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Aruba Data Center Solutions

Dik van Oeveren, Consulting Systems Engineer

June 2022

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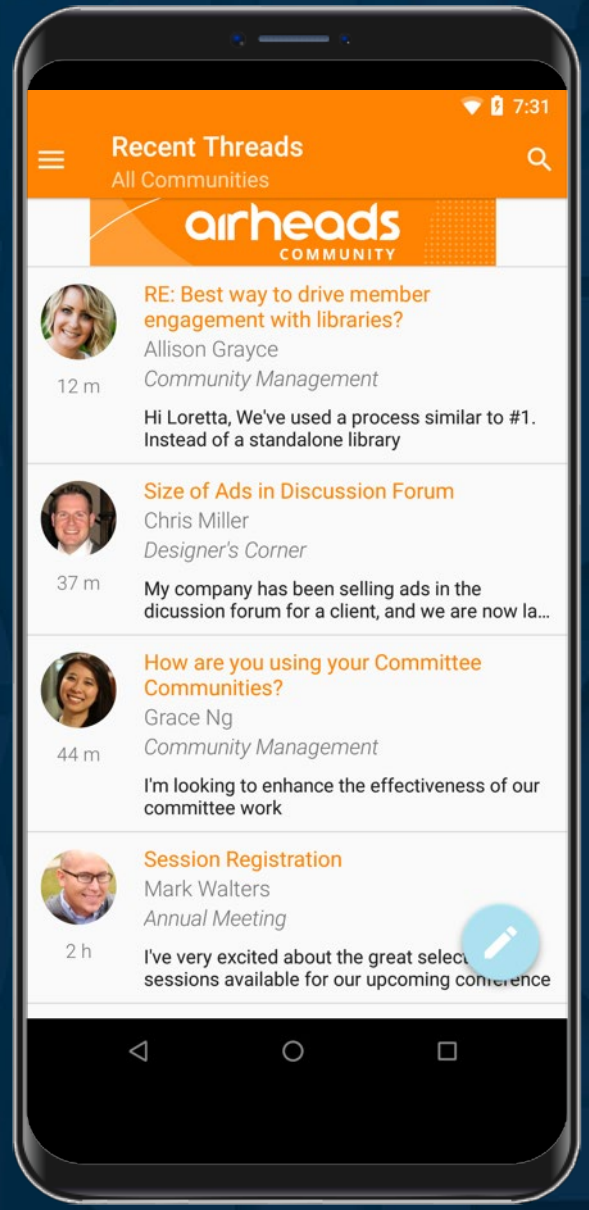

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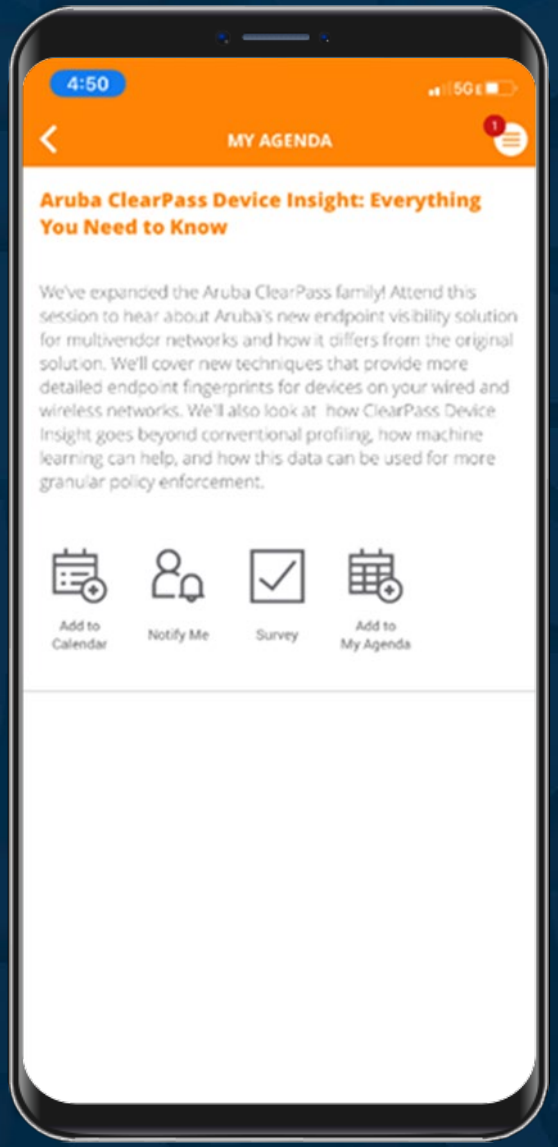
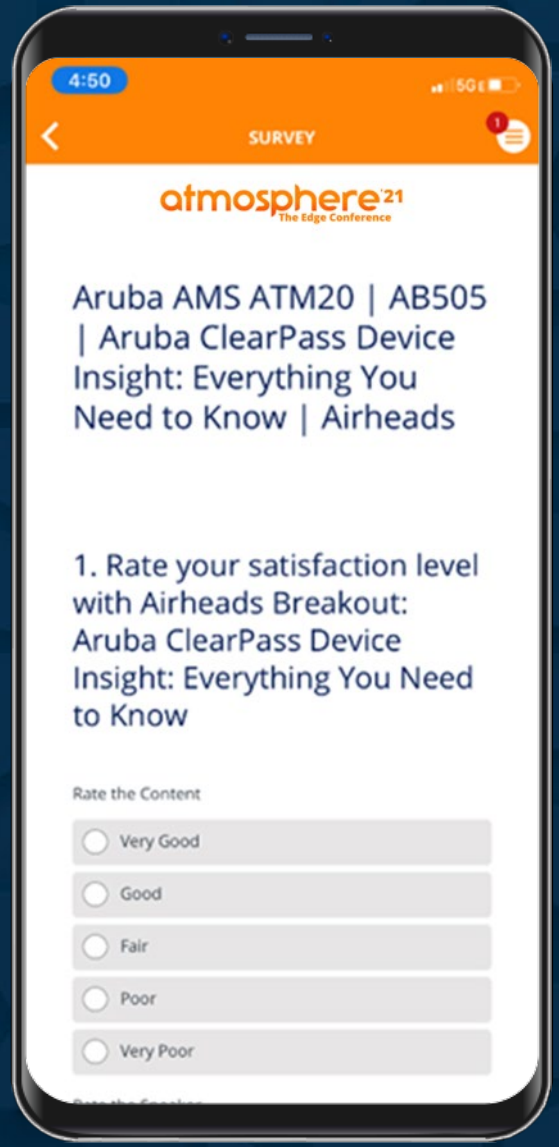
- ✓ Tap the "Survey" icon



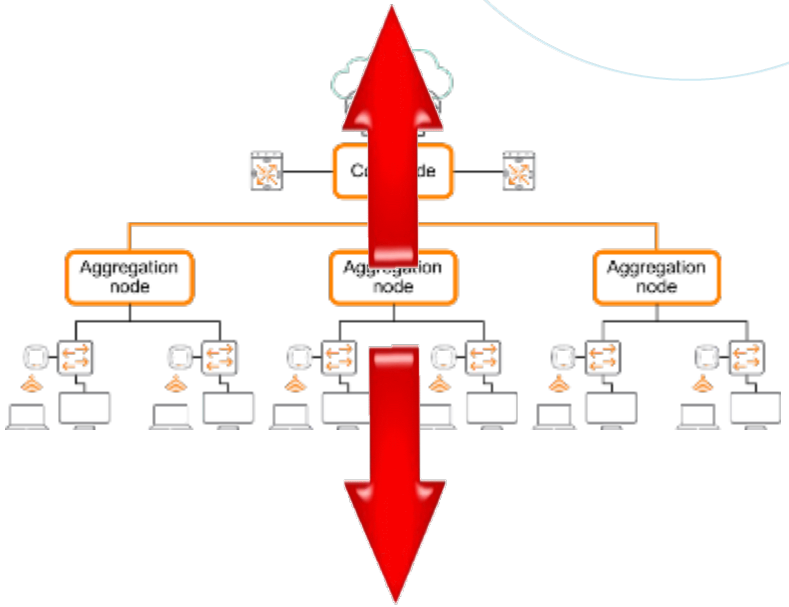


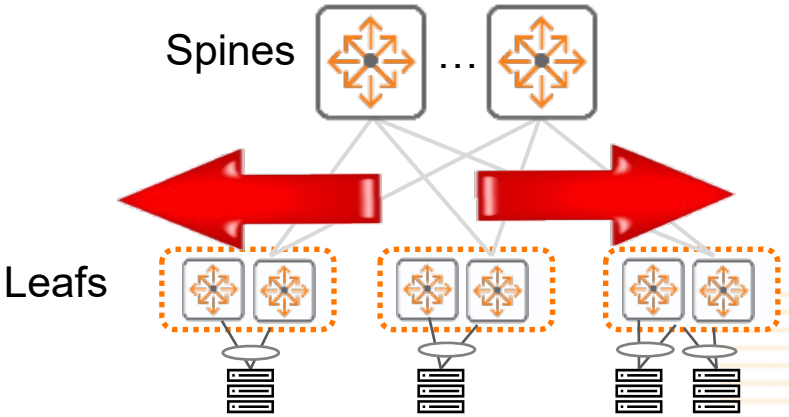
Data Center Network Architectures and Use Cases

What makes a Data Center Network?

- **Local Area Network (LAN) / Campus Networks**
  - Same geographical location, building, campus etc.
  - Wired and wireless network connects users, IP phones and wireless APs
  - Typical features required: POE, 802.1X etc

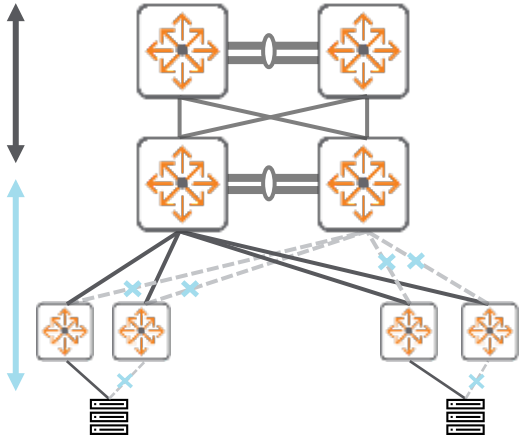
- **Data Center Networks**
  - Same geographical location (single data center)
  - Connects Servers/VMs/Containers, applications, storage, firewalls/ load balancers, etc. – wired connectivity
  - Stable, low latency fabrics with high availability / high performance and throughput / density and scale
  - Build revenue for business (E-Commerce)!
  - Typical features required: VXLAN/EVPN, BGP, OSPF, DCB, etc..
  - Focus on improving East - West traffic between racks



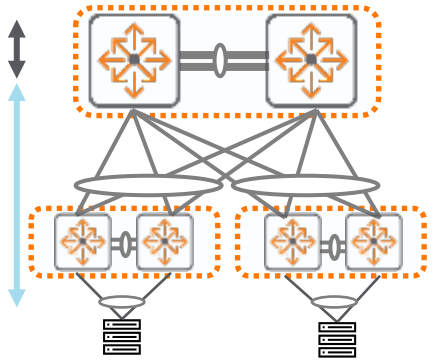


Enterprise Datacenter Network Architecture Evolution

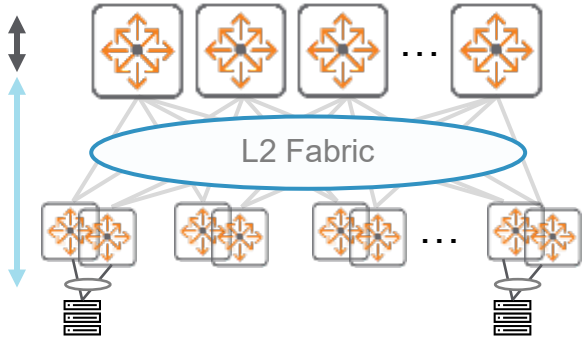
Traditional 3 layer
STP



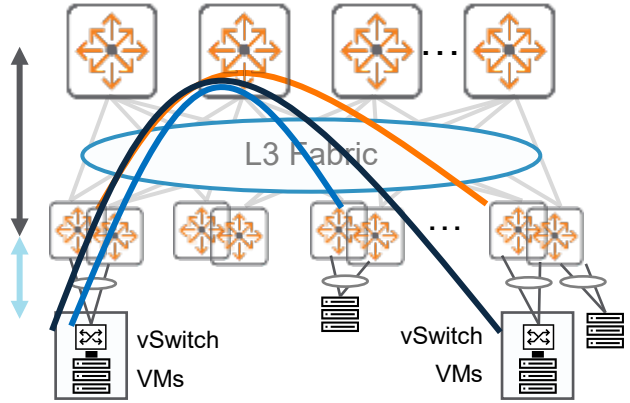
Optimized L2/L3 Fabric
IRF/VSX MLAG



Spine & Leaf L2 ECMP
TRILL/SPB



Spine & Leaf L3 ECMP
VXLAN ,**EVPN & Network Virtualization**



Scalability, Agility, Orchestration

Classic / Underlay

LACP
L2
L3

VXLAN Overlay

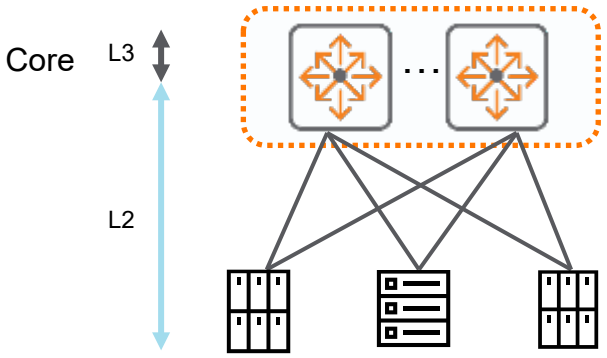
SW VTEPs
SW & HW VTEPs
HW VTEPs

Aruba Data Center Network Reference Architecture Overview

Does Every DC Network Architecture require Spine/Leaf with VXLAN?

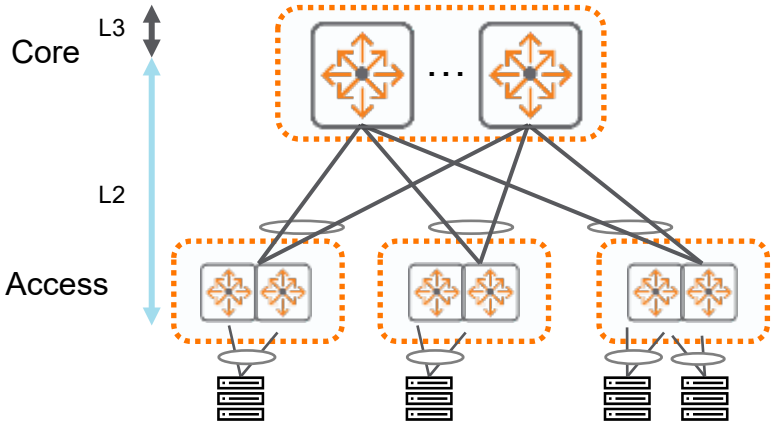
- These are still valid based on customer requirements, they all support HA and network automation

1-Tier Data Center



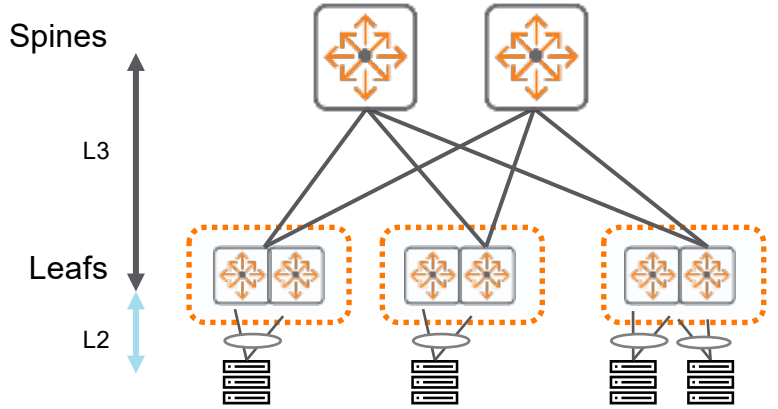
- Supports L2 (e.g. vMotion) /L3 connectivity between racks/servers
- Modular/Fixed port core switches are possible, this will determine how many servers can be connected
- Link aggregation from core to servers provides traffic load sharing and link/switch redundancy

2-Tier Data Center (Star Topology)



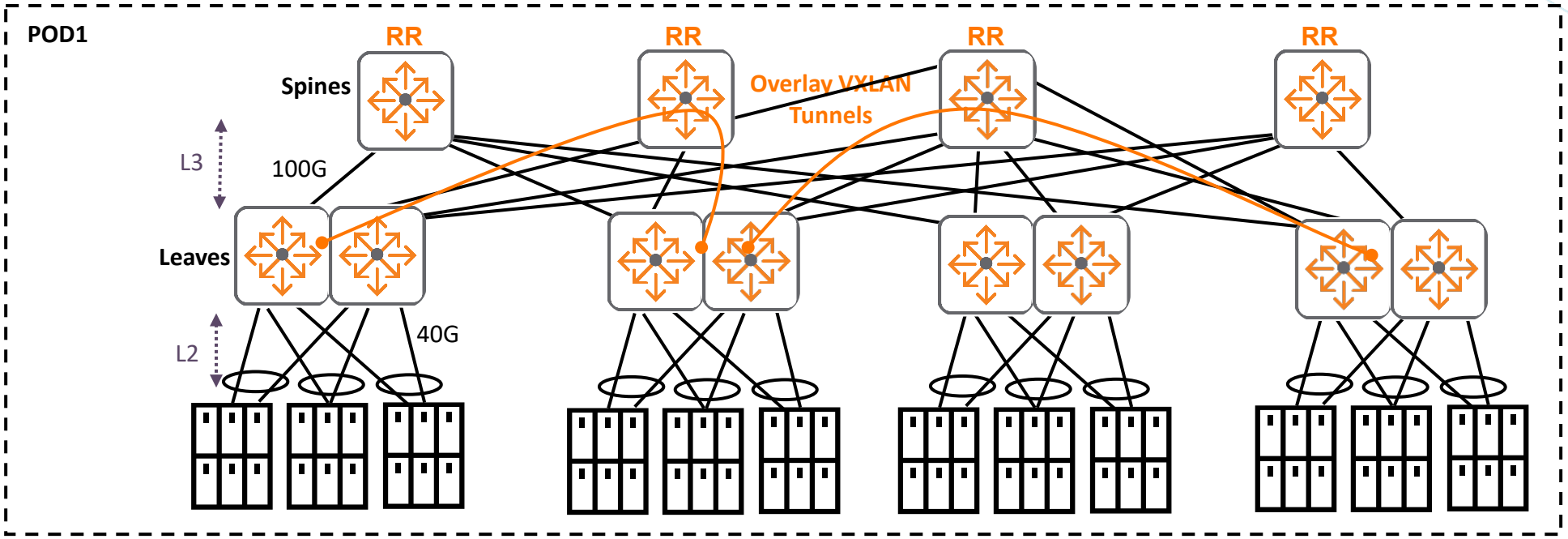
- Supports L2 (e.g. vMotion) /L3 connectivity between racks/servers
- Modular/Fixed port core switches are possible, this will determine how many access switches can be used
- Loop free topology as link aggregation is used between Access/Core for traffic load sharing and link/switch redundancy
- STP enabled as a backup mechanism to prevent loops
- Link aggregation from access to servers provides traffic load sharing and link/switch redundancy

L3 Spine/Leaf Data Center



- Supports L3 connectivity between racks/leafs
- Removes STP since an L3 IP fabric is used
- Failure domain contained at L2 leafs
- Modular/Fixed port spines are possible, this will determine how large the fabric can grow
- Link aggregation from leafs to servers provides traffic load sharing and link/switch redundancy

Intra-DC with EVPN VXLAN



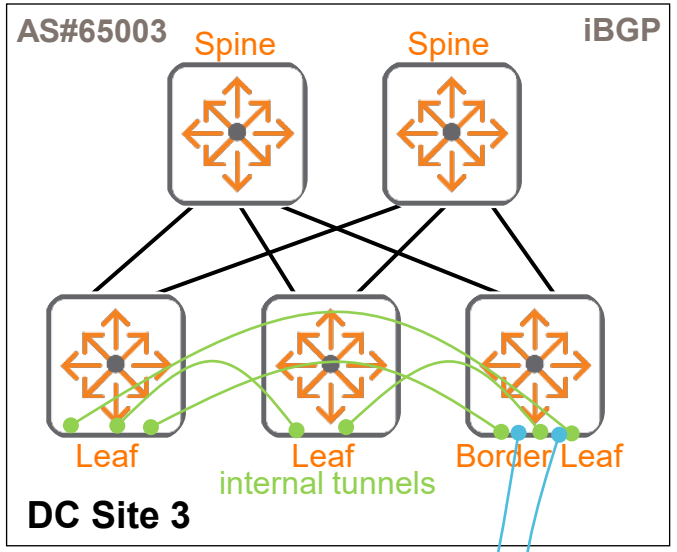
Main drivers:

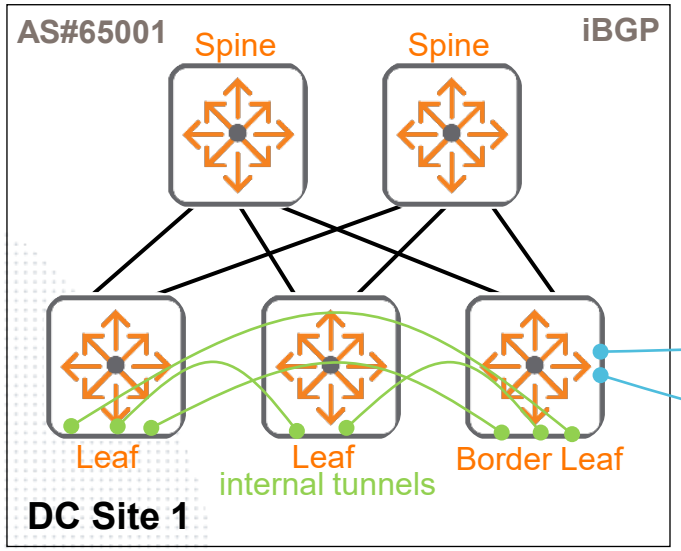
- Provides both L2/L3 network connectivity and multi-tenancy (beyond 4K VLANs) across racks
- Virtual network agility
- Remove STP from the DC fabric

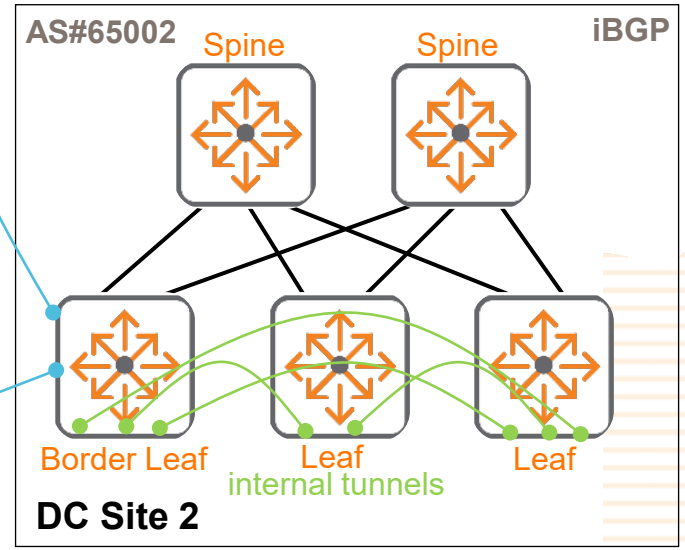
Data Center Interconnect: Single Fabric (1 AS) multi site

– Recommended for majority of deployments (based on CX 10.09)

- Full mesh VXLAN tunnels between VTEPs within a VXLAN fabric
- A single VXLAN fabric with limited VTEP scale (256 max.)
- Supports IPv6 and Multicast (L2 and L3)
- Be aware of table size limits:
  - Approx. 100k MAC per VTEP (8325)
  - Approx. 50k ARP per VTEP (8325)





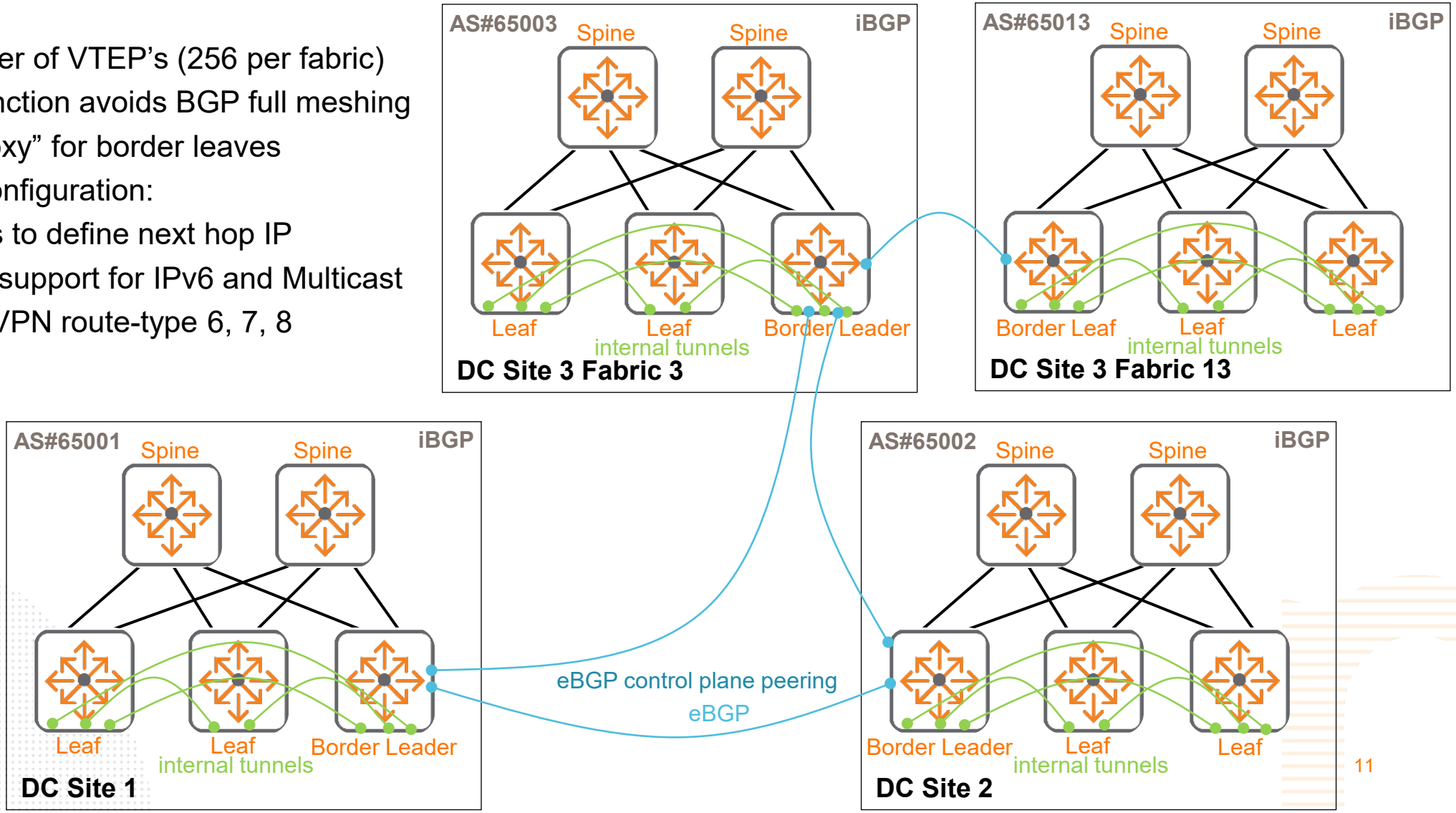


External VXLAN tunnels
eBGP

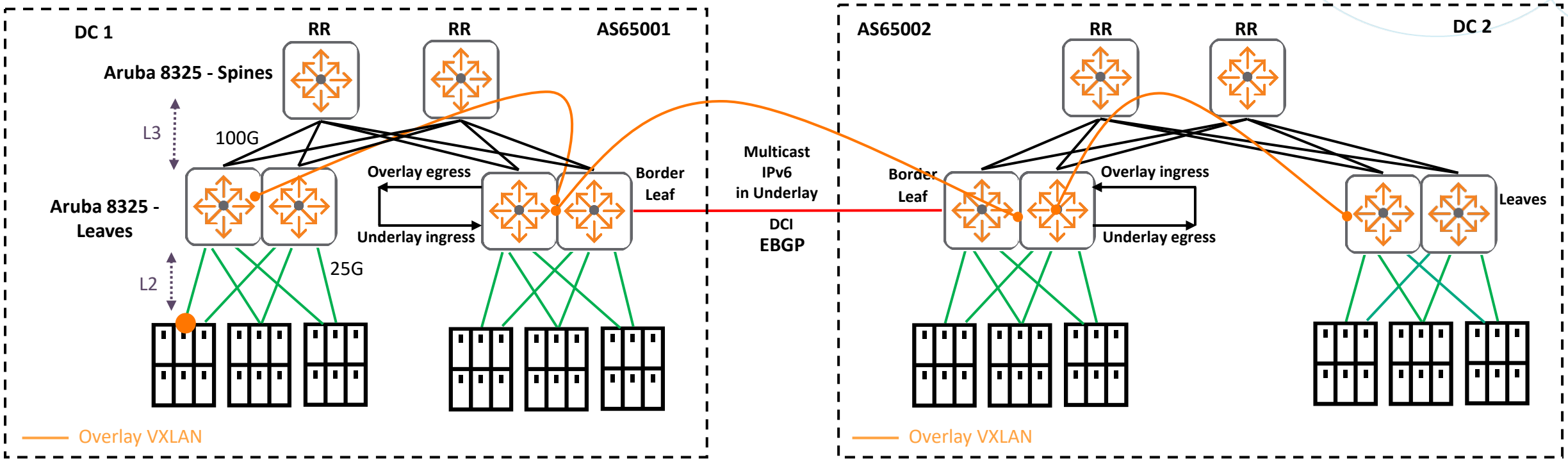
Data Center Interconnect: Multiple Fabric, multiple sites

– If VTEP scale out is required (based on CX 10.09)

- Scales out number of VTEP's (256 per fabric)
- Border leader function avoids BGP full meshing
  - Acts as "proxy" for border leaves
- More complex configuration:
  - Route Maps to define next hop IP
- At this stage, no support for IPv6 and Multicast
  - Requires EVPN route-type 6, 7, 8



Workaround for multi hop multicast/IPv6 in overlay



Intra DC overlay multicast/IPv6 is egressed from overlay to underlay network on the border leaf
Inter DC multicast/IPv6 traffic uses the underlay network

Aruba Data Center Network Switching portfolio

Aruba CX Switching Portfolio

Data Center

Core

Aggregation

Access

Aruba CX 6000

Aruba CX 6100

Aruba CX 6200

Aruba CX 6300

Aruba CX 6400

Aruba CX 10000

Aruba CX 8300

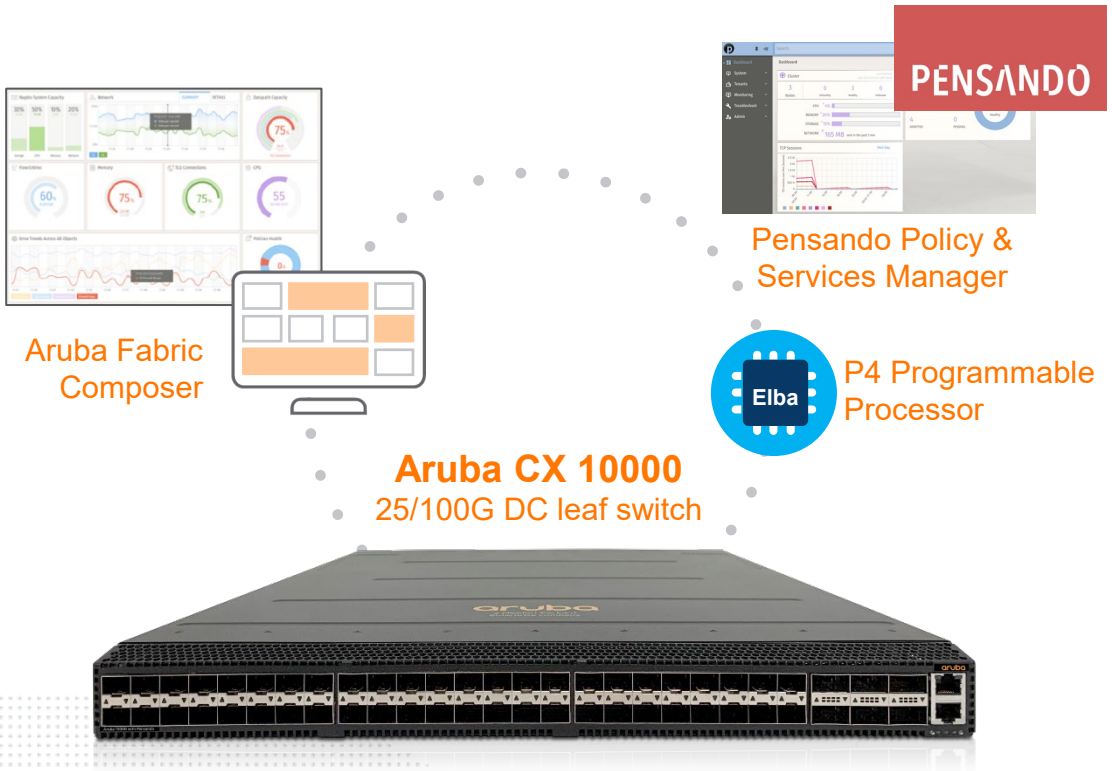
Aruba CX 8400

Ruggedized

Aruba CX 4100i

End-to-End Portfolio for the Enterprise

Aruba CX 10000 Distributed Services Switch - Powered by Pensando



–1RU Fixed Switch Form Factor:

- T3 Switching ASIC - 3.2 Tbps, 32MB Buffer (shared)
  - **Used for forwarding/routing/other features**
- 2 x Pensando Elba (7nm) Programmable Processor
  - **Used for smart stateful services (all forwarding performed by T3)**
- 2 x Redundant Power Supplies (N+1)
- AOS-CX Network OS, full protocol stack support

–Port Configuration:

- 48 x 1/10G/25G SFP28, 6 x 100G QSFP
- 1 x 1G RJ45 management, 1 x RJ45 console port, 1 x USB

–Phase 1 Services/Use-Cases:

- East-West DC Segmentation (Distributed Firewall & DDoS)
- Micro segmentation
- Observability (Packet Capture, Flow Logging/Statistics)

–Platform Management Options:

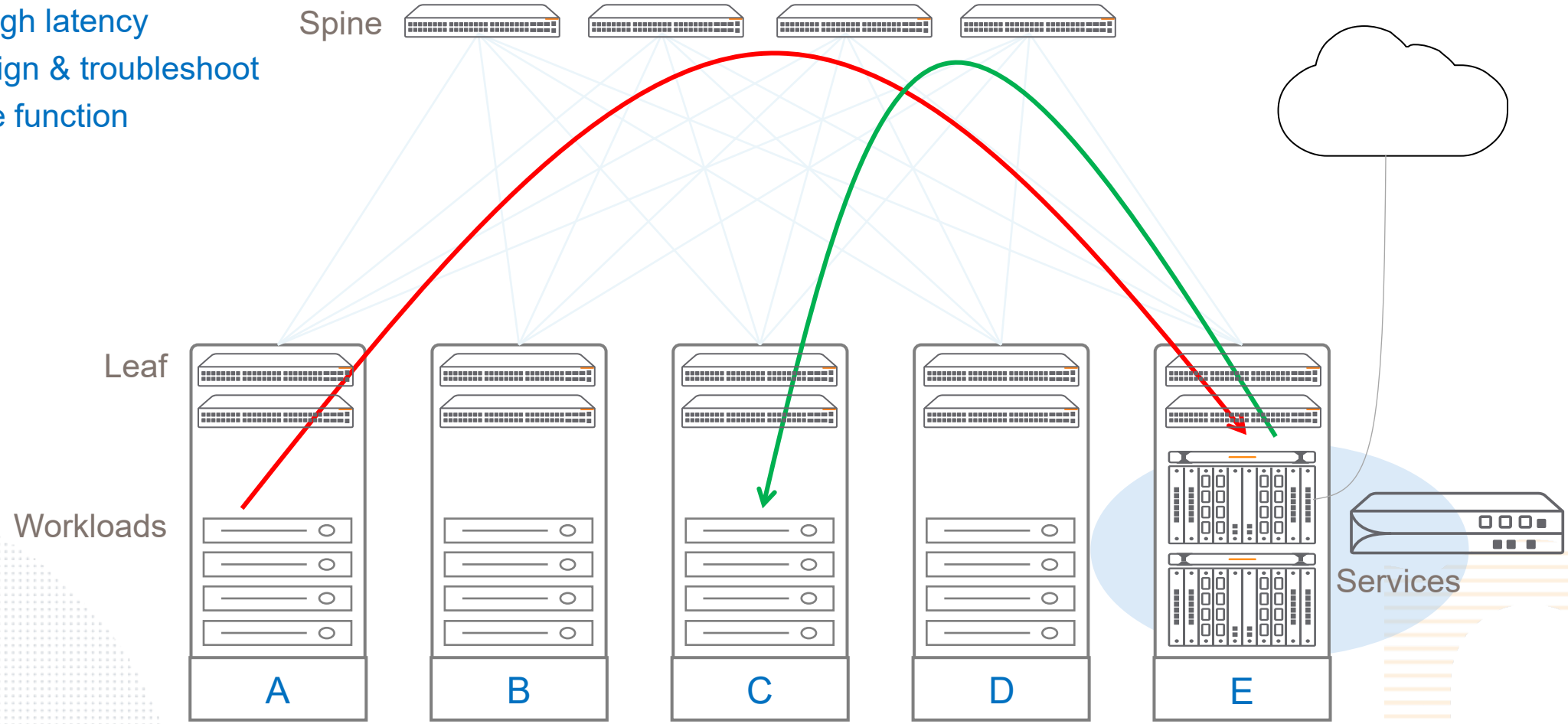
- Aruba AFC & Pensando PSM
- PSM & DevOps Tools (Terraform/Ansible), REST API

70% of all breaches caused by end point security vulnerabilities, followed by Lateral Movement

Security enforcement today: centralized services architecture

Centralized Services

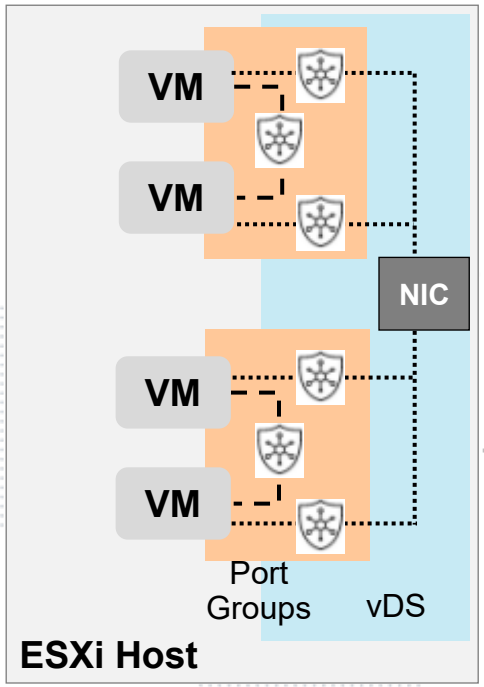
- Waste of bandwidth
- Congestion & high latency
- Complex to design & troubleshoot
- Limited to single function
- Very expensive

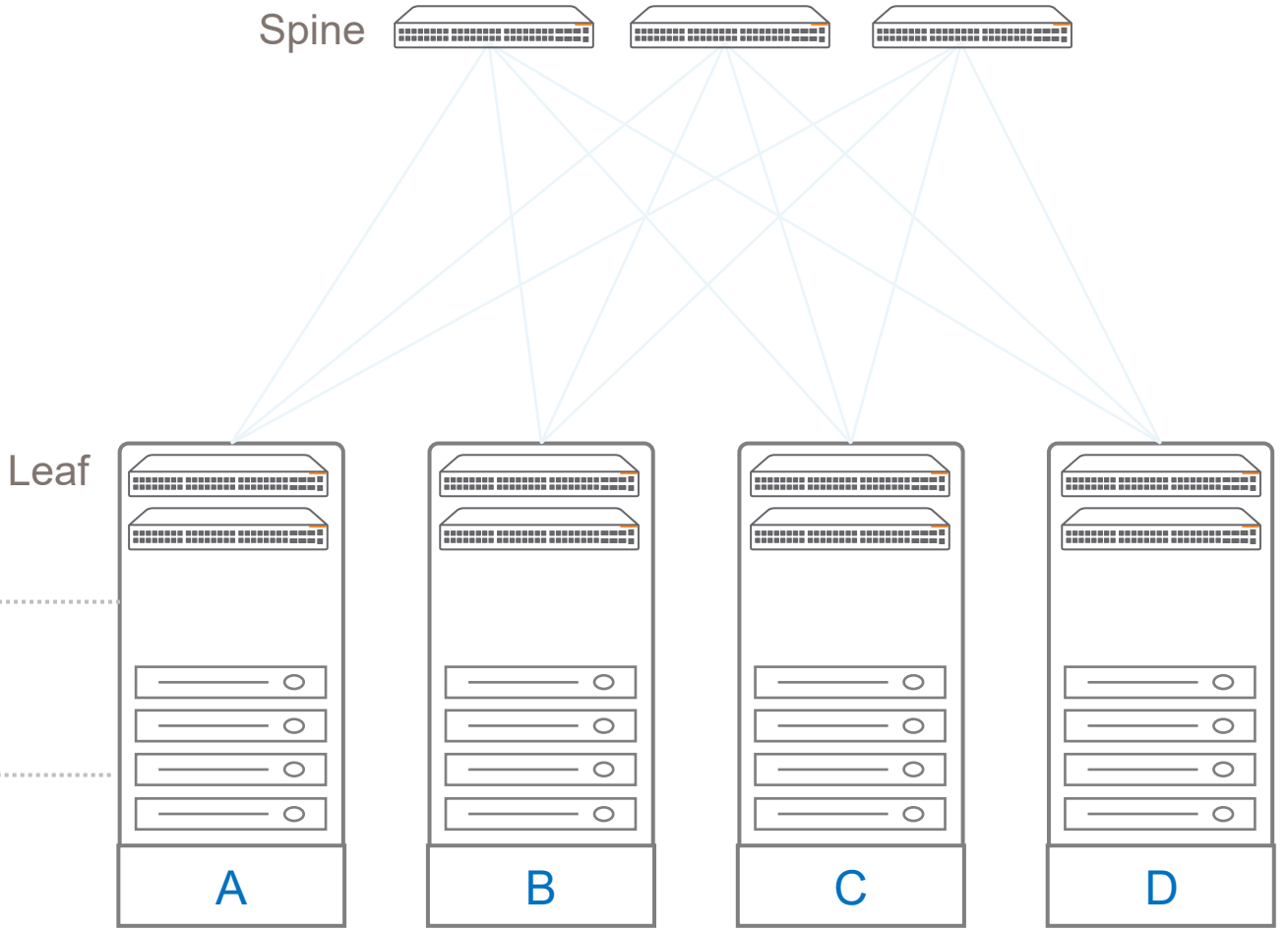


Security enforcement today: distributed Services architecture

Software based Services

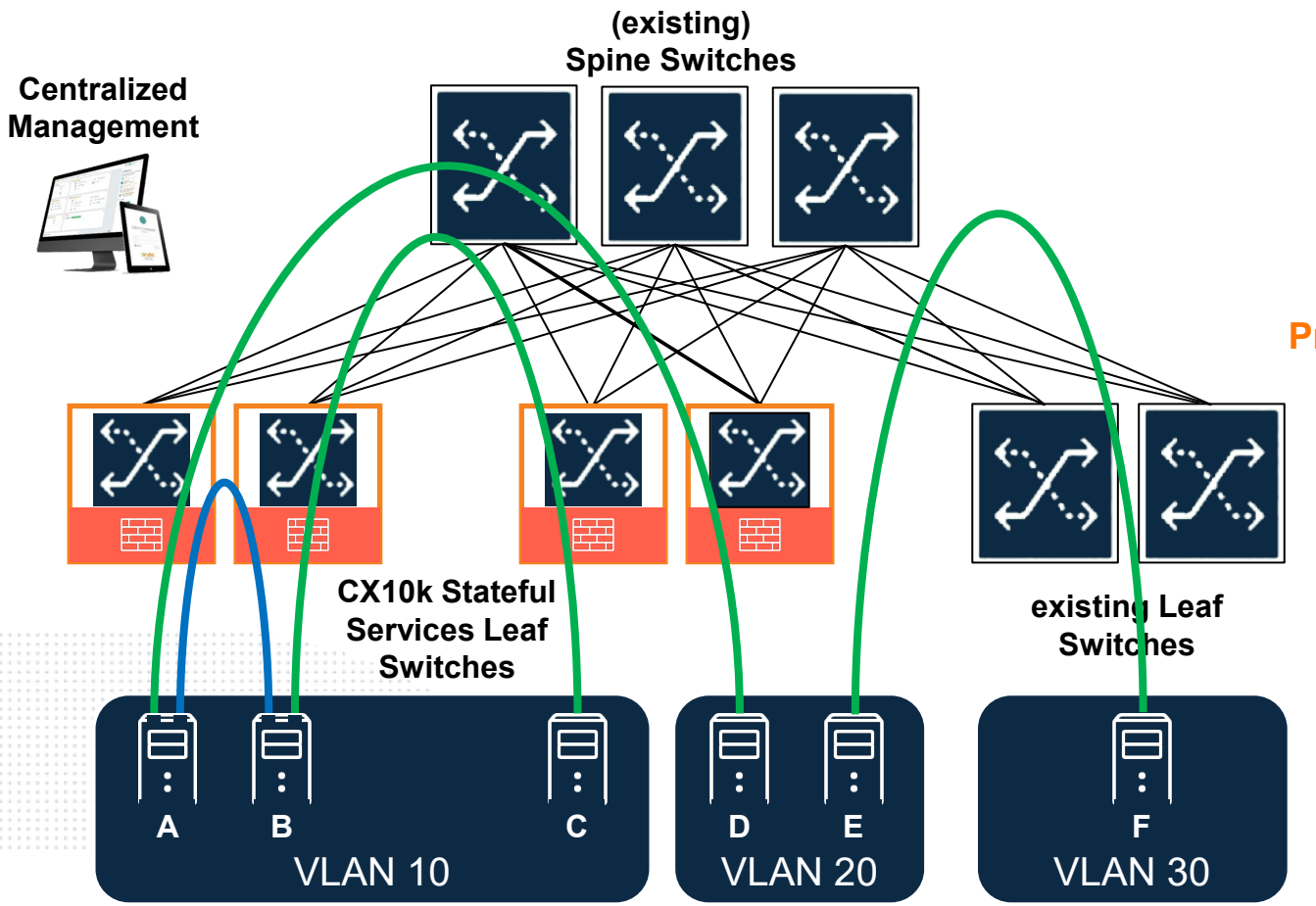
- High resource requirement on host (CPU/Memory)
- Congestion & high latency (ms)
- Complex to design & troubleshoot
- Very expensive (Licenses)





Stateful network firewall

Protect the services inside your Data Center



Secure traffic between two servers through Stateful Firewall:

- In the same VLAN
- In different VLANs
- Both connected any leaf Distributed Services Switch
- Where one server is connected to an existing leaf
- High performance (800Gbps)
- Low latency (4us)

Protect the Unprotected:

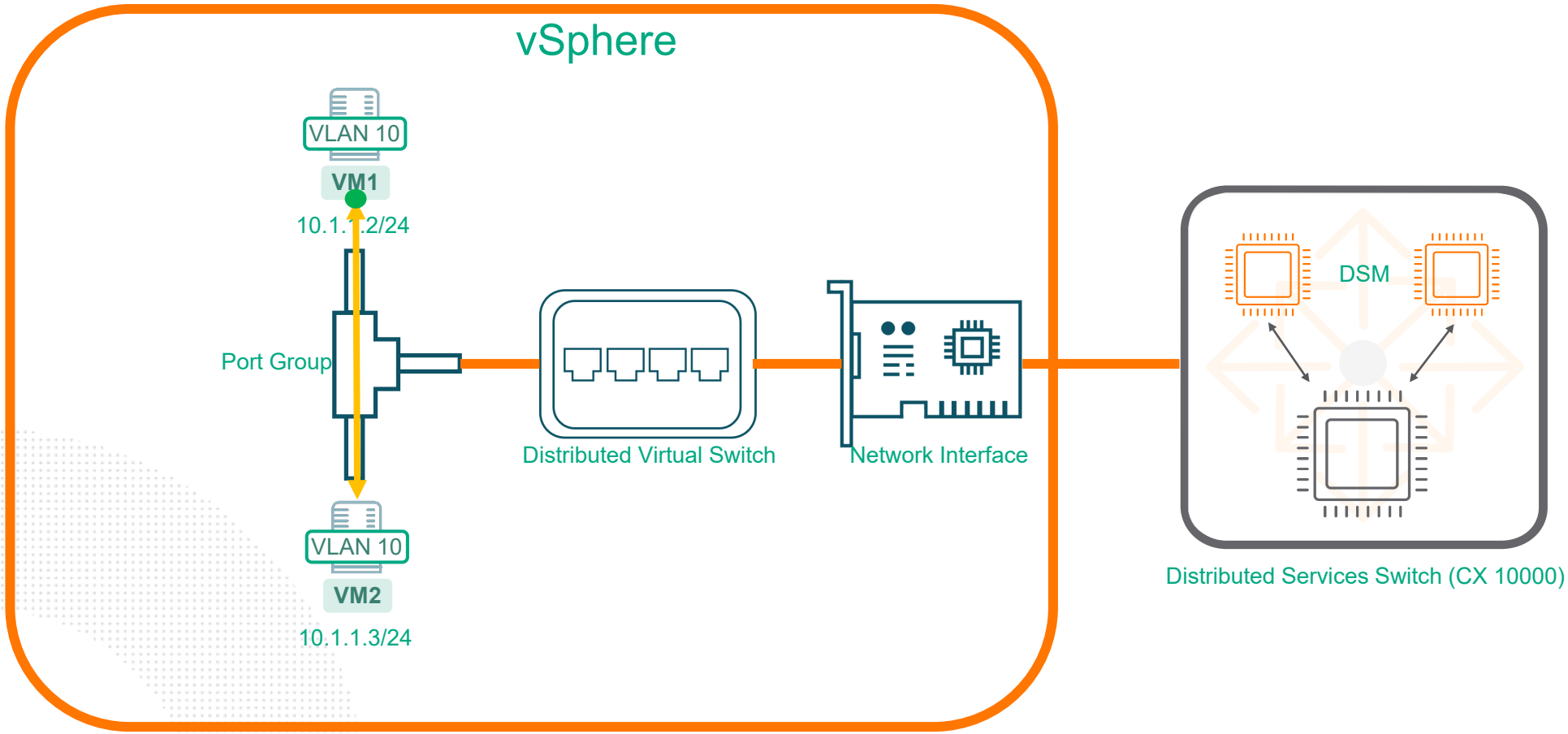
- Hypervisors (management, storage)
- Backup Servers
- IP Storage Appliances
- Shared Services
- Bare Metal Servers

How does it work: micro segmentation

Traffic inspection for workloads that are on the same network

By default on a vSphere port group traffic within the port group is allowed

How can we create micro segmentation that allows stateful firewalling between workloads that are on the same subnet/VLAN?

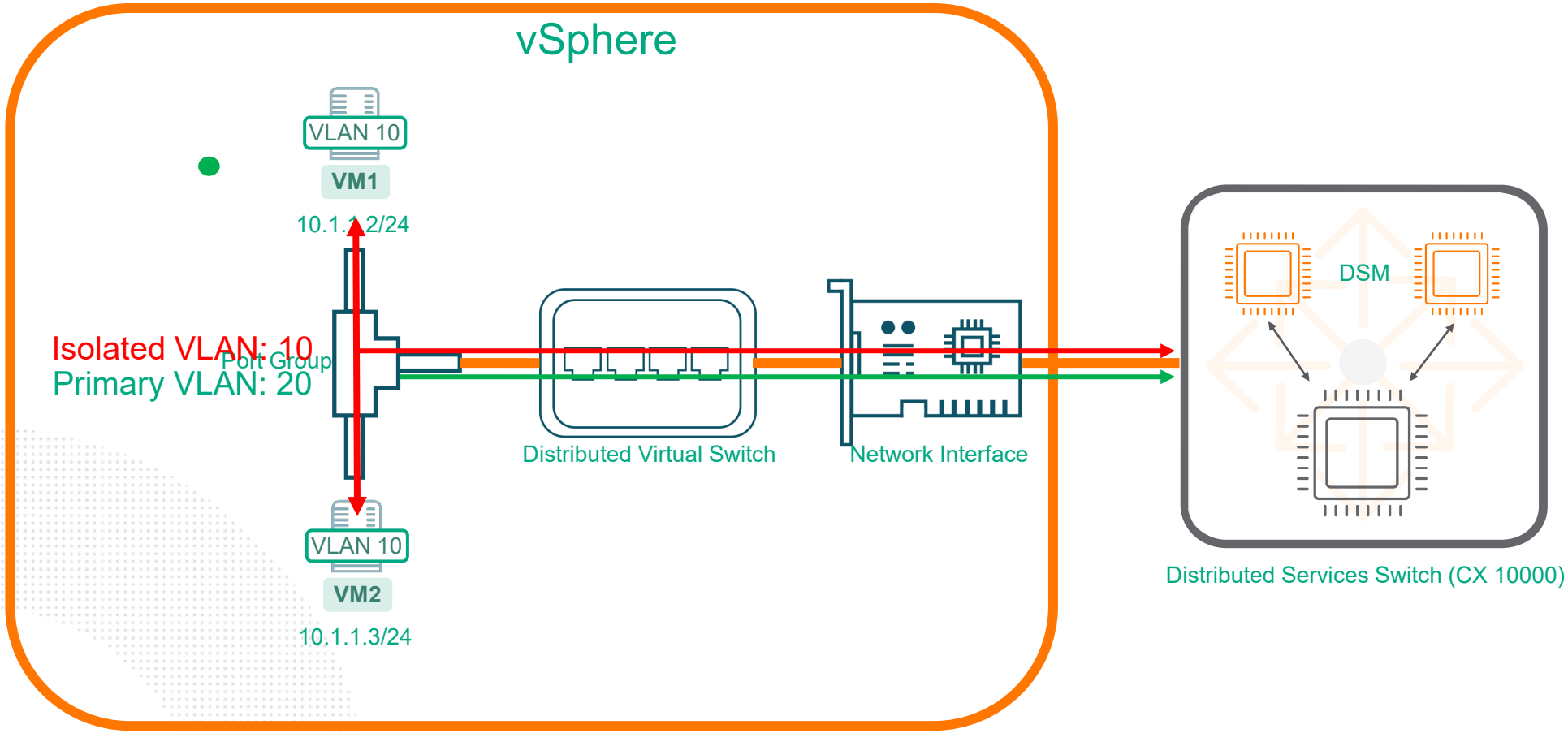


How does it work: micro segmentation

Traffic inspection for workloads that are on the same network

Micro segmentation can be achieved through Private VLAN functionality in vSphere and on Aruba CX switches

The primary VLAN (VLAN 20) is used for egress traffic into the CX 10000. VLAN 10 traffic is also egressed, there is still isolation between hosts

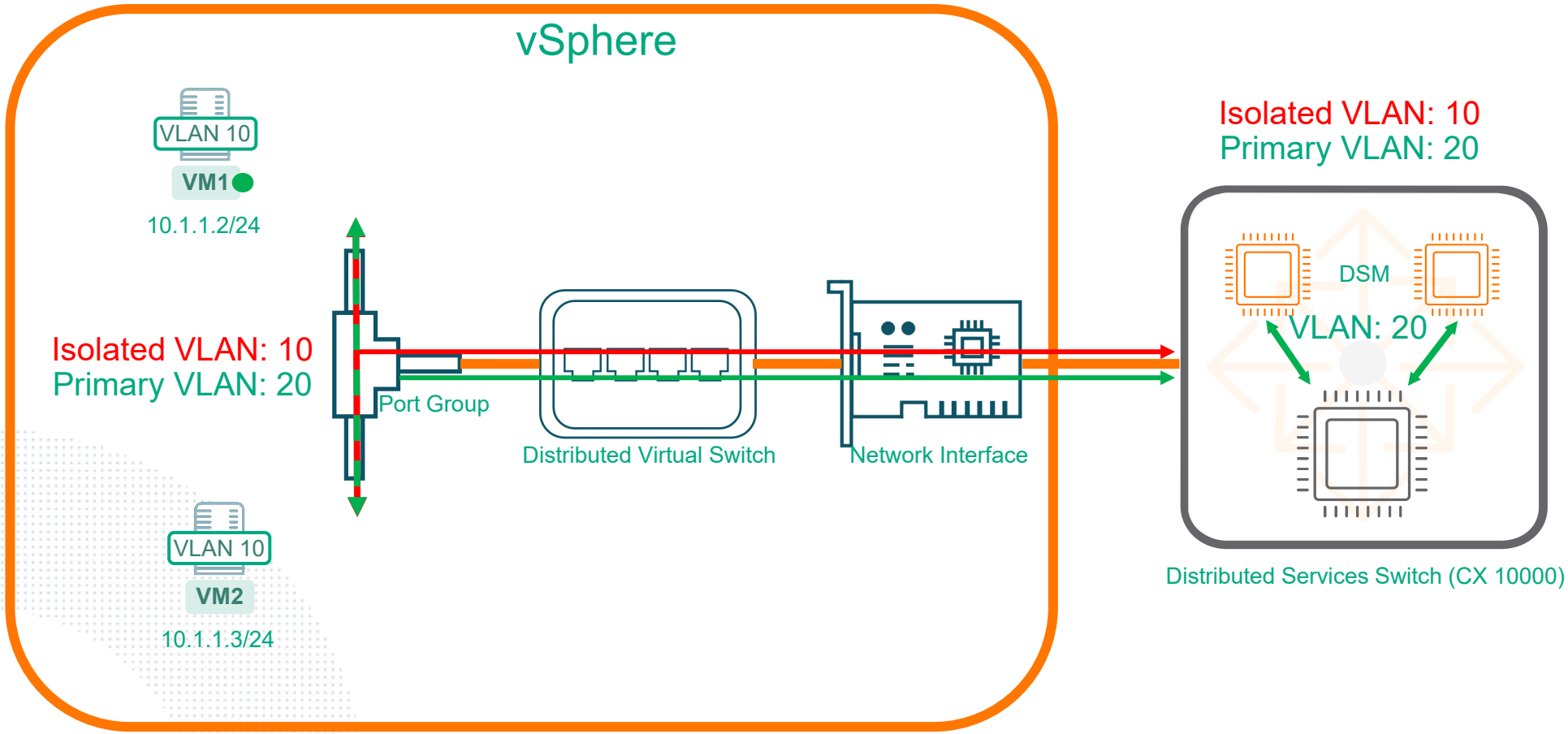


How does it work: micro segmentation

Traffic inspection for workloads that are on the same network

The CX 10000 is also configured for Private VLAN where VLAN 10 is the isolated VLAN and VLAN 20 the primary (promiscuous) VLAN

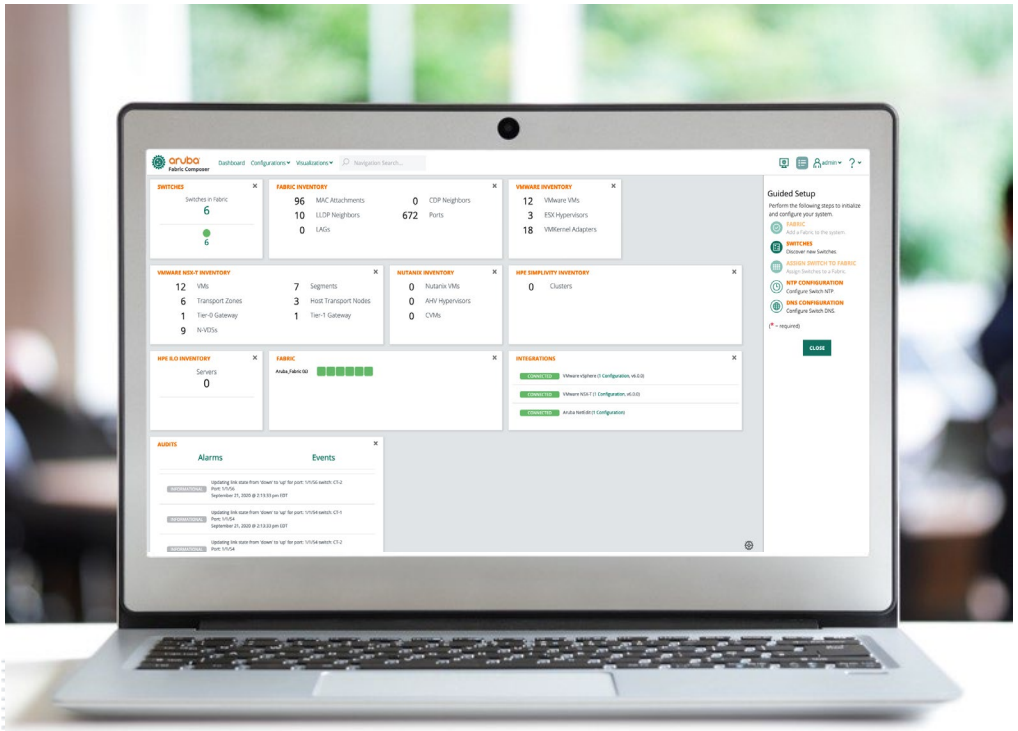
When a VLAN (Network) exists on the DSM for the primary VLAN (20), traffic is redirected to the DSM for stateful inspection



Aruba Data Center Network Orchestration

Aruba Fabric Composer

The on-site data fabric orchestration system



Key Features & Benefits

- Simplified provisioning & orchestration
- Complex workflow automation
- Manage and monitor global network configuration
- Integrate with 3rd party data center orchestration systems
- Integration with HPE Infrastructure hardware and software
- Visualize data center infrastructure
- Automate lifecycle events in the data center
- Holistic troubleshooting of end-to-end network connectivity

Aruba Fabric Composer Delivers Value Across the Data Center

INFRASTRUCTURE & NETWORK TEAM

- Simplify scale and growth
- Rapid and error-free fabric deployments
- Streamline deployments to deliver higher value to business owners
- Enhance visibility and control with simplified API integrations

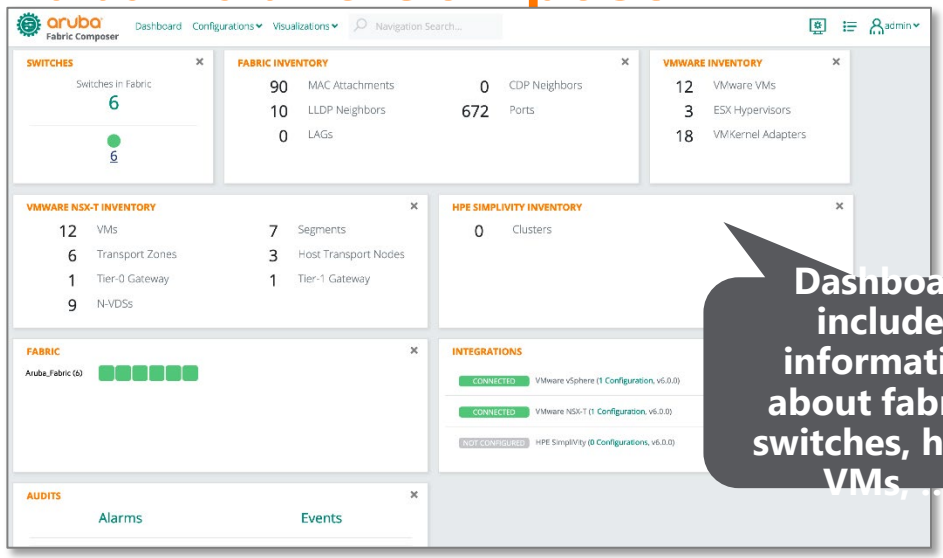
SERVER ADMINS, VM / APPLICATION OWNERS

- Remove bottlenecks and boost performance
- Deploy and scale without the need for specialized skills
- Provision resources in real-time, without opening a Network ticket
- Orchestrate virtualized and bare-metal resources

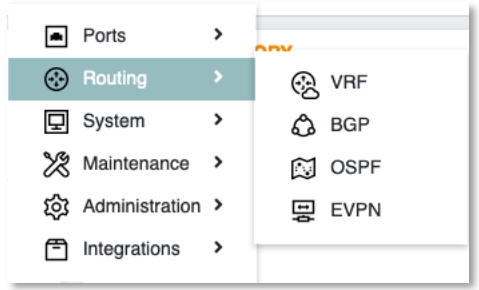
SECURITY AND COMPLIANCE TEAMS

- Centrally managed distributed services to secure critical workloads and data
- Maintain flow-level visibility and control across the estate
- Simplify scale and increase performance
- Reduce costs and increase efficiencies

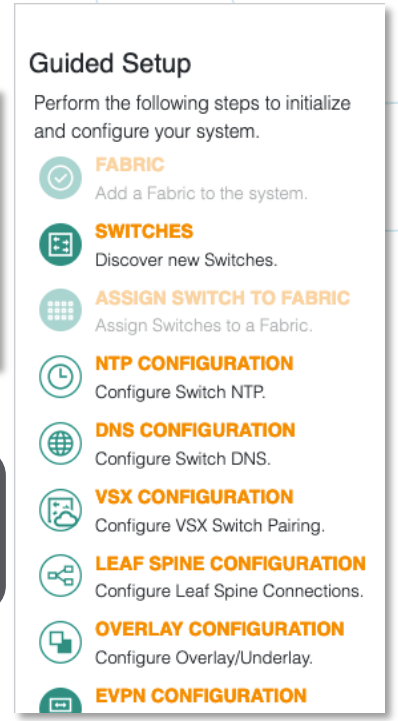
Aruba Fabric Composer



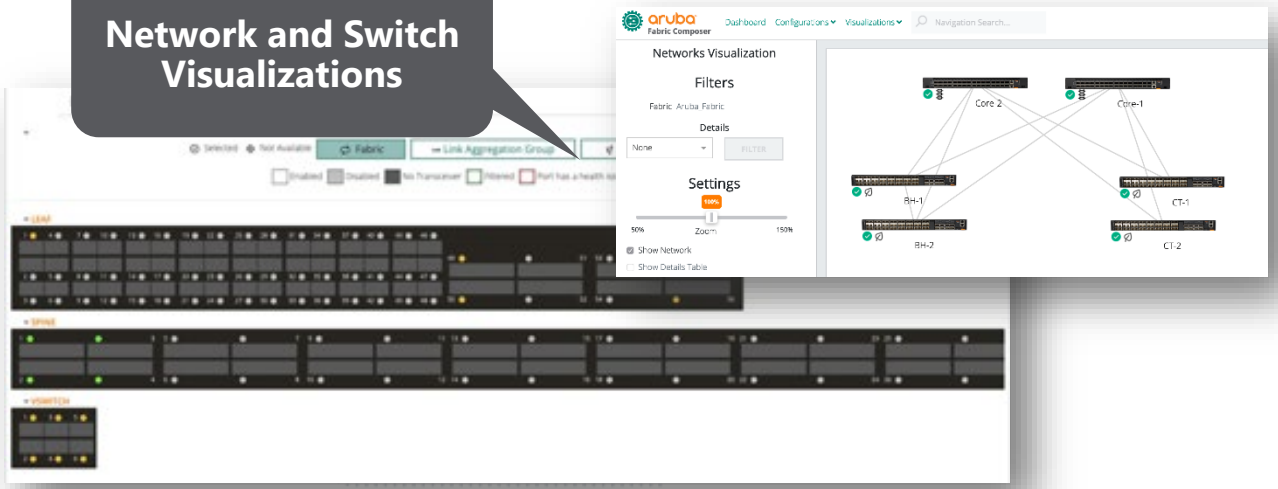
Dashboard includes information about fabrics, switches, hosts, VMs, ...

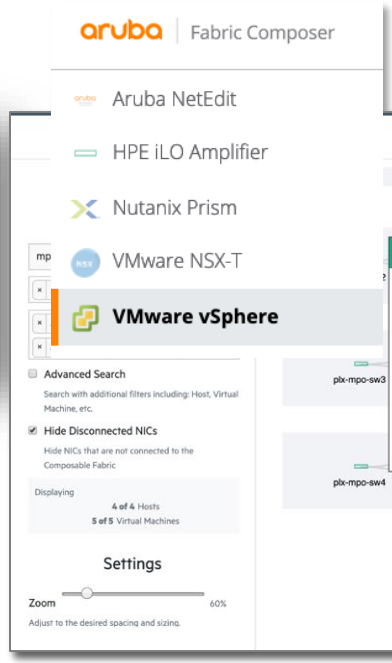


Workflow Automations and Guided Setup



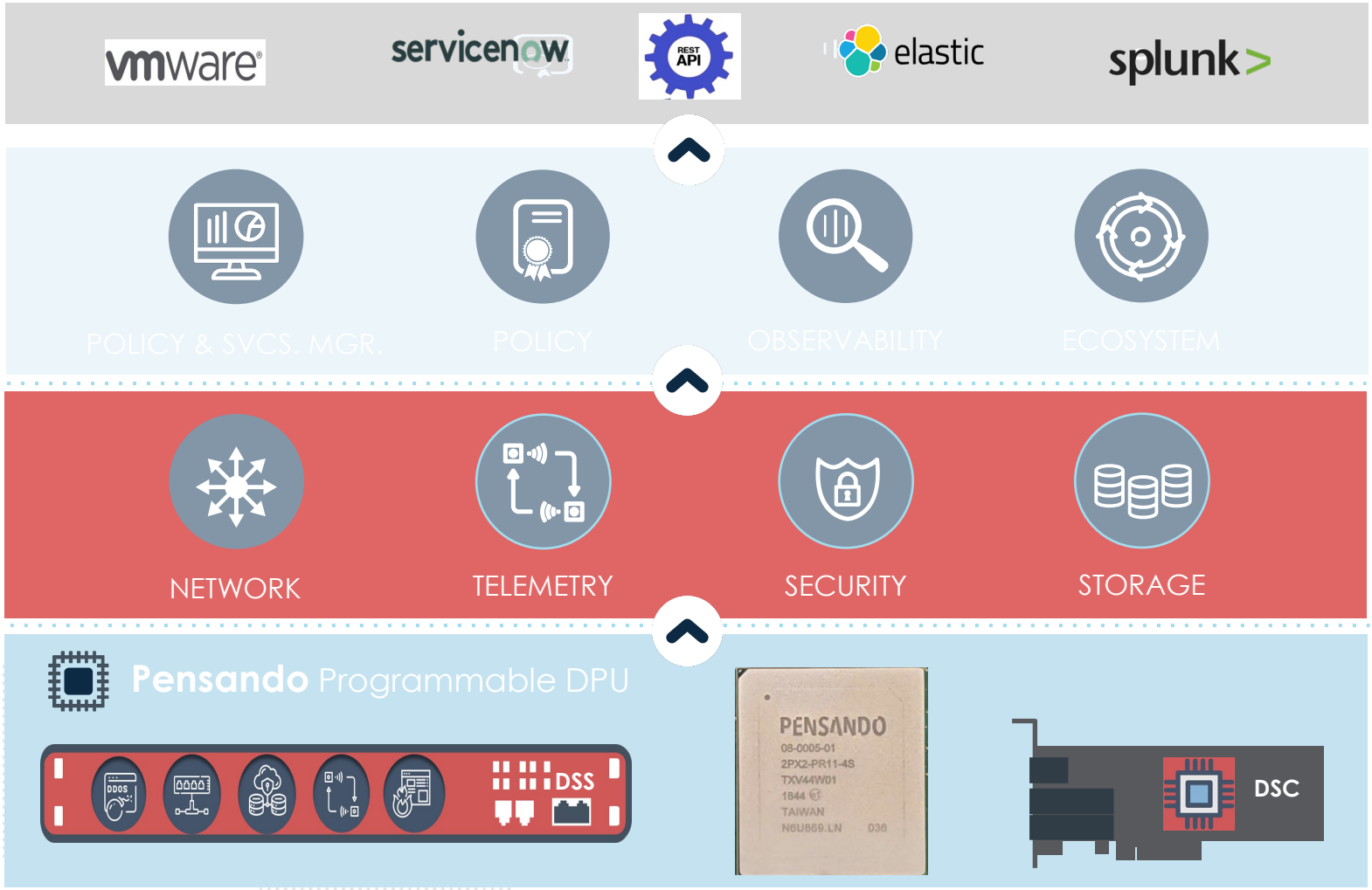
Network and Switch Visualizations





Integrations and End to End Host Visibility

The Pensando Distributed Services Platform



– **Policy & Services Manager**
  – Centralized Lifecycle Management
  – Ensures Full-stack Enterprise-grade Security & Policy Compliance
  – REST-API integration with existing apps
– **Distributed Services**
  – Software-defined Services
  – Inline All-the-time at Wire-speed
– **Programmable ASIC**
  – Form-Factor Agnostic
  – Designed for Security
  – Low Power/Latency/Jitter
  – High Bandwidth & Scale

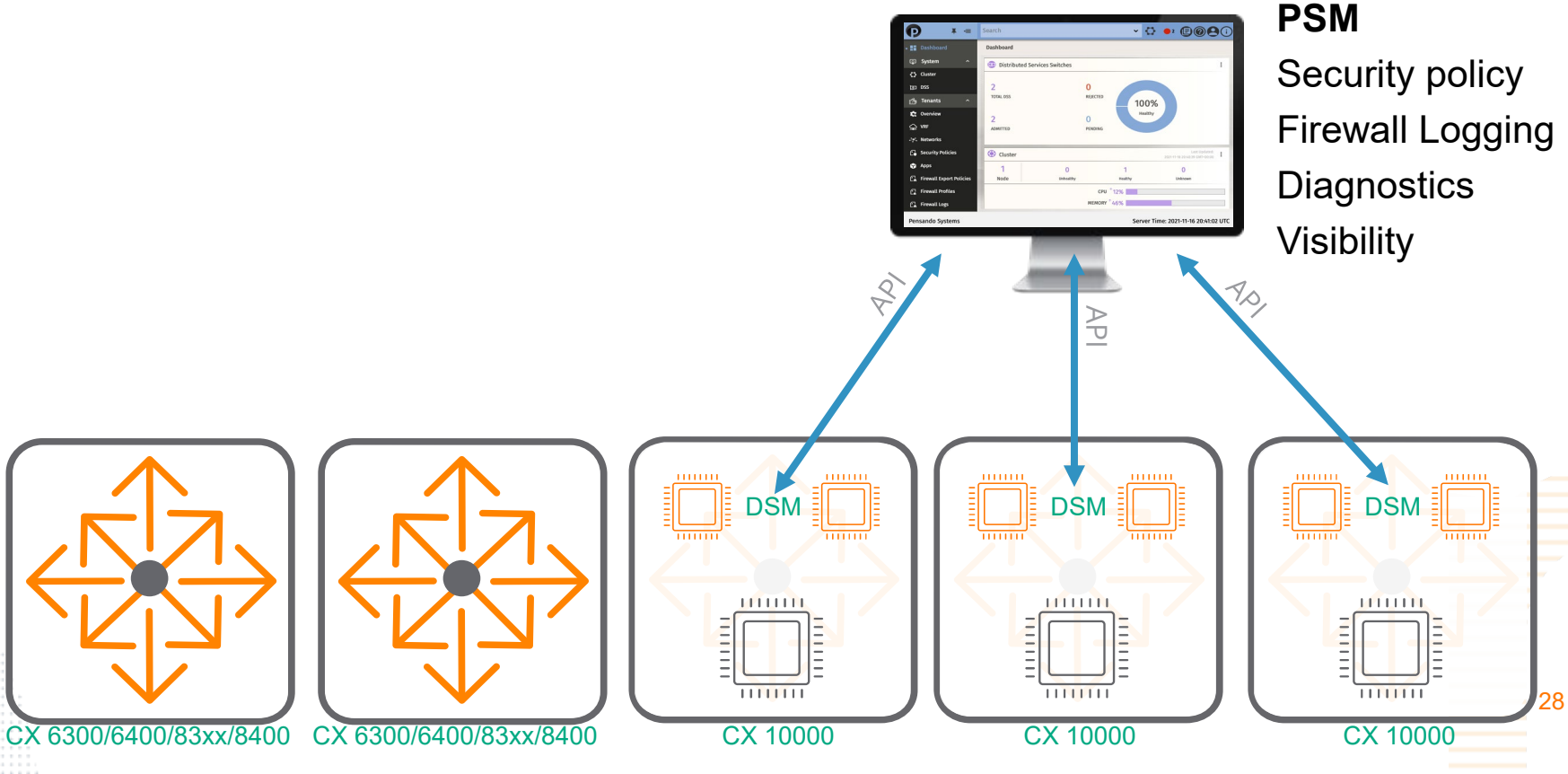
26

Pensando Distributed Services Manager Operations

- Cluster Creation
  - Create PSM Cluster
- DSS Admission
  - Discovery, Commission and Decommission
- Events
  - System generated, immutable record
- Alerts
  - User defined conditions
  - Events/object status/stats based
  - Can be in Open/Acknowledged or Resolved state
  - Syslog Export
- Tech Support
  - Logs and Internal data for offline analysis
- Search
  - All objects, events, logs
- Rollout Service
  - Upgrade PSM
- Metrics Service
  - Distributed time series database
  - Available via APIs

Orchestration and management

Pensando Services Manager provides policy enforcement, firewall logging, diagnostics and visibility for the DSM's
Pensando Services Manager does not provide fabric and switch orchestration and management

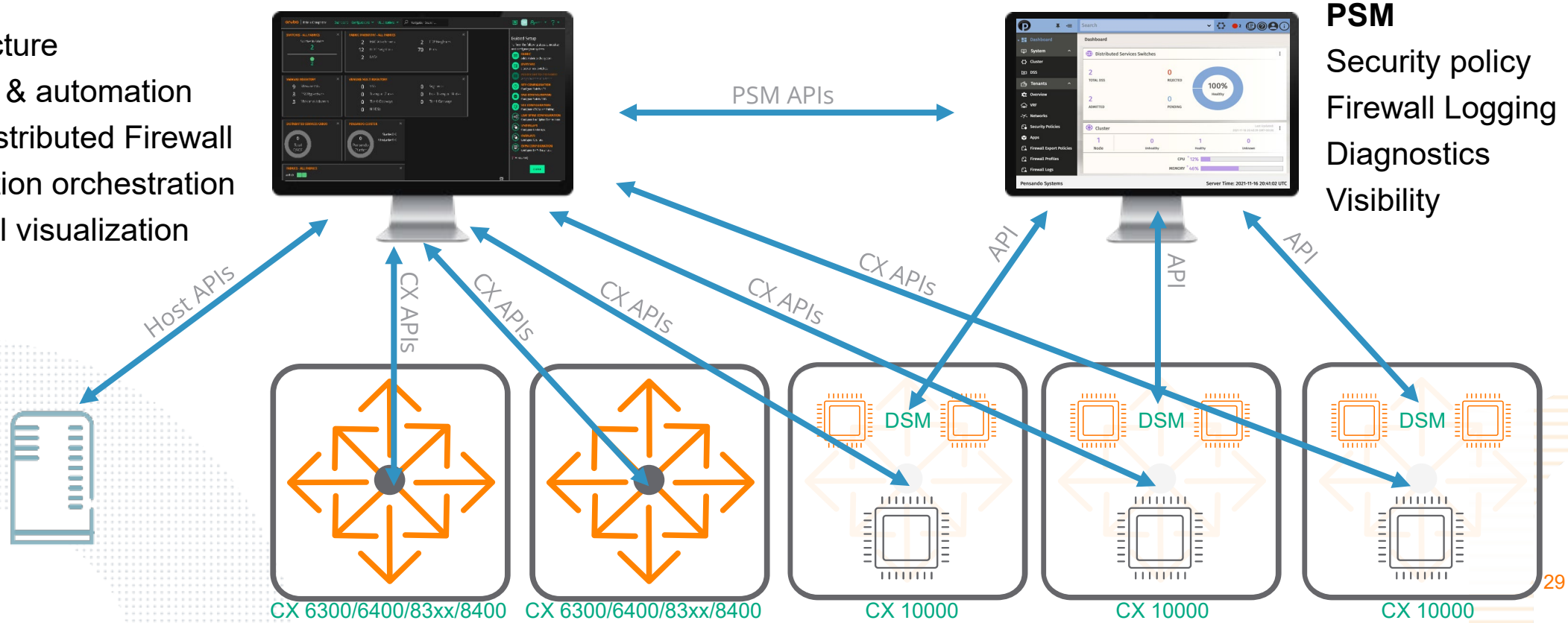


Orchestration and management

Aruba Fabric Composer provides datacenter orchestration, configuration and management for CX switches
Aruba Fabric Composer allows for security policy management by means of PSM API exchange between AFC and PSM
Aruba Fabric Composer has tight integrations with many third-party solutions (vSphere, Nutanix, Simplivity, iLO, etc)

AFC

Unified infrastructure
Fabric discovery & automation
Policy – ACL, Distributed Firewall
Micro segmentation orchestration
Physical & virtual visualization

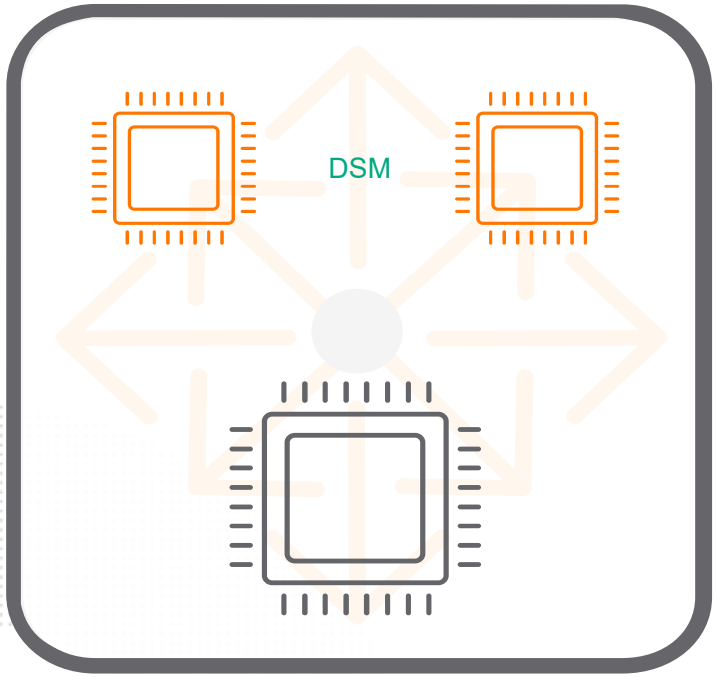


PSM

Security policy
Firewall Logging
Diagnostics
Visibility

Visibility

From Operational Visibility to Observability



NON-SAMPLED

SYSLOG
IPFIX

XDR

FORTINET
paloalto NETWORKS
exabeam
splunk>
CROWDSTRIKE

SIEM

splunk>
LogRhythm
Azure Sentinel
ALIEN VAULT

DATA LAKE

elasticsearch + logstash + kibana
Chronicle

atmosphere'22

FINLAND

Thank you

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