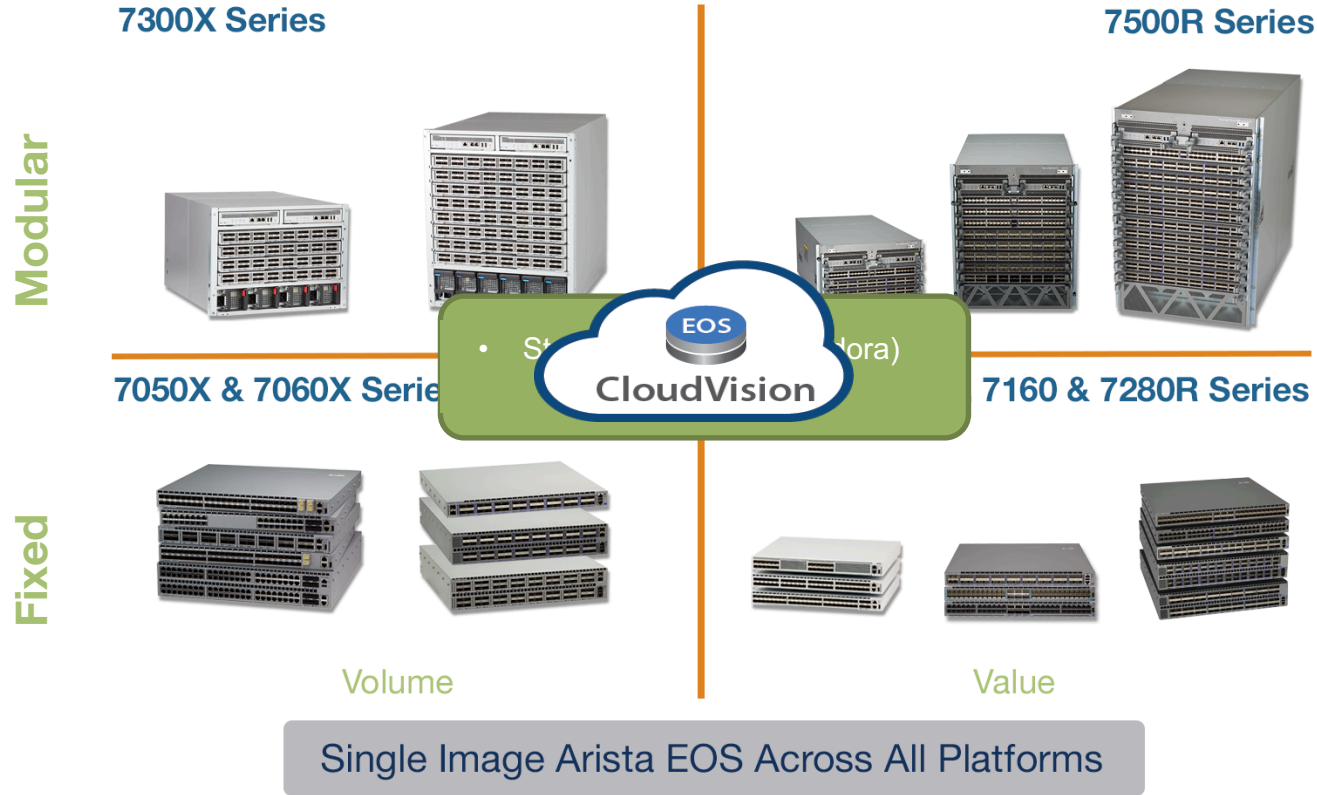# Open Arista SDDC Architectures and Solutions
TREX Workshop 2018

Markku Rantanen
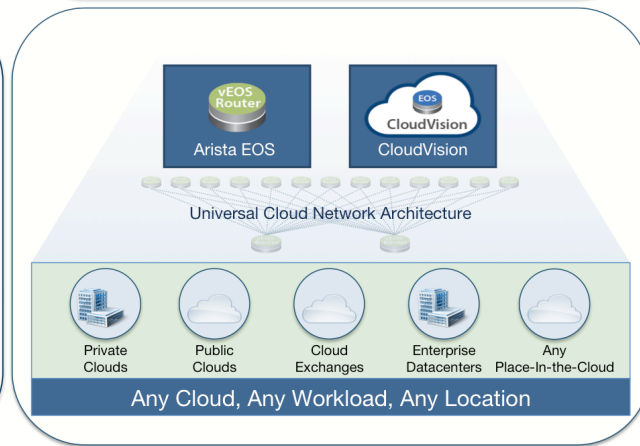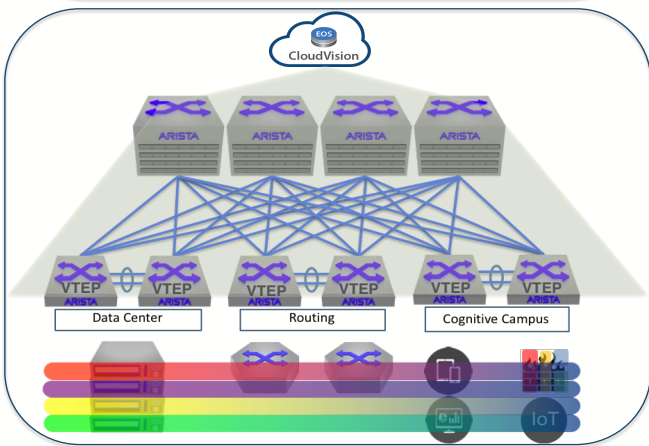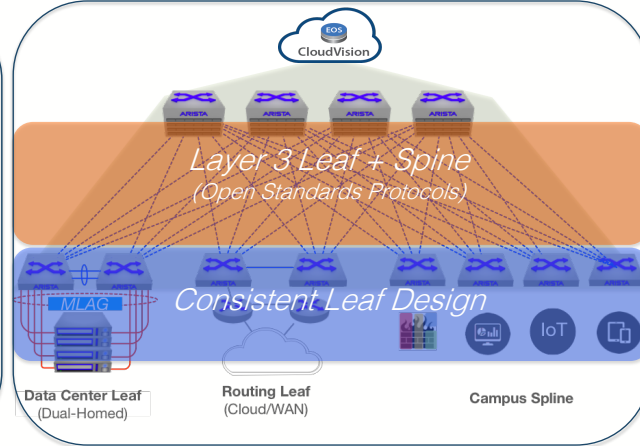
markku@arista.com
ircnet mtr

ARISTA

Arista – What do we sell?

7300X Series

7500R Series

Modular

Fixed

7050X & 7060X Series

7160 & 7280R Series

EOS
CloudVision

Volume

Value

Single Image Arista EOS Across All Platforms

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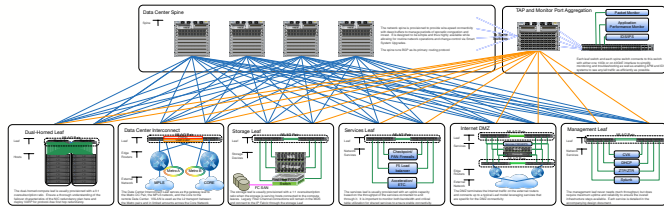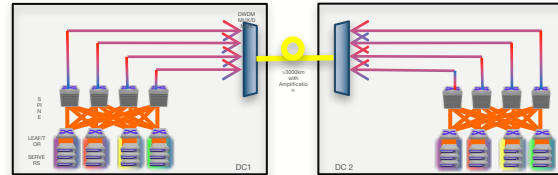# The Universal Cloud Network (UCN)
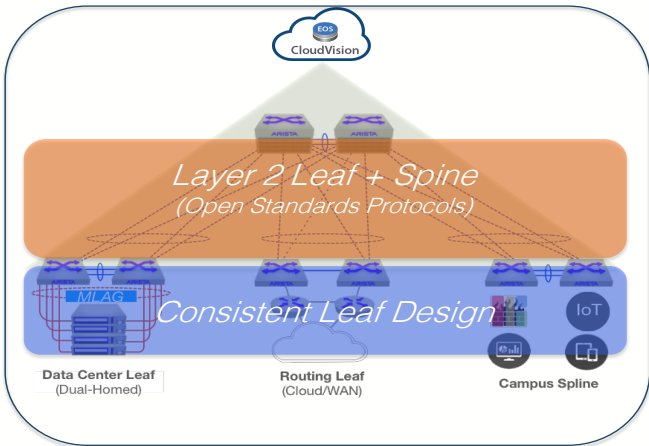
- Simple
- Scalable
- Standards Based
  - not proprietary fabrics
- Solution
  - not a series of architectures

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Arista EOS Use-cases

Universal Cloud Network

Data Center Interconnect

Macro Segmentation
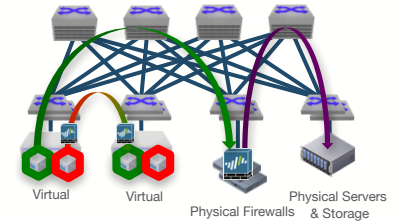
Network Virtualization
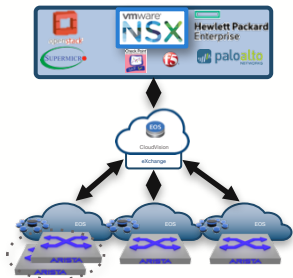
DANZ, LANZ and Tracers
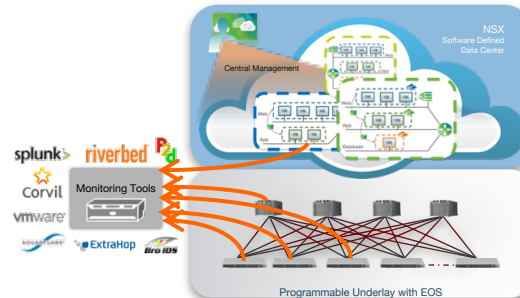
IP Storage Media

IP Peering
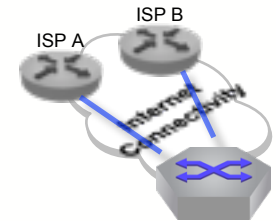
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Arista EOS Use-cases : Arista Any Cloud Platform

Private Cloud

Cloud Exchange

Public Cloud

Any Cloud API

Automation

Analytics

Agile Work-X

Available Architecture

CloudVision

DC Aggregation with Arista Universal Cloud Network

Arista Router at Equinix

vEOS Router in AWS

vEOS Router in Azure East

vEOS Router in Azure West
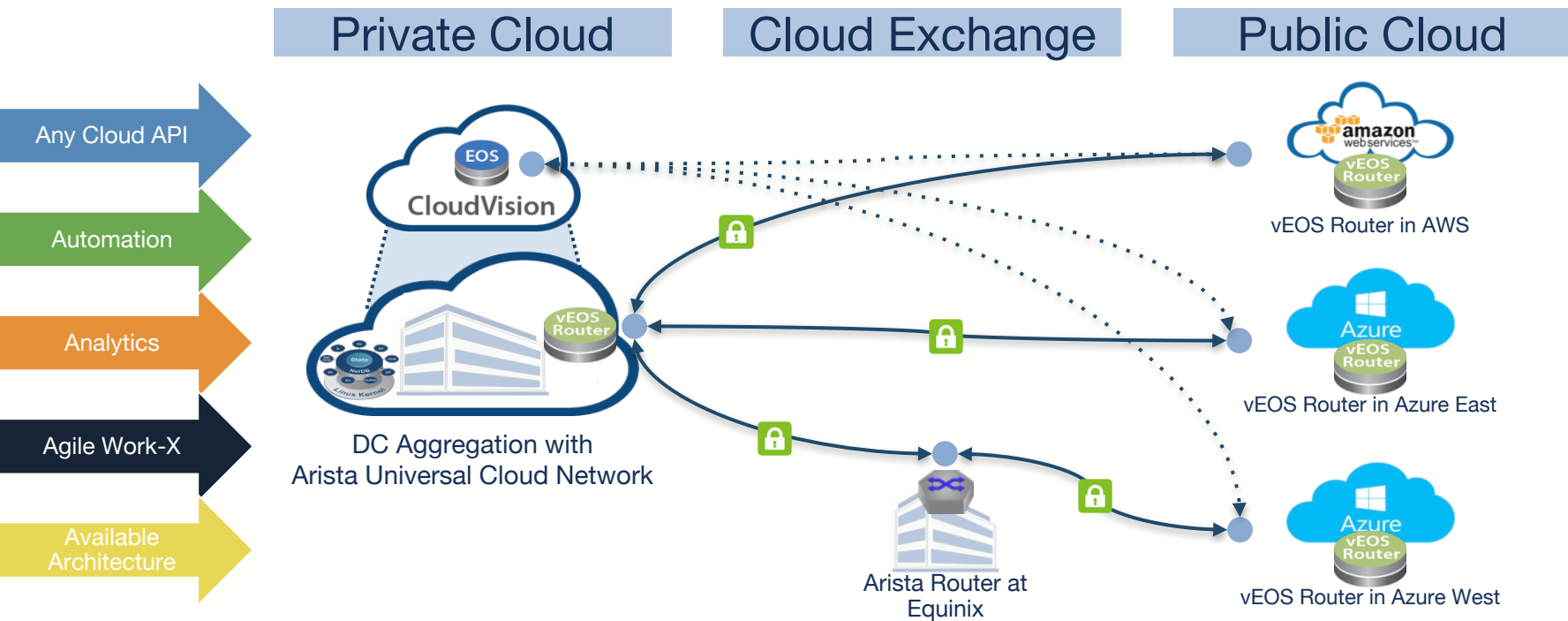
Hybrid cloud, expanding seamlessly beyond the datacenter...

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Arista Silicon Landscape: 2016-2019
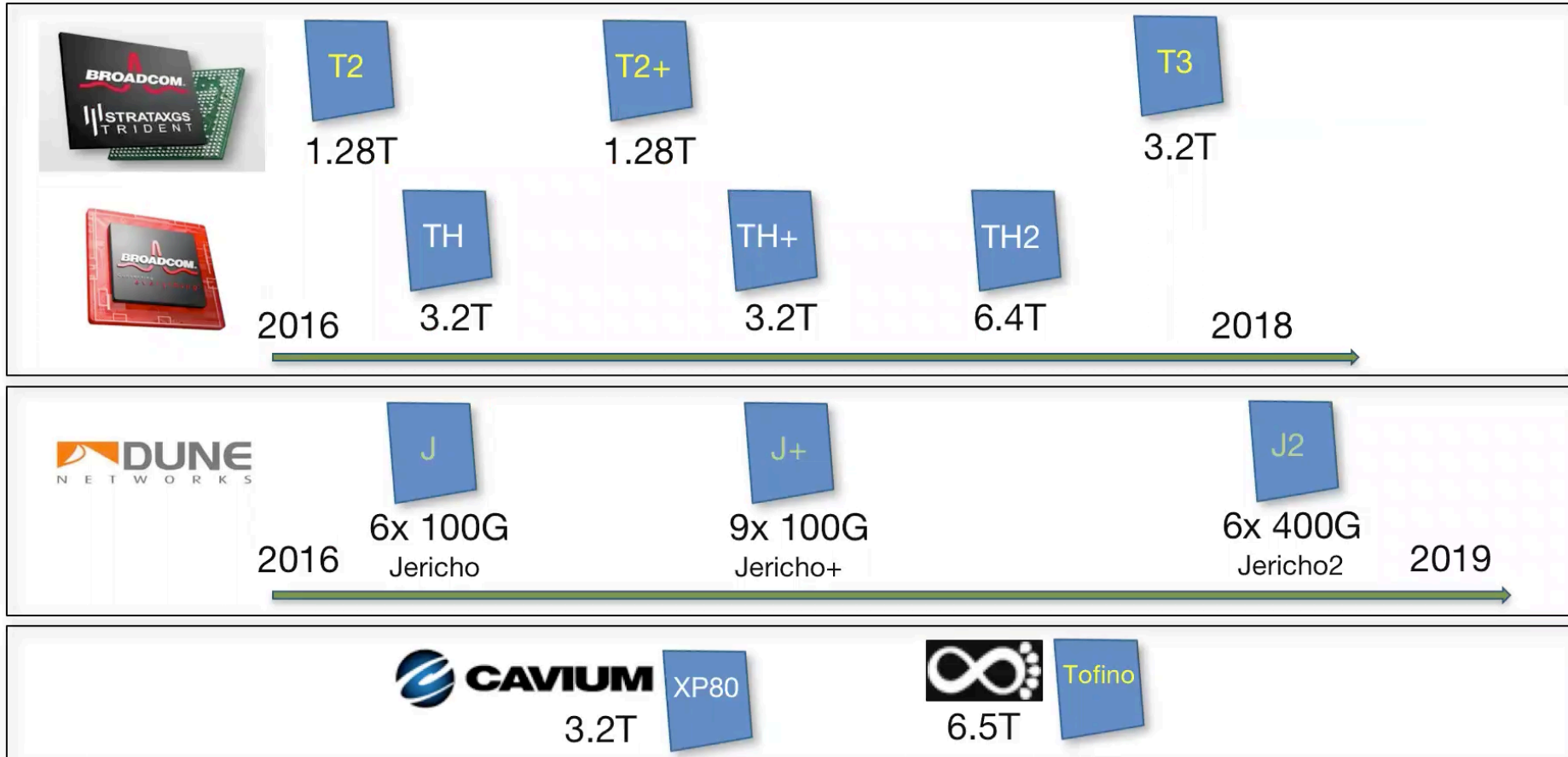
All Merchant Silicon-based Hardware is not Equal

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- Best of Breed Si Vendors
- EOS Hardware Abstraction
- Artistry of Hardware design
- Getting more out of the Silicon
- Investment Protection

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EOS: Software Driven Foundation Like No Other

Single Image
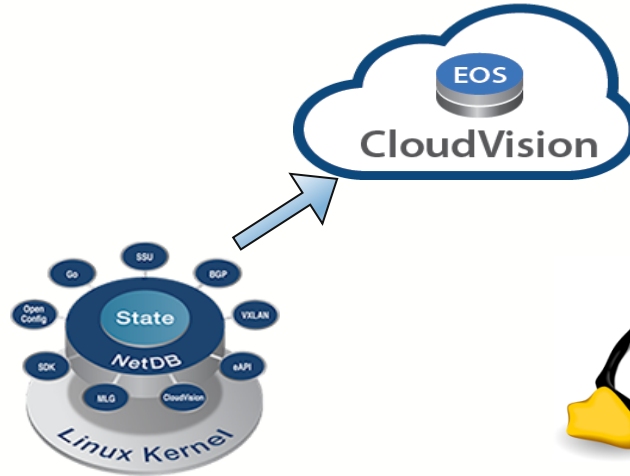
State Oriented

Programmable

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What is Arista's EOS – Best for Resiliency
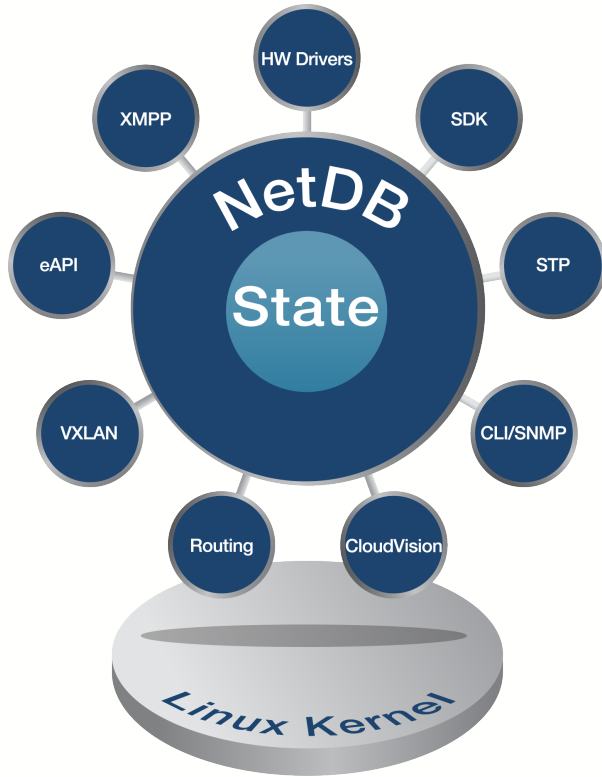
Unique EOS State - Decouples protocol state from processing increasing reliability

Database for IPC – Stateless model reduces complexity and improves performance

Live Patching - Avoid costly downtime for critical security fixes

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

EOS APIs - Network wide automation of operations and provisioning systems

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Modern Operating Systems - Flexibility

One EOS. Many packaging options

	Standard EOS	EOS in a virtual machine	EOS in a container
Architecture	EOS (Linux)	VM / vEOS (Linux)	Container / cEOS
		Multi-Hypervisor	Docker
			Linux Kernel
	Arista Hardware	x86 Server	X86 Server Arista hardware 3rd Party hardware
Use cases	HW+SW Bundled solution	vEOS Lab vEOS Router ← New!	Kernel independence (Cloud) Hardware Disaggregation General lab simulation

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Arista is Open
Examples of automation and 3rd party integrations

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Arista and VMware Innovating together

A History of Innovation

vmware® + ARISTA

2008-2009

2015+

Arista Launches Cloud Networking Vision

VM Tracer for vCenter

Jointly Developed VXLAN

VMware delivers NSX

VMware builds public clouds with Arista

Arista & NSX Network Integration
(L2GW with OVSDB)

Arista vRealize Log Insight content pack

Gateway P/V integration with NSXv

Joint vRealize Operations
(advanced services)

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Orchestration of the physical Infrastructure

Virtual to Physical connectivity

Program state on the SW VTEP on the vSwitch and HW VTEP on the Arista switch

NSX

7500 7500 7500 7500

VXLAN VNI

Spine Layer
10Gbe/40Gbe
Layer 3

L3
L2

HW VTEP

SW VTEP

HW VTEP

Leaf layer
10Gbe/1Gbe
Layer 3

HyperVisor

VM VM VM

Subnet/VLAN C
Layer 2 Domain

SW VTEP

HyperVisor

VM VM VM

Subnet/VLAN B
Layer 2 Domain
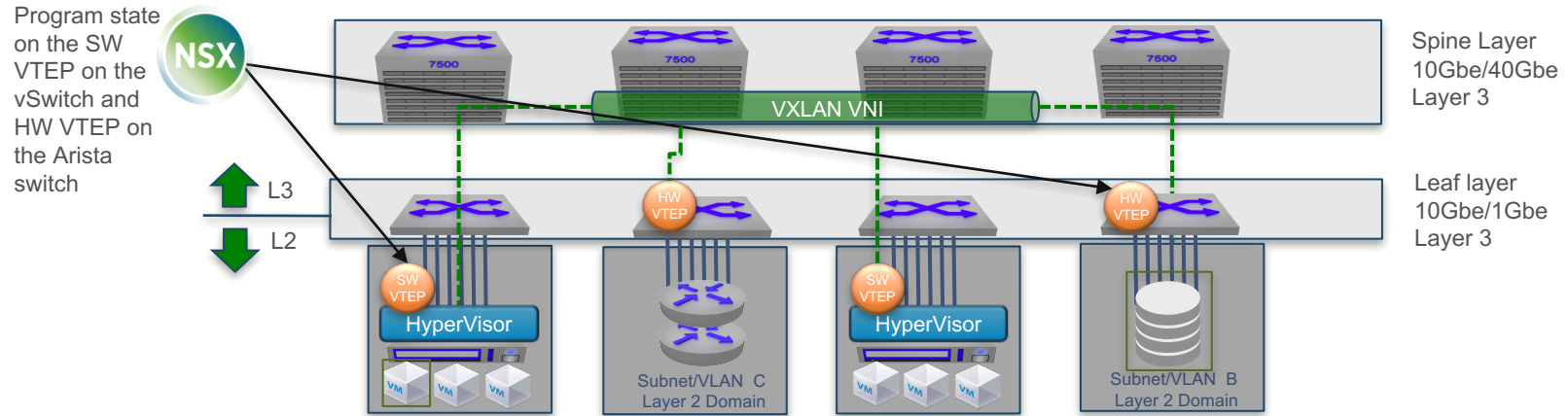
- Vmware NSX controller integration with Arista using VXLAN
  - Configuration of the Arista HW VTEP from the NSX controller
  - Dynamic sharing of MAC address physical and virtual between Arista VTEP and NSX controller
  - Automated discovery of Virtual Machines and physical servers, firewalls, storage

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Arista & Openstack

- Arista Focus - Provide end-to-end tenant network visibility and provisioning across virtual and physical infrastructure for the highest performance VLAN and VXLAN fabrics

- Key Solution Features
  - Provide full visibility to the network team of the OpenStack state
  - Automatically provision t... response to tenant confi... OpenStack

- Native integration via ... and L3 Routing

- Visibility and control fo... team
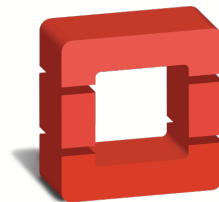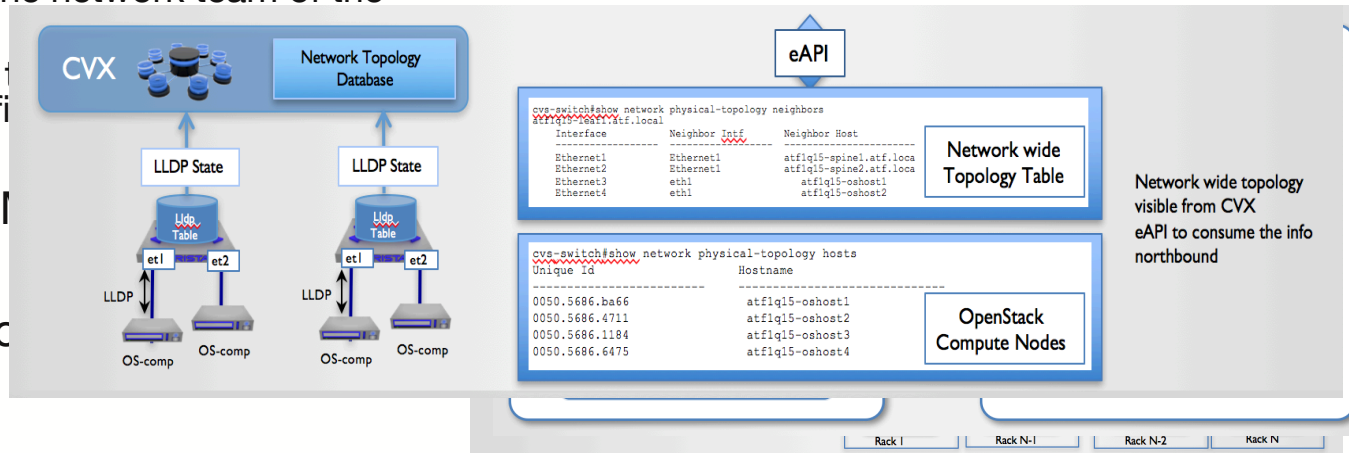
Security integration and automation:
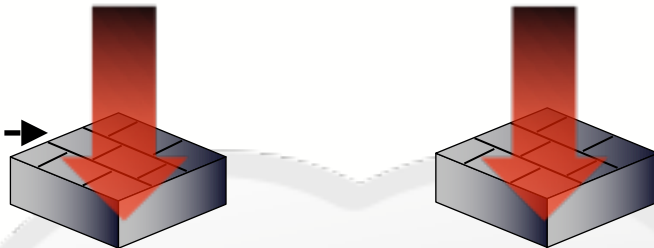
What is Arista Macro-Segmentation Services

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Applying Security in a Physical and Virtual World

Traditional Perimeter
North/South only

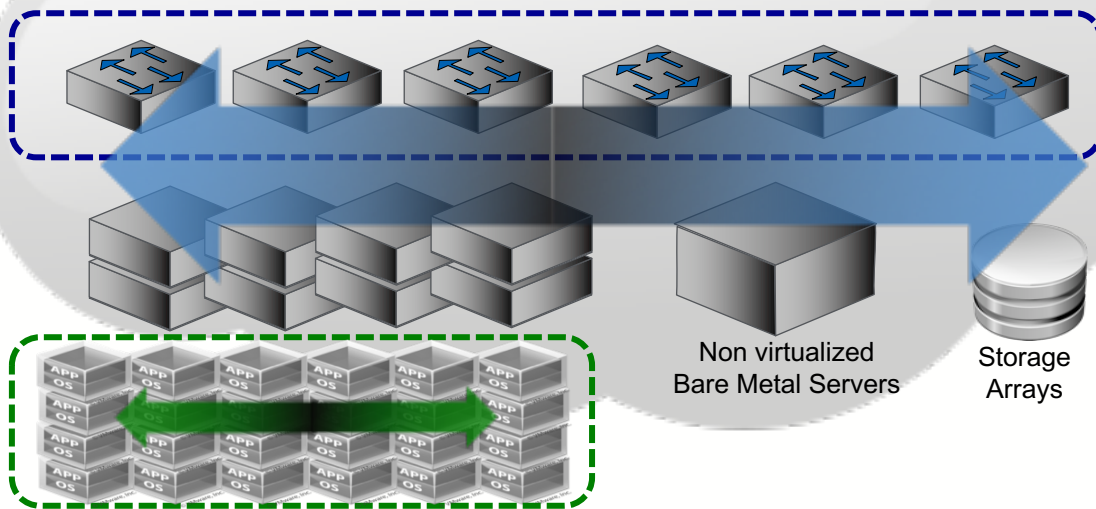**Macro-Segmentation**

Physical to Physical
Physical to Virtual
East/West

Micro-segmentation
VM to VM East/West

Universal Cloud Network
L3 + ECMP + VXLAN

Non virtualized
Bare Metal Servers

Storage
Arrays

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Arista Macro-Segmentation Services

Transparent Insertion of Firewall/Service
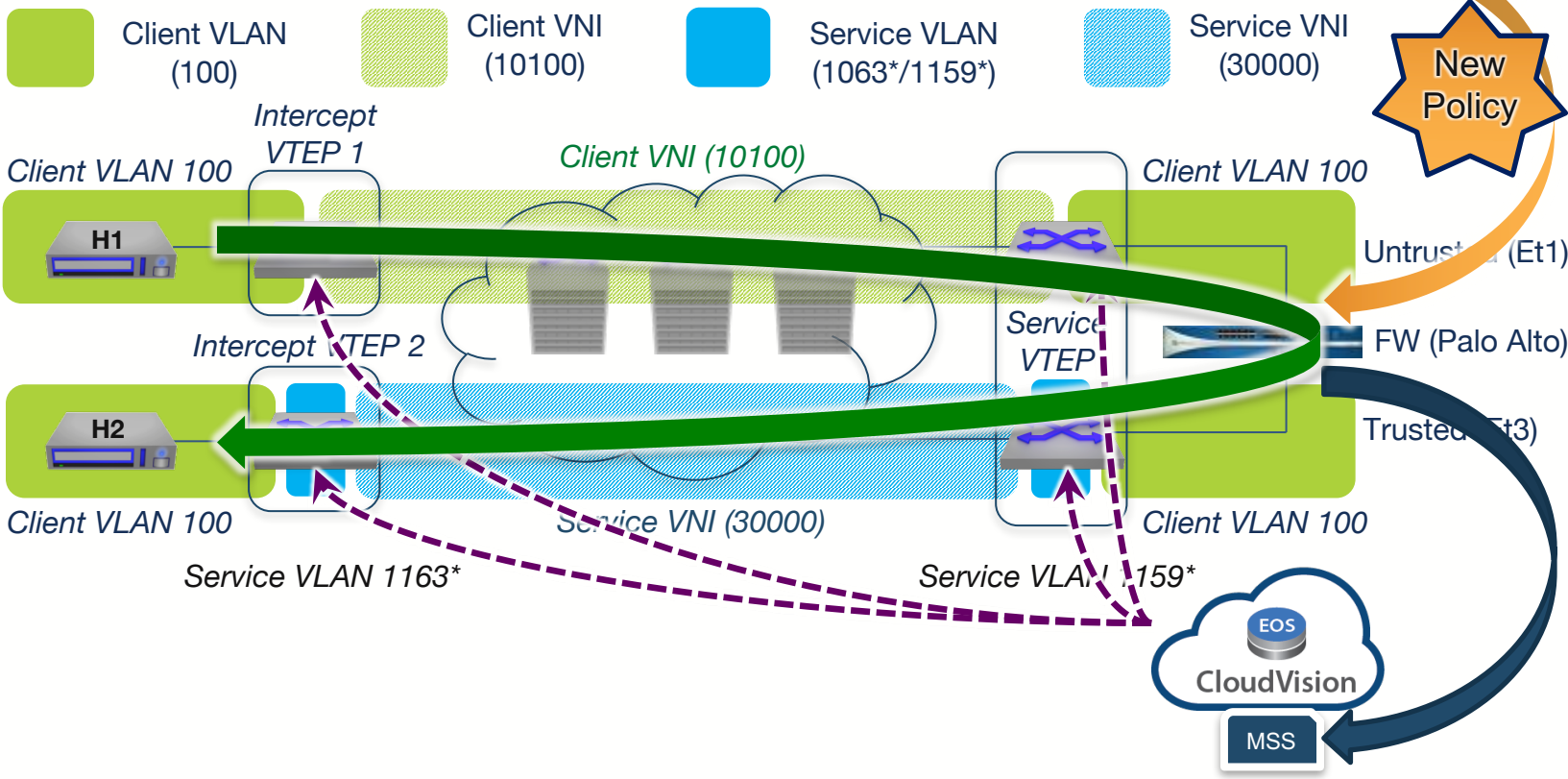
Anywhere, Dynamic, Open, Ecosystem

- Anything can be anywhere in the network on any switch
- Insert security between any workload
- Automatic and seamless service insertion
- Follows host and application throughout the network
- Works with Palo Alto, Fortinet and CheckPoint
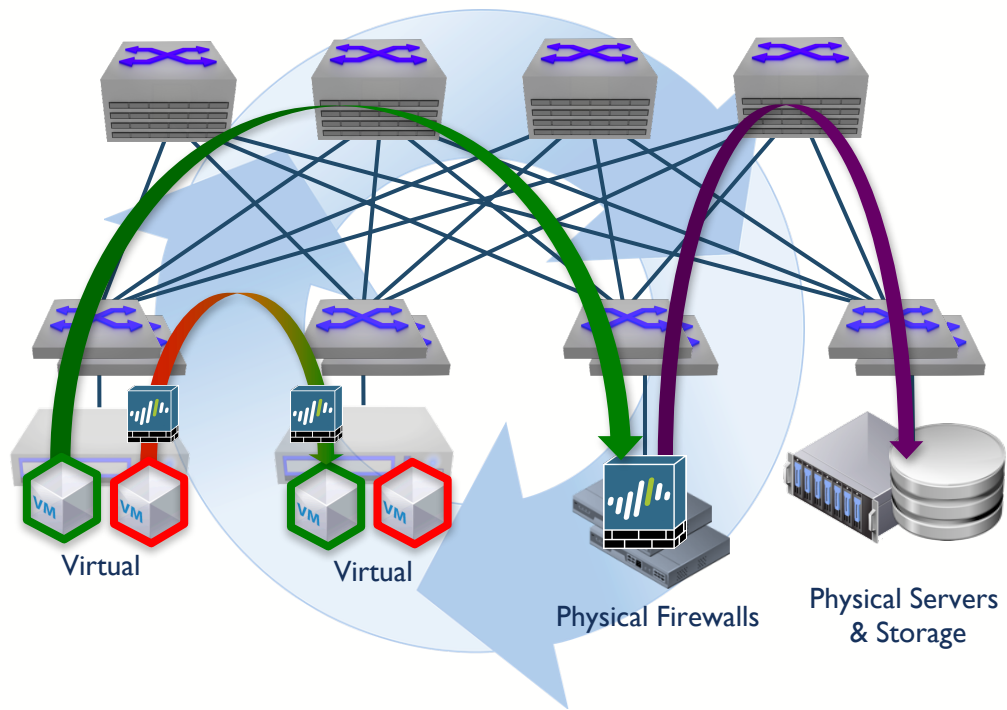
Virtual

Virtual

Physical Firewalls

Physical Servers & Storage

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How does MSS work?

Client VLAN (100) Client VNI (10100) Service VLAN (1063*/1159*) Service VNI (30000)

Permit SSH, HTTP
Deny ICMP

New Policy

Intercept VTEP 1
Client VLAN 100
Client VNI (10100)
Client VLAN 100

10.10.100.20
000c.29ba.e26e

H1

Intercept VTEP 2

Service VTEP

Untrusted (Et1)

FW (Palo Alto)

10.10.100.10
000c.2956.80e3

H2

Trusted (Et3)

Client VLAN 100
Service VNI (30000)
Client VLAN 100

Service VLAN 1163*

Service VLAN 1159*

CloudVision
EOS
MSS

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AUTOMATION and VISIBILITY

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Approaches to Network Automation

Customer Spectrum

⟵ ⟶

D.I.Y.

DevOps

Turnkey

Custom development for
integration

Software development
resources & approach

Leveraging existing tools
(Puppet, Ansible, etc)

Integration &
customization via scripts

Limited solutions today,
focus on legacy models

Customers need turnkey
solution for cloud-
automation!

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ARISTA ✔

ARISTA ✔

**EOS SDK
eAPI**

**EOS DevOps Toolkit
Ruby/Python Object Model**

CloudVision

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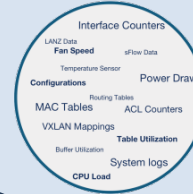# CloudVision: Multi-Function platform focused on Visibility

Overlay Integration
API's for simplified network integration to a best of breed ecosystem

Telemetry & Analytics
Real-time state streaming and historical analytics

Automated Deployments
Initial and ongoing provisioning network-wide

Macro-Segmentation Services (MSS)
Service insertion for securing today's cloud networks

Change Controls
Network-wide upgrades, rollback and snapshots. Compliance and Bug Visibility

DANZ TAP Aggregation
Purpose-built to capture traffic at cloud scale and speed, now provisioned and monitored in CloudVision

Visibility

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Network Automation – Then and Now…

Evolution of Network Automation – The CLI is still king!!!

1990s

```
Router> enable
Router# configure terminal
Router(config)# enable secret cisco
Router(config)# ip route 0.0.0.0 0.0.0.0 20.2.2.2
Router(config)# interface ethernet0
Router(config-if)# ip address 10.1.1.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface serial0
Router(config-if)# ip address 20.2.2.2 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# router rip
Router(config-router)# network 10.0.0.0
Router(config-router)# network 20.0.0.0
Router(config-router)# exit
Router(config)# exit
Router# copy running-config startup-config
Router# disable
Router>
```

2018

```
leaf1(config)#interface ethernet1
leaf1(config-if-Et1)#switchport access vlan 1010
! Access VLAN does not exist. Creating vlan 1010
leaf1(config-if-Et1)#interface loopback 2
leaf1(config-if-Lo2)#ip address 1.2.3.4/32
leaf1(config-if-Lo2)#router bgp 65001
leaf1(config-router-bgp)#router-id 1.2.3.4
leaf1(config-router-bgp)#maximum-paths 2 ecmp 2
leaf1(config-router-bgp)#neighbor SPINE peer-
group
leaf1(config-router-bgp)#neighbor SPINE remote-as
65000
leaf1(config-router-bgp)#neighbor SPINE allowas-in
1
leaf1(config-router-bgp)#neighbor SPINE soft-
reconfiguration inbound all
leaf1(config-router-bgp)#neighbor SPINE maximum-
routes 12000
leaf1(config-router-bgp)#neighbor 1.1.1.1 peer-
group SPINE
leaf1(config-router-bgp)#redistribute connected
leaf1(config-router-bgp)#
```

Only difference is that today SSH rules over Telnet ;)

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EoS is Programmable!

- Many APIS: REST, JSON, etc
- User + Kernel Level Linux Programmability (install RPMs)
- Control programmability
- Openflow, Openstack, etc
- EOS SDK Access and Subscription
- Mgmt Programmability
- Bird along CLI, SNMP, AEM, BYOC
- Scripting Options (Python,Ruby,)
- Third Party:
- Splunk App, Vmware…
- L4-7 Security
- Programmability
- DevOps integration
  (Chef/Puppet Ansible)

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BugAlert Example
How to automate "reading release notes" ?
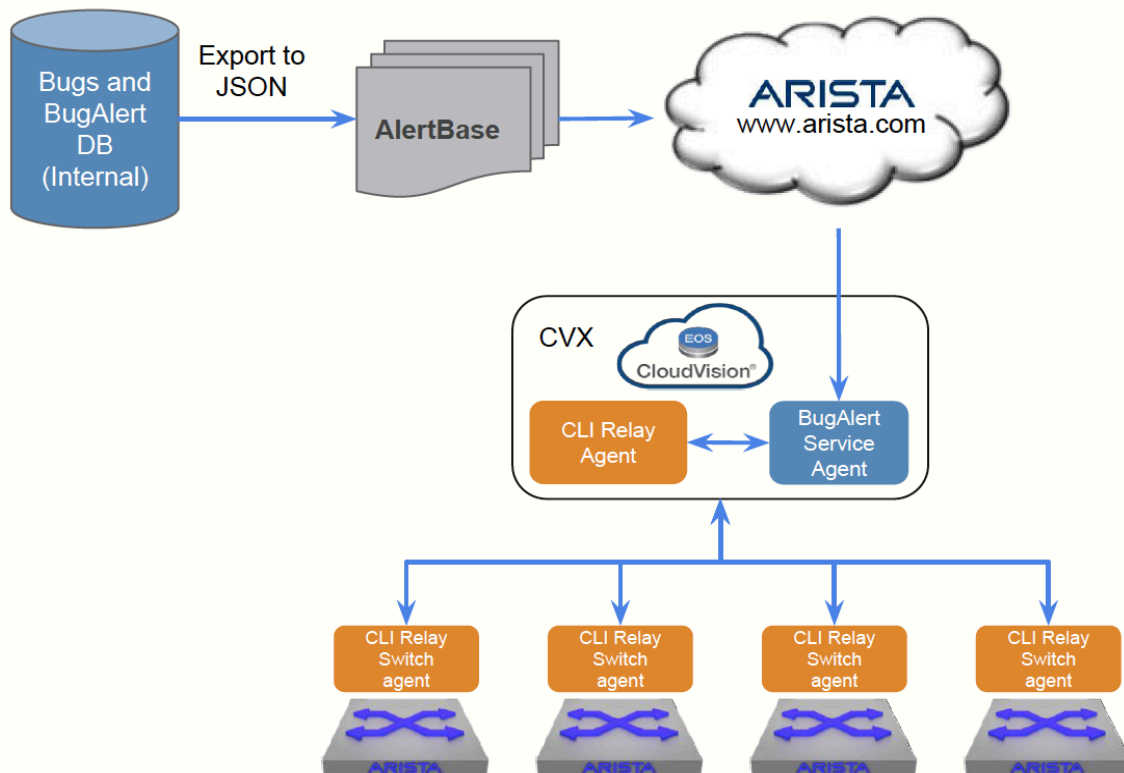
- AlertBase will be published on software downloads page for www.arista.com
- Download and import AlertBase into CVX
- BugAlert service enabled by default on CVX in Chicago
- Reports for affected bugs available through CLI show command
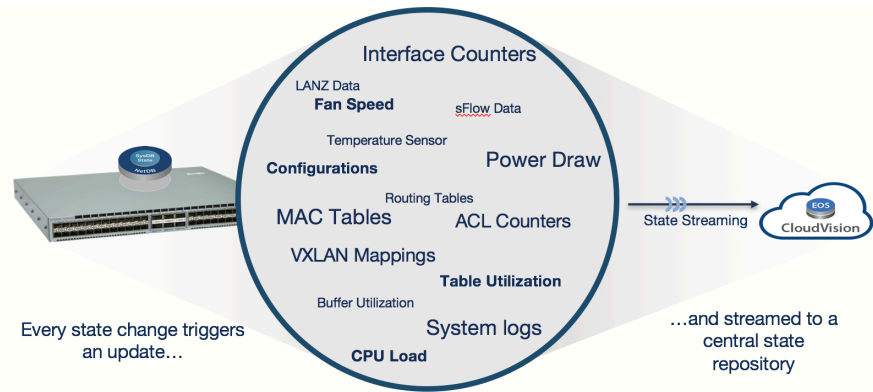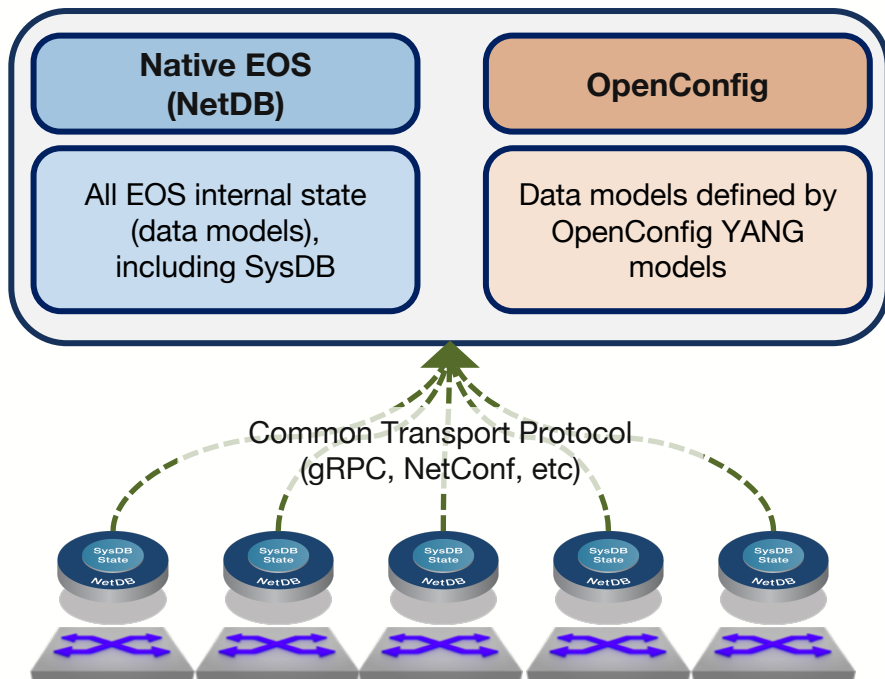- Dynamic updates to bug report based on features configured on switches

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Telemetry and Today's Trends

Many data center operations are driving in the dark…
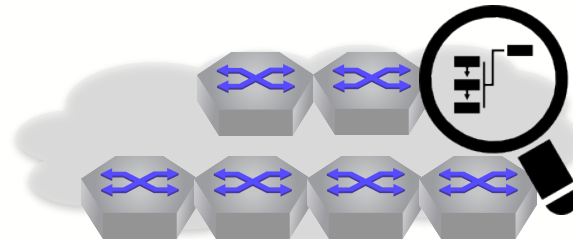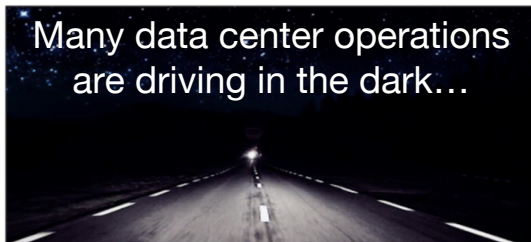
Traditional / Legacy Approach	Cloud Telemetry Requirements
1990's networking	Cloud DC Architectures
Polling Approach (10-15 min)	Real-time streaming
State scope limited to MIB definition	Complete state history
Per-Switch Per Device	Network-wide scope
Static, discrete events. Manually correlated	Dynamic event correlation

The Cloud has driven new telemetry approaches….

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Foundation for State Streaming

Native EOS (NetDB)

All EOS internal state (data models), including SysDB

OpenConfig

Data models defined by OpenConfig YANG models

Common Transport Protocol (gRPC, NetConf, etc)

SysDB State — NetDB

Interface Counters
LANZ Data
Fan Speed   sFlow Data
Temperature Sensor
Configurations   Power Draw
Routing Tables
MAC Tables   ACL Counters
VXLAN Mappings
Table Utilization
Buffer Utilization
System logs
CPU Load

State Streaming → CloudVision

Every state change triggers an update…

…and streamed to a central state repository

Stream every SysDB state change. From every device. Instantaneously

Multiple Options for State Streaming. Open & Standards-based APIs.

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Identify the Value of Telemetry

CLI approach

Interface discards:
```
show interfaces counters discards
```

Traffic rate:
```
show interfaces counters rates
```

LANZ data:
```
show queue-monitor length drops
show queue-monitor length
statistics
show queue-monitor length tx-
latency
```
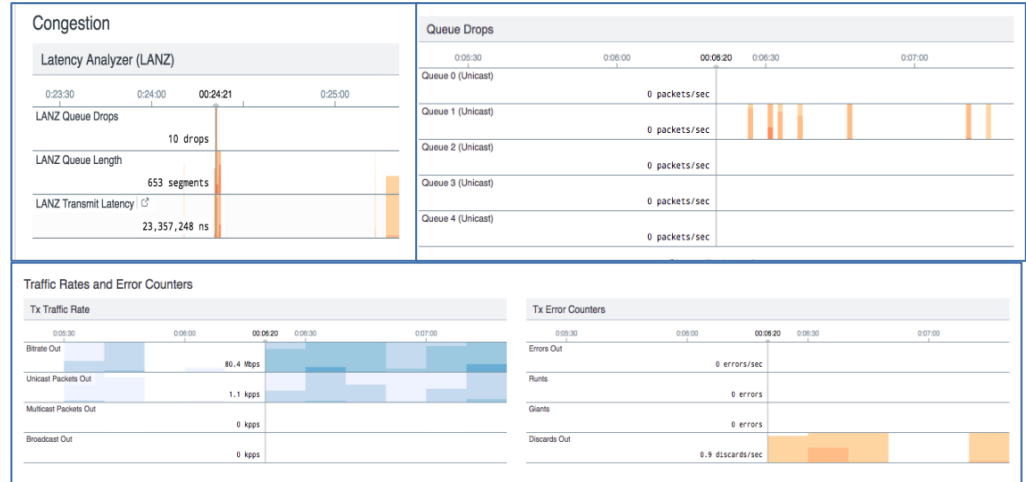
State Streaming approach

BASIC — GRANULAR — REAL-TIME, GRANULAR — REAL-TIME, GRANULAR, AGGREGATED

Queue drops — EOS

LANZ for Queue monitoring — EOS

LANZ Streaming — EOS

Correlation of discards, LANZ and Traffic rate in a time series — EOS CloudVision

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Identify the Value of Telemetry

Historical state - Provides granular visibility for forensic troubleshooting
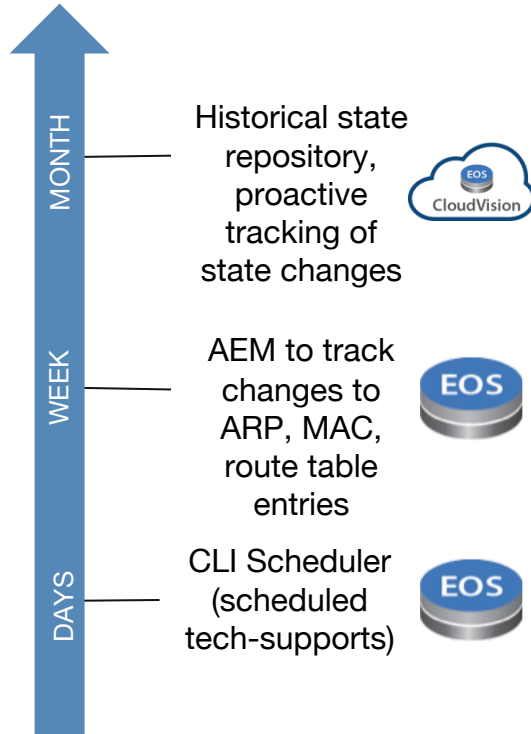
CV Telemetry Routing Table in Device View

MONTH — Historical state repository, proactive tracking of state changes

WEEK — AEM to track changes to ARP, MAC, route table entries

DAYS — CLI Scheduler (scheduled tech-supports)

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Thank You

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