

# ArubaOS-CX release 10.1

Dik van Oeveren – Aruba Consulting System Engineer

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# Agenda

- Aruba Wired Campus Networking Portfolio
- ArubaOS-CX 10.1 new features
- Virtual Switching Extension
- VSX Demonstration
- Community tools
- Questions and Answers

# Aruba campus edge switch portfolio



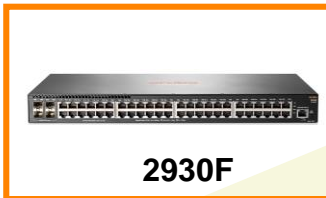
**2530**

- Layer 2
- 8, 24 or 48 ports with 10/100 or Gig
- sFlow, ACLs, IPv6
- Fanless & compact models
- Models with 10GbE uplinks
- PoE+ models



**2540**

- Layer 2 with static & RIP routing
- 24, 48 ports Gig
- PoE+ models
- Fixed 10GbE Uplinks
- Internal Power supply
- Central support



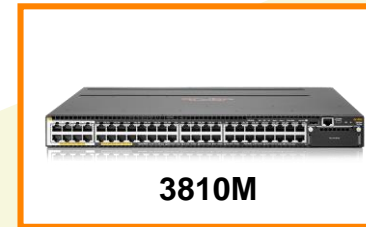
**2930F**

- Standard Layer 3 with static, RIP routing & Access OSPF
- 4 Unit VSF Stacking
- 8, 24, 48 ports Gig
- PoE+ models
- Fixed 1GbE and 10GbE Uplinks
- Internal Power supply
- OpenFlow
- Central support



**2930M**

- Standard Layer 3 with static, RIP routing & OSPF
- 10 Unit Backplane Stacking
- Redundant power
- Modular 10GbE and 40GbE uplinks
- OpenFlow
- Central support
- 1440W PoE/Redundant Power



**3810M**

- Advanced Layer 3
- 24 or 48 port Gig
- Smart Rate multi-gigabit Ethernet
- Wire speed 40GbE
- PoE+ models
- Modular uplinks
- Redundant power
- 10 unit stacking
- OpenFlow



**5400R**

- Advanced Layer 3
- 6 and 12- slot compact chassis
- Smart Rate multi-gigabit Ethernet
- Wire speed 40GbE
- Redundant mgmt. and power
- 96 10GbE ports, 288 1 GbE ports
- 288 ports full PoE+ capable
- OpenFlow

Campus, branch and SMB networks

# Aruba campus core and aggregation switch portfolio



- Advanced Layer 3 and BGP
- 16 to 24 ports of 10G
- Flexible uplinks using 4 ports of 10G or 2 ports of 40G
- Redundant power
- 10 unit stacking
- OpenFlow



- Advanced Layer 3 and BGP
- 6 and 12- slot compact chassis
- Smart Rate multi-gigabit Ethernet
- Wire speed 40GbE
- Redundant mgmt. and power
- 96 10GbE ports, 288 1 GbE ports
- 288 ports full PoE+ capable
- OpenFlow



- Advanced Layer 3, including IPv4/IPv6 routing, BGP, and VRF
- 48 ports of 10G to support SFP/SFP+ and 6 ports of 40G to support QSFP+
- Up to 2.5Tbps of switching capacity and 1.9BPPS
- Flexible bundle that includes 2x power supplies, 5x fans, and the unit (JL479A)
- Supports SFP/SFP+ and QSFP+ Transceivers
- Wire speed 10G and 40G
- Redundant fan and power supplies



- Advanced Layer 3, including IPv4/IPv6 routing, BGP, and VRF
- 8-slot chassis with redundant mgmt. module, fan, fabric module, and power
- Up to 19.2Tbps of switching capacity and 7.14 BPPS
- Flexible bundles that includes 32 ports of 10G and 8 ports of 40G (JL376A)
- Line Modules: 32Px10G w/ MACsec, 8Px40G, and 6Px40G/100G
- Wire speed 10, 40, and 100G
- Up to 256 10G ports, 64 40G ports, and 48 ports of 100G ports

Campus core and aggregation solutions

# ArubaOS-CX 10.1 Software Release

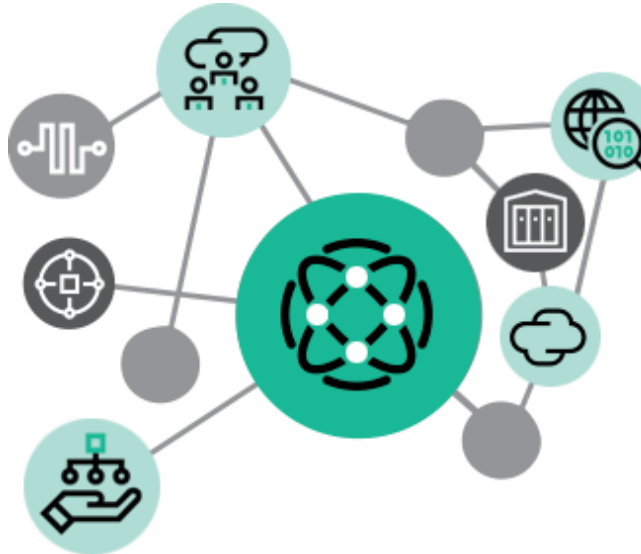


## Aruba 8400

Optimized form factor & cost, carrier class availability, 10/25/40/100 GbE

## Aruba 8320

High performance compact 1U form factor and carrier class availability, 10/40G



## ArubaOS-CX

Programmable next-gen OS for switching, with massive Open Source leverage, and analytics to automate troubleshooting



## Aruba Network Analytics Engine

Native analytics & visibility to automate troubleshooting and streamline operations

# New Features in ArubaOS-CX 10.1

## Resiliency and High Availability

Aruba Virtual Switching Extension (VSX)	Aruba's virtualization technology for Core and Aggregation designed for best in class HA
Bidirectional Forward Detection (BFD) for OSPFv2, Static Route and VRRP <sup>1</sup>	Enable sub-second failure detection for rapid routing protocol rebalancing

## Security

TACACS Accounting	<ul style="list-style-type: none"><li>- Enable accounting use case with TACACS ensuring all commands get logged to the TACACS server</li><li>- Interoperable with ClearPass and other TACACS servers</li></ul>
ICMP Enhancements	<ul style="list-style-type: none"><li>- Toggles for turning ICMP Redirects and Unreachables on and off.</li><li>- Disabling Redirect and Unreachable messages is a common security hardening best practice</li></ul>

1. BFD is only single hop in 10.1

# New Features in ArubaOS-CX 10.1

## Multi-cast

PIM-SM	Support of Graceful Restart in the PIM-SM protocol to speed up multicast routing failover
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## L2/L3 Services

Inter VRF Route Leaking	<ul style="list-style-type: none"><li>- Enable dynamic and static route leaking between VRFs</li><li>- Share core services across VRFs and other use cases</li></ul>
Static ARP and Static MAC	Ability to set static ARP and MAC addresses

## Management

SPAN to a LAG	Enable configuring a LAG port as the destination of a port SPAN
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## Transceiver Support

10GBASE-T and QSFP+ LC ER support	<ul style="list-style-type: none"><li>- Aruba 40G QSFP+ LC ER4 40km SMF (Q9G82A)</li><li>- Aruba 10GBase-T SFP+ RJ45 30m Cat 6A (JL563A)</li></ul>
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# ArubaOS-CX 10.1 Brings Big Scale Improvements

Feature	8400	8320 Mobile First Mode	8320 Route Mode
IP Interfaces	4K	4K	4K
DHCP relay	4K	4K	4K
VRF-lite instances	32	32	32
VSX LAG / MCLAG	128	48	48
OSPF v2/v3	128 Neighbors, Areas, Interfaces	128 Neighbors, Areas, Interfaces	128 Neighbors, Areas, Interfaces
MAC Addresses	128K	96K	32K
ARP Addresses	128K	128K (Shared with ND)	14K (Shared with ND)
ND Entries	64K	64K (Shared with ARP)	7K (Shared with ARP)
IPv4 Route	128K	12K (Shared Route Table)	128K
IPv6 Route	64K	6K (Shared Route Table)	58K
IPv4 Multicast Route	16K	12K (Shared Route Table)	16K



# ArubaOS-CX 10.1 Usability Improvements

## CLI Enhancements

- Repeat command (automatically repeats a command)
- Pipe (|) Support →
- No more “do” required in Config Mode
- Show History

## SNMP Additional MIBs

- IP-FORWARD
- BGP-MIB
- PVST MIB
- BRIDGE-MIB

## REST API Session Clear

- https-server session close all

```
Usage:      show COMMAND [ | { [ include | <pattern-string> ] |  
                                [ exclude | <pattern-string> ] |  
                                [ begin | <lines-to-display> <pattern-string> ] |  
                                [ count [<pattern-string>] ] |  
                                [ redirect [ <file-name> ] ] } ]
```

```
Example:    show running-config | begin 2 "vlan" | redirect "abc.txt"  
            show running-config | include "vlan" | exclude "vlan2" | count  
            show vlan | include "up" | include "VLAN100"
```

Description: The Pipe command allows to filter the output of show commands using one of the options; "include", "exclude", "begin", "count" or "redirect".

# ArubaOS-CX 10.1 OSPF Enhancements

## OSPF v2 and v3 Enhancements

- Route Map Support
- Reference Bandwidth updated for 100G speeds
- RFC 4222 support to enable more reliable OSPF processing in high load scenarios (prioritized treatment of LSA's and Hello packets)

```
VSX-Primary(config-route-map-ospf-10)# match
aspath-list      Match BGP AS path list
community-list   Match BGP community-list
interface        Match Interface
ip               IP information
ipv6             IPv6 information
local-preference BGP local preference path attribute
metric           Match metric of route
origin           BGP origin code
route-type       Match route-type of a route
source-protocol  BGP source protocol
tag              Match tag of route
```

## OSPF v3 only Enhancements

- Feature gap to v2 Enhancements
  - Area range aggregation - Type-3 (Inter Area Prefix) and Type-7 (NSSA External) Address Ranges
  - Virtual Links
  - Configuration of virtual link parameters: hello-interval, dead-interval, retransmit-interval, transit-delay, etc.
  - NSSA
- IPSEC Authentication Support

# ArubaOS-CX 10.1 BGP Enhancements

## BGP protocol enhancements for use case enablers, customer demand and RFC compliance

- Autonomous-System-Wide (4-Byte) Unique BGP Identifier for BGP4 (RFC 6286)
- TTL Security
- Next-Hop Address tracking
- Textual Representation of Autonomous System (AS) (RFC 5396)
- Regex for IP Community list
- Multiple AS Path enable (allows for multipath load sharing)
- Route Map: 4-byte AS Path
- Route Map: Allow set for multiple Individual Community Number
- Enhanced Route Refresh Capability for BGP4 (RFC 7313) (fixes BGP RIB route inconsistencies)
- Autonomous System (AS) Reservation for Private Use (RFC 6996) (64512-65534 and 4200000000-4294967294)

# ArubaOS-CX 10.1 Network Analytic Engine Improvements

## New NAE Solution Agents

- Network Health Script with Baselining
- Fault Finder NAE Scripts
- Office 365 Health Detection using Analytic Data Collectors

## Automatic Baselining

- Using machine learning, automatically generate thresholds for alerting
- No need to manually configure all thresholds any longer

## Analytic Data Collectors

- NAE controlled counting entries (like ACLs) for providing service insight
- Match on any value (like an ACL) and then monitor in NAE enabling broad insight into service health

## Script and Engine Improvements

- Compare Ratio of Rates and take action. (Ex: Compare DHCP Relay Request and Response Rates and take Action)
- Multiple Graphs in NAE for Related Agents
- Improved routing protocol support for OSPF and BGP

## Benefits

### NAE can solve more customer use cases

- More easy to use NAE solution agents
- Even more NAE capabilities

# What Makes for a *Good* High Availability Solution?

## Customer requirement

### Redundancy

*“What if X breaks and Y fails?”*

### Resiliency

*“What if W sputters and Z hiccoughs?”*

### Performance

*“How long is failover? In what scenarios?”*

### Simplicity

*“How complex, with what chance for error?”*

## Solution capabilities

1. **HW redundancy** – management modules, fabric, power, fans
2. **SW redundancy** – dual vs single control planes
3. **Link virtualization** – virtualize multiple links to one logical link
4. **Process resiliency** – self-restart to last known good state
5. **Low-latency link failovers** – minimize duration of traffic outage
6. **Fast upgrade time** – minimize time-at-risk during upgrade
7. **Easy to configure** – # entities to configure, # CLI commands
8. **Low risk of error** – config sync & consistency checks

# Where is ArubaOS-CX with MCLAG?

## Customer requirement

### Redundancy

*"What if X breaks and Y fails?"*

### Resiliency

*"What if W sputters and Z hiccoughs?"*









### Performance

*"How long is failover? In what scenarios?"*

### Simplicity

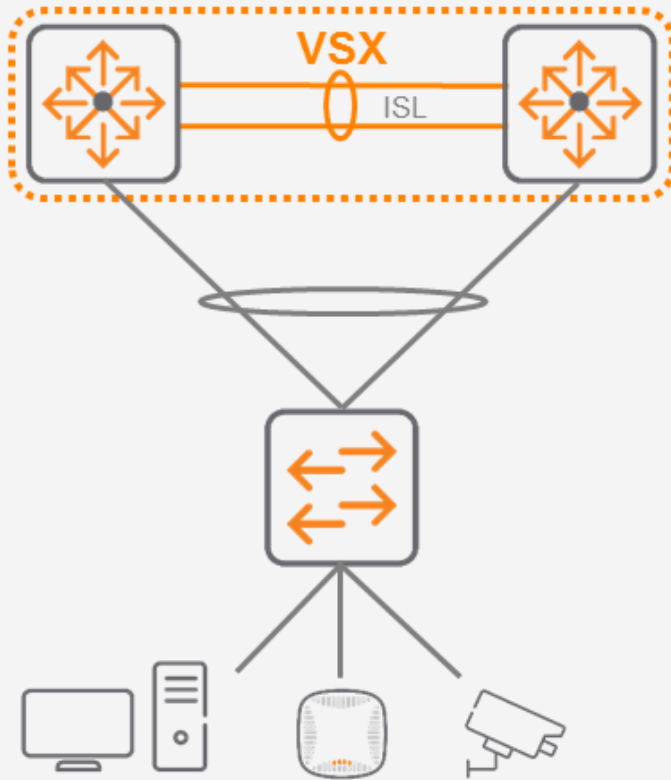
*"How complex, with what chance for error?"*

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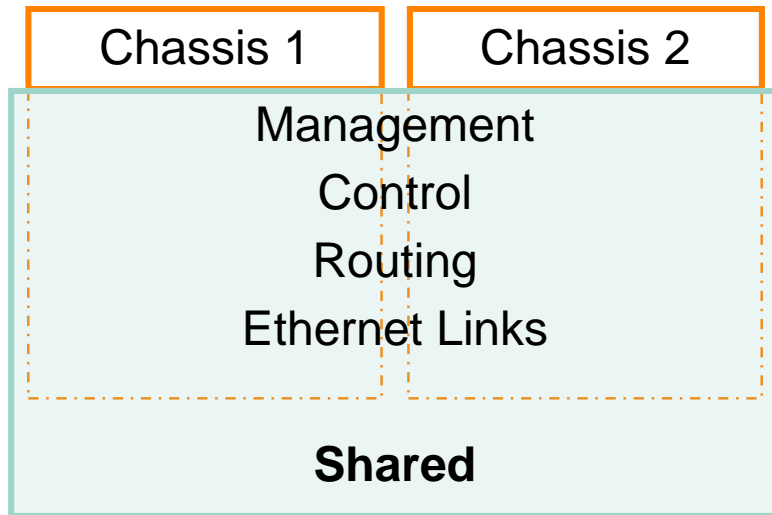
# High Availability for Aruba Core and Aggregation

## Introducing Aruba Virtual Switching Extension (VSX)

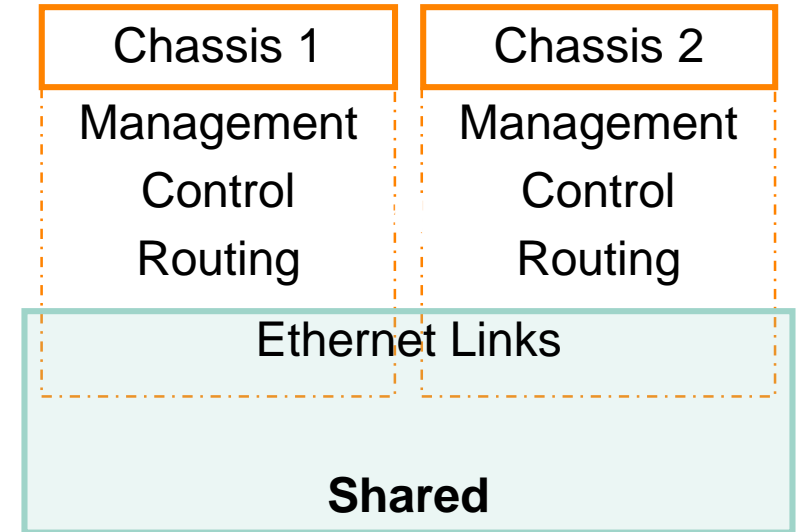
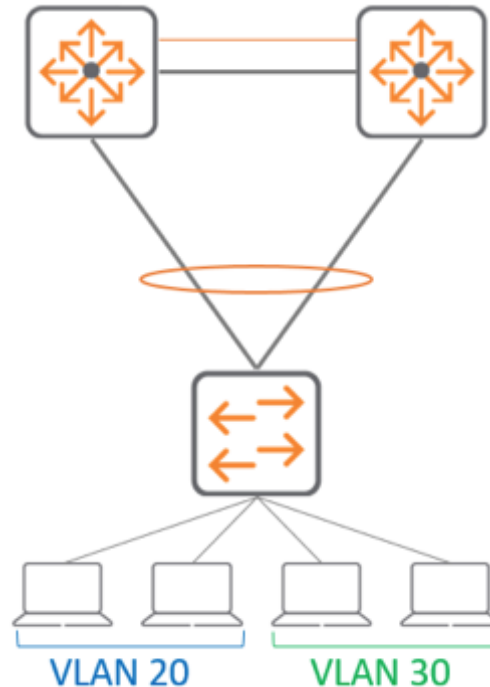


- **Built for Aggregation & Core:** availability, availability, availability
- **Redundancy in both** hardware and software
- **High Availability** by design during upgrades
- **Flexibility for network designs:** Support for active-active L2, L3 unicast and multicast
- **Operational simplicity** and usability for configuration
- Leverages existing and on-going investments on **MCLAG**
- Provides virtually all the benefits of VSF except with **BETTER HA**

# Virtualization Solutions Compared



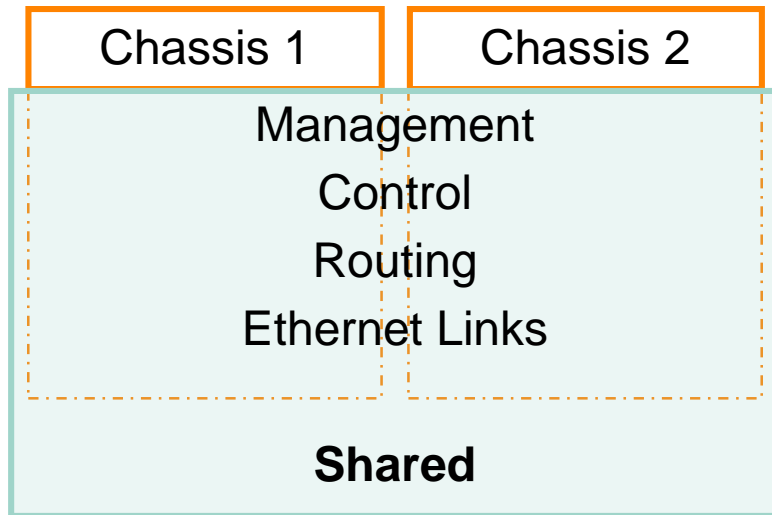
**VSF  
IRF**



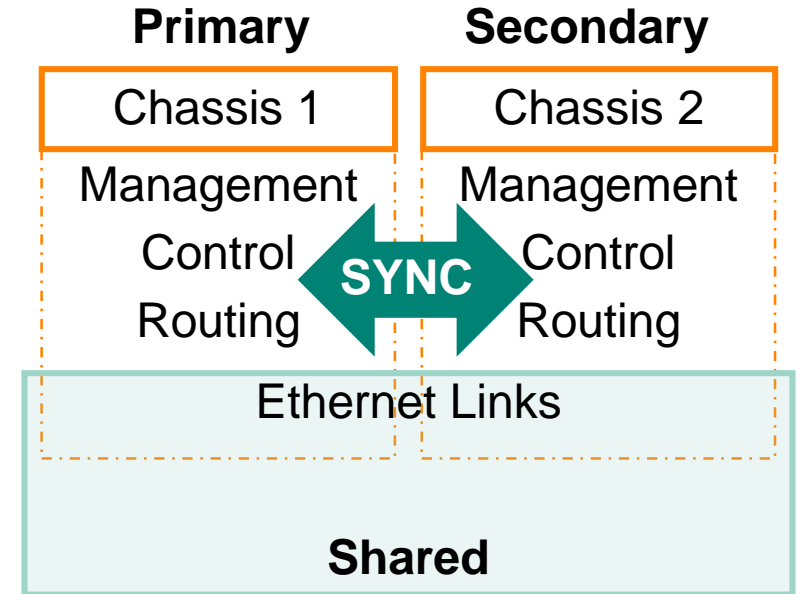
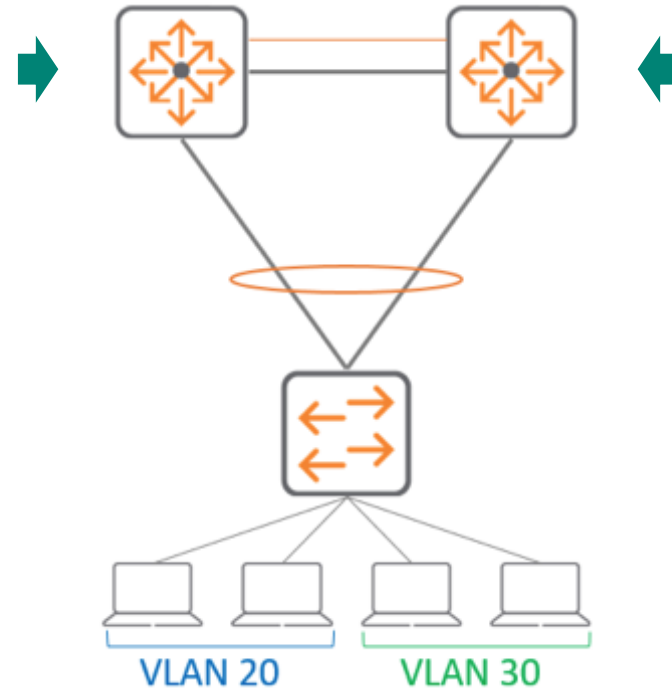
**MCLAG**



# Virtualization Solutions Compared

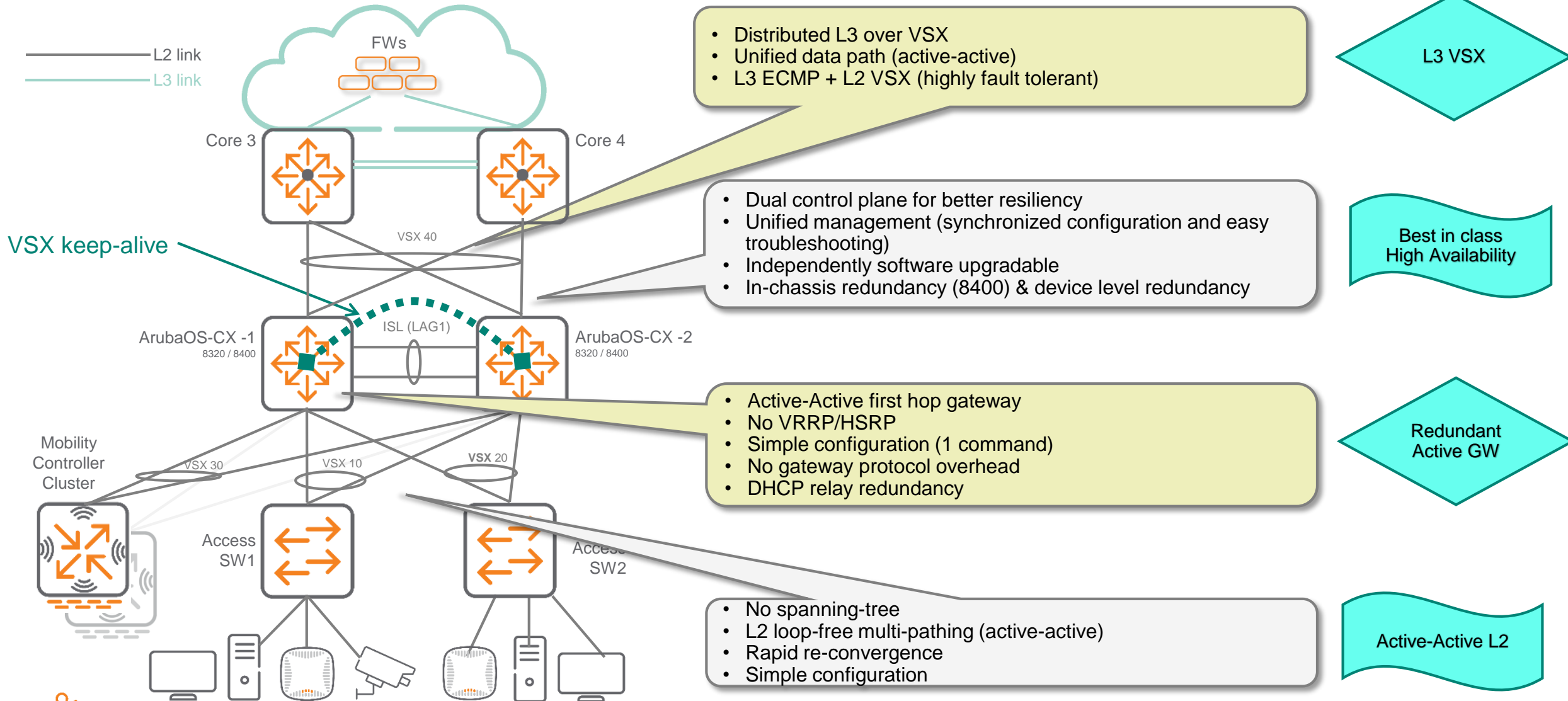


**VSF  
IRF**

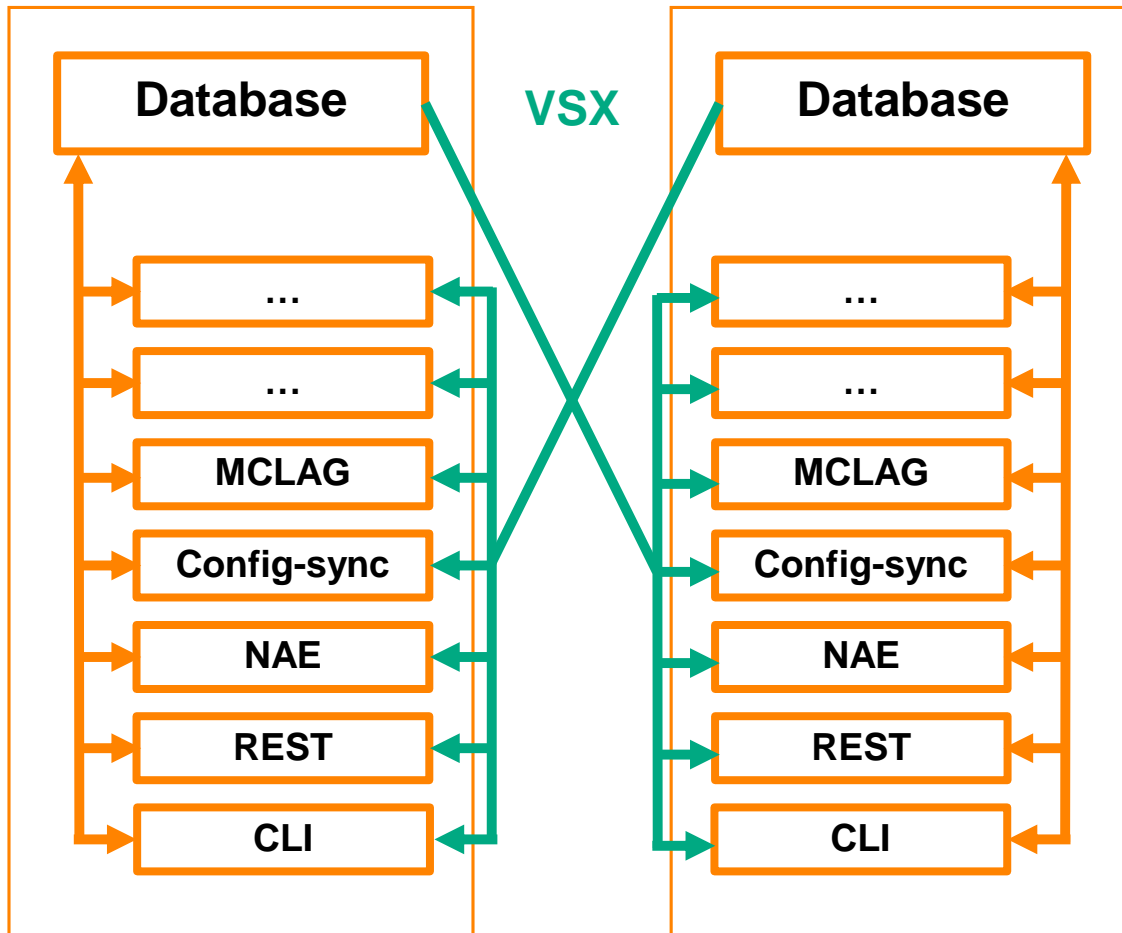


**VSX**

# VSX Design: Addressing All Design Needs of Customers



# Aruba OS-CX Difference: Making VSX Powerful and Easy



## Database driven architecture

- Allows active-active components to know the state of the peer
- Enables CLI/REST/WebUI to easily expose both control planes in a single place
- Allows analytics across the redundant pair

## Configuration and troubleshooting simplicity

- Continuous synchronization of the common configuration
- Show commands that aggregate/contrast information from both switches for ease of troubleshooting
- Almost all show commands will support “| vsx-peer” to show information from the peer
- Provide joint view of the VSX system

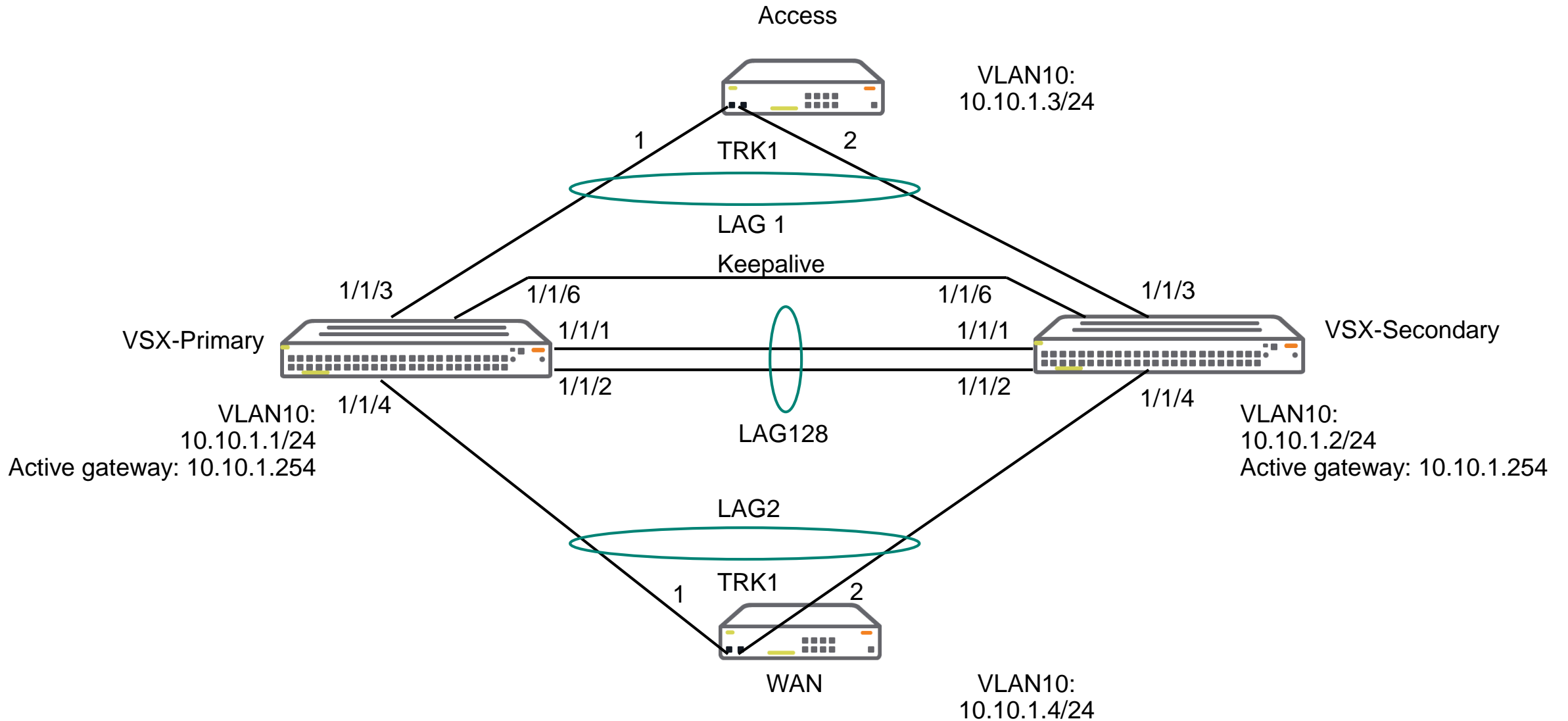
## Hitless upgrade orchestration

- Will allow proactive draining of the traffic from the switch that undergoes upgrade

## Active-Active Analytics

- NAE agents will cross monitor each others database
- Will detect discrepancies that remain for too long
- Will validate that the overall solution is healthy

# VSX Demonstration



# Where are the 8000 series switches with VSX?

## Customer requirement

### Redundancy

*"What if X breaks and Y fails?"*

### Resiliency

*"What if W sputters and Z hiccoughs?"*









### Performance

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## Solution capabilities

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# What can you expect in ArubaOS-CX 10.2

- MP-BGP with IPv6 Address Family (BGP4+)
- Policy Based Routing (PBR)
- IP Directed Broadcast
- VLAN ACLs (Policies and Classifiers)
- Control Plane ACLs
- Object Groups for ACLs
- VSX Improvements (Active-Active Multicast, STP Interop, More Syncing)
- IPv6 Multicast Routing
- DHCP Server
- ERSPAN
- Improved Scale



# AIRHEADS

meetup

**Thank You**