

## SOLUTION OVERVIEW

# Networking for the Evolving Data Center

## Aruba CX Switches

Digital transformation is generating thousands of new application workloads every day. But few are deployed as they would in the past—fitting into a traditional IT infrastructure at a centralized, on-premises data center.

New workloads are being deployed where they yield the best business outcomes, which may be in a public cloud, a colocation facility or at the edge, where data is being created.

At the same time, the infrastructure of on-premises data centers is evolving. Business needs, DevOps, and agile practices are driving a transformation of the infrastructure with requirements for faster workload deployment and more frequent changes.

IT teams are in the difficult position of responding to demands for greater agility yet ensuring their network is always available and performing well.

### NETWORK CHALLENGES

#### Operational complexity

In a data center there is often a mix of network equipment with different operating systems and management tools. Intricately-structured software licensing adds another dimension of complexity. Network designs can differ significantly from legacy infrastructure to HCI to private clouds. Then there are overlays, other forms of network virtualization, and interactions with IT orchestration tools. When added together, the weight of complexity can be overwhelming.

#### Outdated tools and practices

Many data center networks are still administered with tools and practices developed years ago. Device-by-device management using command line interfaces, for example, is labor-intensive and prone to errors. Additional staffing is needed, but seldom provided, when IT relies on outdated network tools and practices to cope with rising complexity and the pressure to operate with greater agility.

#### Limited visibility

When there is an application or network slowdown, the IT team is under great pressure to restore normal operations. It can be challenging to quickly determine the root cause of a problem. Monitoring is typically via slow SNMP polling with enterprise intervals of 30 minutes or more. Existing network analytics tools, which are often purchased separately and run on external devices, typically provide fragmented data and limited actionable insights.

#### Finding time for upgrades

Expectations are high for the availability of data center networks. Consequently, software upgrades are usually scheduled for the middle of the night or on the weekend. In-service software upgrades (ISSU) are intended to shift maintenance to more reasonable times. But ISSU procedures are typically complicated, which increases risk of errors and aborted upgrades.



### AUTOMATION

- Turnkey automation for configuration changes
- Full programmability enables workflow automation
- Integration with overlays and automation tools



### ANALYTICS

- Real-time, network-wide visibility with actionable data
- Automated monitoring for rapid detection of issues
- Predict or even avoid security and performance issues



### AVAILABILITY

- Orchestrate software upgrades with zero downtime
- Microservices-based NOS architecture isolates software failures and enables non-disruptive recovery



### ARUBA'S CX SWITCHING SOLUTION

Built from the ground up with a combination of cutting-edge hardware and the powerful AOS-CX operating system, the **Aruba CX family of switches** is designed for demanding data center and enterprise campus networks.

Simplify the complexities of managing data center networks with automation options to match your IT organization's operating model. Proactively detect issues and speed troubleshooting with actionable insights provided by an analytics engine embedded in every switch. Make your data center network the foundation of an always-on infrastructure with the AOS-CX switch operating system, which is designed for resiliency and upgrades with zero downtime.

### AUTOMATION

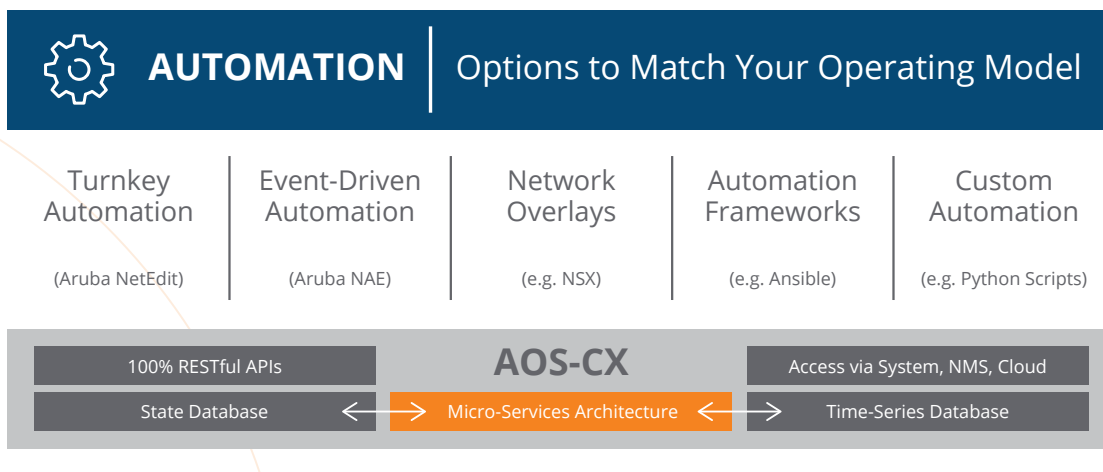
New tools and practices are needed to cope with rising complexity and to act with greater agility. Automation can be an effective way to meet these needs. Aruba CX switches give you several ways (Figure 2) to increase the level of automation in your data center network.

**Turnkey Automation.** You don't need to take a great leap to add more automation to your network. **Aruba NetEdit** gives you a turnkey automation tool that is easily learned by people who routinely use command line and graphical interfaces.

NetEdit automates large-scale configuration deployments, such as switching fabrics, without the need for programming. Routine changes to switches are easily implemented and checked for errors as well as for conformance with corporate and regulatory policies. Validation checks can be performed automatically on all configuration changes, including those made using the switch CLI or through Red Hat Ansible.

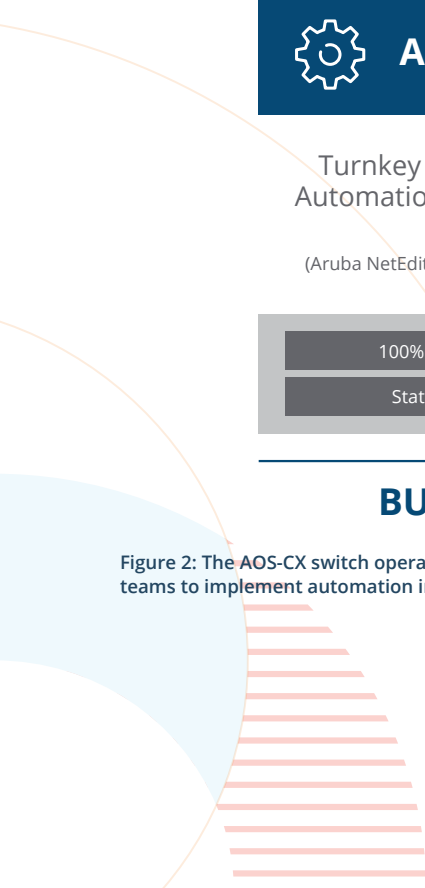
**Event-Driven Automation.** Aruba CX switches also combine analytics with automation to take action when pre-defined events occur. For example, an Aruba **Network Analytics Engine (NAE)** can monitor network communication for indications of declining application health. One way to do this is to calculate the ratio of TCP Syn and SynAck handshake transmissions between an application and clients. If the ratio crosses a threshold that indicates poor responsiveness by the application, then NAE can generate an alert and assemble data to aid troubleshooting.

**Network Overlays.** Full programmability and a rich feature set also enable integration with network overlays. For example, you can use Aruba CX switches as the underlay for VMware NSX. Support for VXLAN, BGP EVPN and other features needed by NSX are all there.



### BUILT ON A CLOUD-NATIVE OPERATING SYSTEM

Figure 2: The AOS-CX switch operating system is designed with cloud-native characteristics that support many forms of automation. This empowers IT teams to implement automation in ways that are aligned with their unique approach to data center operations and infrastructure.





**Automation Frameworks.** Many IT teams are using automation frameworks, such as Red Hat Ansible, to automate workflows in the data center. This approach is especially useful in environments where there is a blend of equipment from different vendors in the infrastructure. Aruba provides a collection of fully-tested Ansible modules written in Python script to automate the administration of CX switches. Learn more about [Aruba-Ansible integration](#) at Red Hat Ansible.

**Custom Automation.** IT teams developing their own automation software sometimes struggle with limitations in network equipment. Aruba CX switches were, in contrast, designed with this use case in mind. The AOS-CX operating system is 100% programmable via a RESTful application programming interface. All aspects of the system are expressed in the state-oriented database, which provides access to features, functions, and statistics.

Building on an already robust AOS-CX-based automation framework, Aruba also offers solutions which solves the problems faced by data center and IT administrators who often struggle with manual and siloed activities for IT service provisioning across compute, virtualization, storage and network infrastructure environments.

## ARUBA FABRIC COMPOSER

### Simplified, software-defined network automation

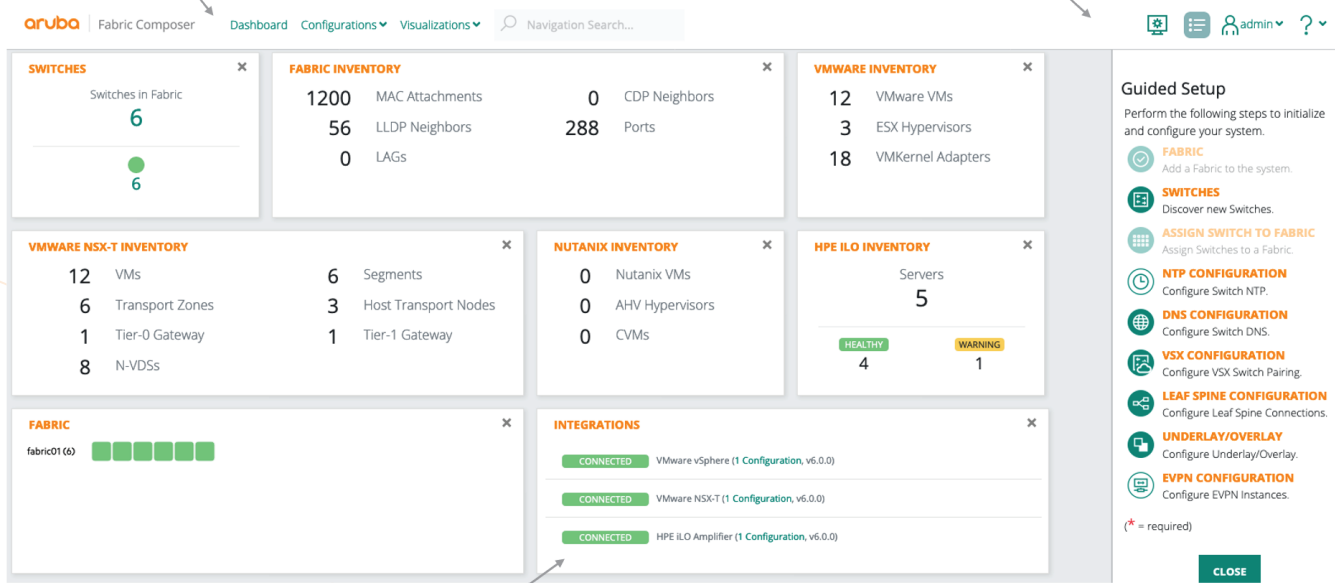
Aruba Fabric Composer is an intelligent, API-driven, software-defined orchestration software tool that simplifies and accelerates leaf-spine network fabric provisioning across rack-scale compute and storage infrastructures. This innovative tool helps increase efficiencies and improve productivity for both network operators and server and virtualization administrators who can benefit from integrated infrastructure management.

#### Aruba Fabric Composer Dashboard

Includes information about fabrics, switches, hosts, and VMs

#### Workflow Automations and Guided Setup

Simple point and click GUI streamlines and automates away complexity



API level integrations with various environments  
Including HPE, Aruba, VMware vSphere, ESX, NSX and Nutanix

Figure 3: Aruba Fabric Composer GUI



What makes Aruba Fabric Composer different from other solutions is that the software orchestrates a discrete set of switches as a single entity in a “fabric” topology which significantly simplifies day-to-day operations and troubleshooting overall.

Aruba Fabric Composer is designed to seamlessly work with **Aruba CX switches**, which optimizes interoperability for improving the performance across a wide variety of virtualized, hyperconverged (HCI), and HPE compute and storage environments. . Aruba Fabric Composer is designed to also seamless work alongside other Aruba and AOS-CX toolsets like Aruba NetEdit and Aruba Central to give our customers maximum capability and flexibility.

Furthermore, the combination of Aruba Fabric Composer and CX switches can also support non-HPE environments, allowing these deployments to also enjoy the benefits of automated fabric provisioning and ecosystem integration into 3rd party IT automation frameworks from VMware, Nutanix and HPE solutions.

### DISTRIBUTED ANALYTICS

Every Aruba CX switch has an integrated **Network Analytics Engine (NAE)** that runs within the AOS-CX operating system. NAE performs intelligent monitoring directly on each switch, giving operators distributed analytics and actionable insights into network-wide health, without delays or loss of information. Using these insights, IT can detect problems in real time and analyze trends to predict or even avoid future security and performance issues.

The traditional approach is for a switch to send a stream of telemetry to analytics software running on a host somewhere across the network. That method is inherently limited in the amount of data that can be transmitted and by the delay in processing it. Aruba has overcome these limitations by embedding an analytics engine and dedicated processing in the switch itself, where a rich set of data is available in the AOS-CX state and time-series databases. This makes it possible to do in-depth analyses in real time.

Aruba NAE maps network problems to their common root causes, accelerating troubleshooting routines by predetermining many first- and second-order diagnostics, so operators can focus on a more targeted set of issues.

NAE is tightly integrated with NetEdit, giving network operators the insights to monitor and troubleshoot issues from a single console. NetEdit collects data when an issue

of interest occurs and submits a notification to the operator via Slack or another ITSM tool. Upon clicking into NetEdit, the operator immediately sees the impacted devices and services, with full diagnostic details correlated to the time the event occurred.

### AVAILABILITY

Aruba delivers the always-on level of availability needed in data centers. It starts with the AOS-CX network operating system, which is designed to maximize availability and resiliency.

All software processes run as microservices that communicate via the state database of the switch; there is no direct communication between microservices. Should a software process crash, the impact of that failure will be limited. The microservice will restart, access the state database, and quickly restore the switch to full operation.

Modular CX switches come with Aruba’s **Virtual Switching Extension (VSX)**, which provides a robust, yet simple solution for high availability. VSX uses a unique design for control plane synchronization and an architecture that is redundant in both hardware and software.

Thanks to its design principles, VSX also supports live upgrades of switch software (Figure 3) with no need for maintenance windows. VSX delivers on the promise of in-service software upgrades (ISSU) without the complexity and risk associated with many ISSU solutions. Aruba CX switches in a VSX pair can be successfully upgraded in less than an hour while continuously delivering high-performing network services, without compromise.

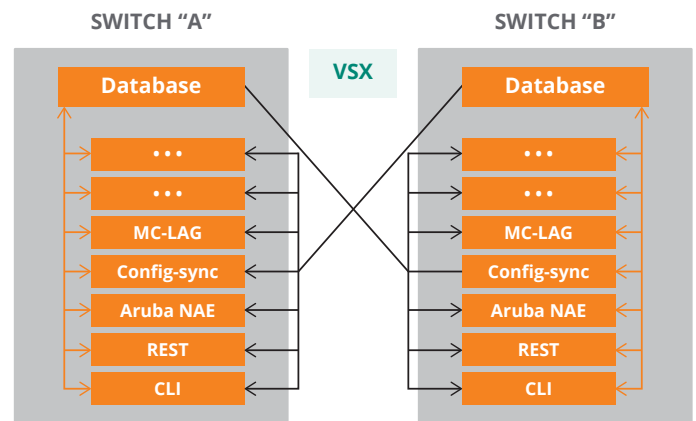


Figure 4: The Aruba VSX provides a redundant architecture that is highly available with minimal to zero traffic loss, even during live upgrades of software.



Figure 5: Modular and fixed Aruba CX switches for data center environments.

## SWITCHES FOR ANY ENTERPRISE ENVIRONMENT

### Data center, campus, and branch

From small to large enterprise environments, Aruba's comprehensive switching portfolio includes models that are ideal for access, aggregation, core, spine, and leaf deployments. Aruba CX switches reduce complexity by giving you one portfolio of switches that can be deployed from edge to the data center with one operating system, one approach to management, and one operating model.

The power of the Aruba CX switching portfolio provides a choice of fixed ports or modular chassis with non-blocking speeds from 1GbE to 100GbE. This gives you the flexibility to start with a low port count and scale to full-density switches – all with built-in automation and analytics – as your business requires. Access switches are available with high-density industry-standard high power PoE and HPE Smart Rate multi-gigabit ports.

No extra software licensing or subscriptions are required for the Aruba CX switches. All software enhancements and features, such as stacking or BGP protocol support, are included. Aruba also offers industry-leading warranty and global support services.