

Arista Cognitive Unified Edge (CUE)

Introduction

Employee productivity is being accelerated by highly personalized mobile devices, containerized micro service applications, and workforces that can work from anywhere. Companies are demanding more from their workers with an increased emphasis on data mining where artificial intelligence is unlocking new business opportunities.

Networks, specifically the edge, provide the on ramp into these new productivity infrastructures, irrespective of location (office, home, satellite locations etc). As other technologies are driving this new productivity world (IoT, artificial intelligence, video collaboration, etc) so must the network.

Silo'd approaches where edge networking services, including wired, wireless, intrusion protection, performance optimization, and content filters consumed independently of each other are behaviors of the past. Edge networking must evolve with a set of integrated services, similar to cloud infrastructures where the non technical savvy retailer, healthcare provider, or even small business owner can pick from a list of services, with zero touch involvement.

Legacy approaches, where each service is offered with specialized hardware/software appliances, inflexible topologies, and non-integrated operations management must evolve. For smaller companies to compete, they need access to the same networking technologies as the big gorillas in the market, minus the overhead of having highly trained networking guru's. There should be no technology divides here.

As containerized micro services applications rapidly expand, where the data intelligence lives within "the cloud" as the data sources are no longer in a highly centralized data center. The edge of the network is now 100's of smaller employee on ramp sites, mixed with a few office sites, and multiple cloud connections including both public clouds and private data centers, where the applications reside.

Split communication tunnels between private and public sites, location awareness, inclusion of LTE for low cost connectivity, secondary back-up, bandwidth pruning of non critical applications, high density wireless, and bi-directional firewalls are just several examples of networking services that all companies need, large or small.

Delivering on the ever expanding need for integrated edge networking services requires a repeatable architecture where many of the technologies are unified including common topology designs, platforms, operating systems, service flows, real time telemetry, and artificial intelligence. Further there must be a real time database, with predictive machine learning, that is commonly shared and leveraged across all of these services.

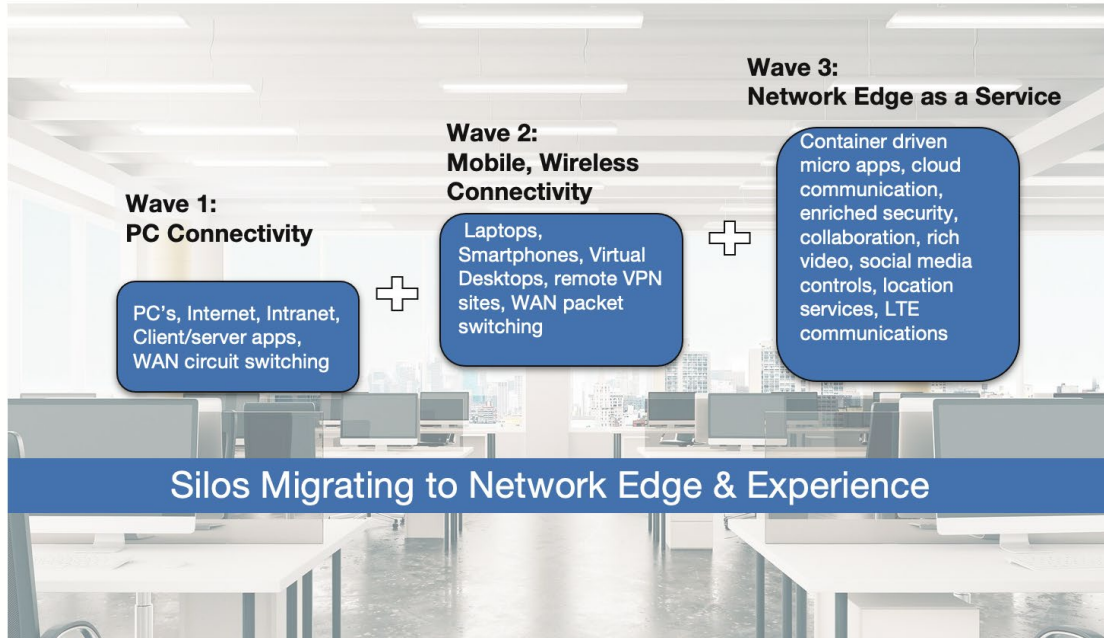


Figure 1: Edge Networking Productivity Waves

Arista Networks Cognitive Unified Edge

Agility, Availability, Automation, Analytics and AI are the 5 A's and pivotal foundations for carrying data sets from the edge to the cloud. The architectural cloud principles of data-driven networks bring validated designs with proactive platforms, predictive operations and prescriptive experience. This unification of these silo'd networking technologies requires a rich data model, interdependency models, artificial intelligence, real time telemetry, and use cases that are task focused. These are the underpinnings of Arista's Cognitive Unified Edge (as shown below).

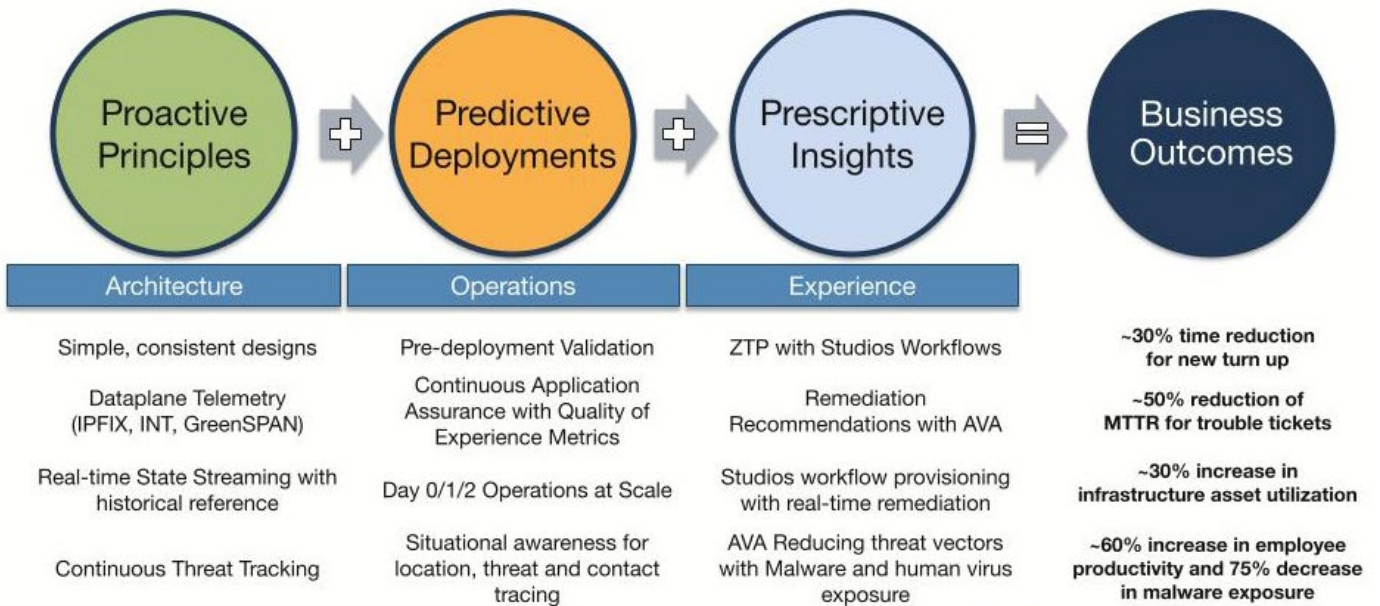


Figure 2: Arista's Cognitive Networking - Driving Business Outcomes

Arista's Extensible Operating System

Arista EOS is the first and only fully state-store and data lake oriented network operating system, where all state regarding switch operations is stored in-memory for real time analytics and proactive remediation. Real time state information overcomes legacy approaches where blocks of management data are stored, queued and collected, with historical representations. These legacy approaches do not address the need today for rapid problem detection, diagnostics, and remediation; moreover, where many of these operations are resolved automatically with intelligent systems.

CloudVision, Arista's multi-function operations management platform leverages not only benefits from this real time state information, third party sources can also ingest structured, unstructured, flow and packets for proper action using Arista's flagship EOS based on NetDL (Network DataLake).

Arista's Autonomous Virtual Assist

As large data sets explode, the use of artificial intelligence applications, real-time video and workflow traffic intermingled with breakthroughs in the mobile Internet at 5G to 400Gbps speeds place greater reliance on the networking edge. This has driven Arista to build a highly programmable state and AI driven software stack. Arista's Autonomous Virtual Assist (AVA) for prescriptive analysis and experience. AVA is not only the AI engine for predictive and proactive operations management, it also resides within Arista's CloudVision management plane, where all networking data, both past and real time, generate a data source for rich visibility and analytics, that is available across a broad ecosystem (as shown below).

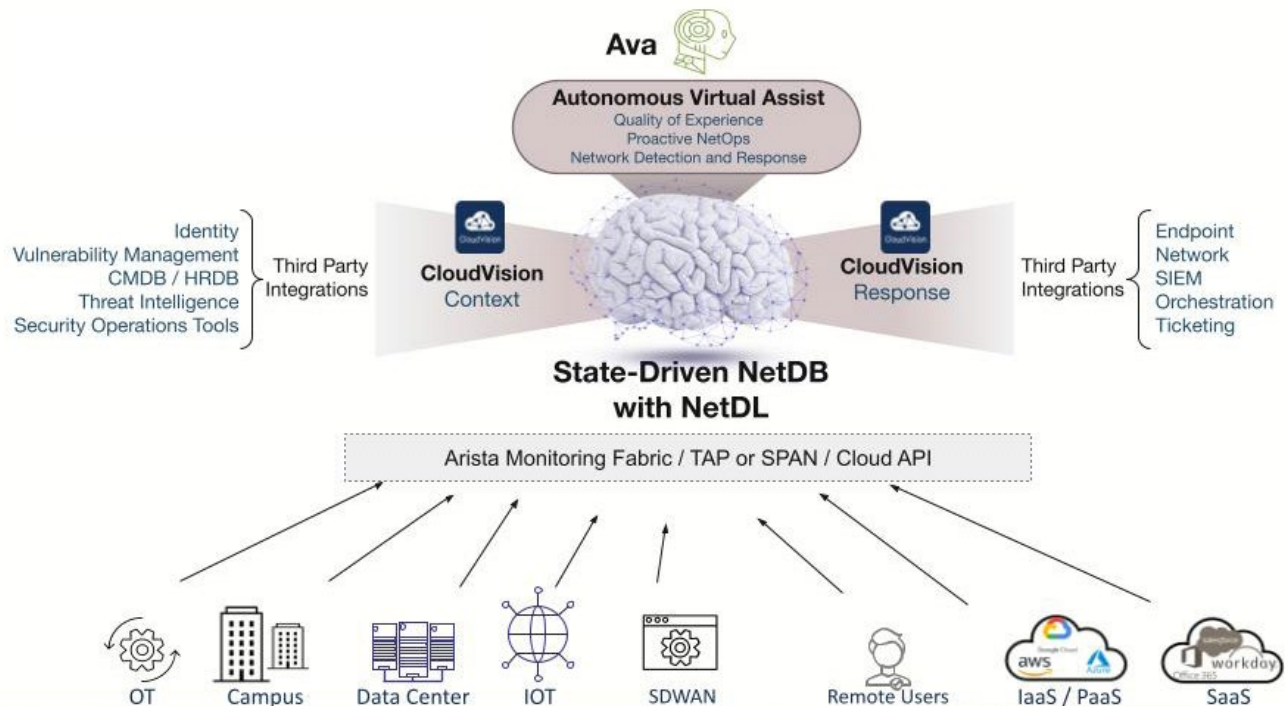


Figure 3: Data Driven Ecosystem

Post-Pandemic Campus Decade

As we exit the pandemic of 2019, we are seeing a new normal of hybrid mobile workforces, floor/office space that accommodates virtual and physical meeting rooms, enriched IoT building intelligence, smart devices, location services, video conferencing, and cloud applications. The transition to digital healthcare, connected retail, borderless banking, serverless offices, self-service kiosks, pop-up urgent care centers, online take out restaurants, has only been accelerated by the pandemic with no going back.

The intersection of loosely coupled networking technologies will be a thing of the past, as businesses realize the need for a set of combined services that can be rapidly deployed, easily updated, and quickly diagnosed. While the upfront hardware costs continue to drop on a per gigabit basis, based upon open market chip technologies, many businesses are realizing the more hidden costs associated with outages, security updates, troubleshooting, and forensics, and understand that these need to be strongly considered when purchasing edge networking services.

The Cognitive Enterprise

Arista's cognitive enterprise delivers a rich set of edge networking services from small to large enterprises, whether highly distributed in small sites, or concentrated in large buildings. Arista's cognitive enterprise is based upon cloud principles of availability, agility, and analytics, bringing the combination of inference and real-time action.

As the post pandemic networking edge requires 7x24 uptime, rapid troubleshooting and service restoration is a top requirement. Downtime equates to loss of business, loss of productivity, and customer satisfaction issues. Rapid troubleshooting requires artificial intelligence as there are many active networking services running (including security, wireless, encryption, authentication, and connectivity) where any one of these could cause an outage. Again this is where cloud principles of AI, correlation, and a common management plane where services are captured within the same data repository is critical. A unified management plane eliminates finger pointing as there is a definitive understanding on where there are service outages.

Arista's cognitive campus leaf/spine or spline network designs leverage the same universal topology designs, which have been cloud proven. Also known as UCN (Universal Cloud Networks), UCN offers customers with a 'high radix' model, specifically an optimized network diameter, in which the number of devices supported by a network scales very linearly, without additional tiers and added complexities. These designs are less hierarchical, and offer a lower TCO.

Indeed, the definition of what constitutes the campus edge has rapidly changed. Customers are interested in a combined set of services that are universal, whether it is a hotspot, headquarters, home, or satellite office; not a number of discrete technologies made up of wireless, wired, fiber, firewalls, and optimization products.

Arista's campus platform, running its flagship EOS leverages telemetry innovations of cognitive management plane to deliver the next level of integrated performance, reliability, security and automation for campus users and administrators. Based on CloudVision, it scales in support of 1 to 1000's of users managed in the cloud as a service or premise. Arista continues to drive and meet customers' goals in line with their ever changing workplace.

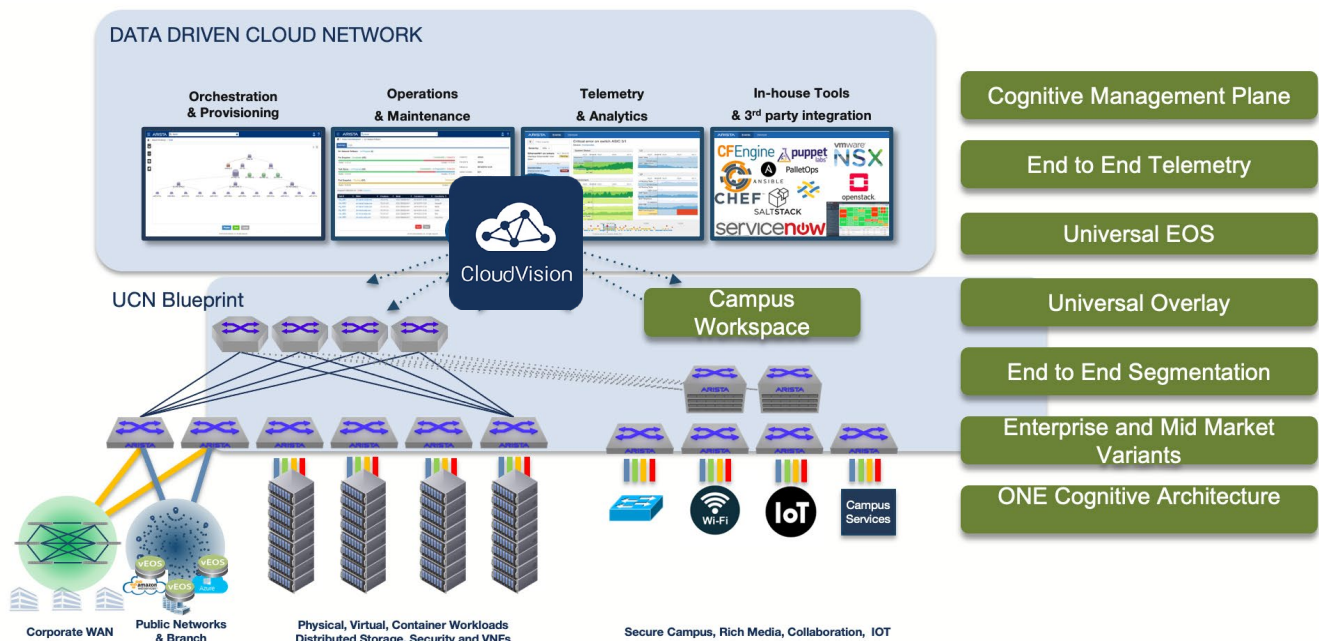


Figure 4: Enterprise Client to Cloud Strategy

New Network Edge – CUE

The next phase of Arista’s campus vision brings the entry of a new campus edge for commercial and mid markets. The Cognitive Unified Edge (CUE) complements Arista leaf-spine campus enterprise as a service to provide plug and play simplicity and workflows for the integrated wired and wireless secure edge. This “Edge As A Service” concept accelerates new services and technology introductions for the commercial market with smaller branch-level deployments across client to campus workspaces and wholesale managed services (as shown below). Security is deeply embedded in these wired and wireless services including intrusion detection, intrusion prevention, automated mitigation, and edge threat management.

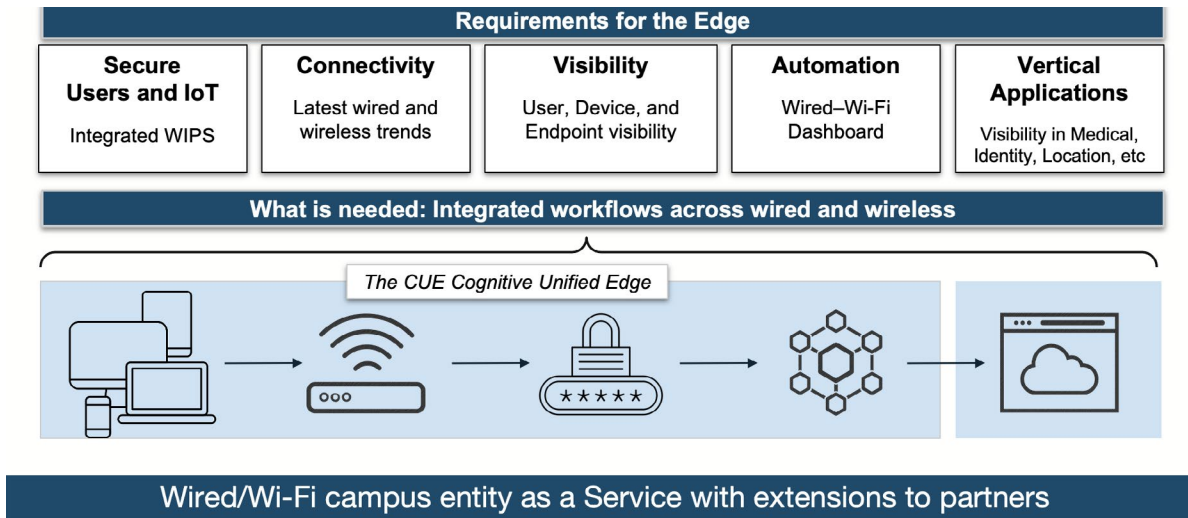


Figure 5: The New Edge as a Service Concept

Let us review some of the key attributes of Arista’s CUE

1. Consistent Architecture

The simplicity of CUE’s agility is it leverages the same architectural foundation of CloudVision to offer flexible consumption and subscription-based services. Delivering that common EOS and CloudVision based design brings consistent operations and experience unlike other disparate and discontinuous products in the industry today. CloudVision CUE delivers network lifecycle for commercial smaller campus sites with built-in automation, visibility and security for ongoing edge assurance and experience.

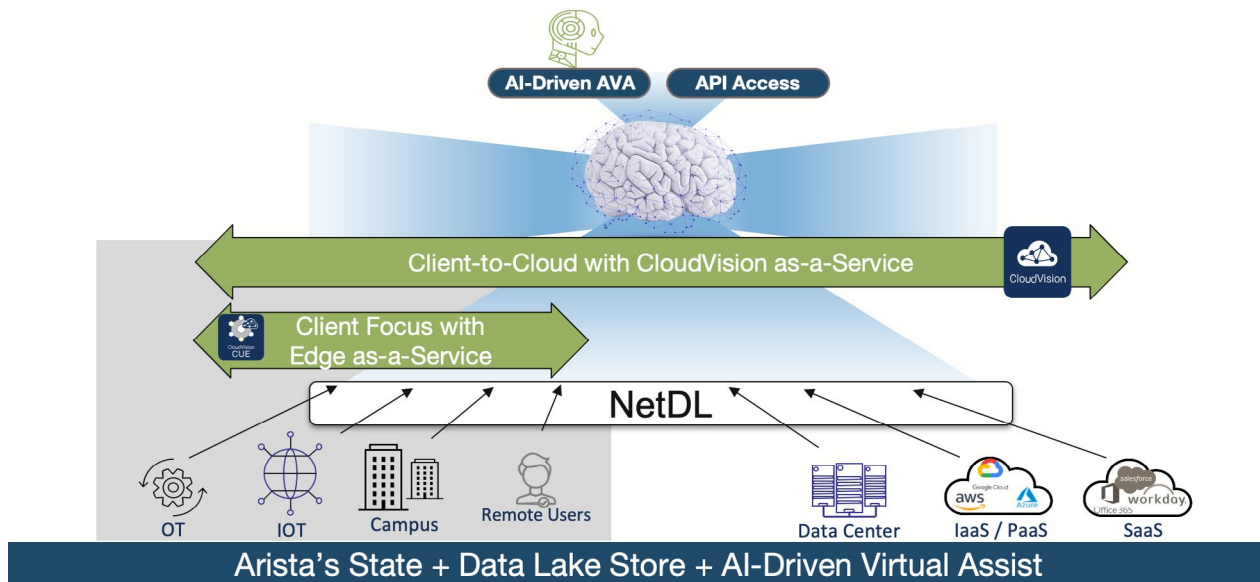
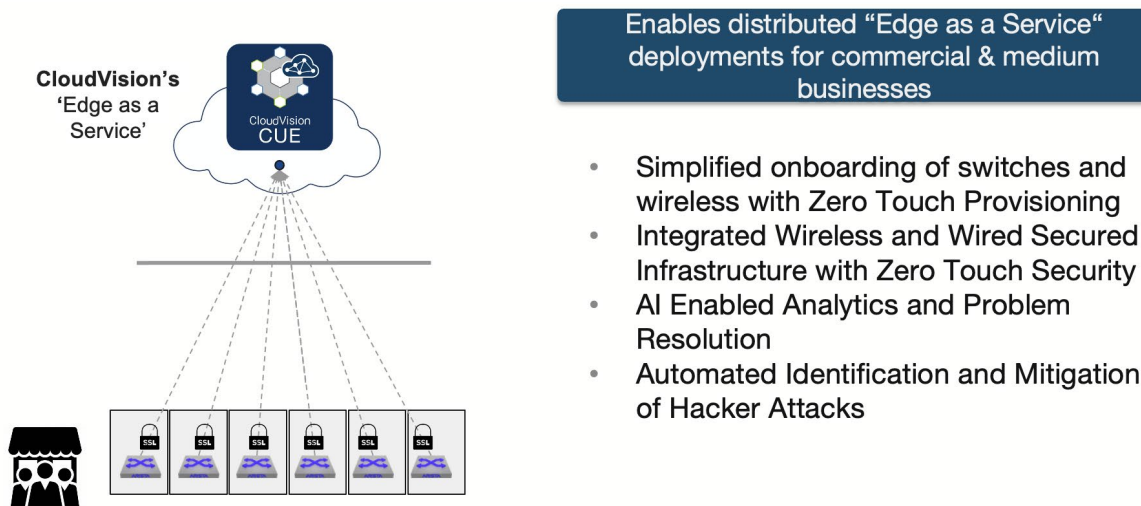


Figure 6: CUE Leverages Consistency of CloudVision and EOS

2. Edge Network Automation

Just as Data Centers have moved from rigid, highly structured infrastructures, to agile on demand infrastructures as a service, so has the need for Campus networks. Cubicles are becoming places to collaborate, conference rooms are becoming virtual points of presence, gated checkpoints are being managed by IP cameras and scanners, retail branches are becoming online shopping experiences, healthcare is moving closer to the patients, and applications are real time in the cloud.

Campus must take a page from the transitions data centers have gone through over the past 15 years. Automated provisioning where networking services can be added, re-deployed, re-purposed, re-tuned, has to become the norm as campus networks are now highly flexible workspaces. As Arista pioneered zero touch provisioning (ZTP) within data center networking, it is extending this technology into the campus, into the branch office and into the home via its common EOS and CloudVision technologies. ZTP enables real time upgrades, changes and easily adapts the network, in concert with office, building, and/or furniture changes. As an example Arista offers a remote wireless access point, for the at home worker, with automated provisioning, that includes a secure tunnel back to headquarters. This all deployed from the cloud; any employee familiar with configuring a smartphone can set-up this access point, securely.



Zero Touch Provisioning of Clients, Users & Devices “As a Service”

Figure 7: Edge ZTP for Wired and Wireless

3. Client Journey

Edge networking in many respects is analogous to containerized applications where many services are deployed within different appliances, processors, and operating systems, however these services appear as one to the end user as an integrated application. Specific to edge networking, most of these services are transparent, while a few including security, authentication, and wireless associations are visible. The secure, seamless client experience is the number one networking deliverable. The more reliable the experience the better. The more secure the experience the better. The less the end user has to do, the better.

Arista views this client experience as the Client Journey. The journey captures the rich set of services that the network is providing whether it be a wireless, or wired connection, whether it be an authenticated or encryption service, whether it be local IP connection, or a VPN service, and whether it be highly secured with localized firewalls, or tunneled back to a corporate network. The journey is across all of these services, (not just one), whereby any individual service can create a catastrophic, or intermittent outage condition, where productivity is impacted, whether it is one employee, or many.

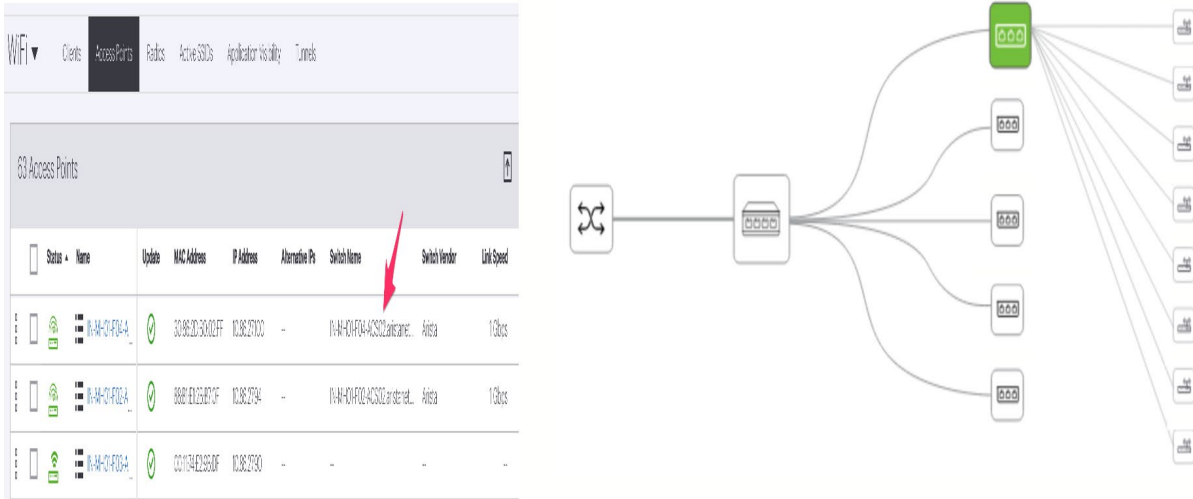
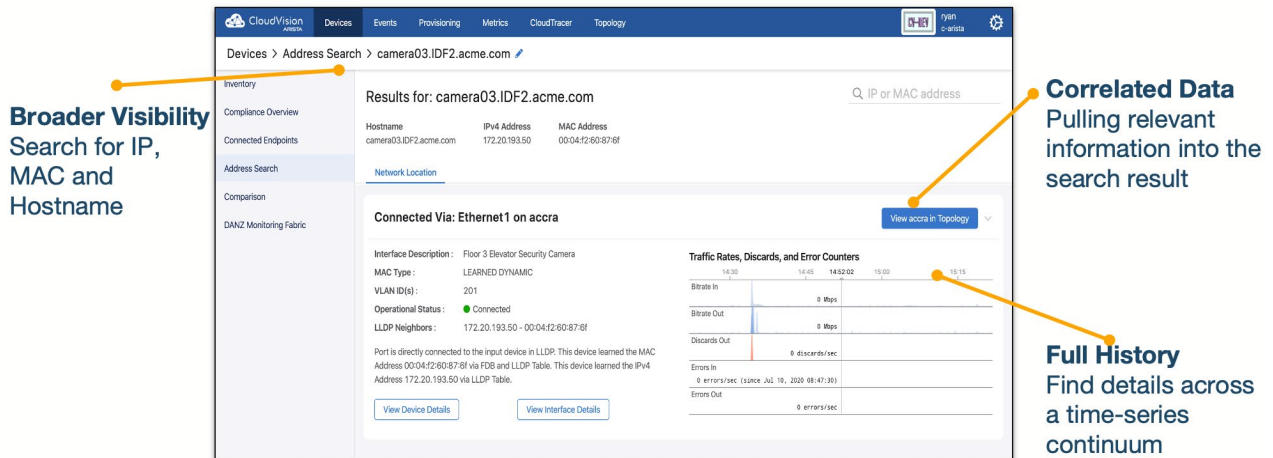


Figure 8: CUE Wired-WiFi

Within Arista’s CloudVision CUE offering, Arista offers a Client Journey view of these services. And more importantly provides pro-active diagnostics, to prevent catastrophic outages, as well as real time troubleshooting when there are service outage complaints (see below).



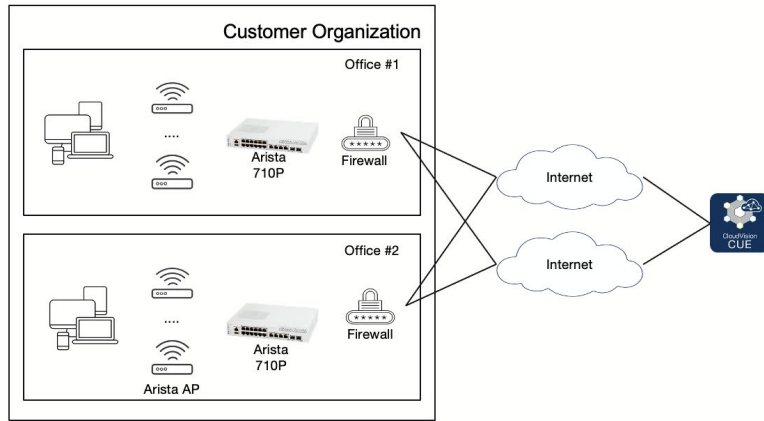
Search Network-wide to Pin-point Device Location

Figure 9: CVCUE - Endpoint - Client Journey Example

4. Edge Network Design

Modern development tools mirror the distributed systems in which they are designed to work with; as a result they have far more intelligence across the virtual machines and containers building blocks that make up the applications. These development tools have replaced the more traditional tools, which were based on monolithic code bases.

Networking is moving in the same direction. Traditional CLI based Network Ops are lagging way behind here by decades model will only scale if declarative practices to augment mature DevOps. CUE brings that edge-control. Together with CloudVision foundation one can implement network wide change controls, real-time automation, and proactive event monitoring with analytics. For operational efficiency. NetOps Teams are emerging from IT infrastructure to balance out this dynamic. These operator’s functions are rapidly becoming understood and accepted as critical roles within a CUE network design.



Use-case	Example	# of Network Devices/site	# of Sites	Admin Level
Retail - Small Enterprise	Restaurants, Fast Food	1x 710 Switch, ~10 AP's	100's	IT generalist admin
Branch	Lawyers, Doctors Offices, Body Shop	1x 710 Switch, 2-5 AP's	1-2	IT generalist admin
Rural School District		2-3x 710's, 10-20x APs	4-5	IT generalist admin

Figure 10: CUE Network Design

5. Comprehensive Product Line

Arista offers both modular and fixed enterprise class wired POE switches, Wi-Fi 6 access points, branch office connectivity and security products. CloudVision CUE manages these services for delivering a unified operations experience. Customers can choose from a broad number of chassis offerings, that scale from remote satellite branches, typically with less than 25 employees, to branch offices with over 500 employees, with connectivity back to headquarters that scale to thousands of employees.

Arista offers innovative POE adaptive power features, for a true plug and play experience with IP phones, cameras, IoT and even Wi-Fi 6 AP's which often need more than 30 watts of power. Arista's Wi-Fi access points are leading within the market with innovative WIPs, Wi-Fi 6E automated channel tuning, and AI driven troubleshooting and remediation features.

Arista offers gateway network security and optimized branch connectivity with LTE connectivity for failover available for remote locations with unreliable internet. Arista also offers edge security hardware appliances that are "all-in-one" units with onboard WiFi and secure connectivity combined into one compact unit. All of these products are managed from a single console experience, whether hosted on premises, or as most customers prefer, from the cloud as a service.

6. Secure the Edge

The importance of network security tops every IT administrator's priority list. From content filtering to advanced threat protection, VPN connectivity to application-based traffic shaping for bandwidth optimization, network administrators expect network security appliances to handle it all. This broad set of features is needed to ensure the network is protected from the headquarters to the perimeter without compromising access and network performance.

In addition to advanced security features, edge devices at branch locations also need to provide WAN optimization to prioritize network traffic, provide failover in case the primary internet connection is disrupted, and ensure real-time communication applications don't suffer from jitter or packet loss. Employees in these locations need to have reliable access to critical SaaS business applications like CRM tools, support systems, accounting and payment tools, while also having access to internal servers, systems and data in the same way users have access at the headquarters office. Networks of all sizes require security and connectivity to the very edge of the network to protect the network, improve efficiencies and provide business continuity.

Securing the Edge is an important edge imperative to bring the right protection and prevention via WIPS, identity and threat sensor features. Regardless of legacy IT today a thoughtful secure edge enterprise with special attention to virulent malware and threats and hackers starts with the first point of entry to secure the edge.

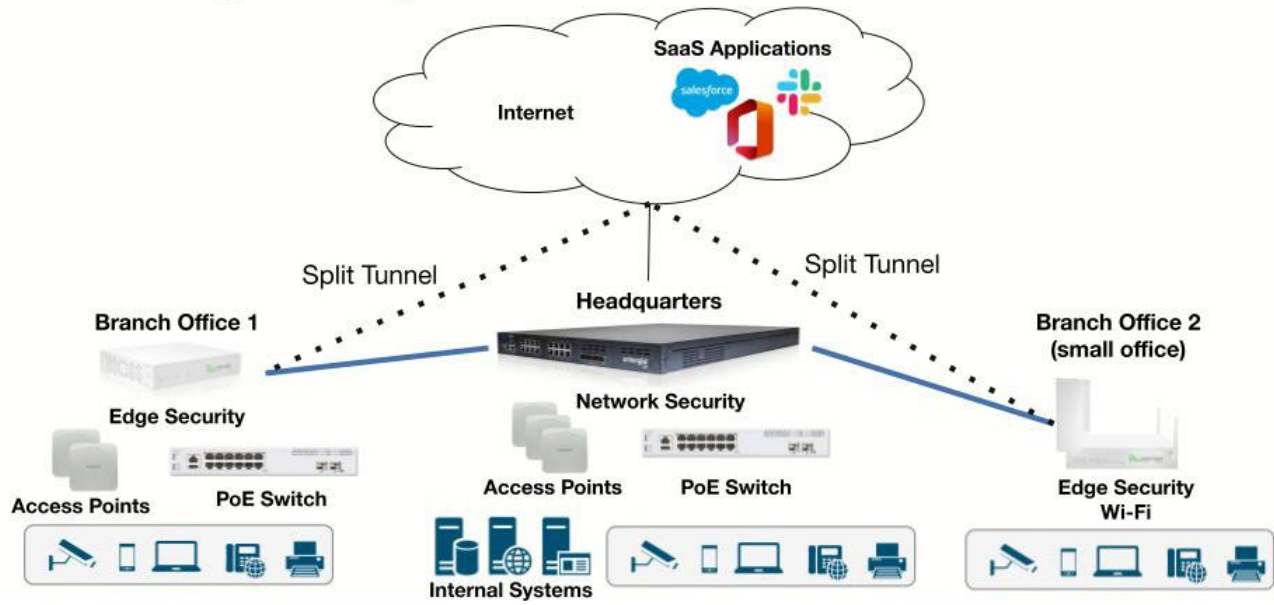


Figure 11: Securing the Edge

Summary

Arista Networks was founded to deliver software-based data-driven networking for cloud scale, enterprise class and now a new edge as a service for smaller environments. We pioneered at a time when programmability was not even on the radar screen of networking infrastructures. The cognitive campus of the future can be delivered “as a service” eliminating manual intervention via silo box configuration to automate service design and provisioning.

Arista’s CUE based on the same uniform ground of truth (based on CloudVision) improves customer experience and service activation in minutes while reducing the time it takes to remediate client and edge issues.

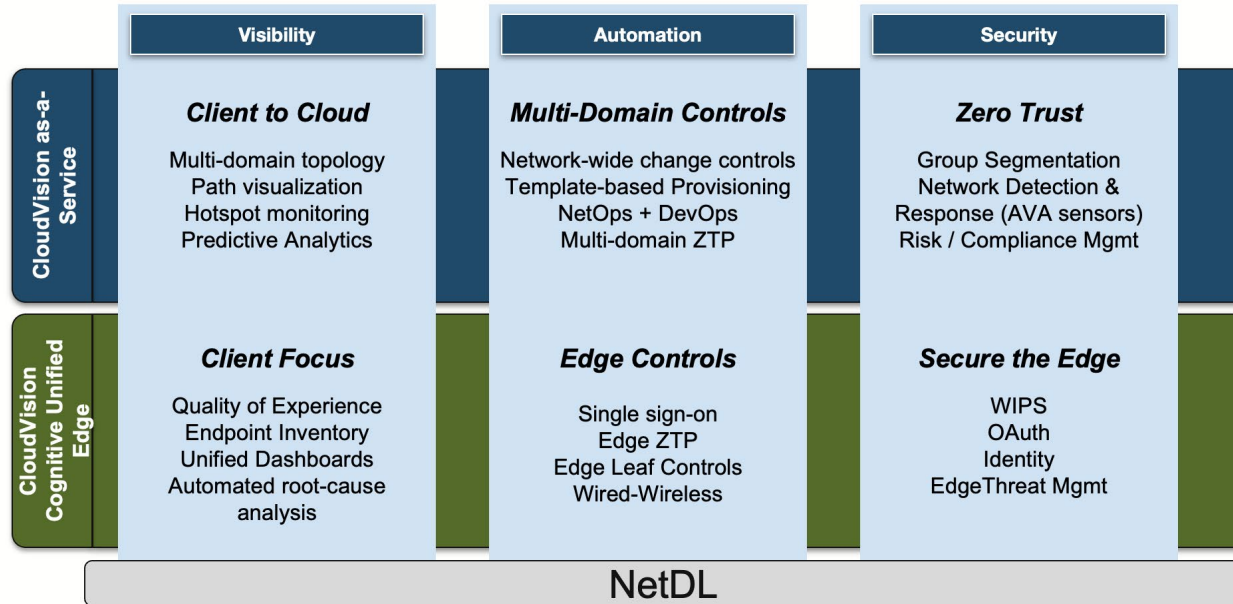


Figure 12: One Architecture. Two Experiences.

Our journey into the commercial market with edge as a service has only begun! As pioneers we don’t rest on our laurels, we keep innovating making the network transformation proactive, predictive and prescriptive in experience for the new CUE, cognitive unified edge.

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