Hewlett Packard Enterprise

ARISTA

Arista Solution Overview

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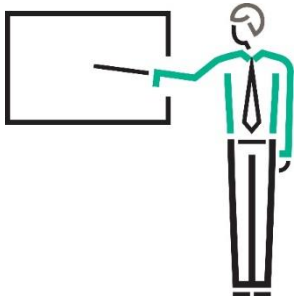
Solution Architect

November 2016



Arista overview

Introducing Arista's mission…transform every network

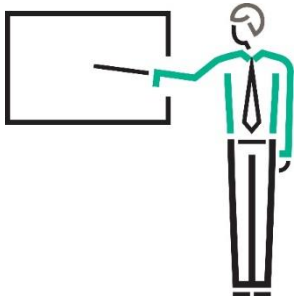
– Arista established and leads the **Cloud networking market transformation**

– The Arista name is Synonymous with **economy**, **open standards**, and **quality**

– Away from a static, closed, proprietary silos

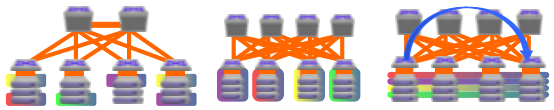
– Towards an **automated**, **programmable**, and **cost efficient** platform for applications

– **P**rice, **P**erformance, **P**ower, **P**ort density, **P**rogrammability



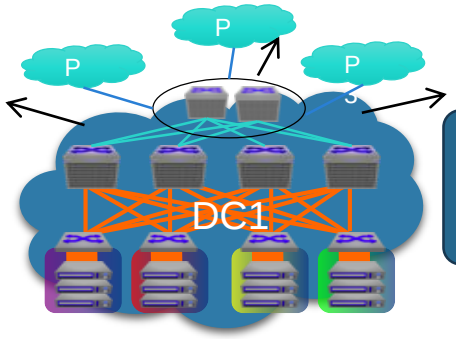
Service Provider DC Network Requirement

Heralds the Universal Spine for Many Roles

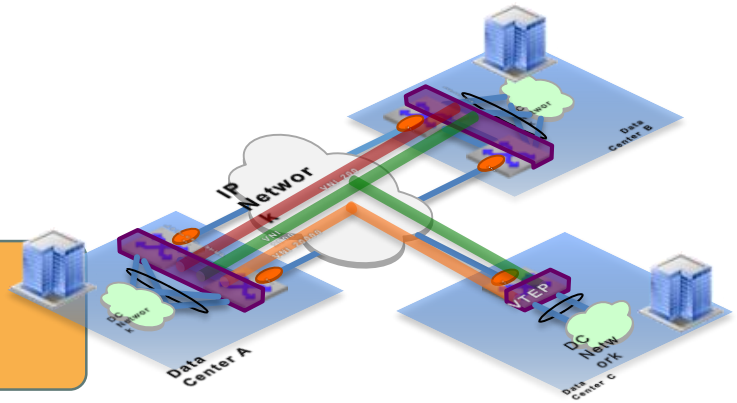


LDP/MPLS Segment Routing VXLAN EVPN

Flexible WAN Leaf

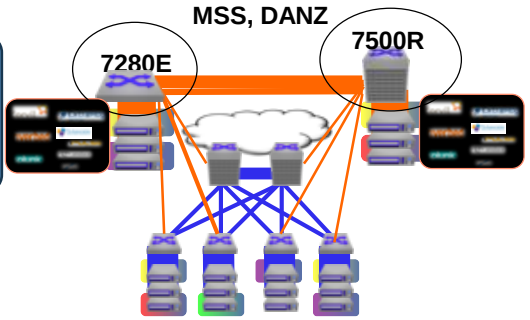


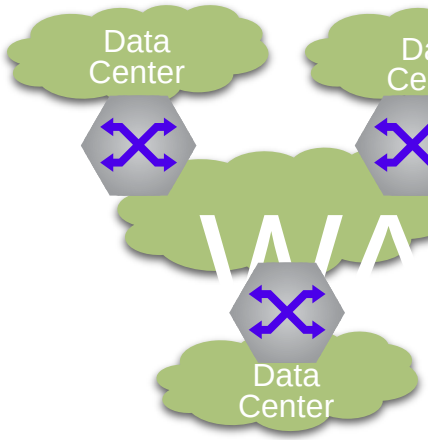
Spine DCI



CDN or Cloud Peering Edge

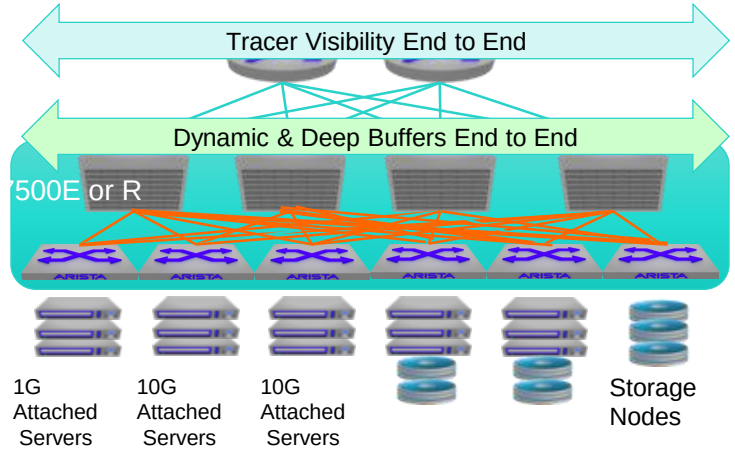
Monitoring Security MSS





Spine Routing >1M routes

IP Storage Big Data



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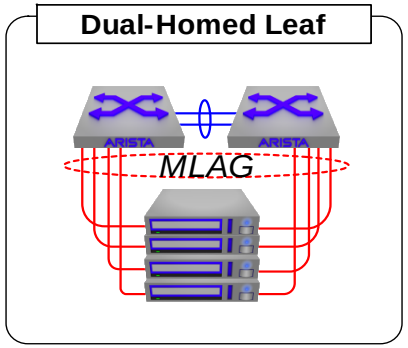
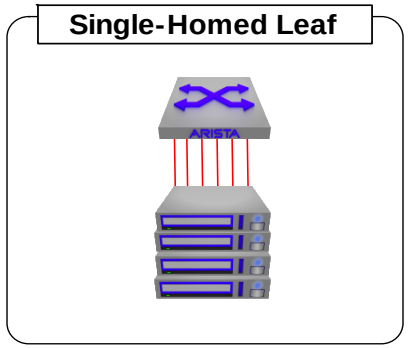
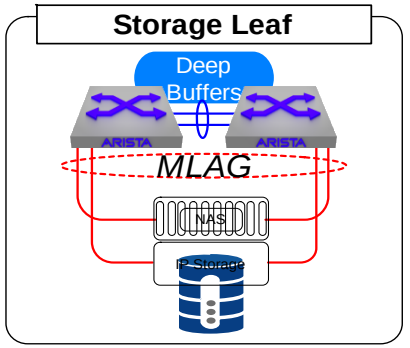
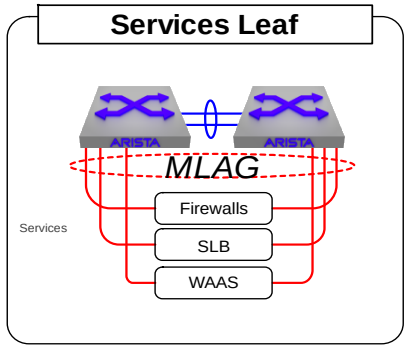
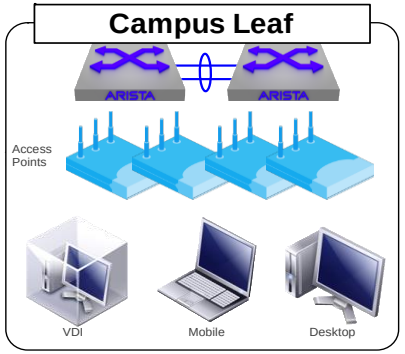
Consistent Leaf Designs

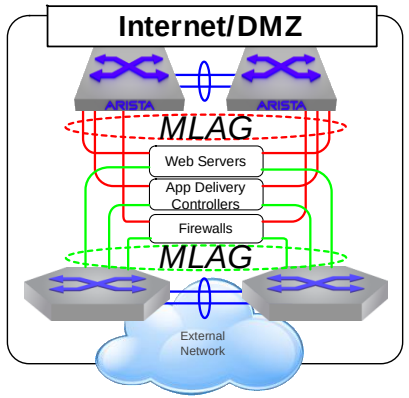


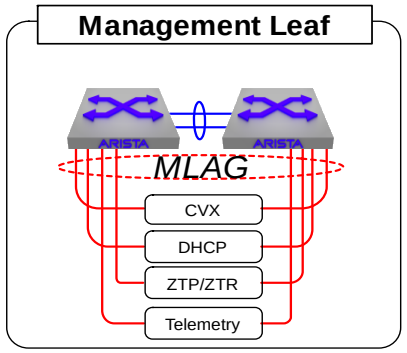


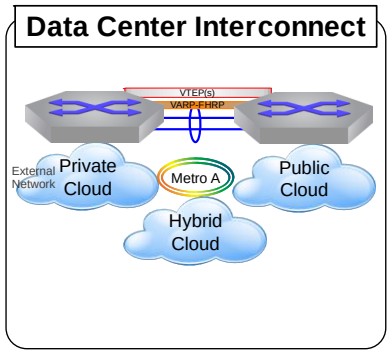


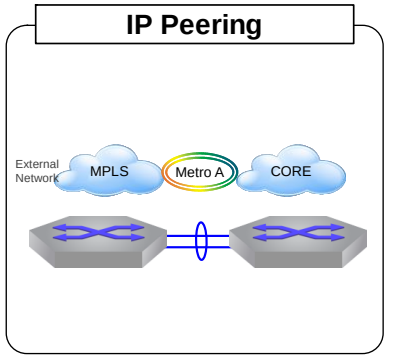


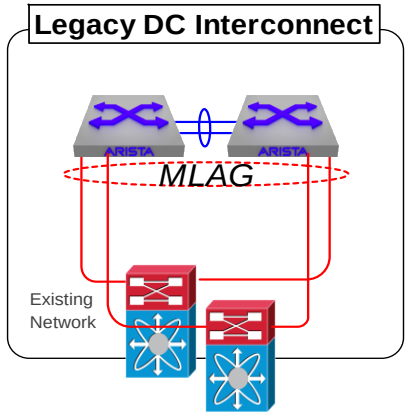


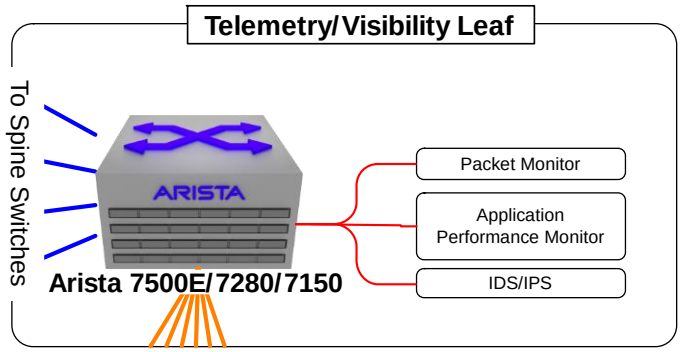












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Recognized by Industry

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Arista product portfolio

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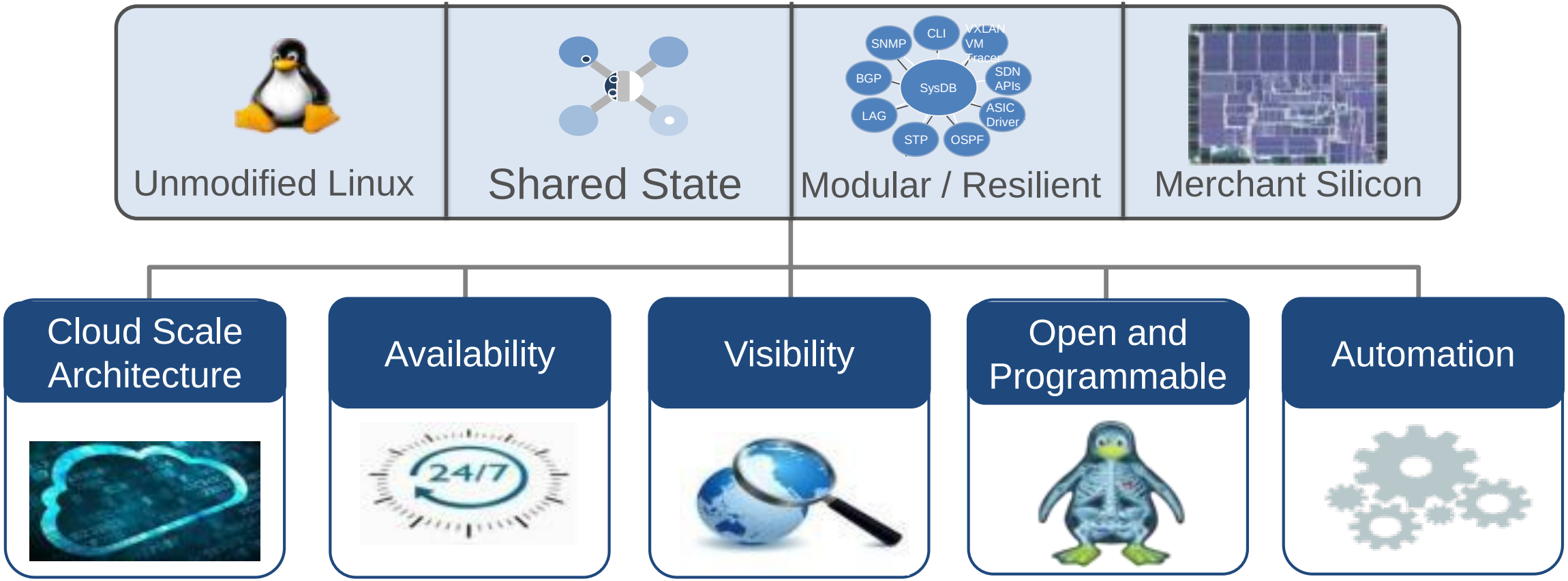
Arista Extensible Operating System (EOS)– Customer advantage

The platform for Software Driven Cloud Networks



Accelerates time to service and **reduces TCO**

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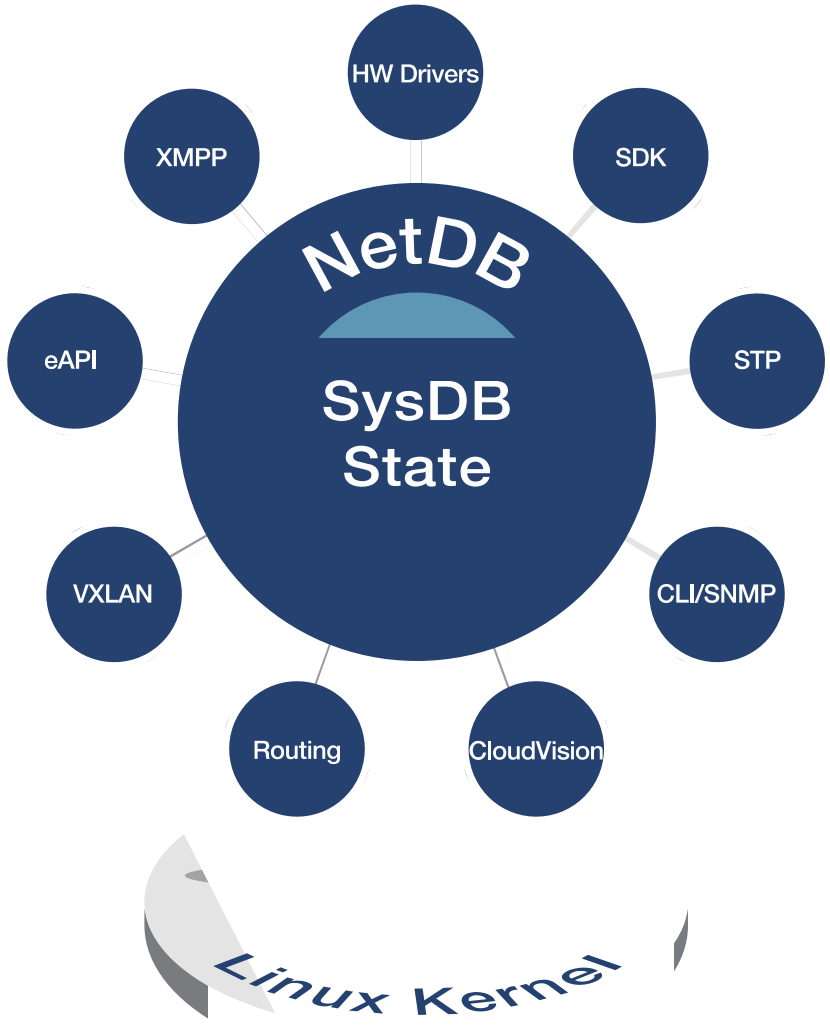
What is Arista EOS – Extensible Operating System



– **Basis of All Arista platforms** – a single software image for all of Arista's platforms: Switching, Routing, vEOS, TapAgg, and CloudVision

– **Unique architecture** – SysDB decouples protocol state from processing increasing reliability

– **Database instead of IPC** – Stateless model reduces complexity and improves performance

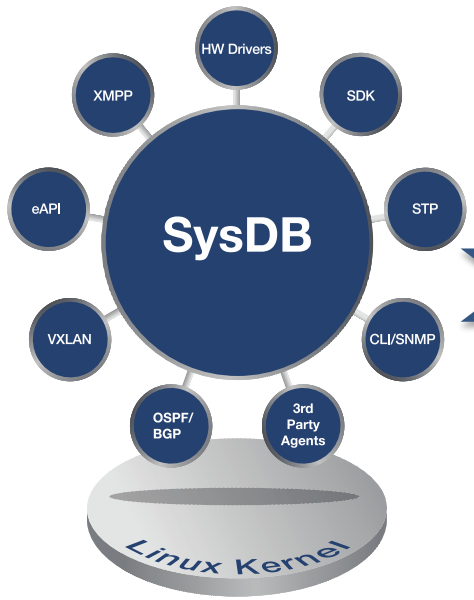
– **Live patching** - Avoid costly downtime for critical security fixes and hitless upgrades

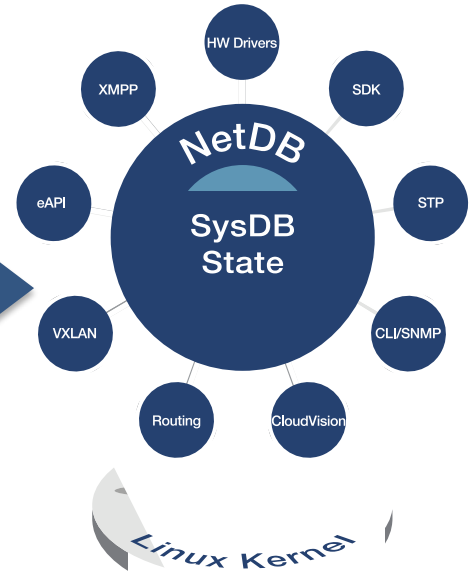
– **Standard Linux Kernel** – Open to flexible automation using Linux toolsets and scripts

– **EOS APIs** – For network wide automation of operations and provisioning systems

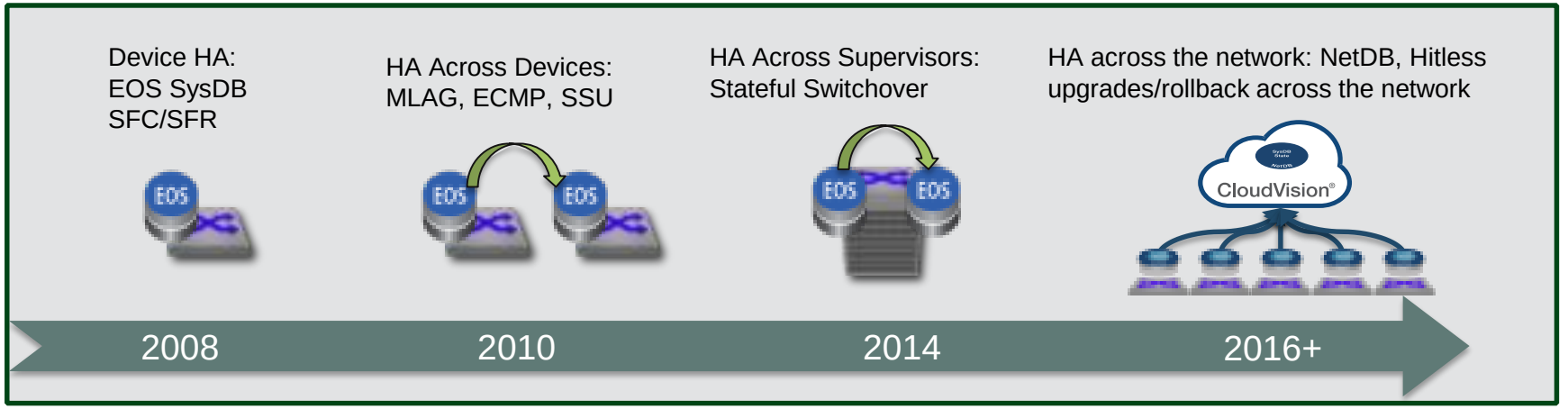
State of the Art - Highly available architecture

EOS SW Architecture
Strong Foundation
Highly resilient
Highly programmable
Extensibility
Open
Scalable
Automation





Aggregate network state
Abstract physical layer
Single point of integration
Open controller integration
Increased scalability
State Streaming
Telemetry



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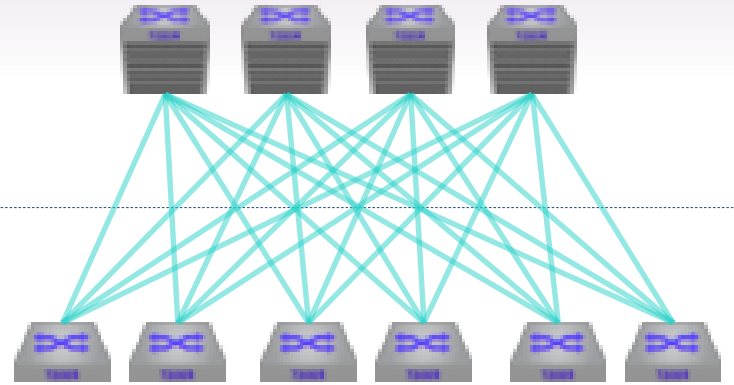
A foundation for high availability and resiliency



Network

CloudVision advantage
- Automated network wide change controls, including upgrades and rollback

Spine

Spine SSU
- Maintenance mode
- Dual SUP SSO with NSF
- MLAG Active/Active L2 SSO

Leaf

Leaf SSU
- Hitless Software Upgrade
- MLAG Active/Active L2 SSO

EOS

EOS Software architecture
- Multi-process state sharing architecture
- In-service software patching
- Software Fault Containment (SFC)
- Stateful Fault Repair (SFR)

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Introducing CloudVision Telemetry – modern management

Complete, real-time NetDB state streaming

CloudVision Telemetry Apps provide front-end for visibility network state

– **Workstream Analytics Viewer**

  – 1st CloudVision Telemetry App

  – Correlation of network-wide data

  – Views: Event, Device, Metric, and more

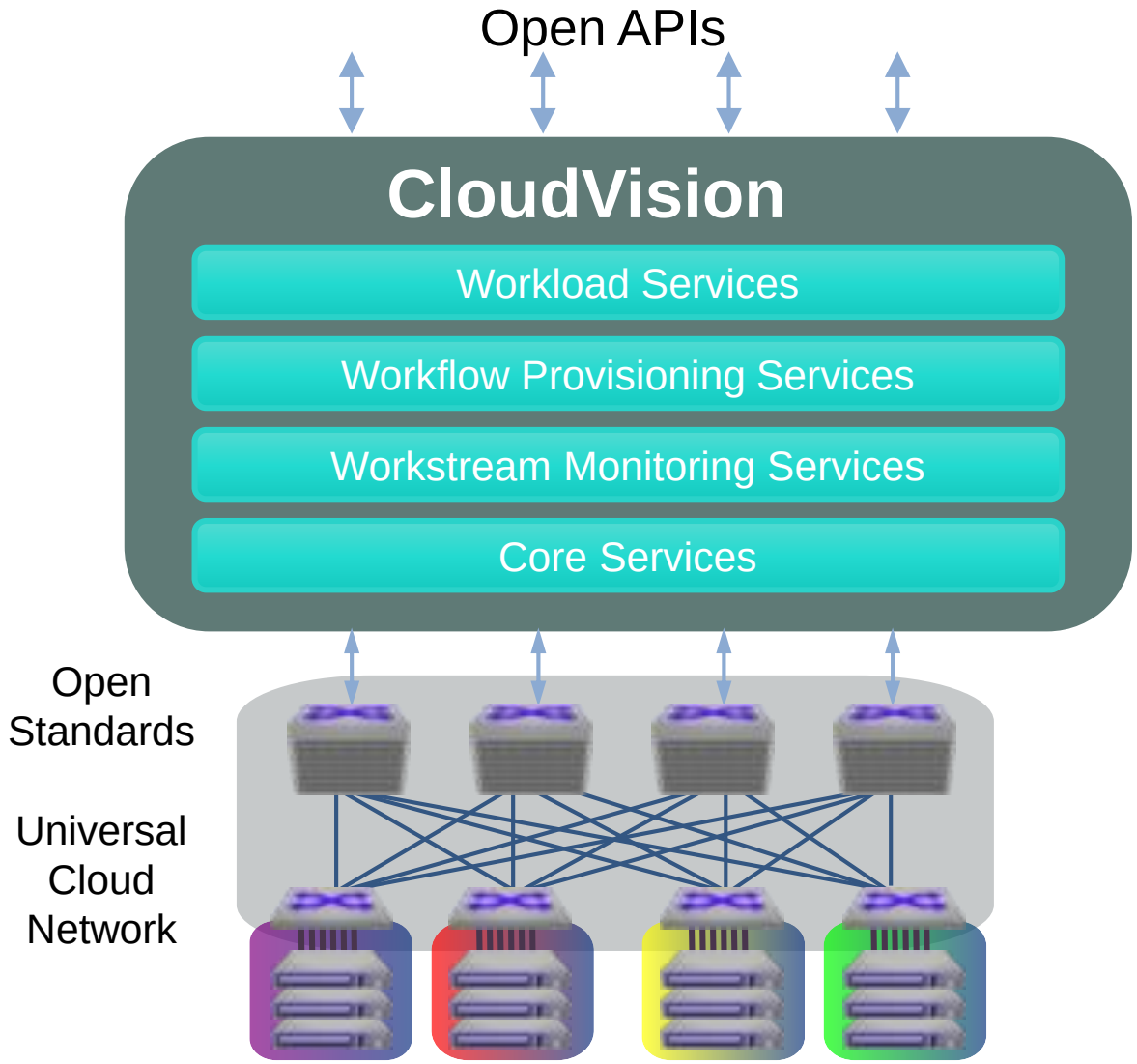
  – Timeline view for better historic troubleshooting

– More apps to follow:

  – Other CV-based apps

  – APIs for customer and partner apps

Arista CloudVision – Integral to Arista EOS Software



– Extends the EOS Platform

– Network-wide services and visibility via single access point

– NetOps and DevOps tools applied across boxes

– Integration and provisioning point for 3rd party controllers and orchestration systems

– Web-based User Interface

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CloudVision partner ecosystem

Partner for NSX Controller for overlay networking, VROps and vRealize for Visibility

Partner for IT Operations Management (ITOM), with HPE OneView Converged Infrastructure

Partner for Optical transport network controller integration

Partner for OpenStack Cloud

Partner in L4-7 Services

Partner in real-time network security auditing & compliance

Partner in IT Operations Analytics (ITOA)

Partner for Windows Server 2016 integration for network controllers

Partner for Solution integration, including ASM

Partner for L4-7 services integration

Partner for Converged systems

Partner in OpenStack Cloud

Leveraging open APIs and standardized transport from EOS and CloudVision

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All software is not equal – Dynamic Hitless Speed Change (SSO)

This example shows how to change the port mode to 48x10g+breakout6x40g for QSFP+ ports:

```
switch# configure terminal
switch(config)# copy running-config bootflash:my-config.cfg
switch(config)# write erase
switch(config)# reload
WARNING: This command will reboot the system
Do you want to continue? (y/n) [n] y
switch(config)# hardware profile portmode 48x10g+breakout6x40g
Warning: This command will take effect only after saving the configuration and reload!
Port configurations could get lost when port mode is changed!
```

Ex 1: Requires a reload

You configure breakout ports with the `/etc/cumulus/ports.conf` file. After you modify the configuration, restart `switchd` to push the new configuration (run `sudo service switchd restart`; this interrupts network services).

Ex 2: 'switchd' restarts

Ex 3: Switch will restart

```
Arista(config)#show interfaces et29/1 status
Port       Name           Status       Vlan     Duplex Speed
Et29/1                    disabled     1        full   40G

Arista(config)#interface et29/1
Arista(config-if-Et29/1)#no speed forced 40gfull
Arista(config-if-Et29/1)#show interfaces et29/1-4 status
Port       Name           Status       Vlan     Duplex Speed
Et29/1                    disabled     1        full   10G
Et29/2                    disabled     1        full   10G
Et29/3                    disabled     1        full   10G
Et29/4                disabled     1        full   10G
```

Only Arista EOS has **Dynamic Hitless Speed Change**

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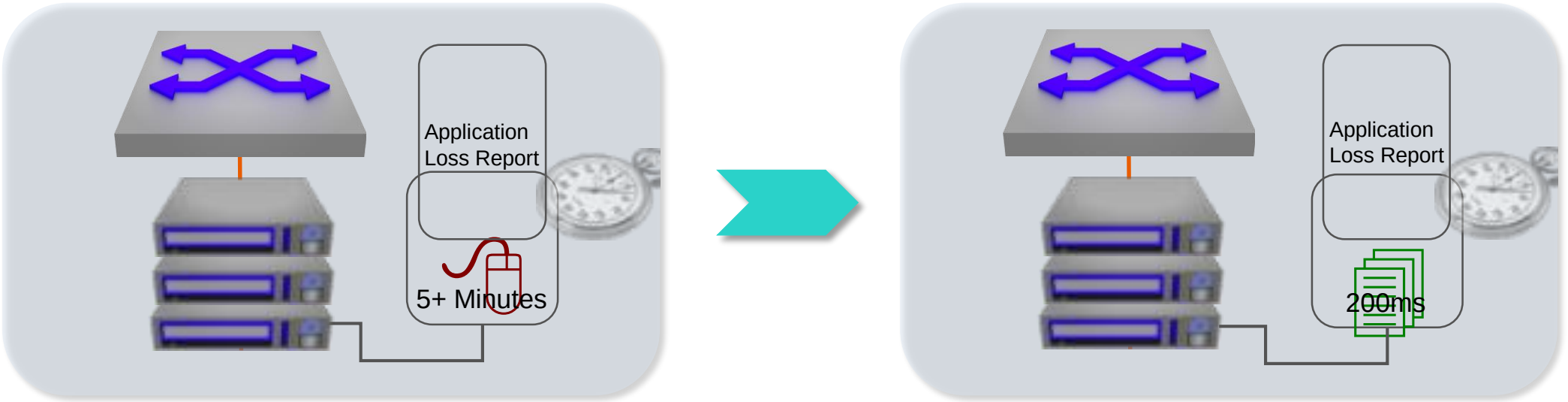
Smart System Upgrade – Hitless upgrade



Existing approaches

SSU Hitless upgrade

SSU Hitless upgrade

– Designed to provide simple, low risk upgrade options, for fixed configuration systems and single connected servers

– Key feature for critical applications where maintenance windows are impossible to schedule

– During reload, Data Plane remains fully operational and acts as a proxy for Control Plane

– Traffic loss during an SSU Hitless Upgrade is unnoticeable to applications

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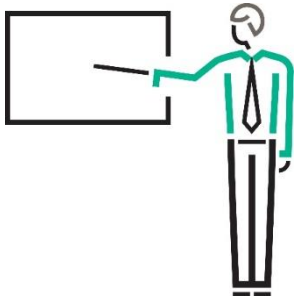
EOS quality – A proven track record

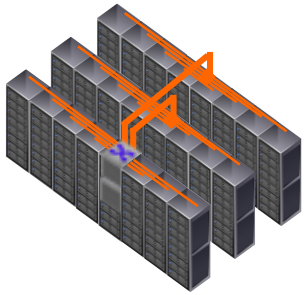
Criteria (2010-2016)	Indicator
# of EOS code versions across ~26+ shipping products	1
Software field notices	7
Software regression bugs	5
Security advisories	9
End of software support announcements	3

Stability, Stability, Stability….

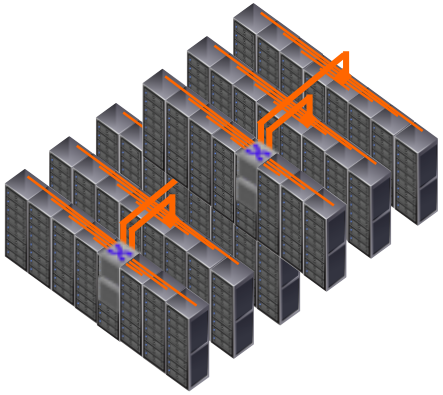


Network Architecture – Universal Cloud, Spine, and Leaf

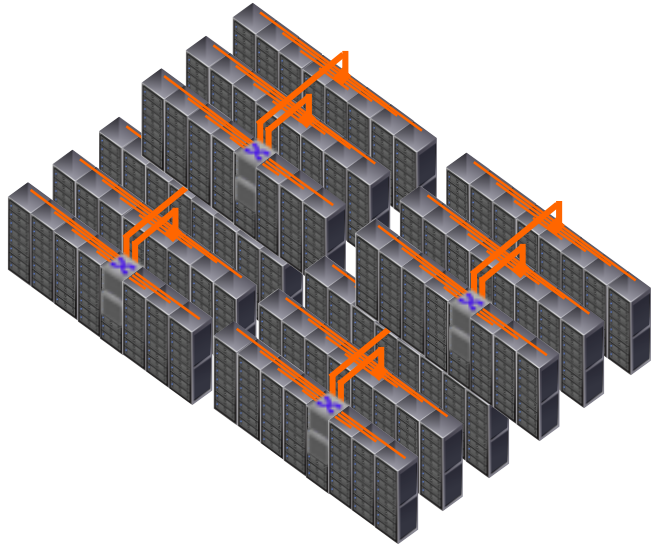
Cloud networking architectures



Spline™

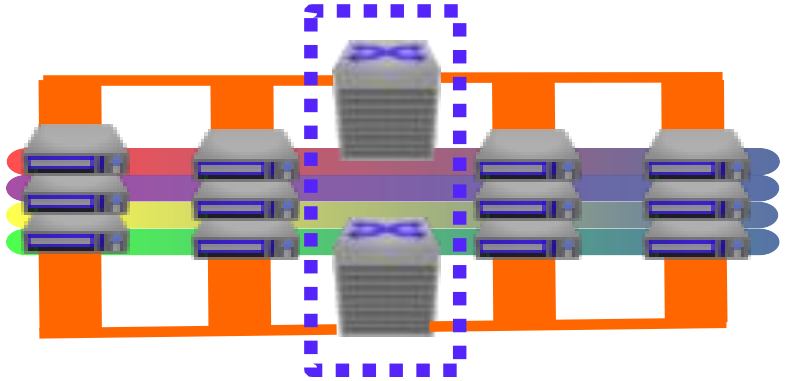


Layer 2 / MLAG

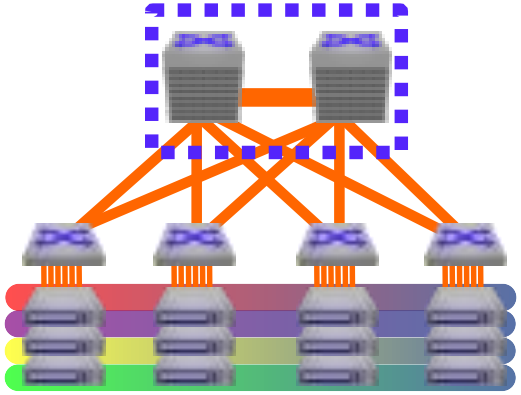


Layer 3 / ECMP

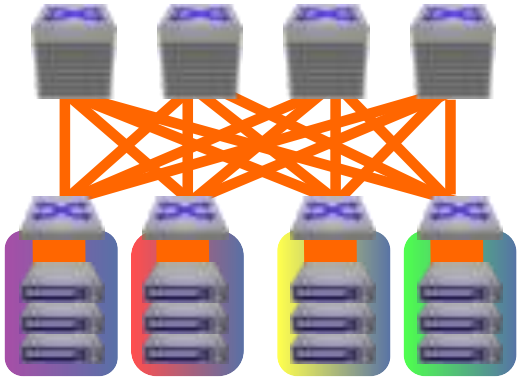
VXLAN: Network Virtualization



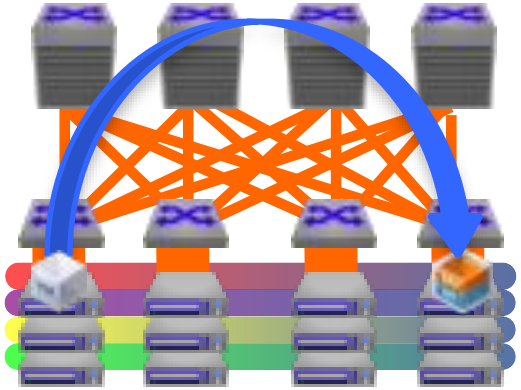
Host Scale: 0 to 2,000



100 to 10,000



500 to 100,000+



500 to 100,000+

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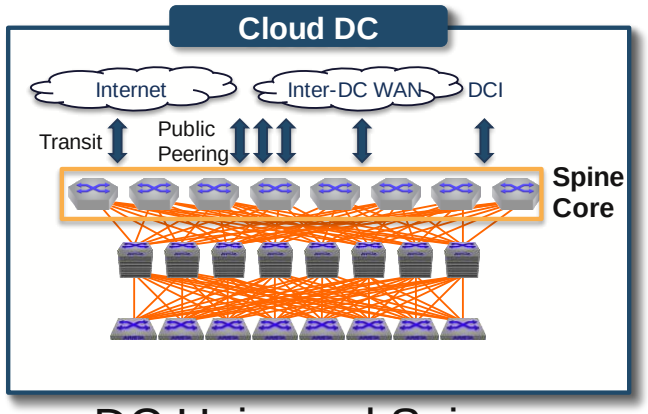
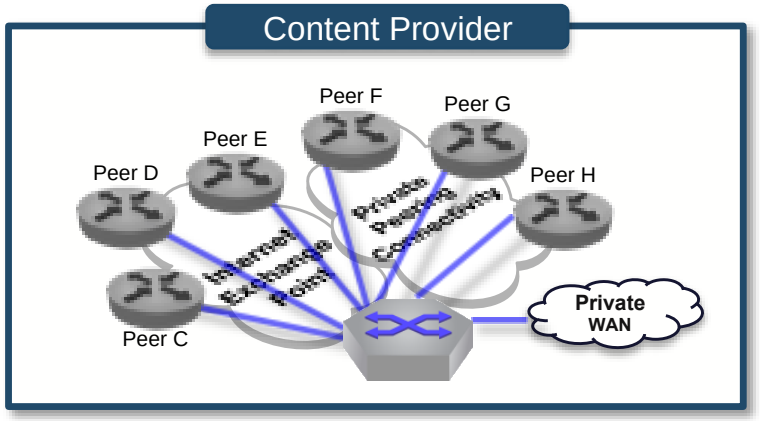
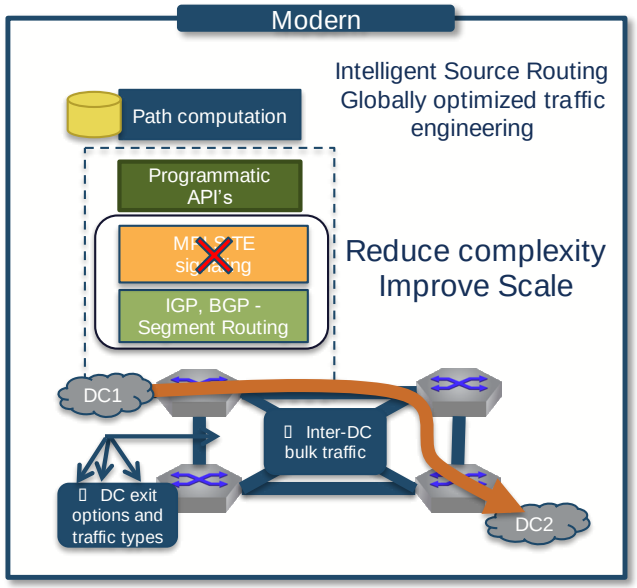
Arista Universal Spine Routing use-cases



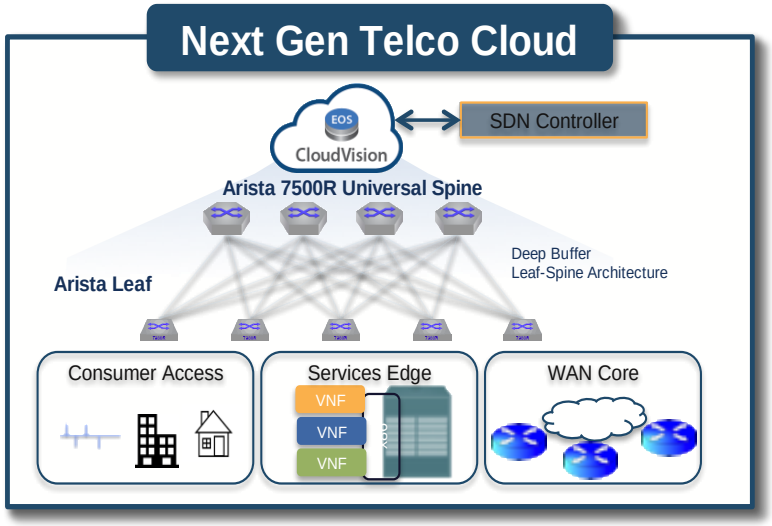
DC Universal Spine



Internet Peering



Cloud WAN



Service Provider NFV

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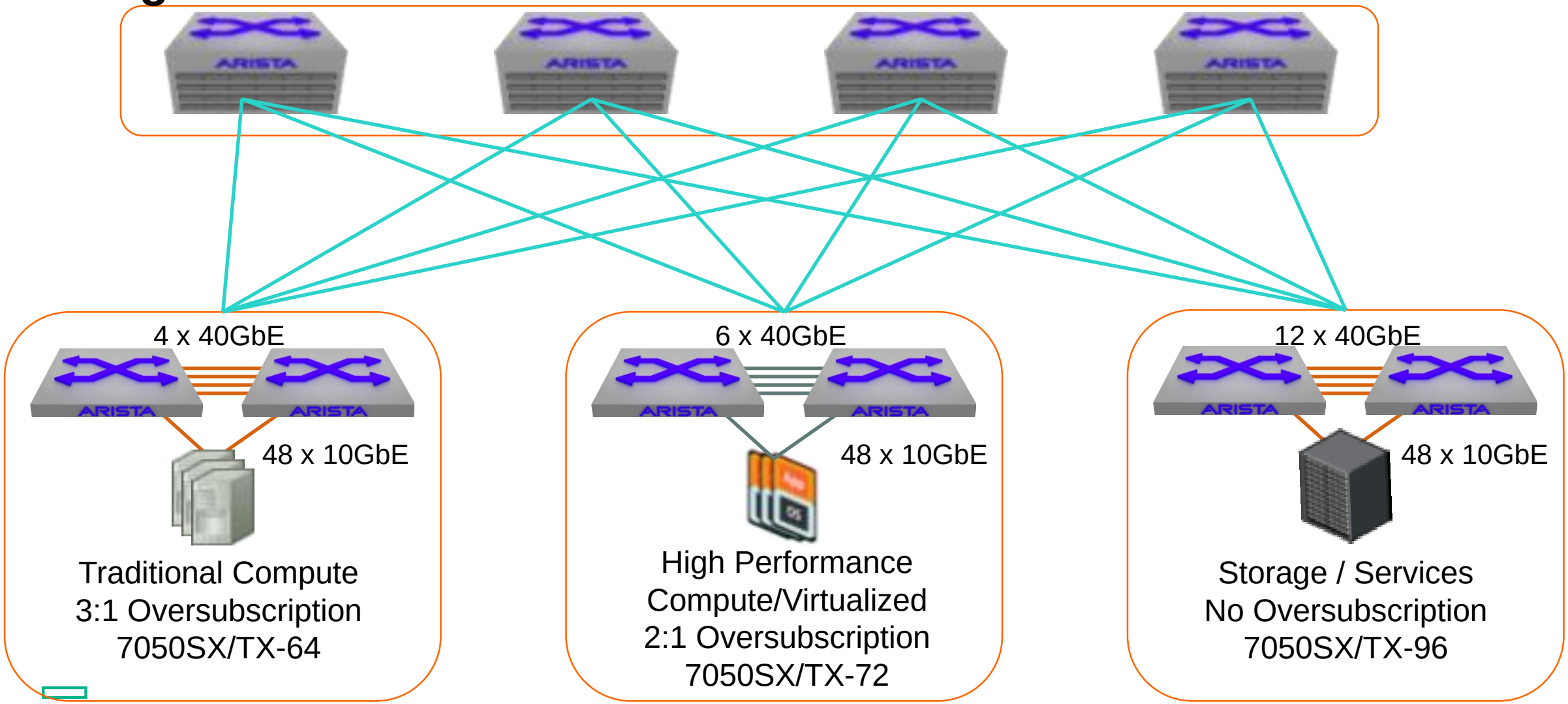
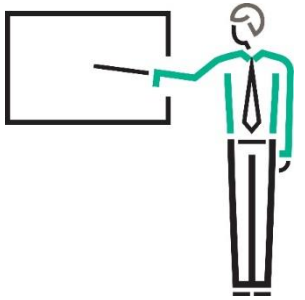
Universal Cloud Architecture Platform choices with consistent designs



Network virtualization deployment architectures

VMware	VMware NSX	OpenStack	OpenStack with SDN Controller
Arista VM Tracer with VXLAN support automatically provisions segments and supports thousands of VMs	Arista integrates with VMware NSX in VLAN mode today and in 2015 will integrate via OVSDB	Arista natively supports OpenStack Neutron ML2 integration natively	Arista integrates with multiple controller vendors to support OpenStack orchestration



Hardware – Family of platforms built on merchant silicon

Broadest portfolio with merchant silicon

Arista is now a synonym for merchant silicon based switches

DUNE NETWORKS

intel

FULCRUM microsystems

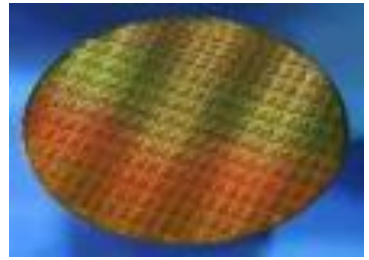
pliant

BAREFOOT NETWORKS

Arista and the merchant silicon landscape today

T+ → T2 → T2+ → T3

T2 → TH → TH2



64x10G 32x40G 32x100G 64x100G

DUNE NETWORKS

Petra → Arad → Jericho → Jericho2

8x10G 6x40G 6x100G 18x100G

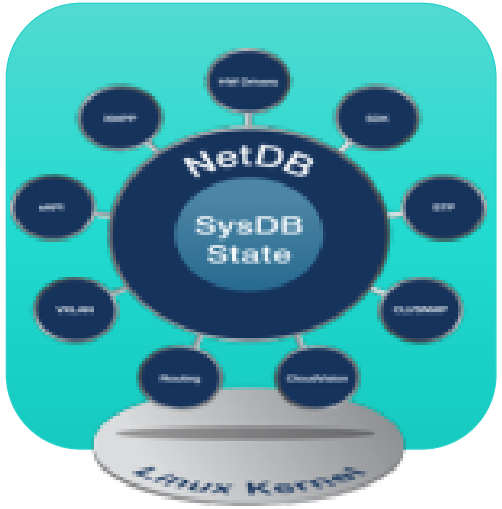
Others

Several choices coming to market in 2016 and 2017

Arista FlexRoute™ Engine (R-Series Platforms)

Arista Innovation that enables Internet IP Routing with lowest power footprint

ARISTA FlexRoute™



Merchant Silicon with Arista Innovations
– Internet Routing table (with headroom)
– 1M+ Routes in hardware
– Half the power consumption[1]

Arista EOS NetDB Evolution
– Hundreds of BGP peers
– Scales to millions of routes
– >2X faster convergence[2]

Enables switches to be deployed in Internet Edge / Router scenarios

Virtual Output Queuing with Deep Dynamic Buffers

– **Deep Dynamic Buffers at input** – frames queued awaiting scheduling slot

– **Virtual Output Queues at input** – N queues representing output ports

4GB Buffer Memory per Ingress Packet Processor (up to 288GB/System)

– ~30% buffer dedicated per Output Port + TC

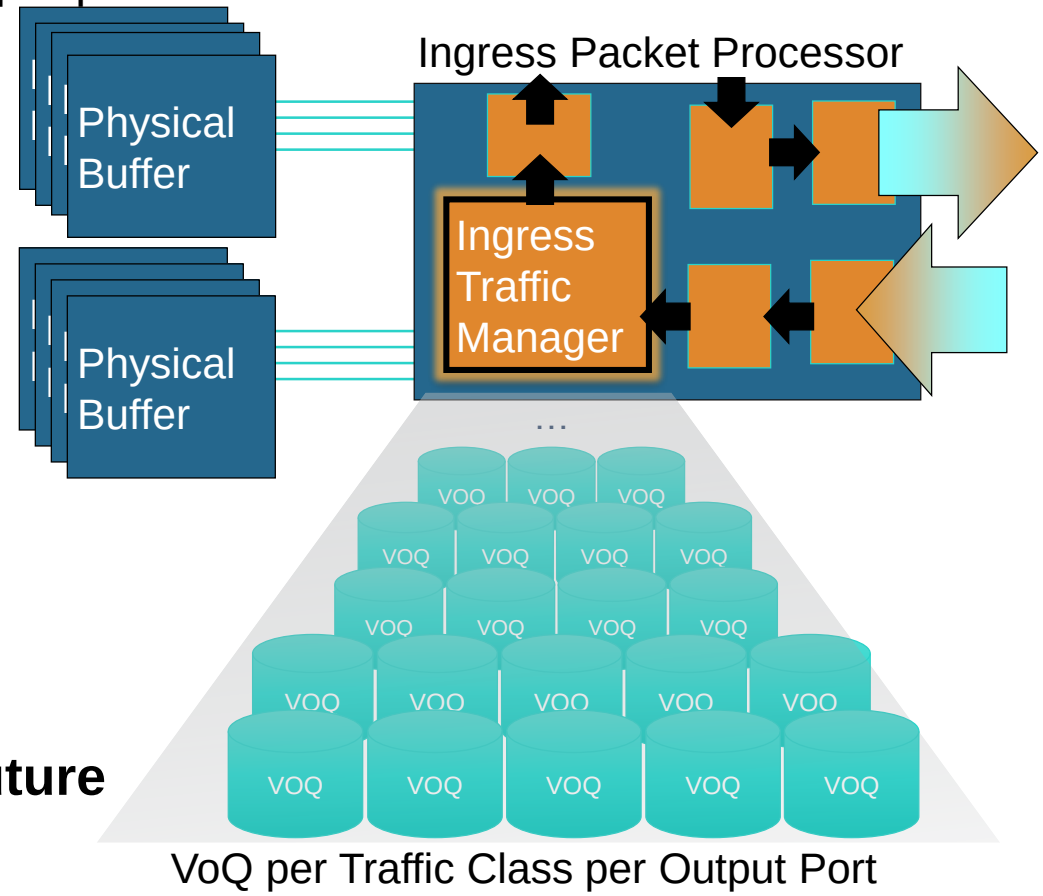
– ~15% buffer for multi-destination traffic

– ~55% smart pool of dynamic buffer

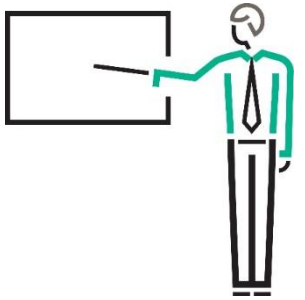
VOQ Subsystem, millions of queues/system

– Smart Queue Limits per VoQ (bytes, frames)

– Always fair - QoS policy always enforced



Any application workload, now or in future

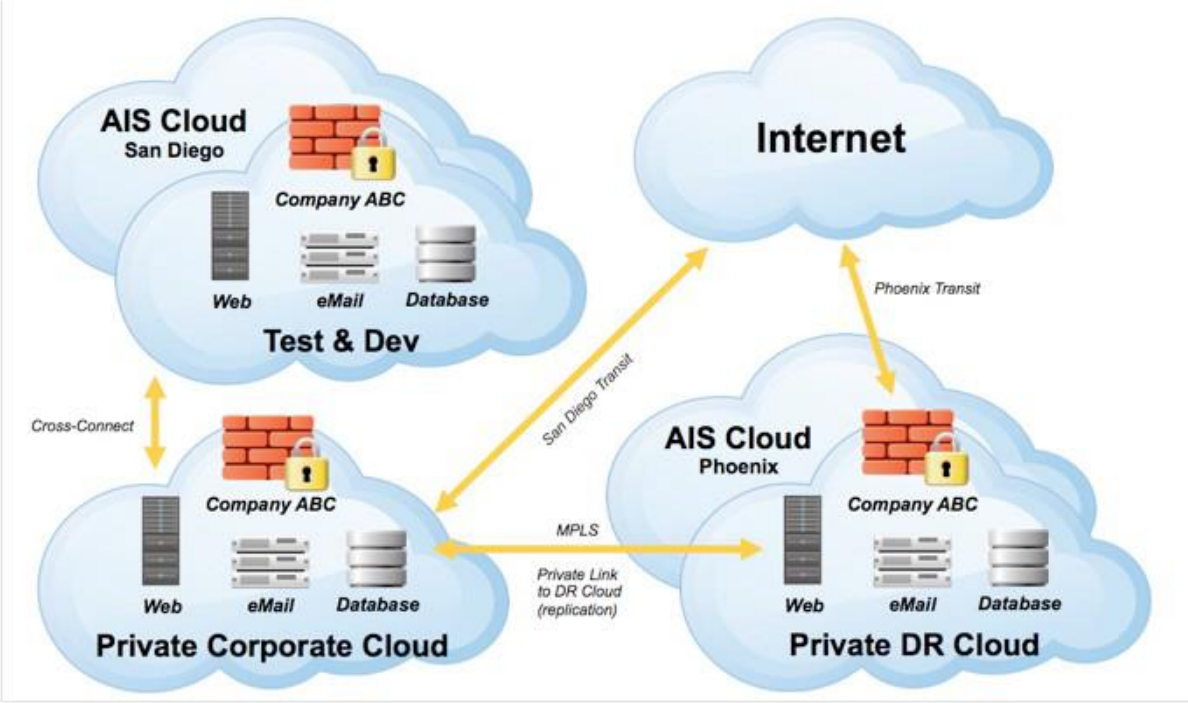


Case Study

AMERICAN INTERNET SERVICES (AIS)

One of the Southwest's leading IT infrastructure solutions providers, AIS (American Internet Services) delivers colocation and cloud services across seven enterprise – class facilities in San Diego, Los Angeles and Phoenix.

AIS Delivers Cloud Computing Solutions using 10GbE switches from Arista Networks



Hewlett Packard Enterprise ARISTA

AMERICAN INTERNET SERVICES (AIS)

Brian Wood, AIS's marketing vice-president, summed up the pre-sales discussions with Arista Networks:
"There was lots of back and forth on the technical specifications. The (Arista Networks) sales engineer knew what we were trying to implement and he had solid suggestions."

AIS's initial deployment used 7050S series switches in a Multi-Chassis Link Aggregation (MLAG) configuration. This design simplified both the dual 10GbEconnected hosts, and the storage array configurations.
The second deployment rolled out additional 7050S series switches and a number of 7048T Gigabit Ethernet switches.

"On functionality, feature set and price, Arista Networks 7000 Series switches had everything we needed."

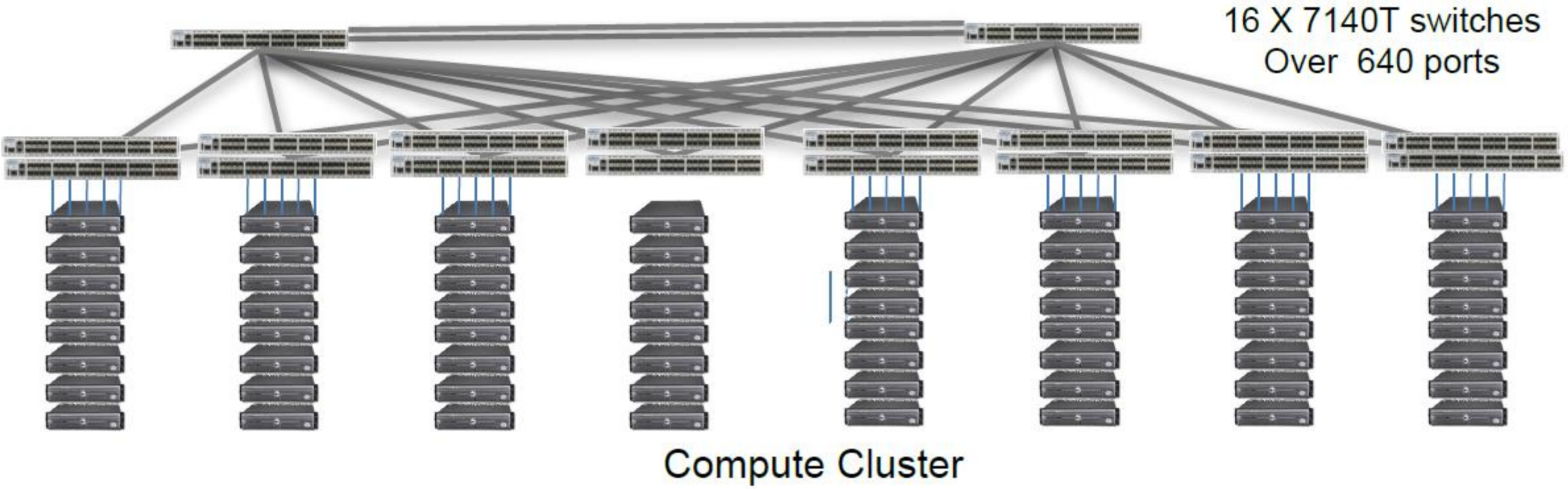
RACSA is the leading commercial and residential Internet Services Provider (ISP) in Costa Rica.

– To minimize the data center's carbon footprint, RACSA took advantage of containerized data centers, which are compact, energy efficient and seismically resistant. However this strategic choice introduced another requirement: high performance in a small package.

"Being the first cloud in Costa Rica was a great challenge for us, on one hand we had the costumers' requirements (high end switching, wire speed and support) and on the other the commitment to a green facility and thanks to the Arista solutions we accomplished both."
Gonzalo Berrocal Brenes,
IT Director, Racsa.

RACSA is the leading commercial and residential Internet Services Provider (ISP) in Costa Rica.

2 X Arista 7148SX
Spine Switch With MLAG



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RACSA is the leading commercial and residential Internet Services Provider (ISP) in Costa Rica.

– **The Arista Solution:** “Having evaluated a number of oversubscribed 10GbE switches, what most impressed us about the 7100 series was that it was totally non---blocking, delivering 10GbE wire speed on all ports. In addition, the ability to carry both 1GbE and 10GbE gave us the flexibility to fully leverage our existing infrastructure. Happily, the Arista Solution was also the most high performance and cost effective option we considered”.

– **Metrics and Differentiators:** Additionally, the service has been interrupt free since its launch. Arista’s wire speed, non---Blocking switches provided the bandwidth to ensure the needed scalability and performance in the data center. Its unique Top of Rack 1000Base---T/10GBase---T switches also simplify server migration from one to ten gigabit Ethernet networks. Finally, the added benefit of uncompromising layer 2 and layer 3 performance in a power efficient 1RU form factor ensured scalability and low operating costs. Plans are already under way for a new data center to accommodate future growth in RACSA’s subscriber base.

Hewlett Packard
Enterprise

ARISTA

Thank you