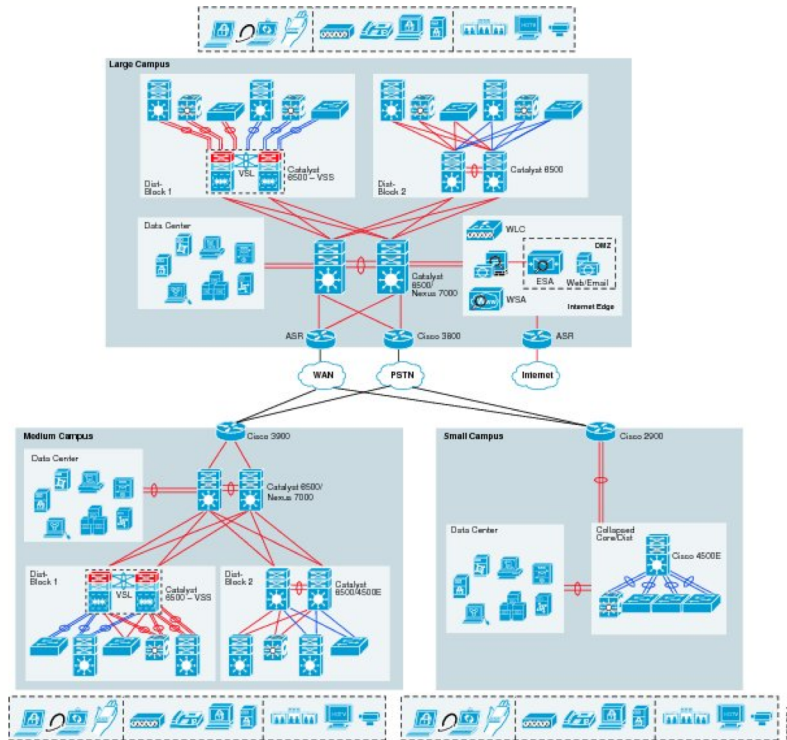


Arista Cognitive Campus

Arista Moscow Cloud Builders

Dec, 2019

Traditional Core-centric View of Enterprise Networks



4-5 Different Product Classes

4-5 Different Operating Systems

20+ Different Software Images

4-5 Different Management Platforms

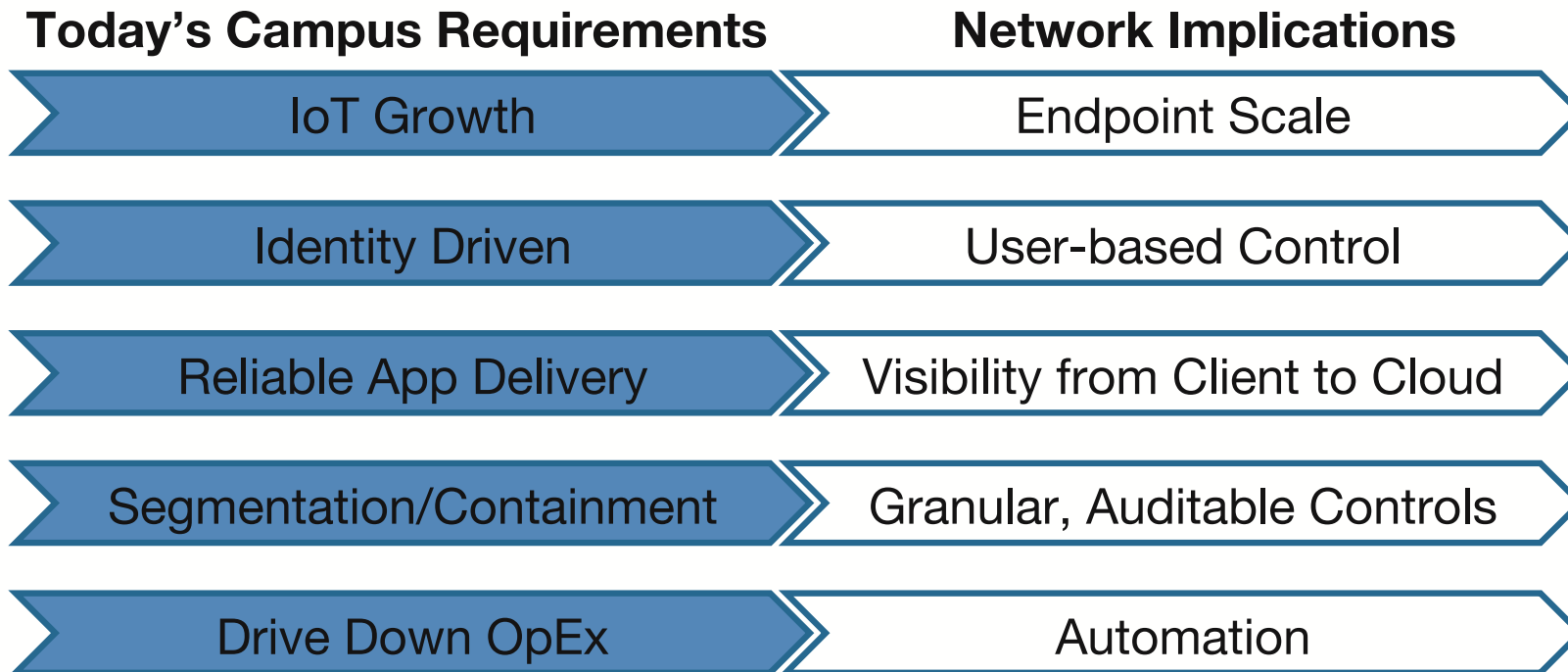
6-7 Hops between User and Data

Limited Repurposing of Products

No End to End Visibility or Security

Extremely Poor ROI and High Operational Overhead

New Trends for Campus Networks



Arista's Campus Vision

Cognitive Management Plane

Centrally Managed, End to end Visibility, On- or Off- Prem



Campus Spline

Fixed and Modular Systems
Collapsed Spline or Traditional
Core/Distribution

DC Class Capabilities in a
Campus Focused Platform

Collapse complex topologies
Unlock DC performance for
Campus Users

Campus Edge

High Power, Multi-Gig
Platforms with integrated
visibility

Consistent feature and
operation with DC and Spline

Next Gen Workloads
End to End Automation and
Segmentation

Wireless

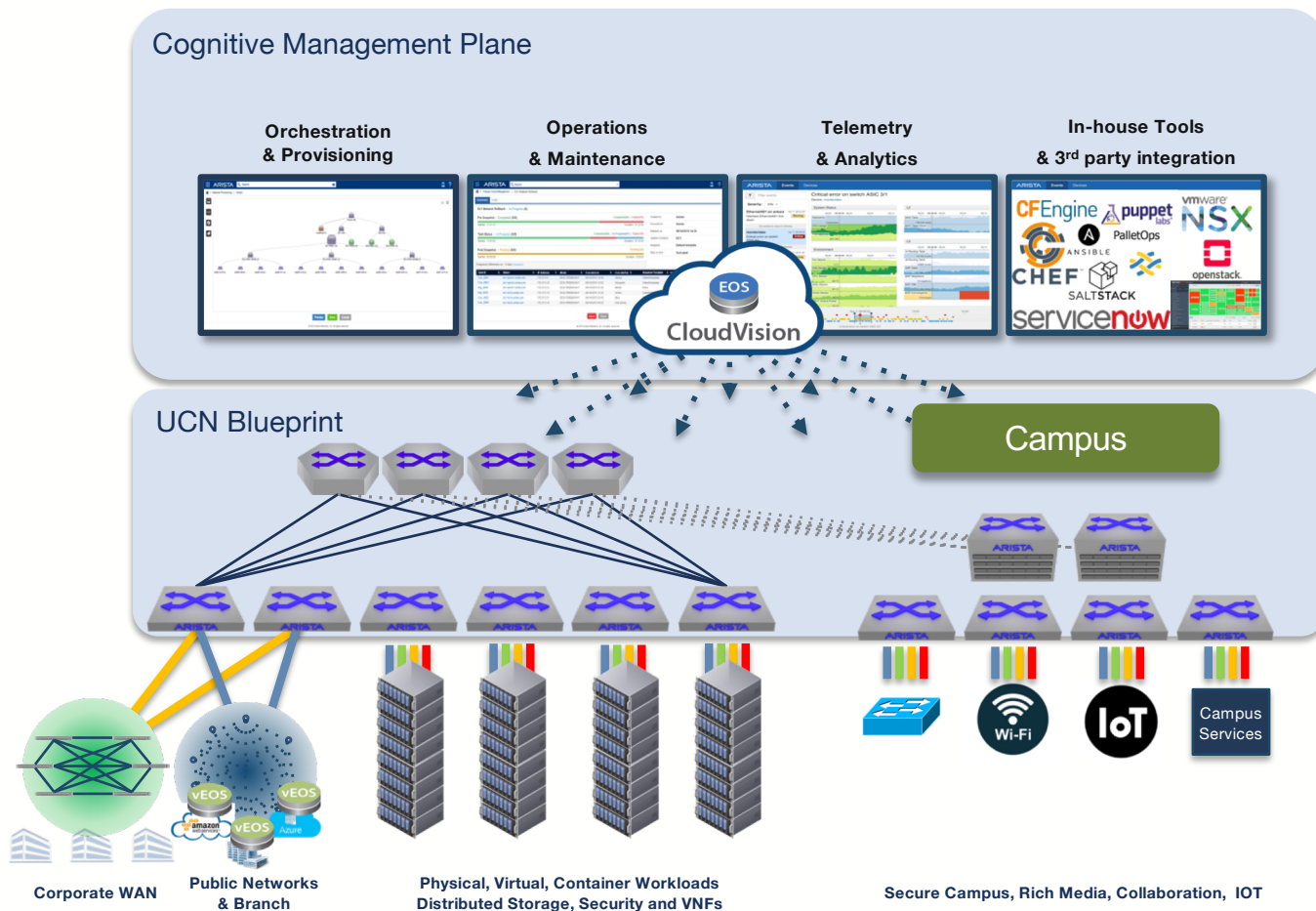
Class leading Enterprise
Wireless Solution

Real-time security and
monitoring

Scales of 10,000's of APs

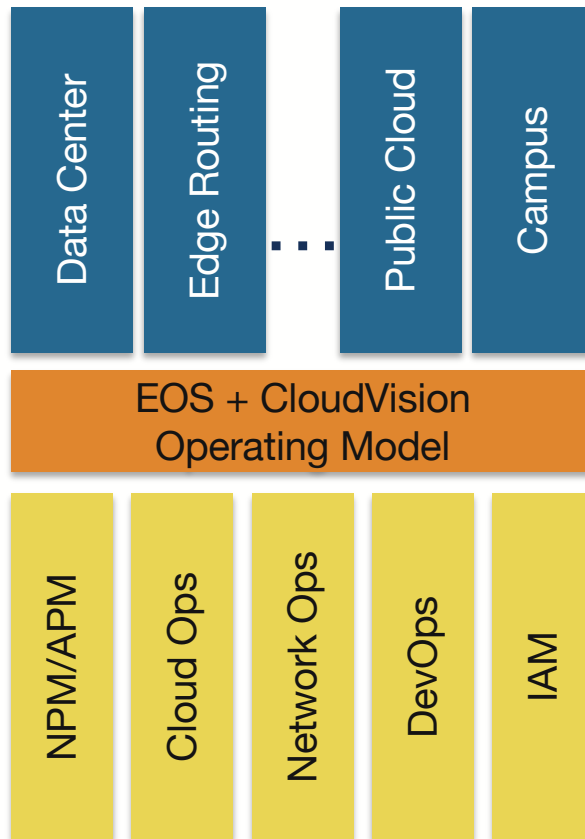
Controller-free Scaling
Single Pane of Glass
Management

Client to Cloud with Arista's UCN



- Cognitive Management Plane
- End to End Telemetry
- Universal EOS
- Universal Overlay
- End to End Segmentation
- Consistent Operations
- Any Application Readiness

Operational Benefits of Consistent Architecture



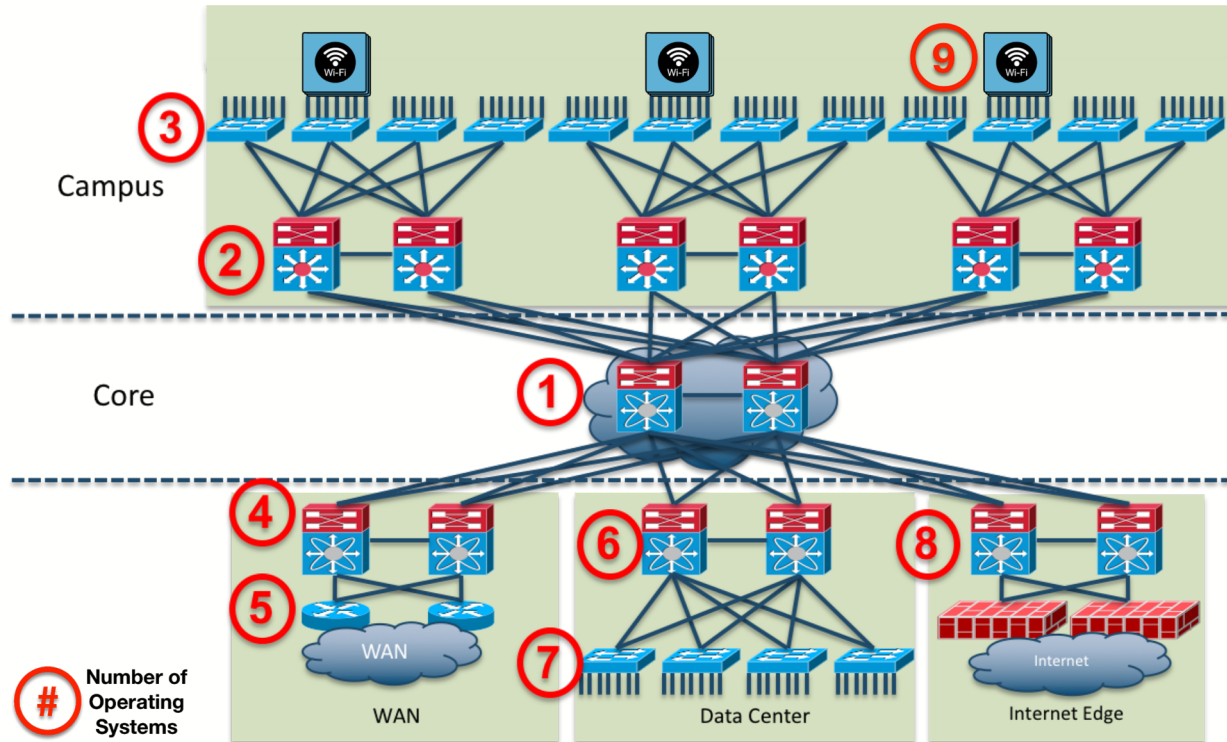
Ops teams can implement a single operating model and ITIL runbook for:

- Upgrade procedures
- Certification efforts
- Lifecycle management
- Vulnerability management
- Network designs
- Troubleshooting approaches
- Automation techniques
- Feature discrepancies
- Management platforms
- Ecosystem integration
- And more...



Campus Architectures

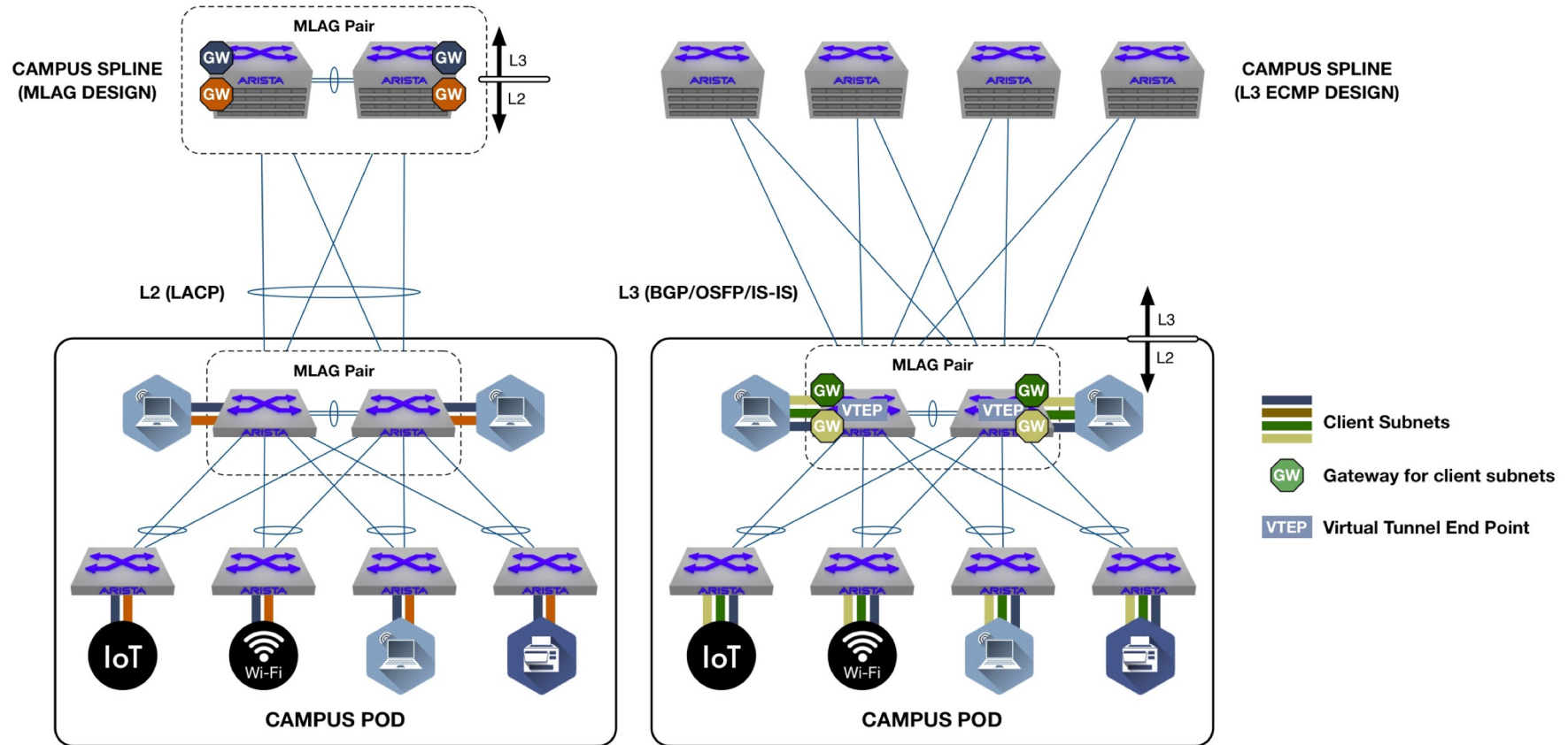
What problems are we trying to solve in the Campus?



- Multiple operating systems (#) within campus alone (let alone across entire network)
- Difficult to scale and secure with growing number of IoT devices
- Growing bandwidth requirements
- Numerous proprietary elements:
 - Switching stacks
 - Proprietary tunneling protocols
 - Proprietary secure segmentation protocols
- Lack of unified automation and visibility tools

Legacy campus networks are ready for change

Campus Spline Design

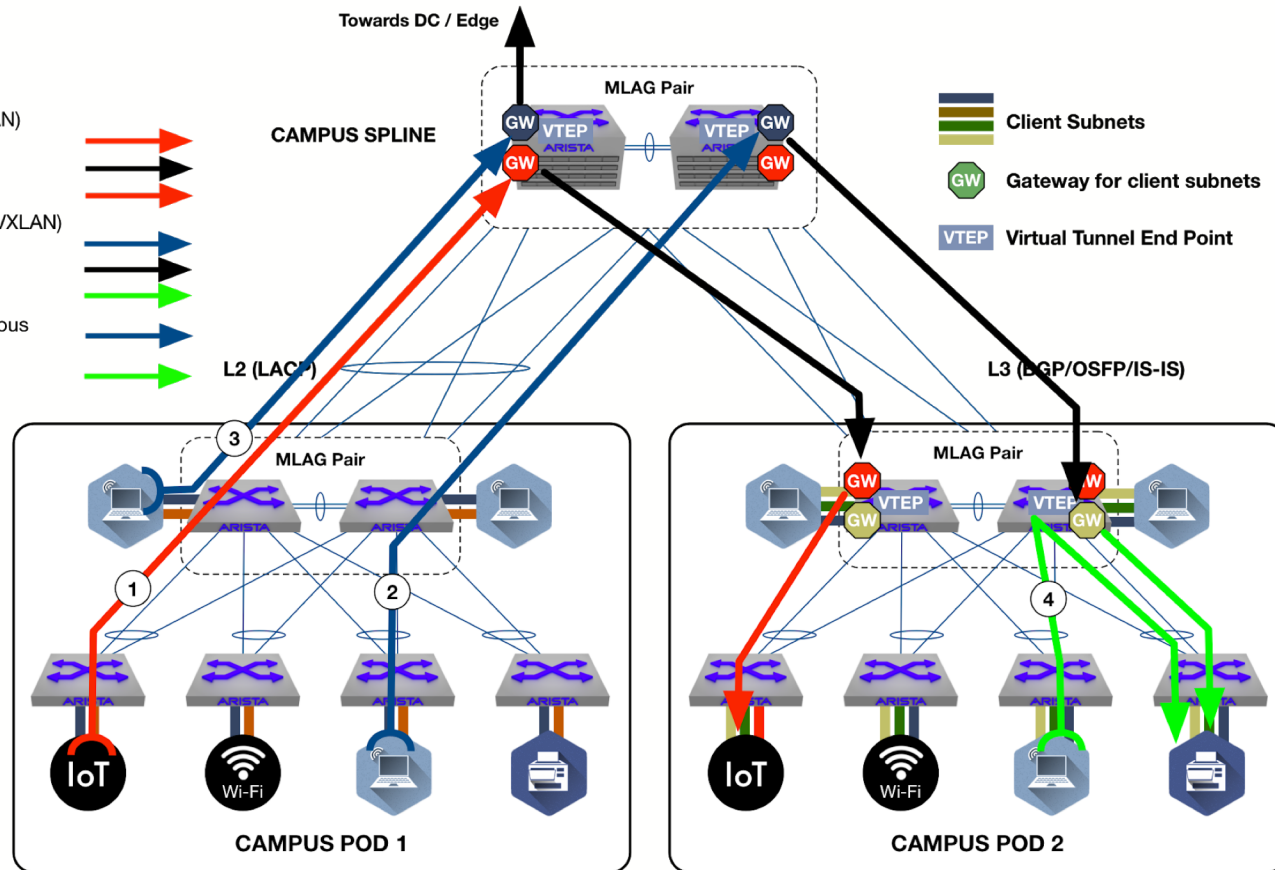


Flexible upstream connectivity options

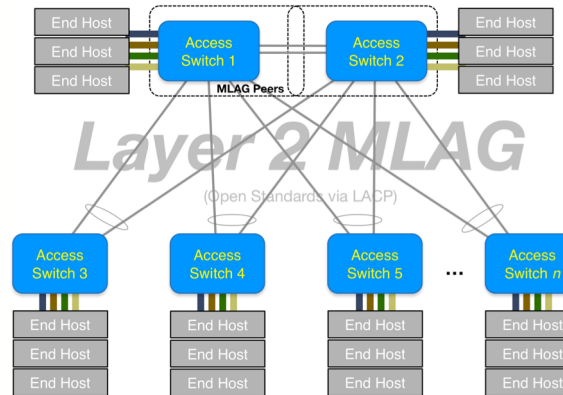
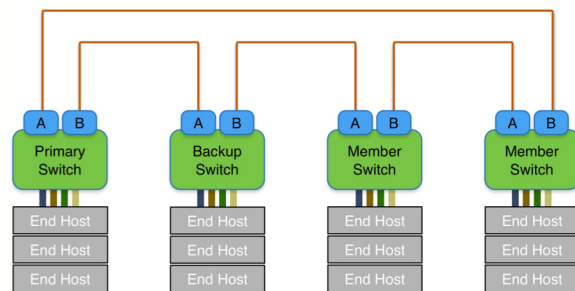
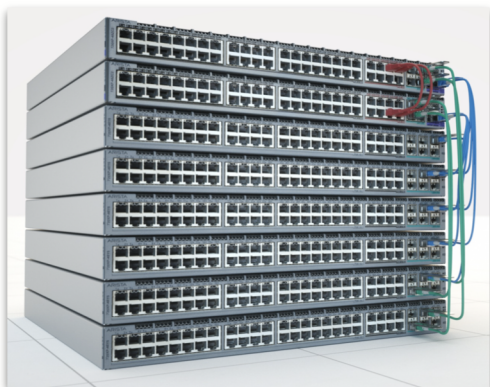
Campus Spline - Traffic Flow Examples

Traffic Flows

1. IoT Device to IoT Device (L2 bridged with VXLAN)
 - a) IoT Device to Gateway
 - b) Gateway to Remote VTEP
 - c) Remote VTEP to IoT Device
2. Laptop to Printer (L2 bridged then routed with VXLAN)
 - a) Laptop to Gateway
 - b) Gateway to Remote VTEP
 - c) Remote VTEP to Printer
3. Laptop to Web Application (L2 bridged to Campus Spline then routed to DC)
4. Laptop to Printer (L2 bridged)



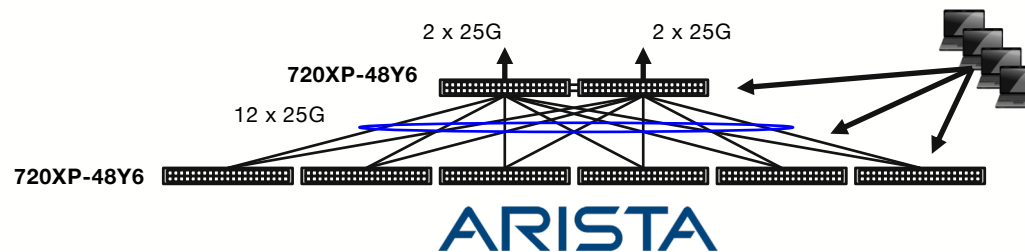
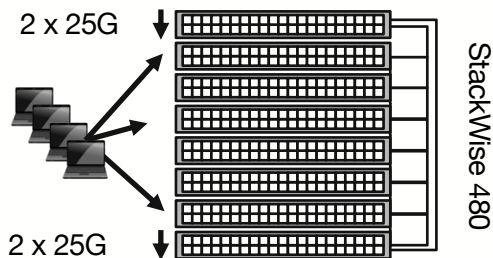
Stacking Approaches



	1990s Era Stacking	Arista
Expansion	Disruptive upgrades, stack members must be same vendor & model, co-located members	Hitless and non-disruptive expansion, no model/vendor limitations, members up to 10km apart
Uplinks	Merged control planes provide aggregate uplinks to the Distribution	MLAG for L2 and ECMP for n -way L3. No Spanning Tree. Distributed control plane highly reliable.
Maintainability	Split brain risk, merged fate-sharing control planes	Standards-based and highly scalable. Proven architecture in largest data centers
Management	Single point management for just the stack	CloudVision for Enterprise-wide management: change management, compliance, visibility, upgrades

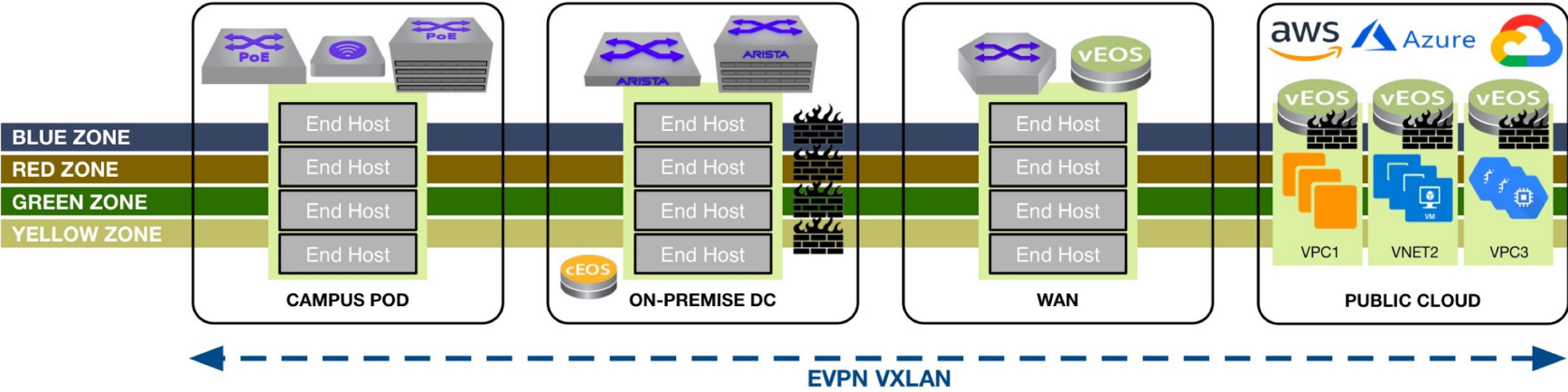
A modern cognitive approach to wiring closet design

Comparing Wiring Closet Designs



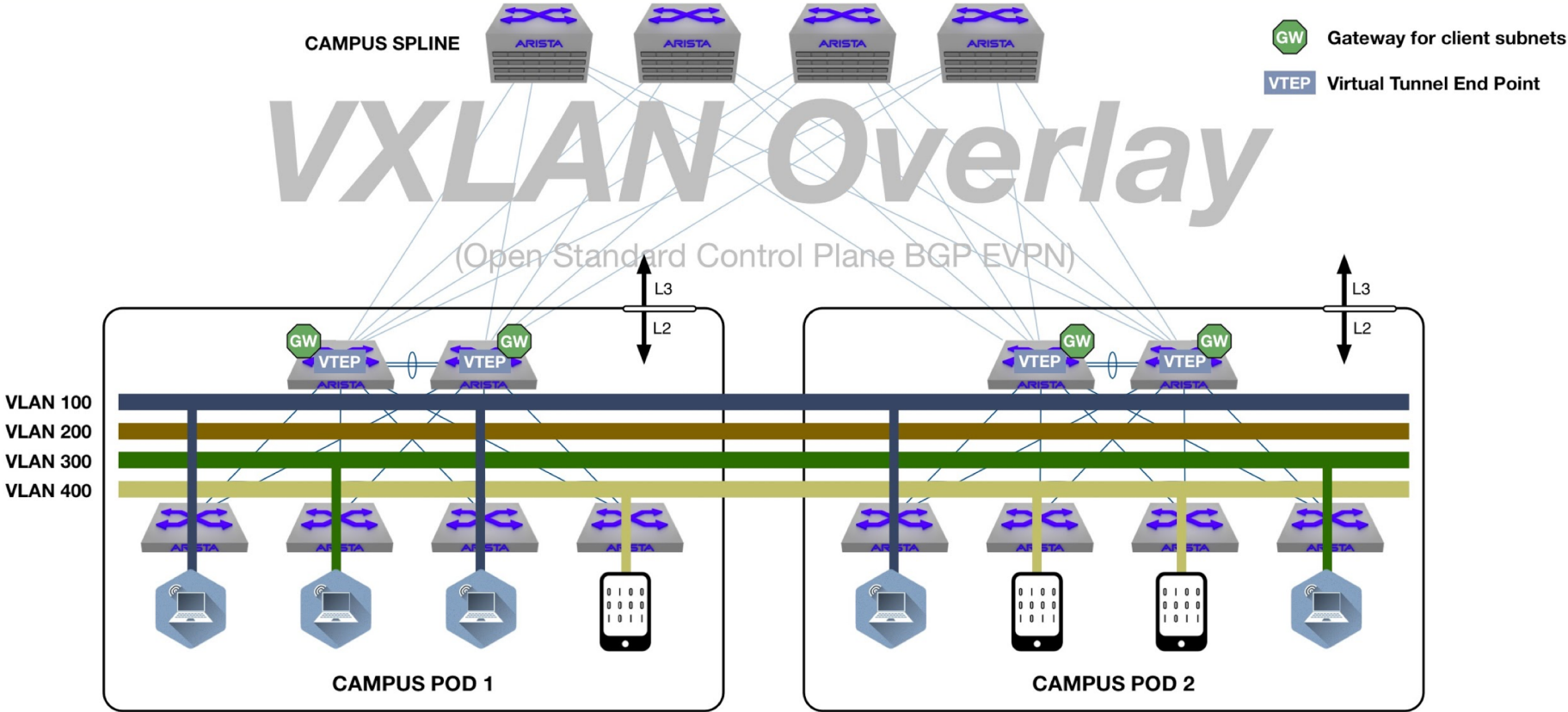
Example BOM	8 x Campus switch with 48 PoE and 2 10/25G ports	8 x CCS-720XP-48Y6
Host facing ports	384 PoE ports + 12 1/10/25G ports (288 100M - 2.5G, 96 100M - 5G)	384 PoE ports + 20 1/10/25G ports
Fabric Capacity Actual / Aggregate Math	120Gbps / 240-480Gbps (Proprietary Ring - Unpredictable)	350Gbps / 700Gbps
Typical Uplink Capacity	100G (2 x 25G per uplink switch)	100G (2 x 25G per uplink switch)
Distance between any 2 connected devices	0.5-3m (using proprietary stack)	0.5-30m (DAC/AOC) / 70m - 10km with SFP

End-to-End Secure Segmentation



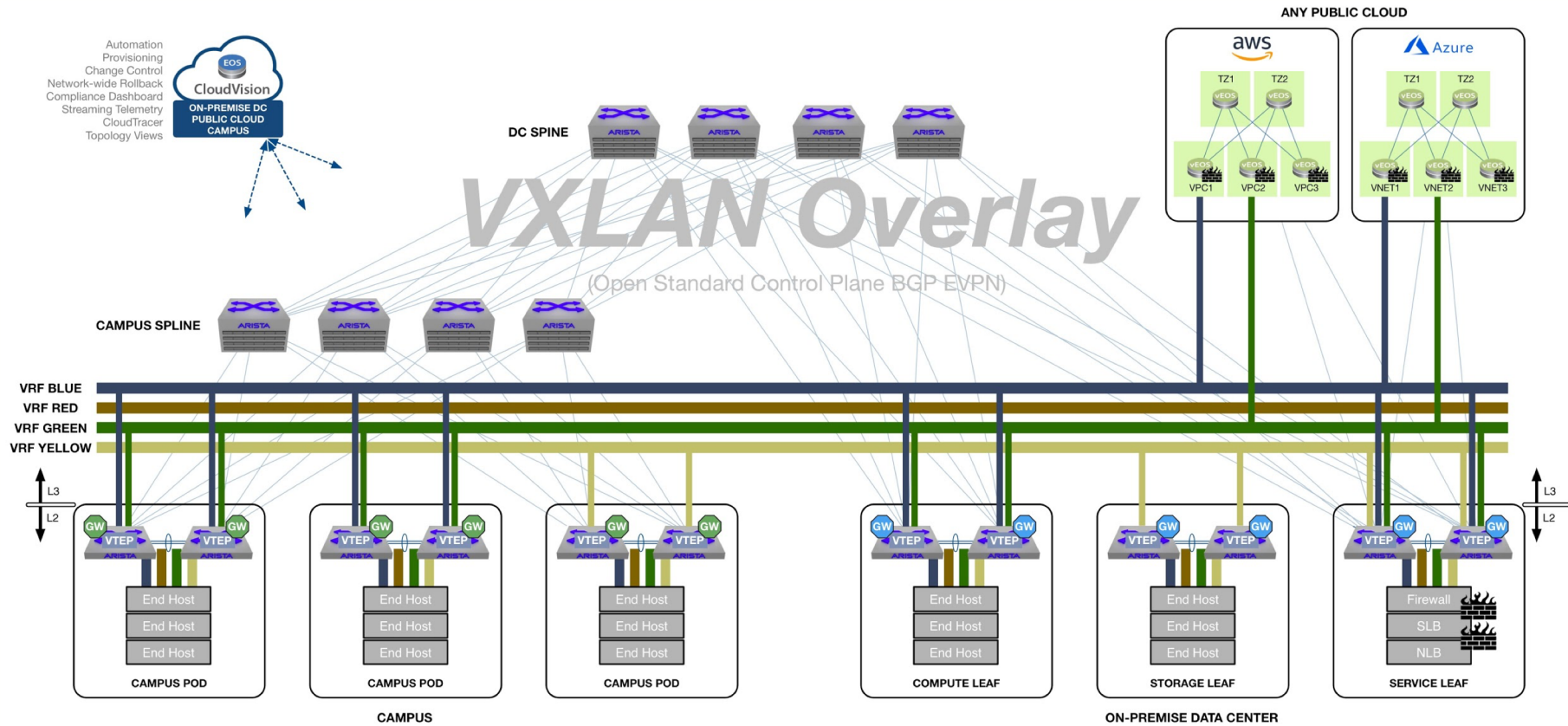
Standards-based segmentation from Campus to DC to Public Cloud

Segmentation in the UCN-C (L2 EVPN)



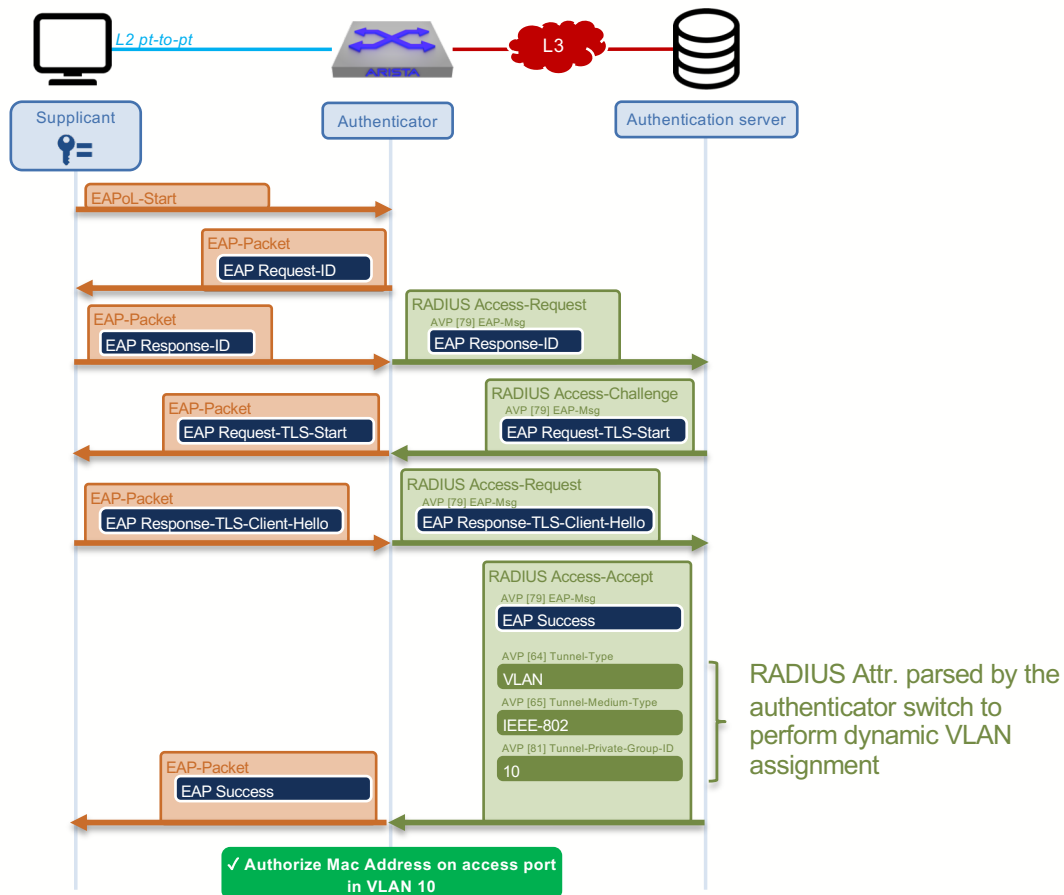
EVPN VXLAN for Layer 2 extension across Campus network

Segmentation in the UCN-C (L3 EVPN)



EVPN VXLAN for Layer 3 segmentation from Campus to DC to Public Cloud

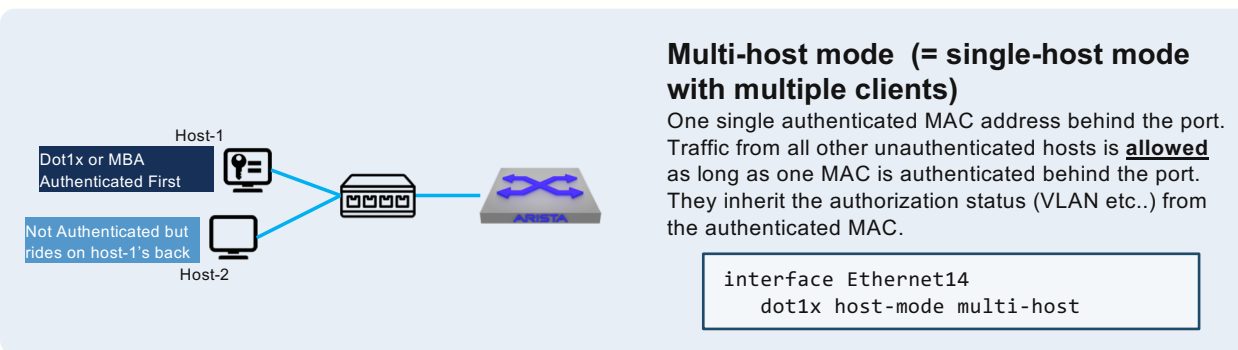
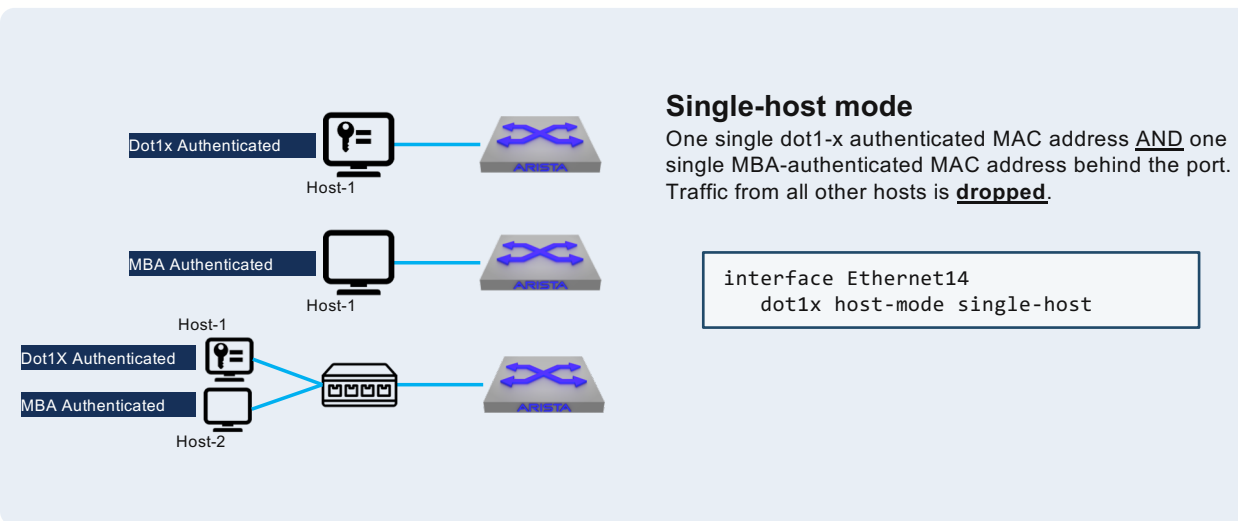
About Dynamic VLAN assignment



- RADIUS Authentication server pushes the endpoint VLAN down to the authenticator switch as part of a specific RADIUS attribute.
- Upon successful authentication, the switch positions the authenticated MAC address into that VLAN
- The VLAN received over RADIUS typically overrides the VLAN configured at the interface/switch level
- Works with 802.1x and MBA

No specific configuration required on the switch. When present, the dynamic VLAN carried over Radius gets applied and overrides the local switch configuration.

Understanding Host-modes



Supported features in Single-host and Multi-host modes

Feature	Support
802.1x	4.21.3F
Mac Based Authentication	4.21.3F
802.1x and MBA	4.21.3F MBA as a 802.1x fallback auth. method
Dynamic VLAN assignment	4.22.2F The VLAN received over RADIUS overrides the native VLAN configured on the switch
Filter-ID	4.22.1F
Auth-FAIL VLAN	4.22.1F
Guest VLAN	4.23.0F
Server-unresponsive VLAN	4.23.0F
CoA	4.23.0F (Session Termination, ACL name, ReAuth, Disable a Host)

For full set of supported Host-mode features please contact local SE team

Arista Campus documentation

The screenshot shows the Arista website's navigation and content sections. The 'Solutions' menu item is highlighted with a red box. Below the navigation, the 'Cognitive Campus' banner is visible. The 'Literature' tab is selected, showing a list of documents. The 'ESG Report: Cognitive Networking with the Arista Campus Solution' is highlighted with a red box. The 'White Papers' section lists several documents, and the 'Solution Briefs' section lists others. The 'Design Guide' section is also highlighted with a red box, containing the 'Arista Universal Cloud Network for Campus Design Guide'.

ARISTA

Search Login WiFi Login EOS Central English

Solutions Products Partner Support Company

Cognitive Campus

Overview Literature Media

Jayshree Ullal's Blog: Unveiling Cognitive Campus Networking

Ken Duda's Blog: CloudVision: A Cognitive Management Plane

ESG Report: Cognitive Networking with the Arista Campus Solution

White Papers

- Cognitive Campus White Paper
- Arista WIPS and the Marker Packet White Paper
- Migrating Your Controller-based WLAN to Arista Cognitive WiFi White Paper
- Security of the Arista Cloud White Paper
- Arista WIPS White Paper

Solution Briefs

- Arista Cognitive WiFi Solution Brief
- Arista Guest WiFi Solution Brief
- Arista Higher Ed at Glance Solution Brief
- Arista Higher Ed Use Cases

Design Guide

- Arista Universal Cloud Network for Campus Design Guide



CloudVision for Campus

Arista CloudVision's Value in the Campus



Change Management	Compliance	Security	Visibility	Wired + Wireless
Reduce Maintenance Window Time	Assess Risk	Understand Threat Vectors	Faster Mean Time To Root Cause	Break down boundaries
Change Control Workflows	Compliance Dashboard	Device Analyzer	Consistent Dashboards	CloudVision WiFi

Break down PIN boundaries with Consistent End-to-End Operations


Campus Use-case: Securing the Campus

Endpoint Security

Access Control



Device Inventory



Traffic Analytics
Who is talking to whom?




Infrastructure Security

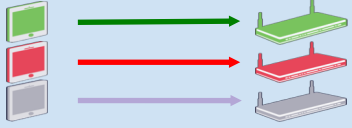
Group-based Segmentation



Risk Assessment and Compliance Reporting

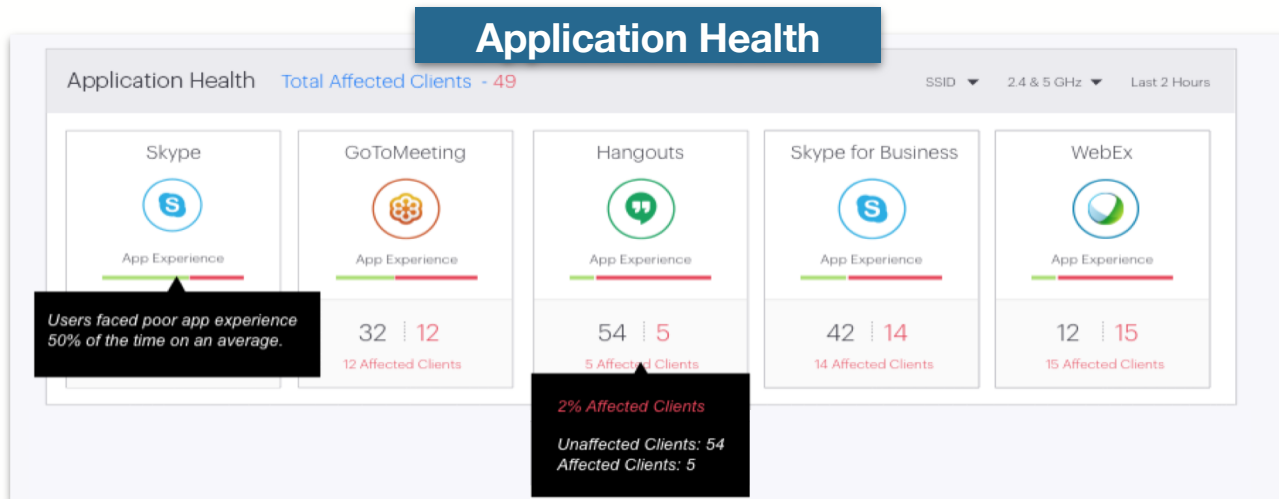
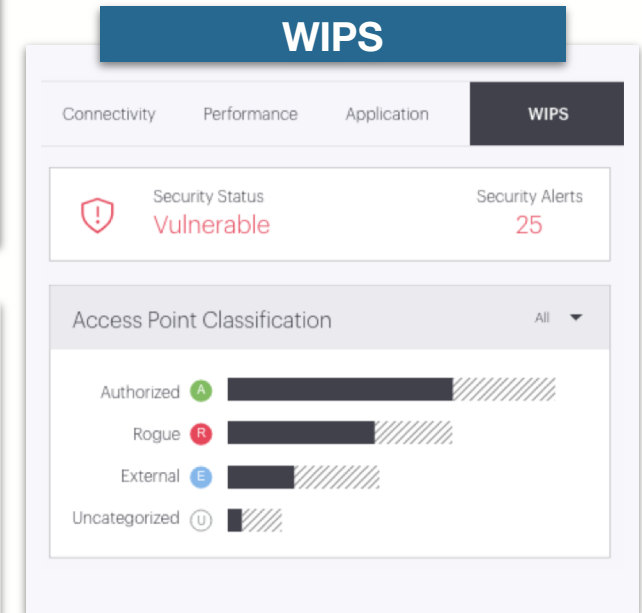
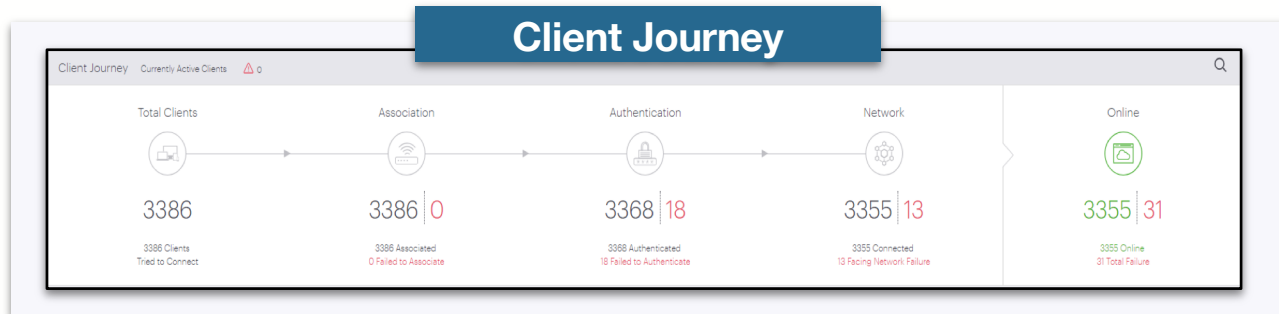


WiFi Intrusion Prevention System (WIPS)



Multiple Integration Points for Security Focus

Cognitive WiFi: Using AI for a Better User Experience

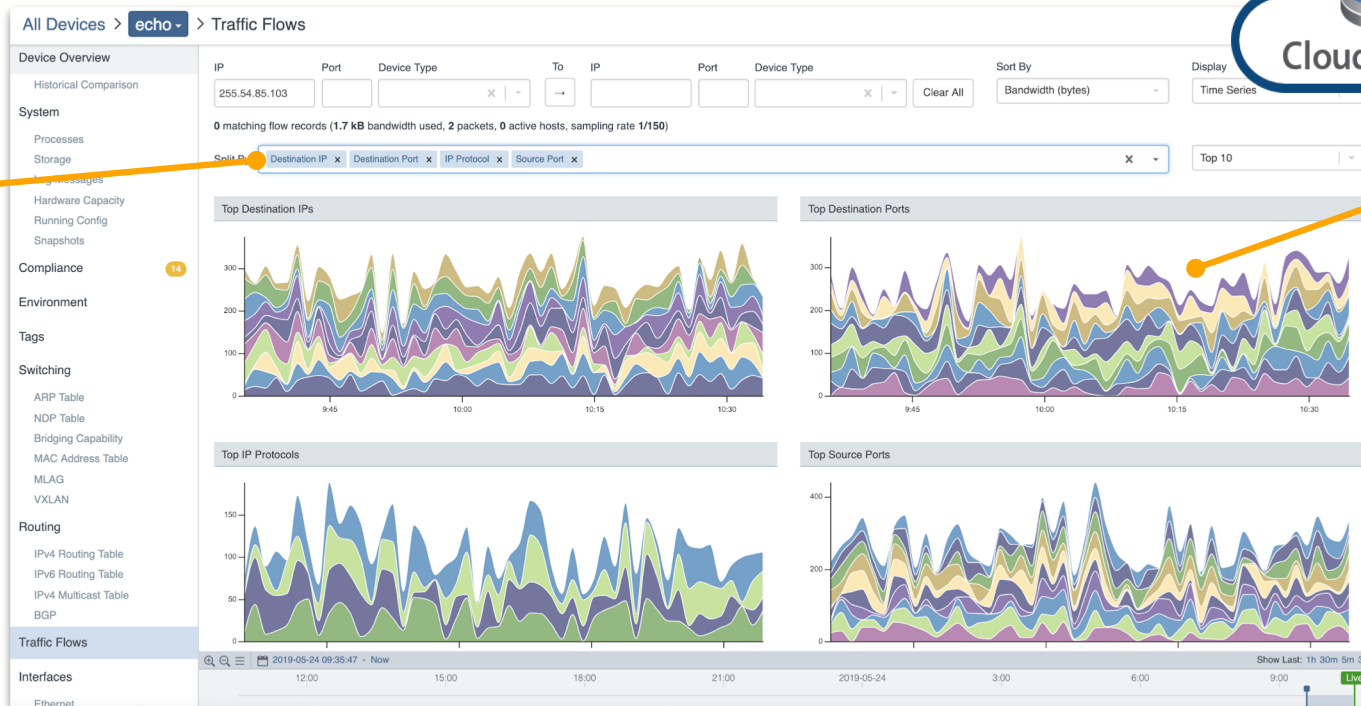


Campus Use-case: Device Analyzer



Behavior Modeling
Understand endpoints

Broad Visibility
Correlations extend to DC



Flow Tracker
Visualization and trend analysis

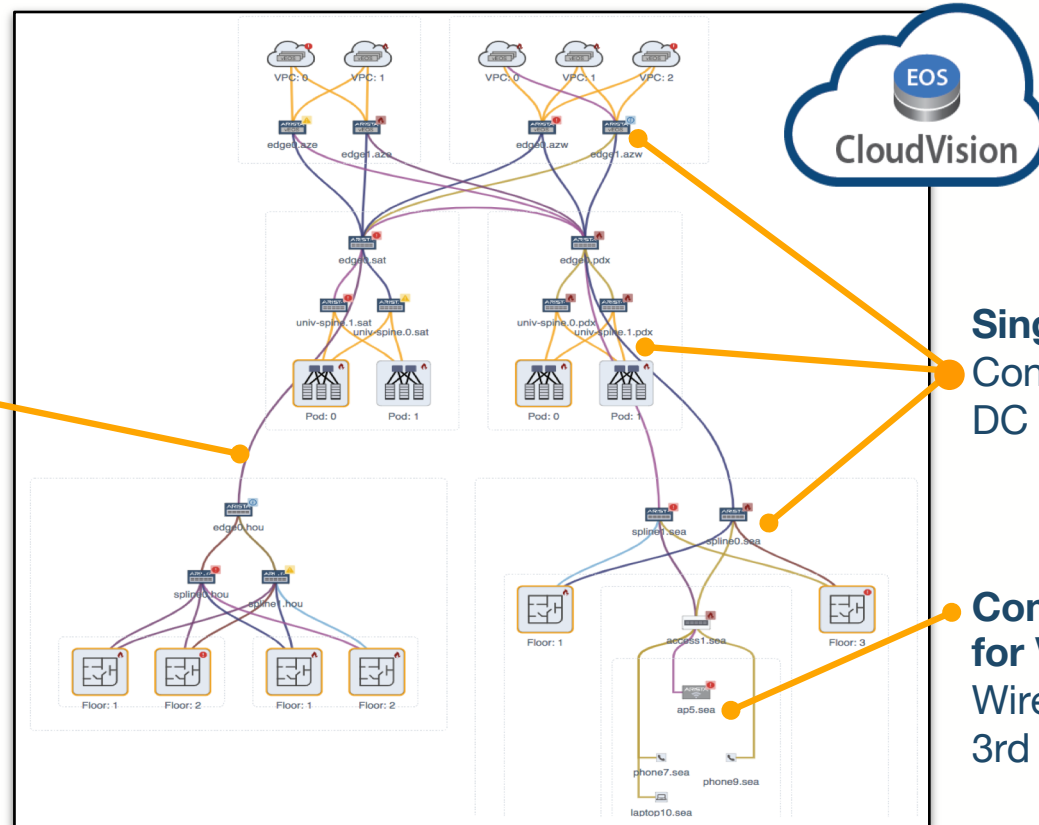
Improved Security with Endpoint Visibility

Campus Use-case: Client-to-Cloud Visibility

State Streaming-based
Modern, granular,
complete. (No Polling - at
all!)

Overlay Telemetry Views
Performance, Events,
Segmentation and more

Starting Point...
For diving deeper into
control, data, mgmt plane



Single Management View
Consolidation of
DC + Campus + Cloud

**Common Dashboard
for Visibility**
Wired and Wireless
3rd Party devices

CloudVision: Improved Visibility by Breaking down Silos

Campus Use-case: Automated NetOps for the Campus

Orchestrate Changes
Config, Software Upgrades, Patches

ARISTA Devices Events Provisioning Metrics CloudTracer Topology cvpadmin

Network Provisioning
Configlets
Image Management
Tasks
Change Control
Snapshot Configuration
Public Cloud Accounts
Device Labels
Device Tags

Change Control > Campus Rollout ✓ Synced Review and Approve

Preliminary Checks ✓

Spline Upgrade ✓

HQ-MDF1-Spline1
UPGRADE IMAGE
EOS-4.21.3F

HQ-MDF1-Spline2
UPGRADE IMAGE
EOS-4.21.3F

Access Switch Rollout ✓

HQ-IDF1-Leaf1
UPDATE CONFIG
+3 0 0

HQ-IDF1-Leaf3
UPDATE CONFIG
+1 0 0

HQ-IDF1-Leaf5
UPDATE CONFIG
+1 0 0

HQ-IDF1-Leaf2
IMAGE ROLLBACK
EOS-4.20.11M.swi

HQ-IDF1-Leaf4
UPDATE CONFIG
+1 0 0

HQ-IDF1-Leaf6
UPDATE CONFIG
+1 0 0

+ Add tasks or actions to build a new stage.

Save changes

CloudVision

Checks + Balances
Monitor health, exit criteria, alerts as changes rollout

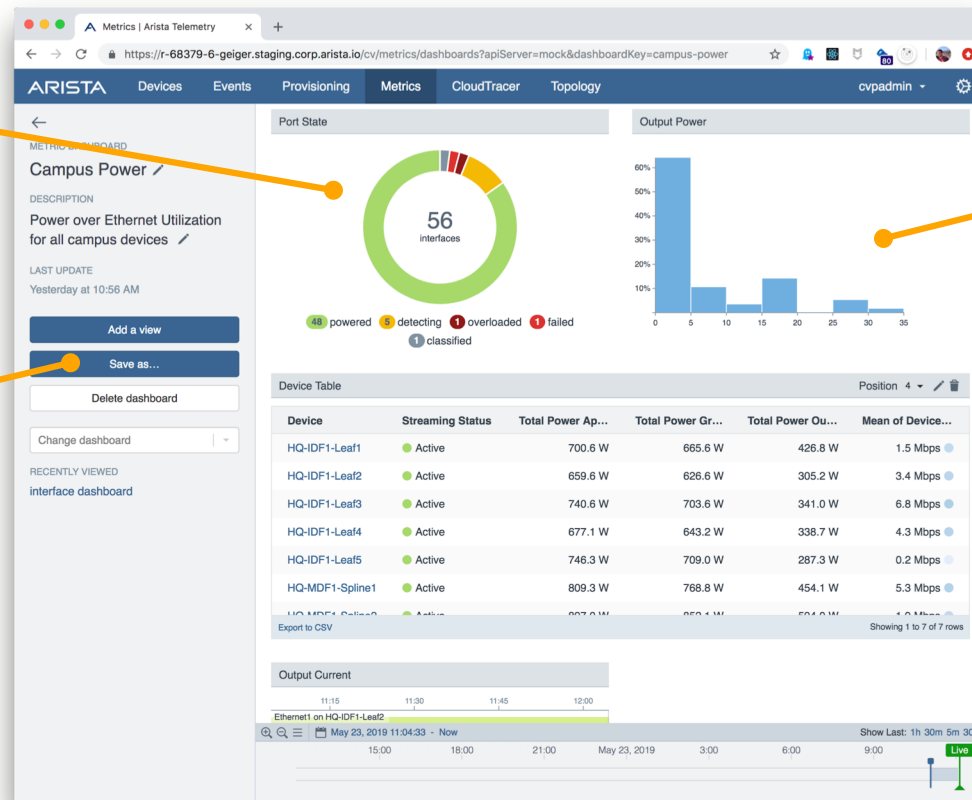
Continuous Snapshots
Granular network state is captured automatically - reduces manual CLI burden

Maintenance windows from Weekends to Hours

Campus Use-case: PoE Management

Interface Summary
Easy access to device summaries

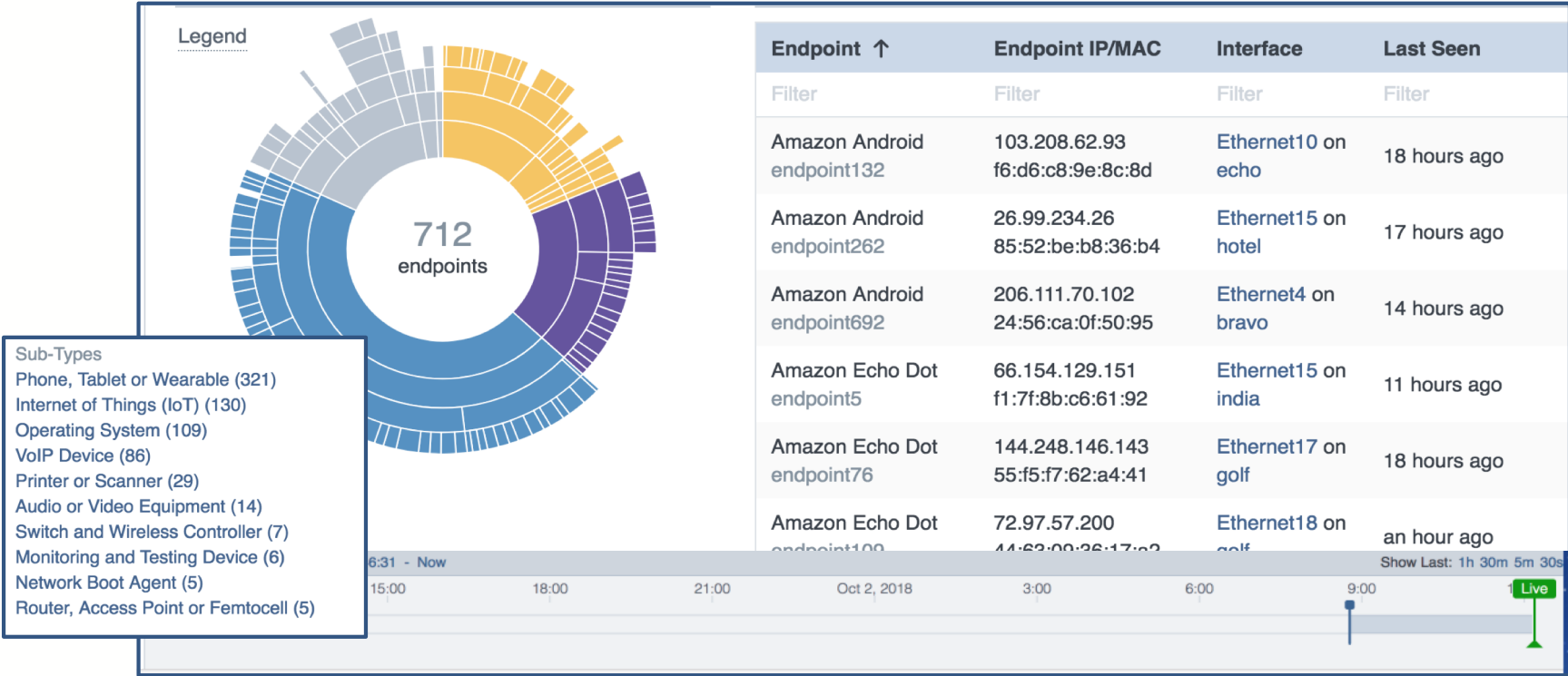
Customizable Dashboards
Create your own view



Power Usage
Monitor aggregate and individual summaries

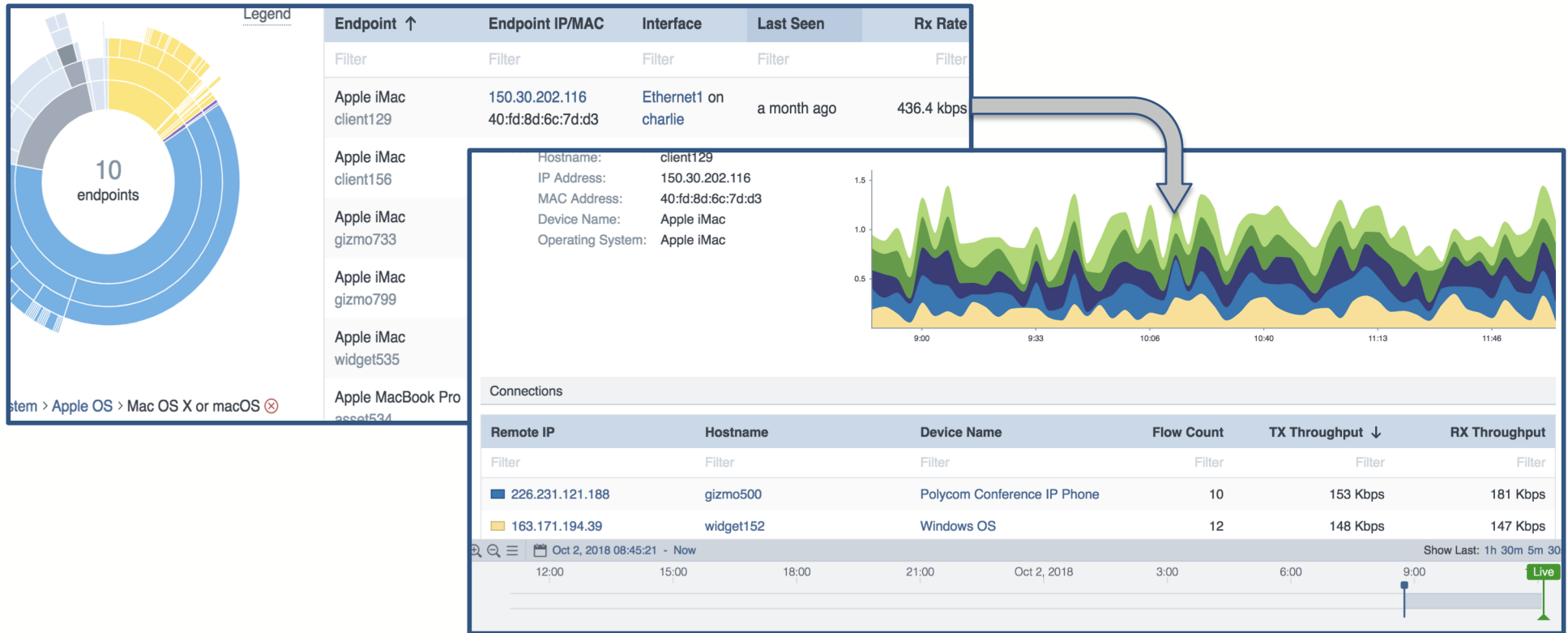
State-Streaming Extended to Campus Use-cases

Device Inventory and Analysis



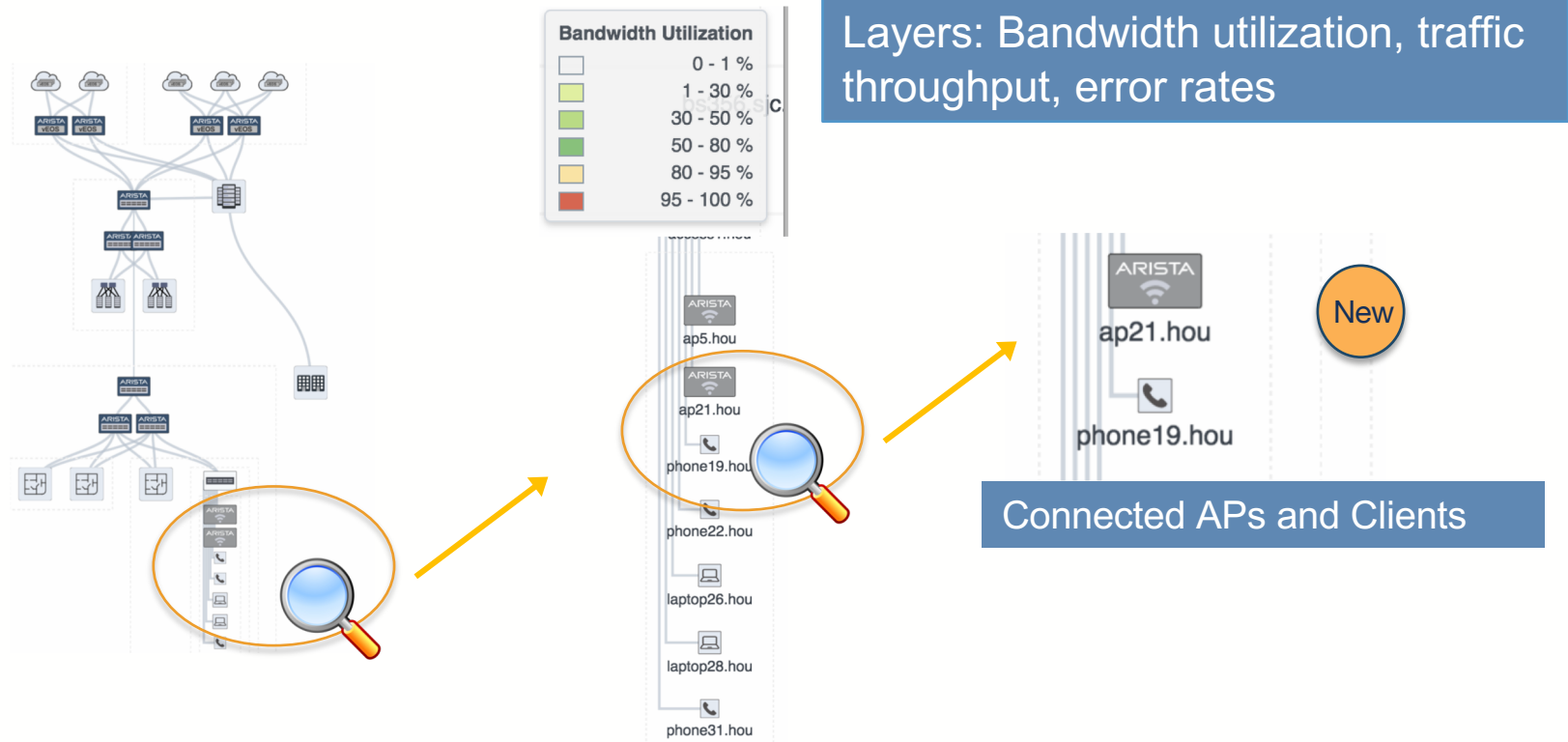
Visibility into IoT, Campus, DC Endpoints

Device Analyzer for Wired and Wireless



Improved campus security with granular traffic visibility

Holistic Topology View



Drill: site -> floor -> switch -> APs -> endpoints



Campus Trident 3 products

Arista X-Series Family



7300X3
10G - 100G Spine



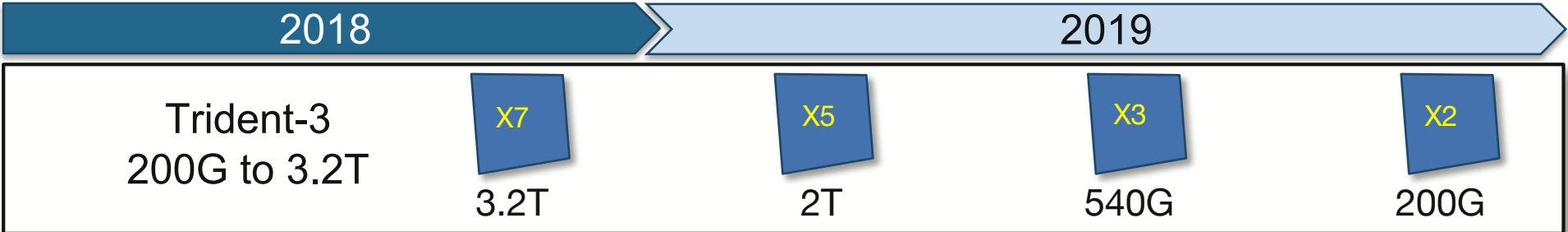
7050X3
10G – 100G Leaf



720XP
PoE 2.5G - Leaf



720XP
PoE 1G - Leaf



1G to 100G – From Wiring Closet to Spine – Flexible Configurations

High Performance – Consistent Features – Enhancements & Innovations

Single EOS Image – Comprehensive L2/L3 Solution – Open, Programmable, Resilient

Imagery may change

Campus Spline - Arista X3 Series:



7300X3

High Density Modular
100G/25G for Campus Spline

Two Chassis:
4 and 8 slot
with 50Tbps Fabric

Linecards:
32x100G QSFP
48xSFP-25G & 4x100G



7050X3

Fixed 100G & 25G
for Campus Spline

32 x 100G and 48 x 25G with
100G uplinks

10G to 100G port flexibility

Industry-leading Power
Efficiency

Large scale L2/L3 Tables



Flow Tracer

Dynamic Path Selection

Dynamic Shared Buffer

Smart Software Upgrade

Unified Forwarding Table

Remote Monitoring

Macro Segmentation

Single EOS image with CloudVision & Cognitive Features

Introducing Arista Campus Switches

- 802.3at & 802.3bt standards-based PoE
- Combinations of 30W & 60W ports
- Multi-Gigabit Ethernet (2.5/5G) ports
- Redundant PSU & Fans
- Rich EOS Automation & Telemetry



720XP-24Y6
24 10M-1G PoE Copper Ports
6 25G 25G SFP



720XP-48Y6
48 10M-1G PoE Copper Ports
6 25G 25G SFP



720XP-24ZY4
16 100M-2.5G PoE Copper Ports
8 100M-5G PoE Copper Ports
4 25G 25G SFP



720XP-48ZC2
40 10M-2.5G PoE Copper Ports
8 100M-5G PoE Copper Ports
4 25G 25G SFP
2 100G 100G QSFP

1RU PoE Systems for Campus Access

Arista 720XP Series – 10M-5G Systems

mGig PoE Campus Access Layer

- High Performance mGig platforms with campus features
 - High Performance with up to 560Gbps throughput
 - Real-time flow telemetry with IPFIX
 - Shared 8MB Smart-buffer and monitoring with LANZ
- Campus Access Optimized
 - Wiring closet access layer switching
 - PoE+ (802.3at) & 4PPoE (802.3bt) standards-based PoE up to 60W
 - Redundant fans and power supplies
 - Default single PSU, optional additional PSU for redundancy or increased power budget
- Campus networking scalability
 - OSPF, BGP, Multicast, MLAG, VXLAN & EVPN
 - 802.1X Enhancements and MAC Authentication Bypass
 - PoE system controls



40 10M-2.5G 30W PoE+ Ports
8 100M-5G 60W 4PPoE Ports
4 25G 25G SFP
2 100G 100G QSFP



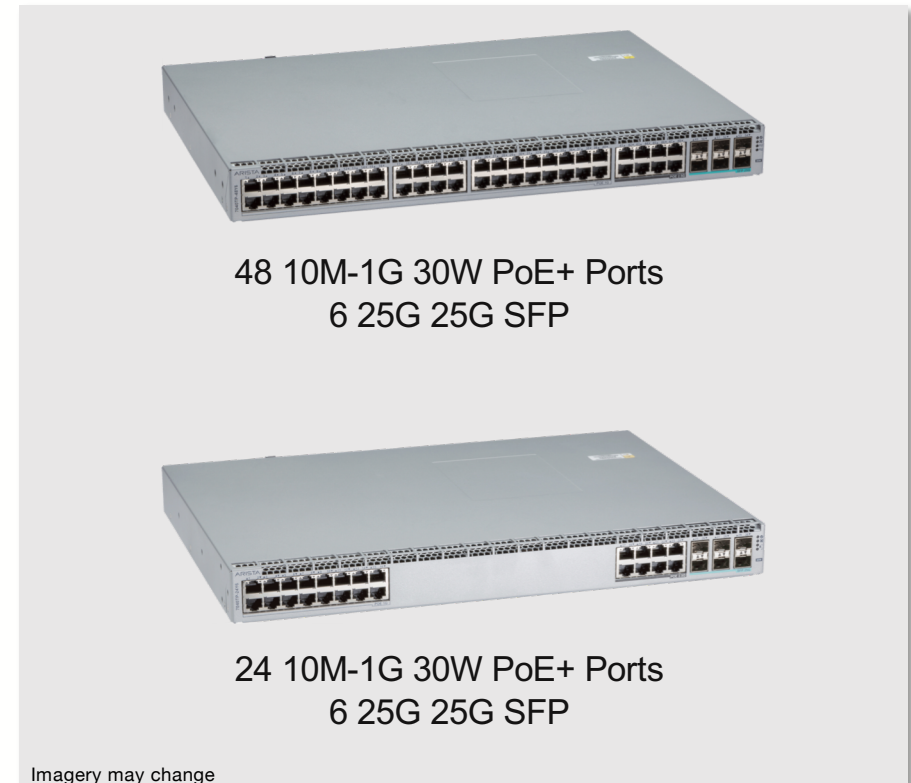
16 100M-2.5G PoE 30W PoE+ Ports
8 100M-5G PoE 60W 4PPoE Ports
4 25G 25G SFP

Consistent certification, knowledge, sparing, and architecture

Arista 720XP Series – 10M-1G Systems

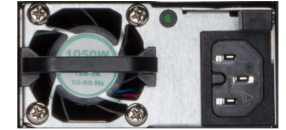
Gig PoE Campus Access Layer

- High Performance mGig platforms with campus features
 - High Performance with up to 198Gbps throughput
 - Real-time flow telemetry with IPFIX
 - Shared 8MB Smart-buffer and monitoring with LANZ
- Campus Access Optimized
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- Campus networking scalability
 - OSPF, BGP, Multicast, MLAG, VXLAN & EVPN
 - 802.1X Enhancements and MAC Authentication Bypass
 - PoE system controls



Consistent certification, knowledge, sparing, and architecture

Power Options



Product	PoE Ports (802.3at & 802.3bt)**	Power Capability 2 x PSU (Non-Redundant)	Av. Power Per Port w/ 2 x Stock PSU (1+1)	PoE Power Budget (W) 2 x Stock PSU (Max / 1+1)	Bundled PSU (x1)***
CCS-720XP-48ZC2-F*	40 x 30W 8 x 60W	All ports full stated power	16.7W/port	1800 / 800	1050W
CCS-720XP-24ZY4-F*	16 x 30W 8 x 60W	All ports full stated power	20.7W/port	1100 / 500	650W
CCS-720XP-48Y6-F*	48 x 30W	All ports full stated power	16.7W/port	1800 / 800	1050W
CCS-720XP-24Y6-F*	24 x 30W	All ports full stated power	20.7W/port	1100 / 500	650W

* Front to Rear airflow is the only available configuration due to cooling constraints.

** PoE follows the 802.3bt standard up to Type 3 (60W / 51W at the PD) on 5G ports.

*** Devices ship with a single PSU - PSUs are compatible with all switches. While mixed PSU sizes will operate, matching PSUs are recommended

80+ Platinum Rated power for >90% Efficiency

Why Are Arista Campus Platforms a Better Choice?

Highest Density SOC Design



Results in lower power consumption, faster convergence, higher reliability and MTBFs

Trident3 family offers sufficient scale for DC and Campus use cases



Larger tables and 128-way ECMP - suitable for all environments not PIN-point use-cases

All Platforms offer Fully Shared Buffering



No hard partitioning of buffers across pipes on the ASIC or low density chips

Real state and packet streaming telemetry



No reliance on proprietary streaming models

A single operating system to certify



One image across the whole Campus and DC



Introducing Cognitive Wifi

How We Do it

Cloud Platform

Secure, mature, flexible, automated: capable of managing any network connected “thing”



Cognitive WiFi

Machine learning based self-aware, self-healing network with application performance assurance.



Tri-Radio AP

Proactive testing, troubleshooting, and real-time 24/7 security; smarter RRM without compromising access.

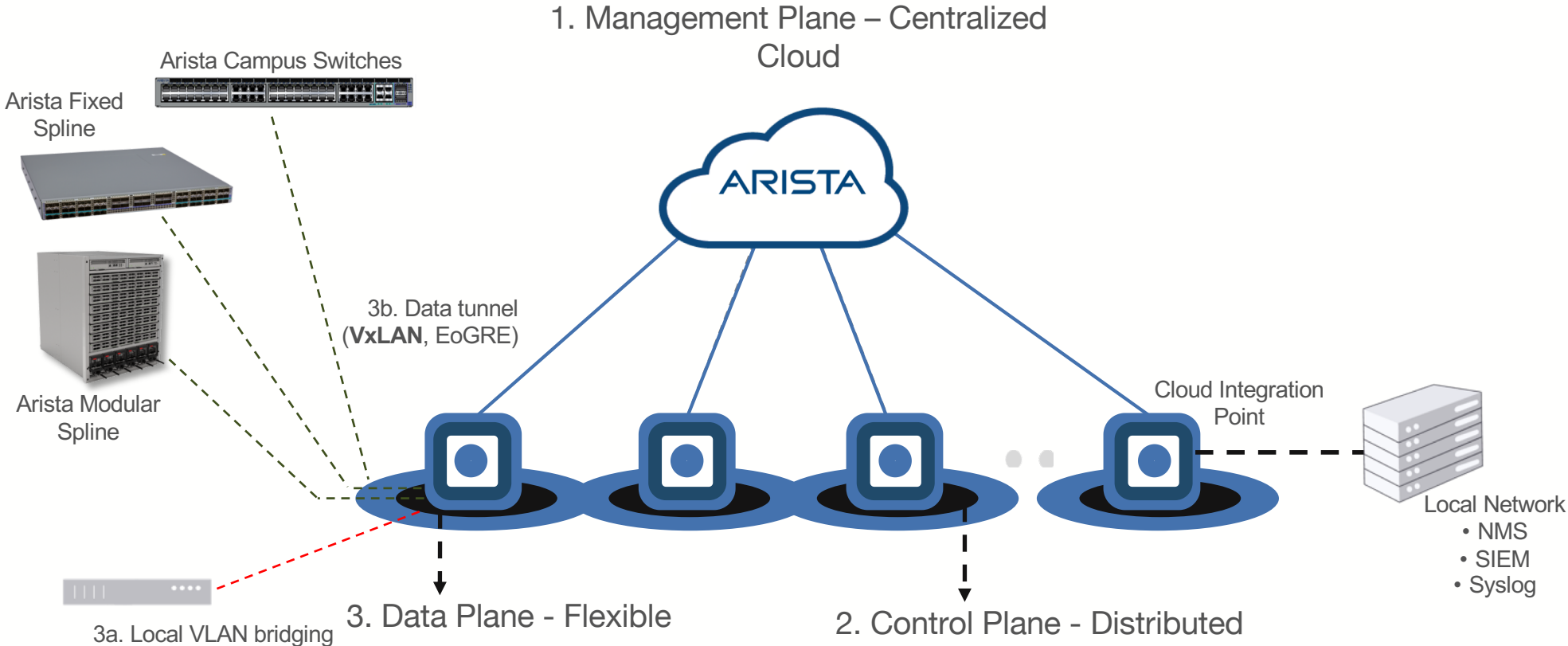


API Driven Cloud

Enables infinite new applications on top of WiFi and integration with 3rd party systems.



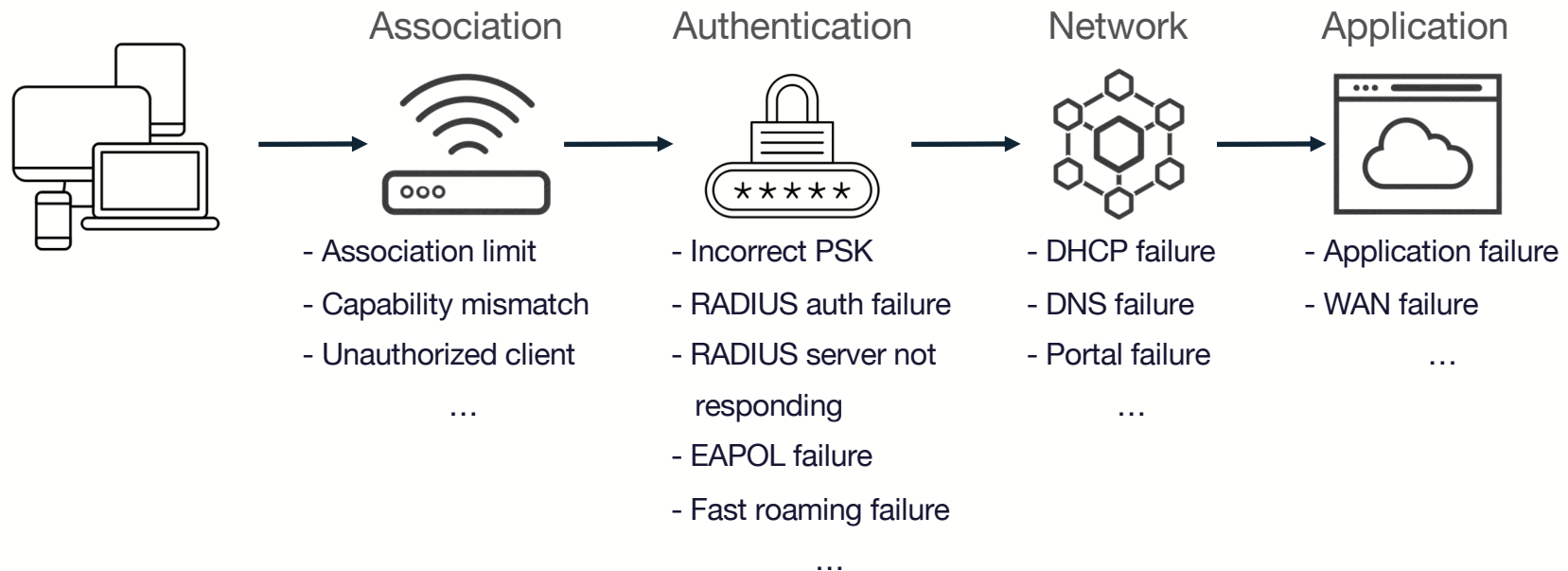
Innovative Cloud Architecture



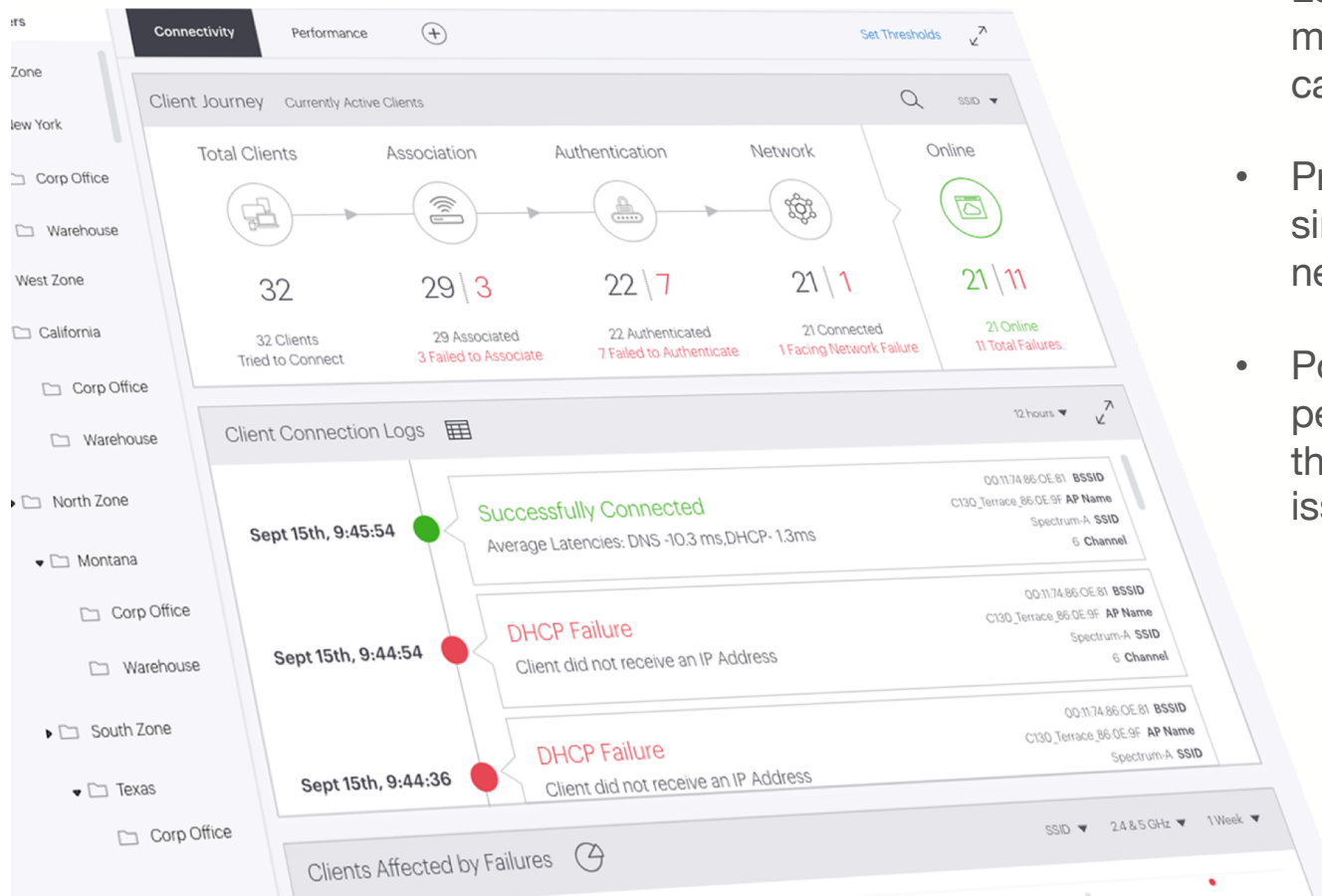


Wi-Fi almost always gets blamed for poor user experience when often it's not the direct cause

But how do you find out and fix the root cause?



Arista Cognitive WiFi

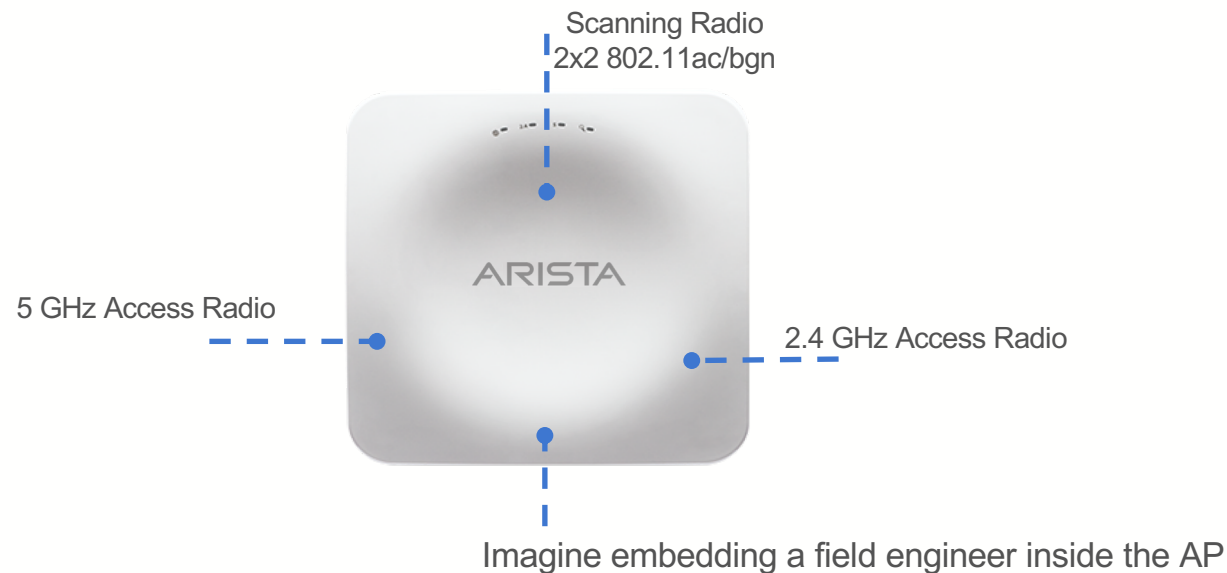


- Leads you to what matters most - how many clients are impacted and what is causing their problem
- Presents complete analysis instead of simple charts or graphs, eliminating the need for manual correlation
- Powered by the cloud, Cognitive WiFi performs ongoing algorithmic analysis that updates you in real-time as you fix issues

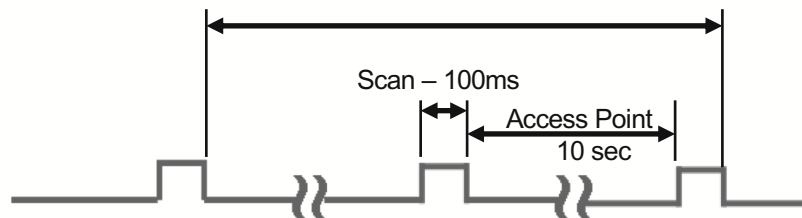
Innovative Tri-Radio AP Enables Cognitive WiFi

The Third radio – Your network's ears

- Most tricky client issues require sending a field engineer onsite to take a packet capture
- The integrated 3rd radio in Arista APs can:
 - Take packet captures anytime, without affecting active clients
 - Simulate a client, to uncover issues before they happen



Dedicated Scanning vs Background Scanning








Dedicated scanning is becoming a major requirement to support modern high-bandwidth applications

- Background scanning disrupts these applications when running
- Background scanning is often disabled automatically or entirely
- RRM and RF optimization suffers without constant off-channel data

2.4GHz	5GHz
Number of Channels	
14	36
Time to complete one full scan using background scanning	
2 minutes, 21.6 seconds	6 minutes, 3.6 seconds
Time to complete one full scan using dedicated scanning	
1.4 seconds	3.6 seconds

Arista 802.11ac AP Family- Disaggregated APs

					
O-105	C-100	C-110	C-120	C-130	W-118
<ul style="list-style-type: none"> • 2x2:2 MIMO 802.11ac • Wave 2 	<ul style="list-style-type: none"> • 2x2:2 MU-MIMO 802.11ac • Wave 2 	<ul style="list-style-type: none"> • 2x2:2 MU-MIMO 802.11ac • Wave 2 • Tri-Radio 	<ul style="list-style-type: none"> • 4x4:4 MU-MIMO 802.11ac • Wave 2 	<ul style="list-style-type: none"> • 4x4:4 MU-MIMO 802.11ac • Wave 2 • Tri-Radio 	<ul style="list-style-type: none"> • 2x2:2 MU-MIMO • Wave 2 • Tri-Radio Wallplate
1x Gigabit Ethernet Port	1 x Gigabit Ethernet Ports	1 x Gigabit Ethernet Ports	2x Gigabit Ethernet Ports	2x Gigabit Ethernet Ports	1x GigE Uplink 3x GigE Wired ports 1x Passthrough port
<ul style="list-style-type: none"> • Internal & external antenna options • Best for stadiums, outdoor spaces, weather-affected environments 	<ul style="list-style-type: none"> • Low cost Wave-2 • Best for medium density, SMB, Retail, K-12 	<ul style="list-style-type: none"> • Low cost Wave-2 • Best for medium density SMB, Retail, K12 Schools, Enterprise • Integrated BLE 	<ul style="list-style-type: none"> • Latest QCA chipset • Best for high density, enterprise, classroom and auditoriums 	<ul style="list-style-type: none"> • Latest QCA chipset • 2x2 ac 3rd radio for dedicated WIPS/RF monitoring • Best for high density, enterprise, classroom and auditoriums 	<ul style="list-style-type: none"> • 2x2 ac 3rd radio for dedicated WIPS/RF monitoring • Best for conference rooms, classrooms, hospitality, dormitories, etc. • Integrated BLE

Wifi 6 - 802.11ax, C-250 Access Point

Gen 2 Advantages

- Higher performance
 - OFDMA and MU-MIMO
 - 8x8:8 5GHz, 4x4:4 2.4GHZ radios
 - 2x2:2 scanning radio
 - BLE
- Better more secure AP
 - FIPS 2 certification
 - Conformant to new NIST standard for H/W-based key gen
- Most efficient power consumption
 - All .11ax features at 802.3at with 4x4 5GHz
 - Full Feature set at 802.3bt (<40W)
- Competitive price point with Gen2 H/W





Thank you