Mgmt Switch *Helix4*
- 10G TOR Switch *Trident II*
- 40G Spine Switch *Trident II*
- 100G TOR & Spine Switch *Tomahawk*
- 100G TOR & Spine Switches *Trident3*
- 64 x 100G Spine Switch *Tomahawk II*
- 32 x 400G *Tomahawk III*
- 10G/100G Edge Switch *Qumran*
- Open Rack Switch Adapter

## Design Contributions in OCP Review

- 100G OMP800 Chassis *Tomahawk*
- 100G OMP1600 Chassis *Tomahawk*
- 25G TOR Switch *Tomahawk*
- MiniPack AS8000 *Tomahawk III*

## Partner Designs, Edgecore OCP-Inspired™ Product

- Wedge40-16X *Facebook*
- Wedge100-32X *Facebook*
- Wedge100BF-32X *Barefoot*
- Wedge100BF-65X *Barefoot*



- Cassini Packet Transponder

### Designs in Process

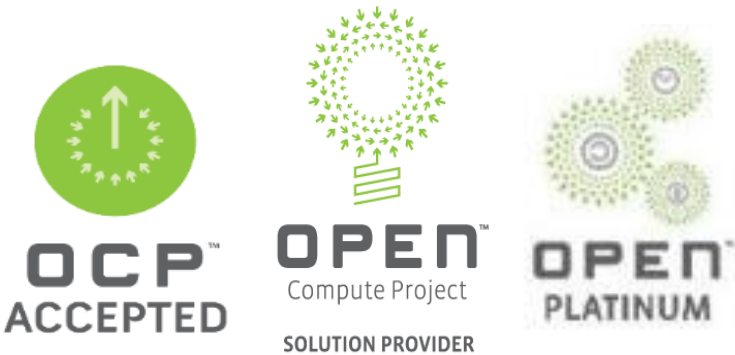
- DCSG Cell Site Gateway

## OCP Telco Working Group

- ASXvOLT16 10G OLT *BCM Qumran & Maple*
- AS7316-26XB Cell Site Gateway *QumranAX*
- AS7926-40XK and -80XK Aggregation Routers *Jericho2 in OCP Review*

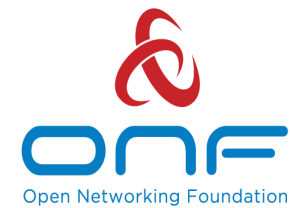
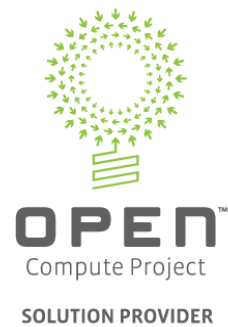
## OCP-Accepted™ Access Products

- 1G PoE Switch *Helix4*
- 802.11ac Wave1 Wi-Fi APs *BCM*
- 802.11ac Wave2 Wi-Fi APs *QCA*



Most Network Design Contributions to  
Open Source - Industry Firsts: 10G to  
400G DC switches, New Telco /MSO Use  
Cases  
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# Edgecore Few Sample Products

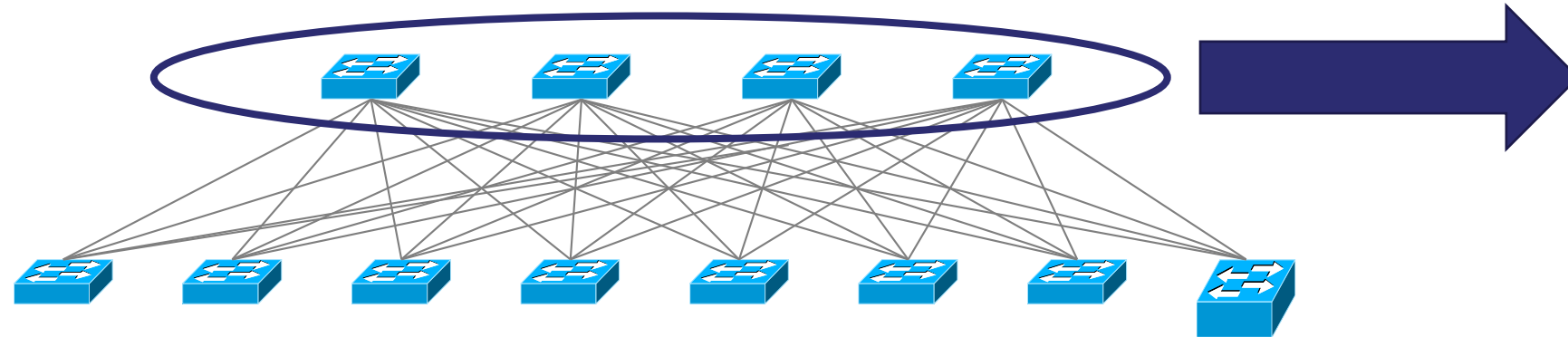
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**Industry's First 400G** Open Network Switch  
Optimized for Spine Applications

*Facebook Design*

Spine Fabric: 40G, 100G Open Network Switches to  
100G, 400G Minipack Open Chassis



*Design Contributed to OCP*



## MINIPACK Edgecore AS8000



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- **Industry's First** Integrates 100GbE switching with L1 optical transport function
- DC Interconnect, CORD uplinks, POP interconnect
- 3.2 Tbps switch based on Broadcom Tomahawk
  - 16 x 100G QSFP28 100G Ethernet fixed ports
  - 8 Module Slots for additional QSFP28, or up to 8 x 100/200G ACO/DCO
- Optical Partners: Acacia, Finisar, FOC, NTT Electronics, Oclaro . . .
- CPU Module: x86 Broadwell-DE with 16-64 GB DRAM, 32-128 GB M.2, Optional BMC



# Cassini AS7716-24SC: Open Packet Transponder





AS7316-26XB Cell Site Gateway **Industry's First**

16 x 10G SFP+, 8 x 25G SFP28 + 2 x 100G QSFP28



Odyssey-DCSG Cell Site Router Gateway **Industry's First**

1G RJ45, 1/10G SFP+, 10G/25G SFP28



ASXvOLT16 **Industry's First**

16 x 10G XGS-PON XFP + 4 x 100G QSFP28



ASGvOLT64 **Industry's First**

64 x GPON SFP + 2 x 100G QSFP28 + 8 x 25G SFP28



Edgecore Cooperation  
with Telecoms

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- 40 x 100G and 80 x 100G models
- Broadcom StrataDNX Jericho 2 (BCM88690)
- Deep Buffer Switch
- Expandable TCAM (BCM16K)
- IEEE1588 and Synchronous Ethernet
- AC and 48VDC Power Options
- “Building Block Design” for future offerings



# AS7926-40XK, -80XK Aggregation and Core Routers

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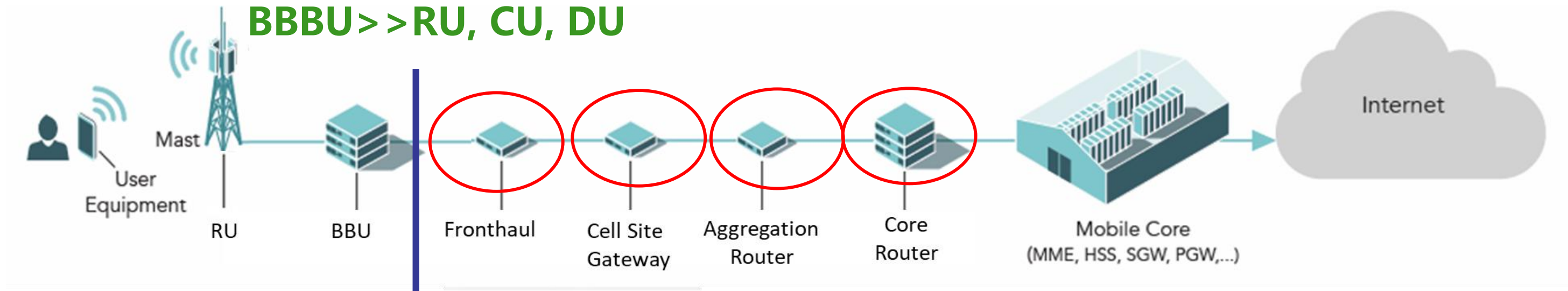
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# What upgrades are needed for 5G ?

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**Edgecore LAB**  
**LaaS**



**SEBA 10G PON**  
**Mobile LAB**



**LEAF /SPINE**  
**IXP**  
**Mobile LAB**



**Want to Try?**

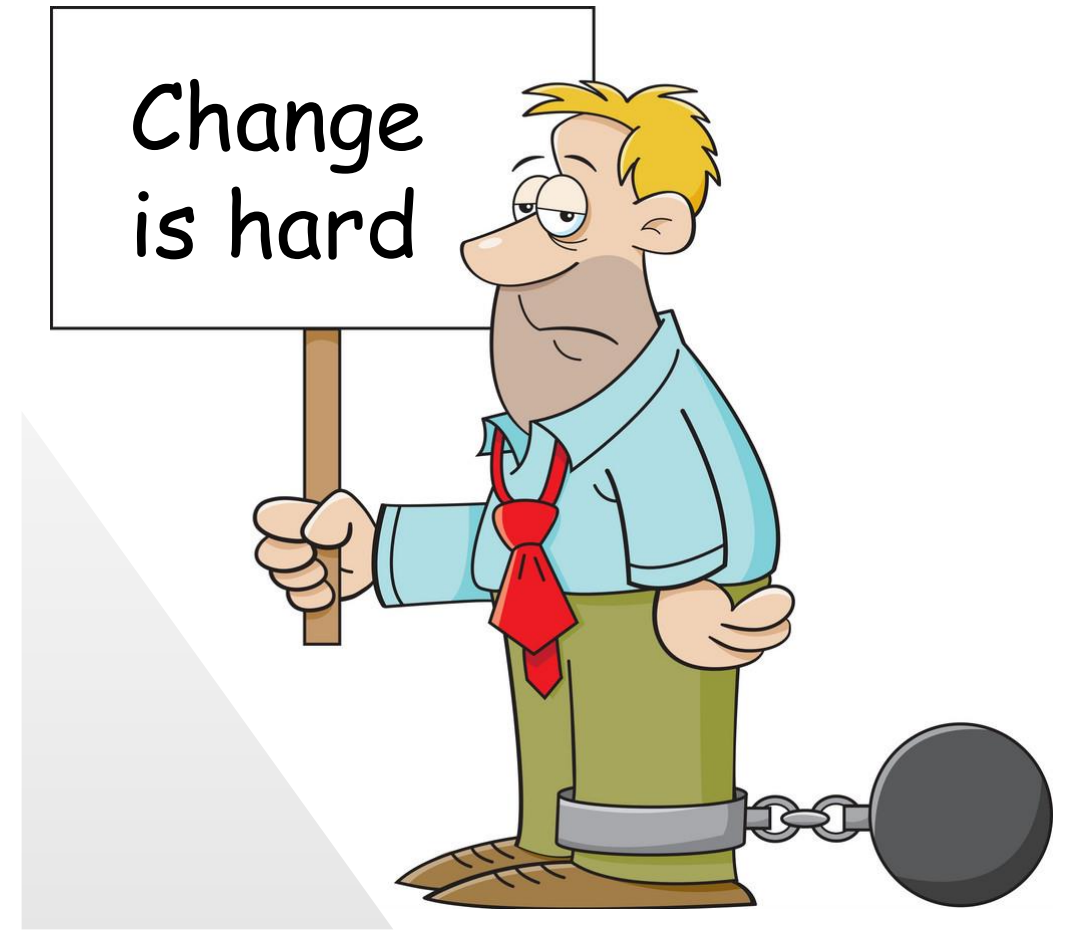
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- 20+ years of 'big iron' system architectures
- Cumbersome and inflexible
- Dominated by a few vendors
- Buyers locked in to vendor solution
- Limited ability to influence vendor roadmap
- Stifled innovation
- Not easy to change without significant disruption
- Telco, Data Centres, Enterprise business model (operations, service, cost) all very similar, little room for innovation



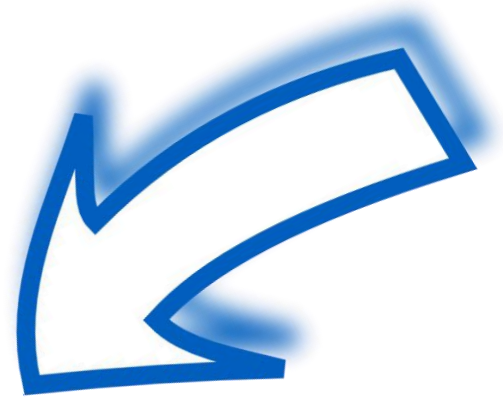
## Current way of building networks

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## 2. Open Environment

- Progressively move functionality to compute
- Reduce dependence on vertical integrated systems
- **Shift operational mindset towards software orientation**
- Improve scale, automation, agility



## 1. Disaggregation

- Foundation for open networking
- **Flexible supply chain – richer set of options**
- First step to secure business buy in
- **Catalyst for wider innovation**

## 3. Agile Architecture

- Expand disaggregation and virtualisation
- **End to end automation**
- **Flexible & agile cloud oriented infrastructure**
- **Faster time to market, lower TCO, increased margin**

**Business Agility**



Progressive adoption  
to Business Agility

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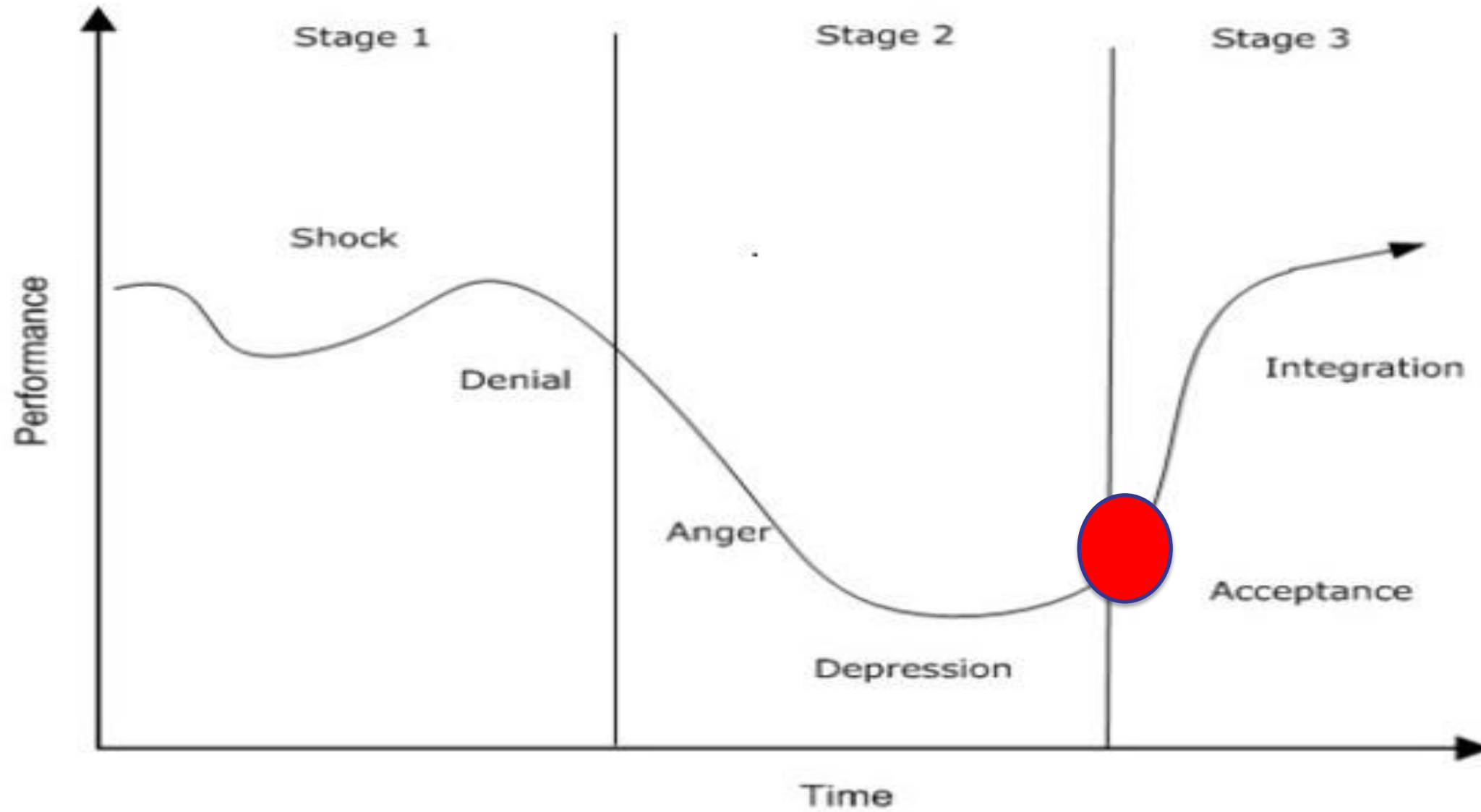


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## The Change Curve



So  
Where are  
You on  
this curve  
now  
?

Kubler-Ross Change Curve



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THANK  
YOU