aruba
a Hewlett Packard Enterprise company

SOLUTION BRIEF

HIGH AVAILABILITY IN THE CAMPUS CORE

Aruba Virtual Switching Extension (VSX)

HIGH AVAILABILITY WITH SIMPLICITY

Enterprise networks face the challenge of delivering 24x7 always-on mobility, reliable access to collaboration and cloud-based services, and support for growing numbers of IoT devices. As a business and network grows, this non-stop availability becomes more critical due to simple economics. Downtime leads to a loss of productivity, user satisfaction and revenue.

Campus core switches sit at the heart of the network and are responsible for the delivery of a high availability (HA) solution that's capable of ensuring always-on access with robust performance.

To address this issue, Aruba's Virtual Switching Extension (VSX) has been designed from the ground up to provide industry-leading performance and high availability with much needed simplicity through a modern network operating system that performs continuous state synchronization (Figure 1).

A MODERN SOLUTION FOR HIGH AVAILABILITY

High availability (HA) refers to a system or component that is continuously operational for extended periods of time. For organizations today, this translates to 24x7 uptime without disruption to network access or performance.

Planning for high availability of core switches involves complex tasks for addressing backup and failover processing. This includes copying and accessing real-time networking state, including routing and forwarding tables.

Aruba VSX takes a new and innovative approach to solving high availability challenges by combining the best aspects of existing HA technologies such as multi-chassis link aggregation (MC-LAG) and Aruba Virtual Switching Framework (VSF), which combines (stacks) access switches into a single network element. This combination provides a distributed and redundant architecture that is highly available (minimal to zero traffic loss) even during software upgrades.

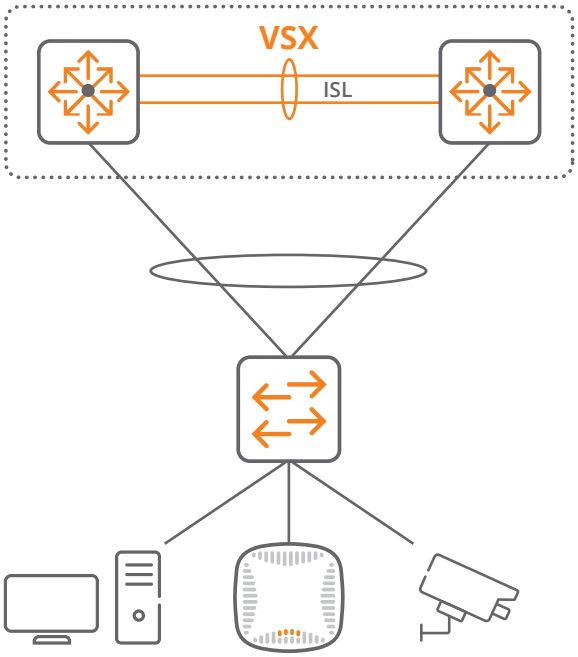

Figure 1: Aruba Virtual Switching Extension

- **Built for redundancy** across aggregation and core
- **Continuous config synchronization** via ArubaOS-CX
- **Flexible active-active network designs** at Layers 2 and 3
- **Operational simplicity** and usability for simple configuration
- **High Availability** by design during upgrades

A BETTER WAY TO ACHIEVE HIGH AVAILABILITY

Aruba core and aggregation switches are based on ArubaOS-CX, a modern operating system created for both high performance and process resiliency. With a modular database-driven design, processes can fail and restart (continue processing) with their last known state. ArubaOS-CX also features a microservice architecture that supports a built-in Network Analytics Engine (NAE) which makes the Aruba VSX implementation possible and unique in the market.

High availability and redundancy are delivered by enabling VSX on two switches. Each switch then maintains its independent control, yet stays synchronized with the other for important L2 information like MAC and ARP addresses. This enables a redundant loop-free topology that does not require spanning tree protocol (STP). By leveraging distributed intelligence, with each switch maintaining its independent control plane, the peer Aruba VSX chassis will continue to operate as if it was always the only chassis.

This highly available pair of switches will have Active-Active packet forwarding and can utilize popular distributed routing protocols such as OSPF and BGP to provide industry-leading HA in both Layer 2 and Layer 3 network designs.

Compared to rigid, legacy operating systems, ArubaOS-CX provides intelligent synchronization across the core, ensuring that configuration is always applied identically to both members of the VSX pair. And NAE constantly gathers real-time context of the availability state of switches to provide HA health information to the network administrator for HA performance tuning.

ALTERNATIVE APPROACHES

Traditional high availability and virtualization solutions can be separated into two major design approaches, each with limitations.

The first approach, referred to as "virtual stacking," uses a unified control plane with a single point of management. This virtualized stack of switches is simpler to configure and manage, but this simplicity comes at a cost as any upgrade requires the entire stack to be offline during the operation. Aruba VSF, available on Aruba access switches (e.g., 2930F and 5400R) is an example of this approach. In access layer deployments, the need for simplicity outweighs high availability requirements.

The second approach, typically implemented at the core or aggregation layer due to the larger failure domain, is an MC-LAG solution that has two distinct and separate chassis and control planes. This approach differs from the first in its ability to support native HA during upgrades, which is especially important in the network core.

Implementations vary in their level of support of operational simplicity, configuration synchronization and troubleshooting. Limitations include (1) MC-LAG implementations restricted to Layer 2 support, causing routed traffic to hairpin between the redundant chassis, and (2) Layer 2 virtualization without Layer 3 support, requiring the chassis to configure a first-hop redundancy protocol such as virtual routing redundancy protocol (VRRP). Figure 2 compares the VSF and VSX approaches, and illustrates the continual state synchronization of VSX.

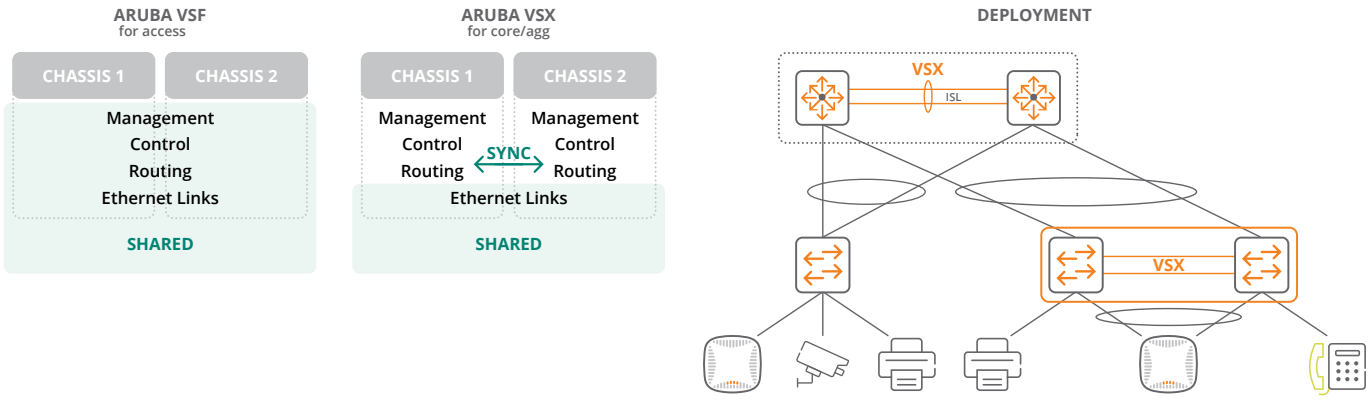

Figure 2: Comparison of VSF and VSX

FLEXIBLE DESIGN OPTIONS

Aruba VSX's benefits include the flexibility to support network designs offered by other high availability and virtualization approaches. Supported designs are discussed in Table 1.

TABLE 1: DESIGN OPTIONS AND THEIR BENEFITS

HA Design Option	Benefit
Dual control plane architecture	Allows for better redundancy and independently upgradable firmware. With the enhanced configuration synchronization features and unified troubleshooting capabilities, VSX management is highly simplified
Active-Active Layer 2	With no need for STP, there are no blocked links and the network quickly reconverges in the event of link or device failures
Active-Active Layer 3	Aruba VSX-capable switches can run OSPF, BGP and Protocol Independent Multicast (PIM) over MC-LAG links for communication between aggregation and core. The data path is unified, so that the first switch to receive a packet forwards it to the downstream neighbor
DHCP Relay redundancy	Both aggregation switches can be configured as DHCP forwarders; one of the devices plays an active role in relaying DHCP requests between the clients and the DHCP server
No First Hop Redundancy Protocol (FHRP) such as VRRP	If one of the devices fails, the other will simply take over and forward all traffic

SUMMARY

High Availability at the campus core and aggregation layers of the network has become a must-have requirement. Aruba Virtual Switching (VSX) is designed from ground up to deliver the availability, virtualization and simplicity requirements unique to the core of the network. Aruba VSX offers a better way to ensure business success with a network that is always available.

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