CISCO Engage | Tech Day

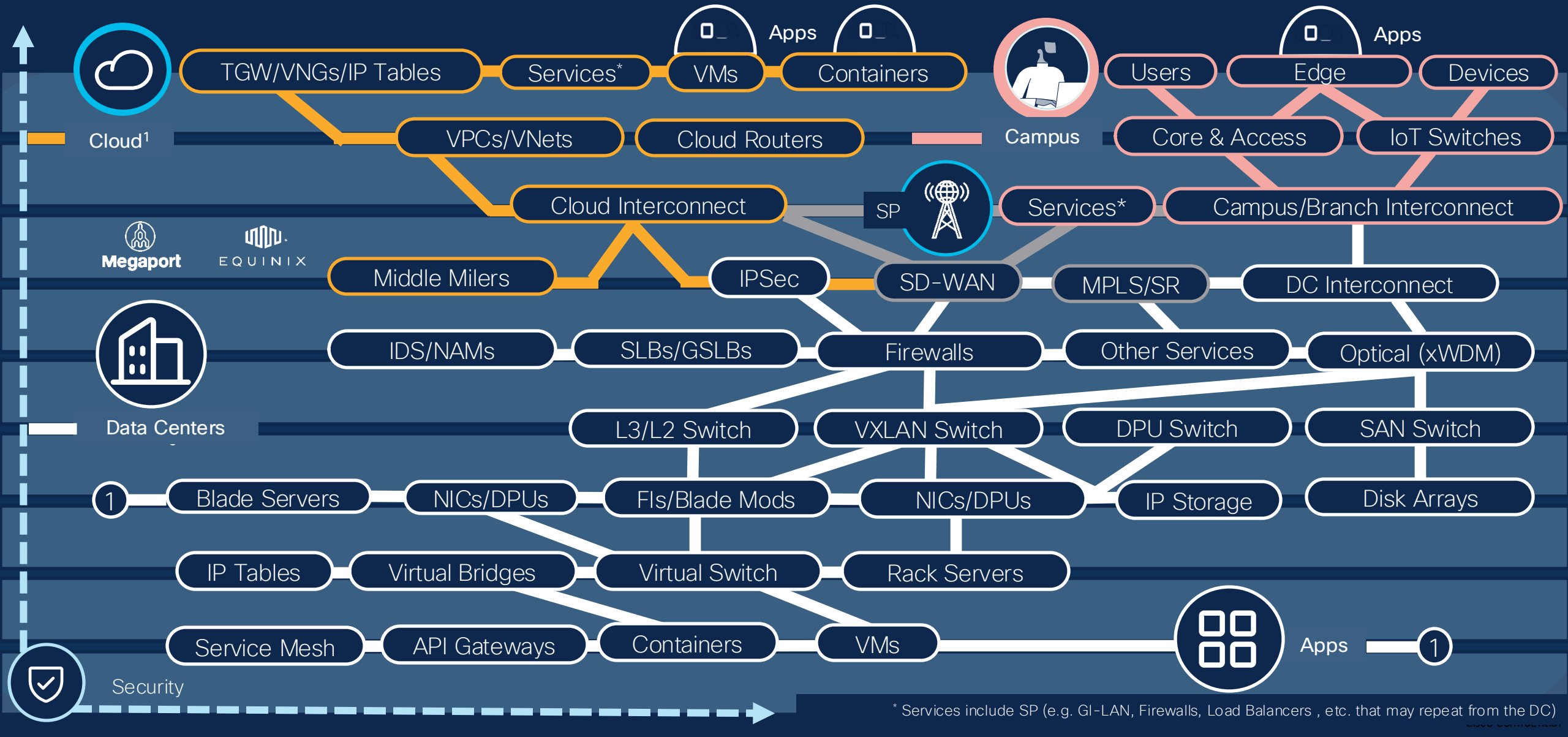
Building Scalable Datacenter Networks

Joshua Lee

How do we build a scalable datacenter?

Communication between users/devices & apps

Today's reality



* Services include SP (e.g. GI-LAN, Firewalls, Load Balancers , etc. that may repeat from the DC)

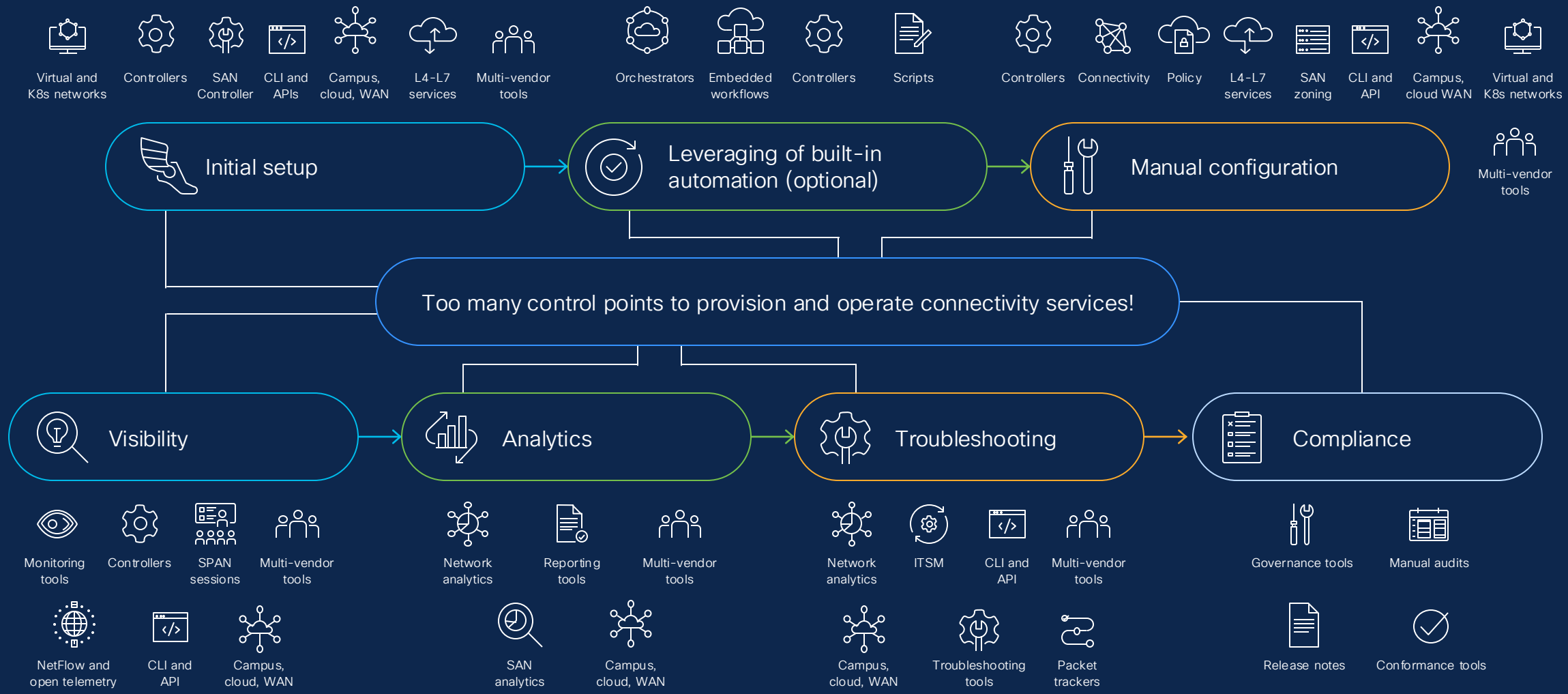
Agenda

1. Nexus Dashboard
2. Nexus 9000 Series
3. Smart Switches / Hypershield
4. Hyperfabric

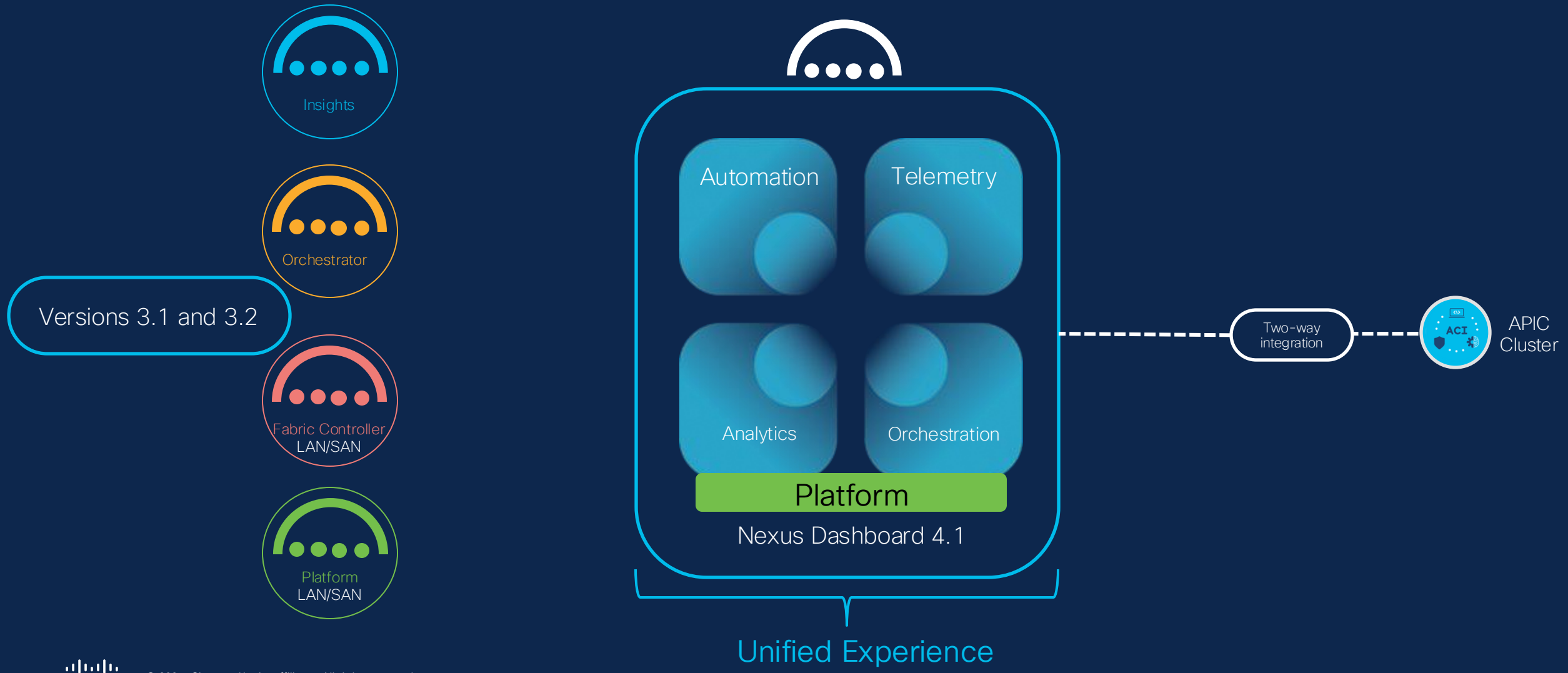
Nexus Dashboard

Today's networks are complex and distributed

We must make it easier for our customers.



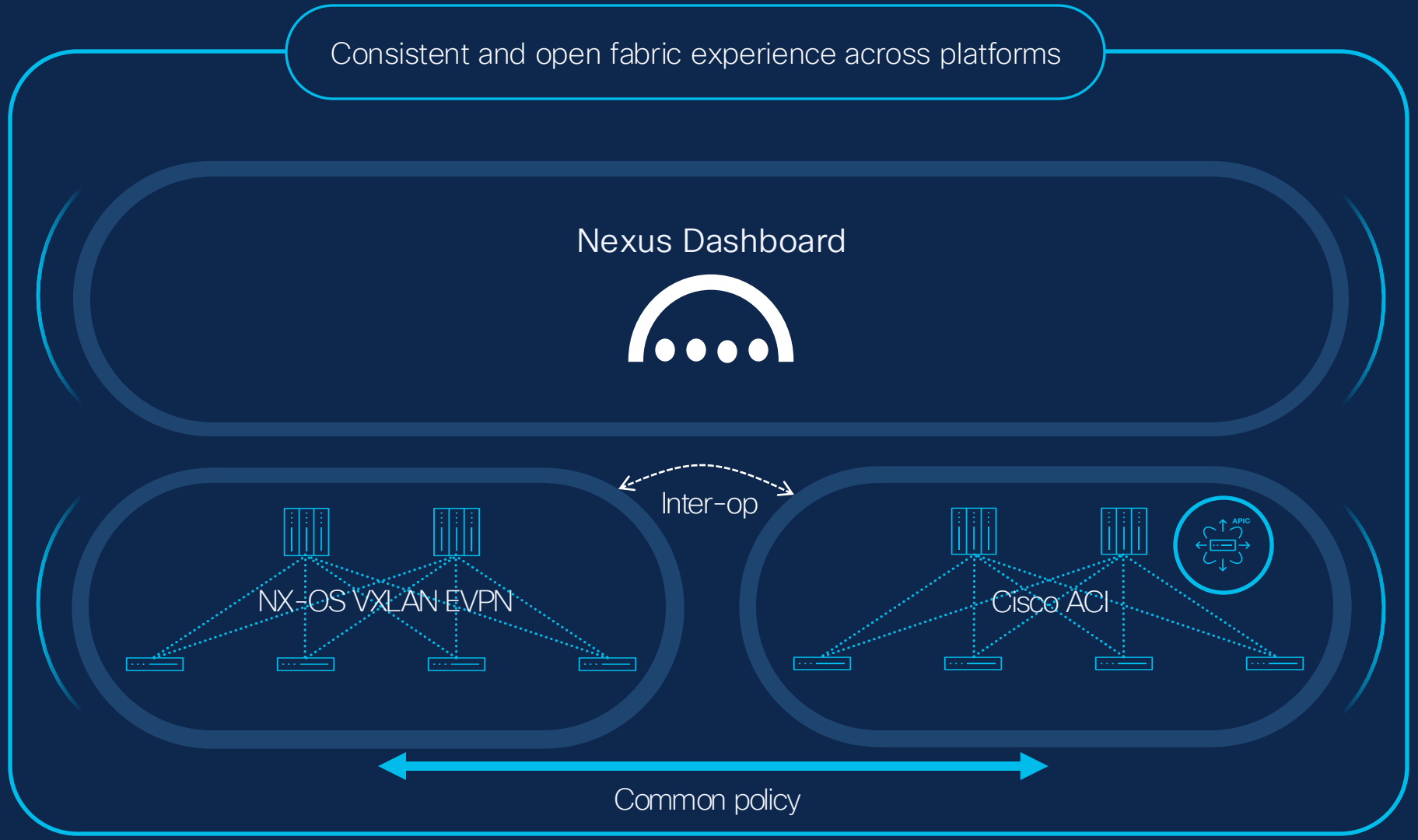
Unify your operational experience



Cisco Nexus One

Solution Components

- Zero-trust networking and micro-segmentation based on endpoint / security groups
- Advanced service chaining and service redirection
- Administrative multi-tenancy
- Standards-based inter-operability with third party networks using open networking protocols
- Integration with CI/CD pipelines with DevOps ready APIs



Cisco Nexus Dashboard

Data Center Networking Management

Provision

Quickly Deploy any Data Center Network Fabrics
Deploy traditional LAN, EVPN VXLAN, AI/ML and SAN fabrics

Manage

Multisite fabric and device management in a single view
Device upgrades, Change control with roll-back, traffic steering, ect...

Analyze

Identify, troubleshoot and resolve issues quickly
Traffic Analytics, **Delta and pre-change analysis**

Segmentation

Unify data center networks across both ACI and NX-OS
Leveraging the capabilities of Cisco Nexus One

Simplified Network Management for modern data center architectures

Demo time

nd-4-eft
Home
Manage
Analyze
Admin

Welcome, davis

Refresh

Overview | Topology | Journey New | What's new

Recent Activity

View All

Fabric deleted successfully: AI-Cluster-1 by davis
1 minutes ago

update fabric(s) for AI-Cluster-1 by davis
1 minutes ago

Configuration deployment completed for the fabric: AI-

Anomaly Level Warning
1 total warning anomaly, out of which 0 occurred in the last week

Advisory Level Critical
3 total critical advisories, out of which 0 occurred in

Fabrics	Inter-Fabric	Switches	Active Endpoints
2	0	10	9

Monthly Energy Usage
0 kWh

7-Day External Traffic
0 KB

Cisco Nexus Dashboard – Manage

Software Updates – NX-OS, IOS-XE, and ACI

Pre-upgrade analysis

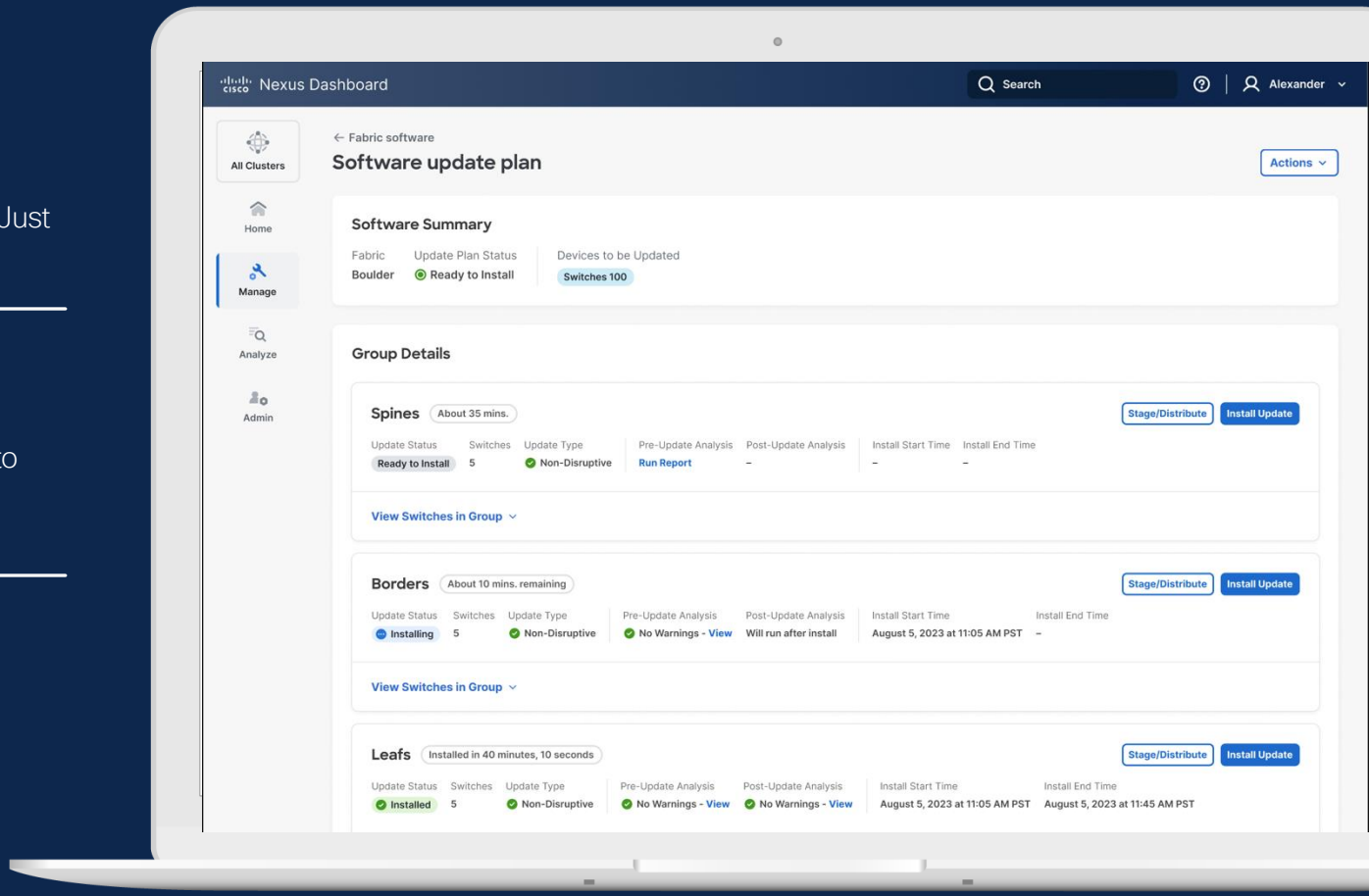
Visualize the potential impact of an upgrade before you perform it. Just select the version you wish to upgrade to and see the results

Automated upgrade plans and recommendations*

Nexus Dashboard will suggest customizable groups and methods to minimize disruption during the upgrade process

Post-upgrade analysis

Once the upgrade is performed, visualize the results, check any changes, and ensure everything came back just as it was before.



* ACI fabrics to support upgrade plans in version 4.1 (not committed)

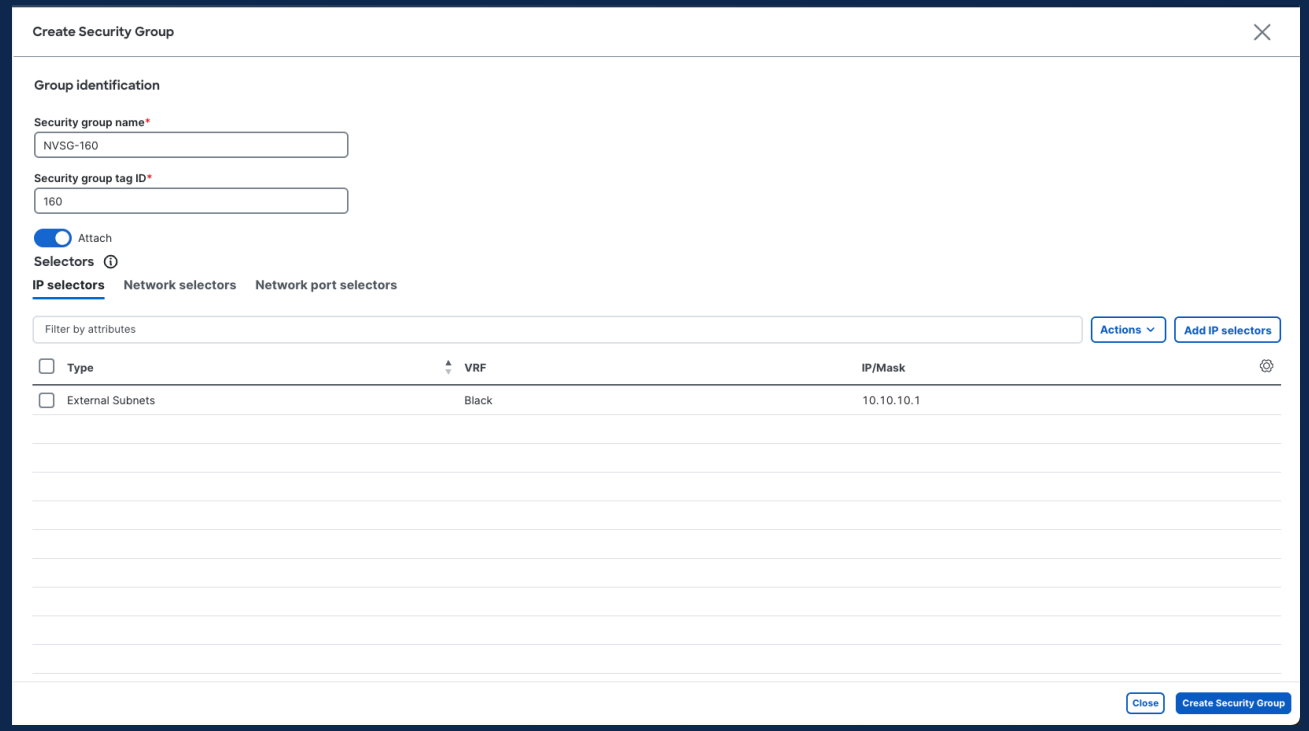
Benefits

Stay up to date and minimize risk

Ease of Use

Cisco Nexus Dashboard – Security

Micro-segmentation for VXLAN fabrics



Define security groups in a single click (based on IP, VM Attributes and VLAN)

Create and visualize micro-segmentation policies/contracts from a single pane

Intuitive and workflow-based service chaining rules

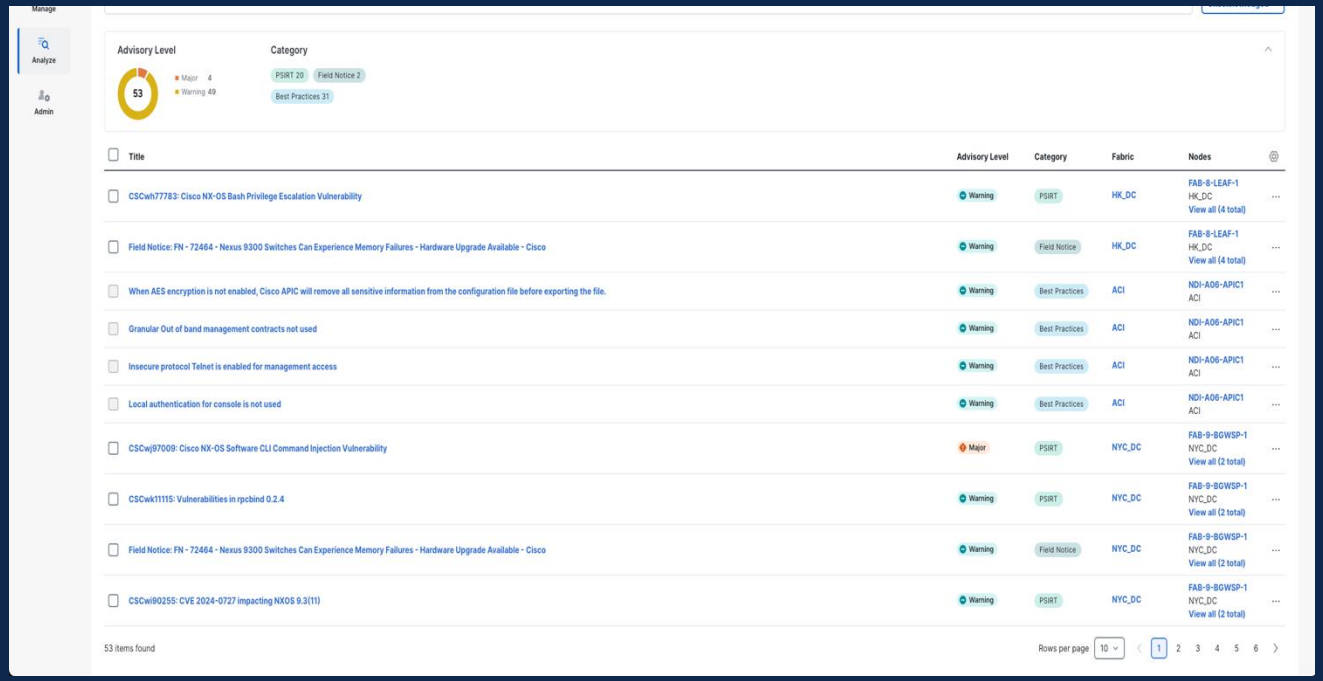
Scale-out with support for single-site and multi-site architectures

Benefits

Segment East-West traffic | Flexible security isolation | Reduce attack surface | Automate your way

Cisco Nexus Dashboard – Security

Compliance dashboard



- Audit Logs for entire data center networking fabric
- Organization security events with Advisories
- Hardening along with best practices
- Patching using Isovalent

Benefits

Single pane of glass | PSIRT and CDETS | Integration with SIEM | Hardening and best practices

Cisco Nexus Dashboard – Analyze

Topology – Maintain updated visibility across fabrics

Updated topology

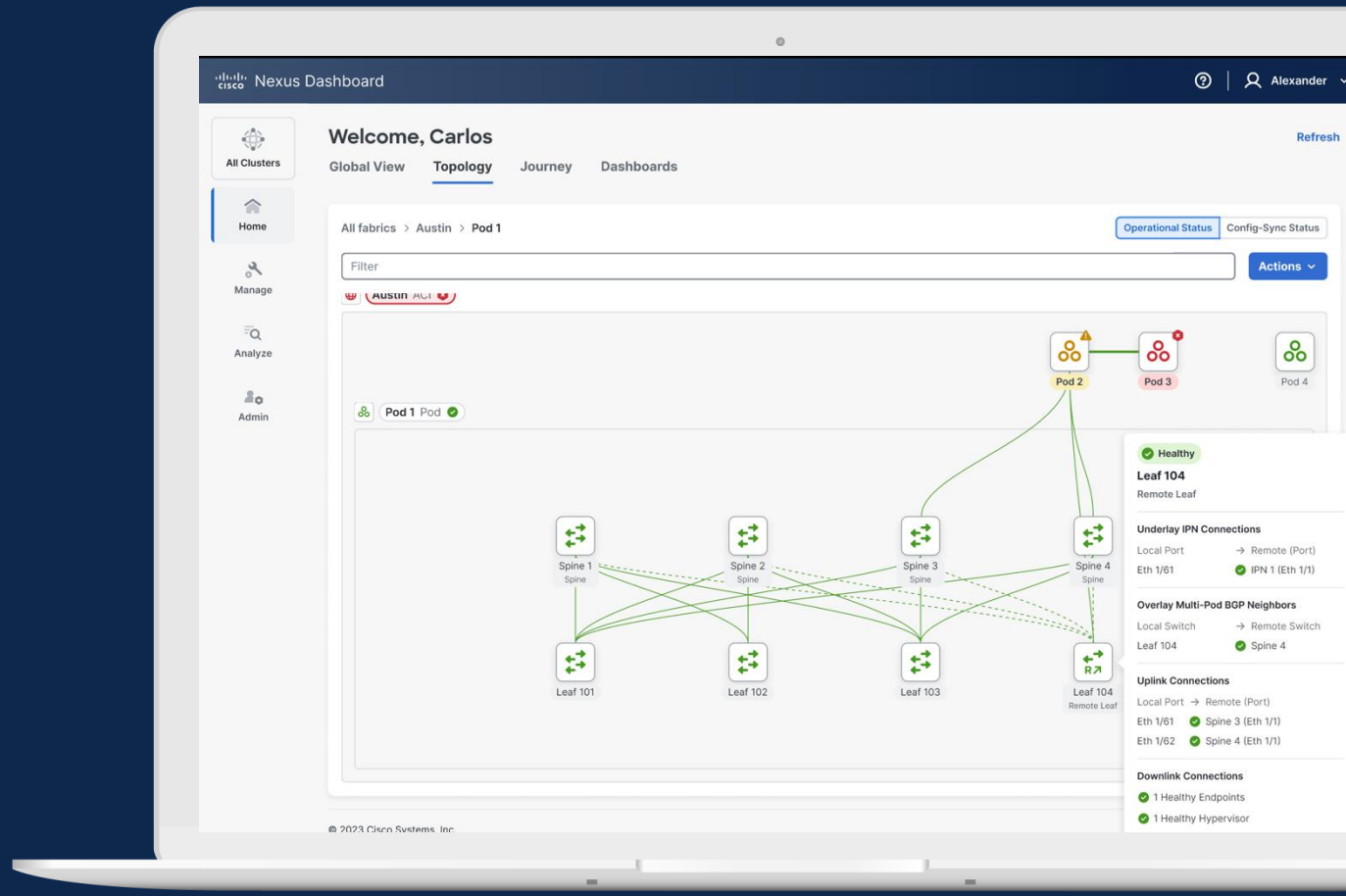
View fabrics, switches, interfaces, and endpoints with their corresponding anomaly scores

Visualize and configure

Verify health and configuration-sync status, configure VPC pairs, assign roles, and more

Single and multi-fabric

Drill down into a fabric or visualize connections across fabrics, including external and inter-fabric networks such as IPN and ISN



Benefits

Visualize all your fabrics in a single place

Cisco Nexus Dashboard – Analyze

Achieve your net-zero goals faster

Cost

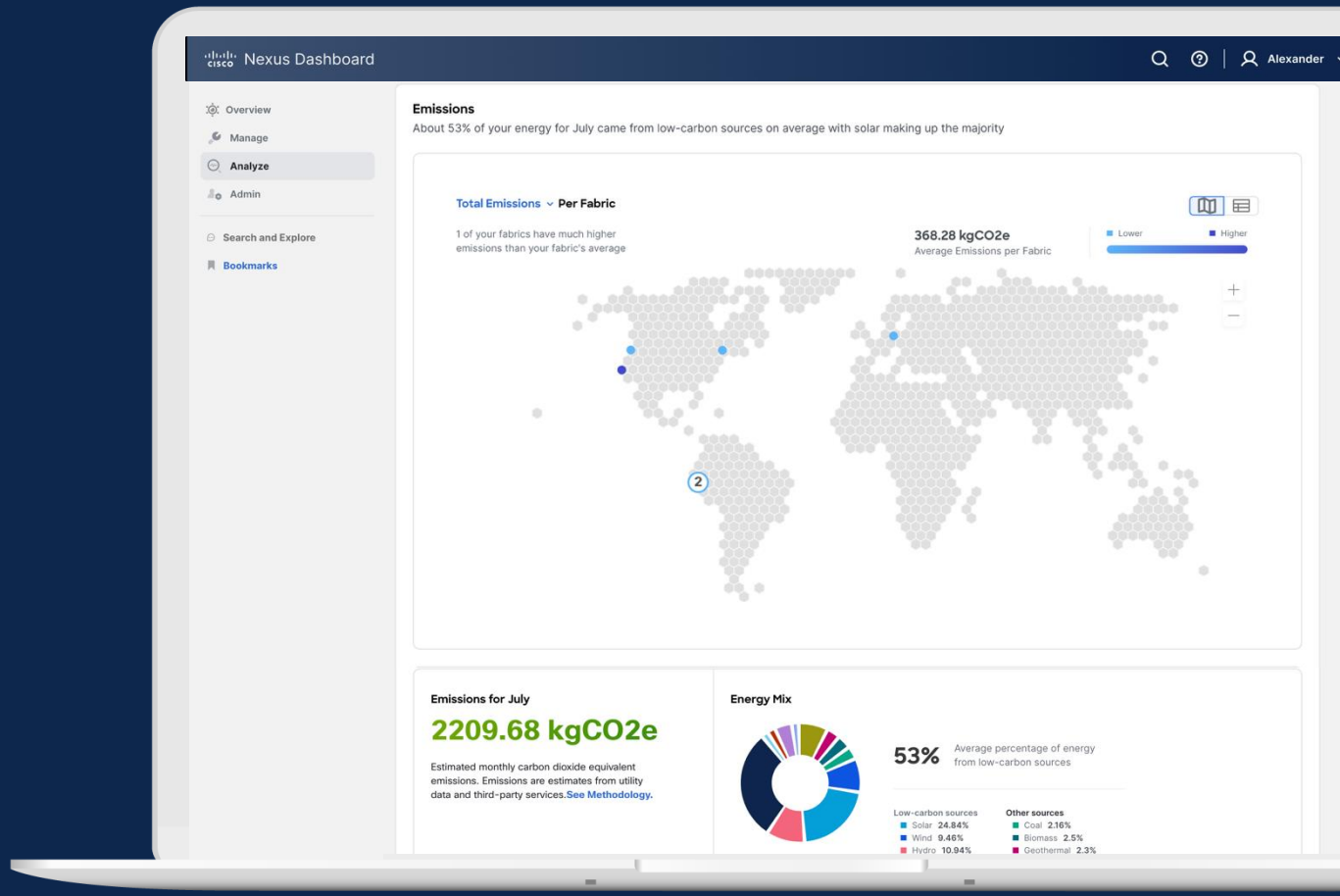
Learn about associated energy costs each month and compare them against previous ones; customize your own negotiated rates

Energy consumption

Switch and PDU (Panduit) power consumption gives you insight into peaks and how efficiently your switches are using electricity

CO2 emissions[1]

Understand the energy sources your data center networks use, visualize the top contributing devices, and compare against previous months



[1] Requires connectivity to Intersight

Benefits

Sustainability | Cost awareness

Cisco Nexus Dashboard – Analyze

Identify latency, congestion, and drops in your network

Automatically identify services in your network

Through well-known L4 ports (e.g., Web - TCP port 80) pre-loaded service categories are learned and monitored; category customization is also allowed based on your own preferences

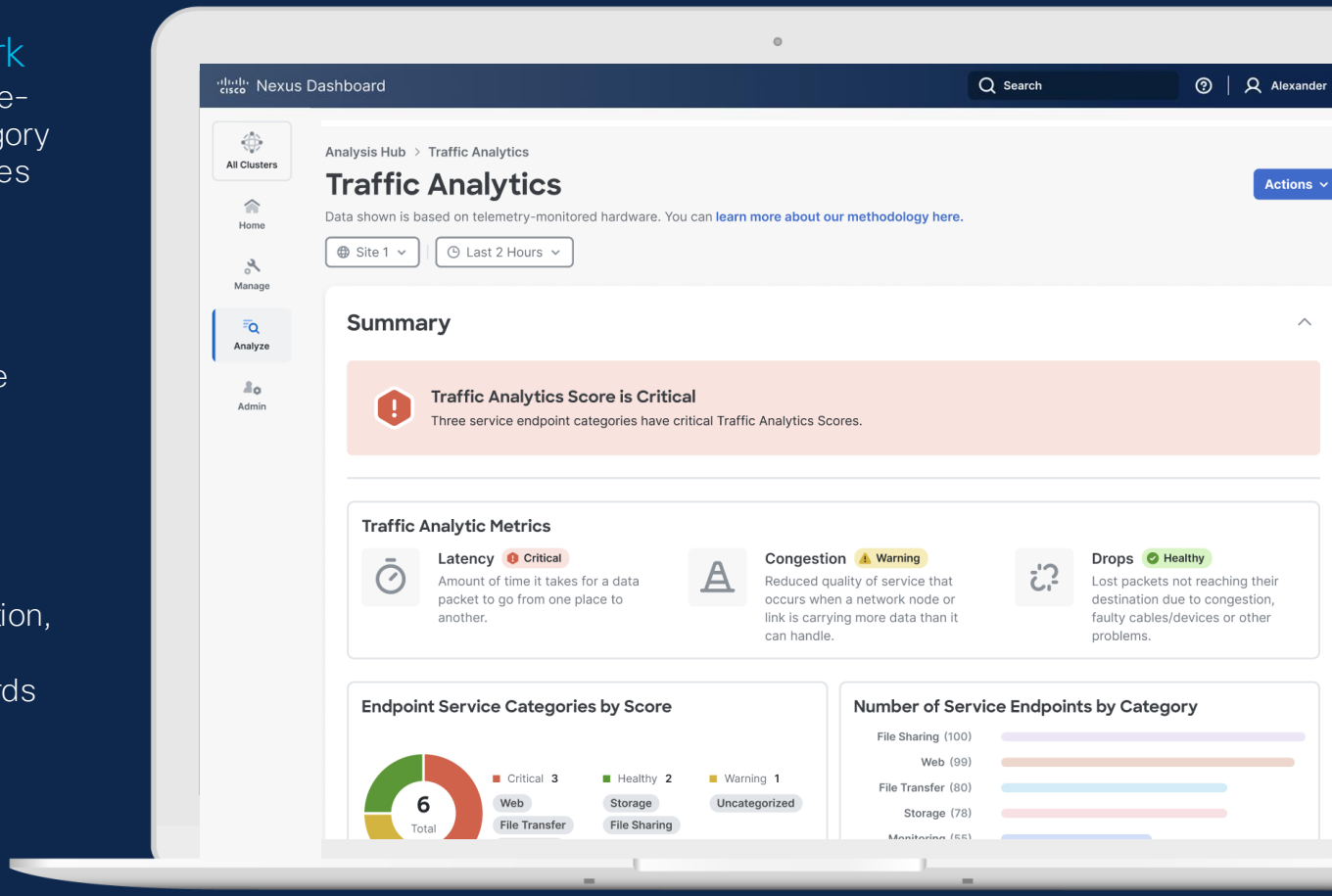
Pervasive across switches and fabrics

Learn about clients and services connecting across multiple fabrics without rules or any additional rule configuration[1]

Granular visibility for every connection

From overall fabric score to category, service, and connection, Traffic Analytics can monitor individual client-to-service sessions and allows you to “tap-in” by capturing flow records on demand

Requires: ACI – 6.1.1 and NX-OS 10.4(2F)



* Fabrics must have PTP configured for timestamping

Benefits

Anticipate performance issues | Customize monitored services

Cisco Nexus Dashboard – Analyze

Delta Analysis

Anomalies

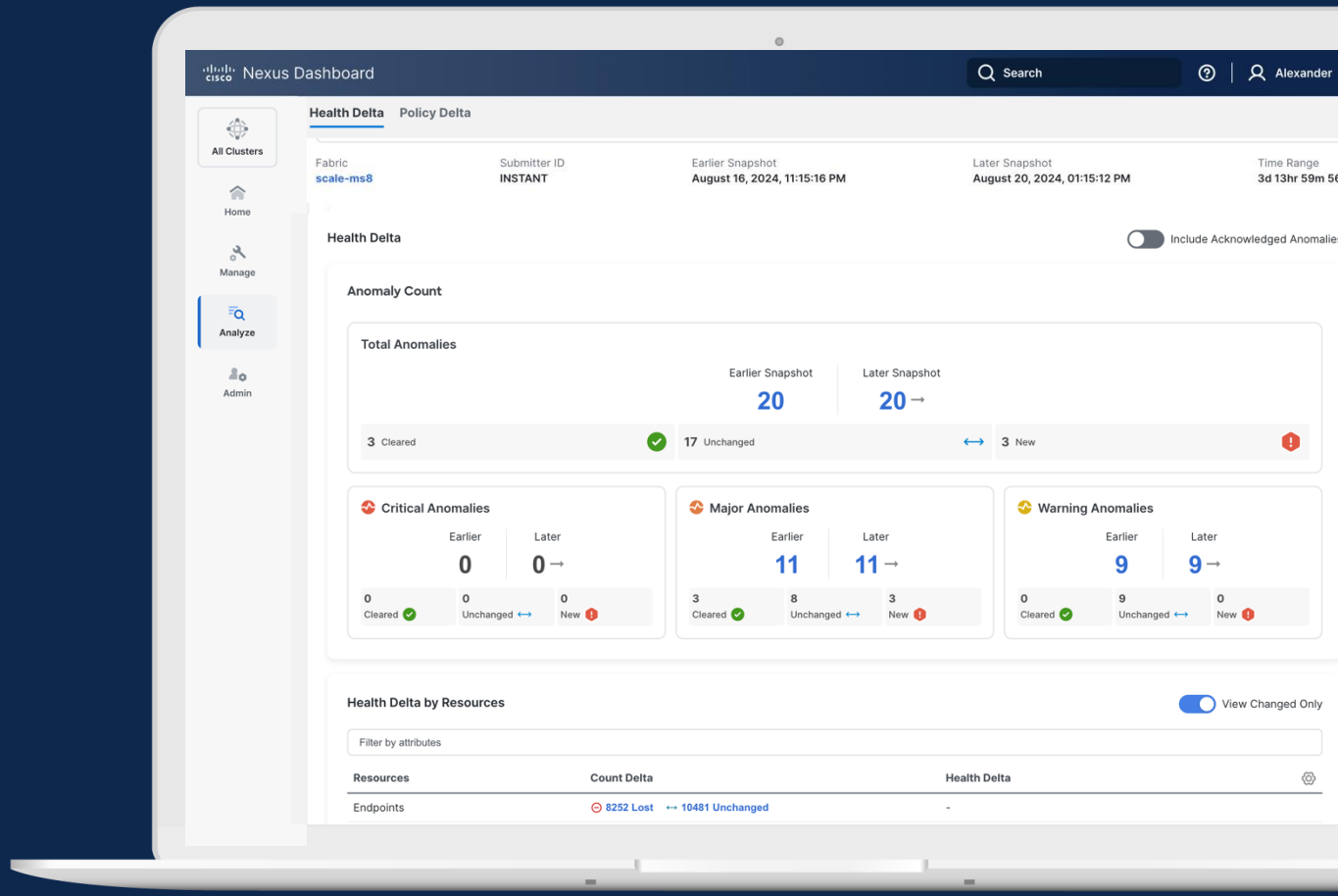
View new, unchanged, and cleared anomalies between two points in time to learn about changes in your network

Resources

Learn about endpoints, interfaces, routes, VRFs, and other objects that may have changed their configuration or health status

Policies and configuration

Get an XML (ACI) or CLI (NX-OS) view of the specific objects that have changed, how they changed, and who changed them



Benefits

Learn about any changes in your network

Troubleshoot faster

Nexus Dashboard

Included with every Nexus 9000 switch license

Nexus Dashboard

Consumption choice, single licensing

Cisco Nexus® Dashboard: Automation, management, AI analytics, and troubleshooting tools included with your Cisco switch license

Simple, modern, useful

Cisco Nexus Dashboard 4.1: Available now!

Appliance based (physical or virtual)

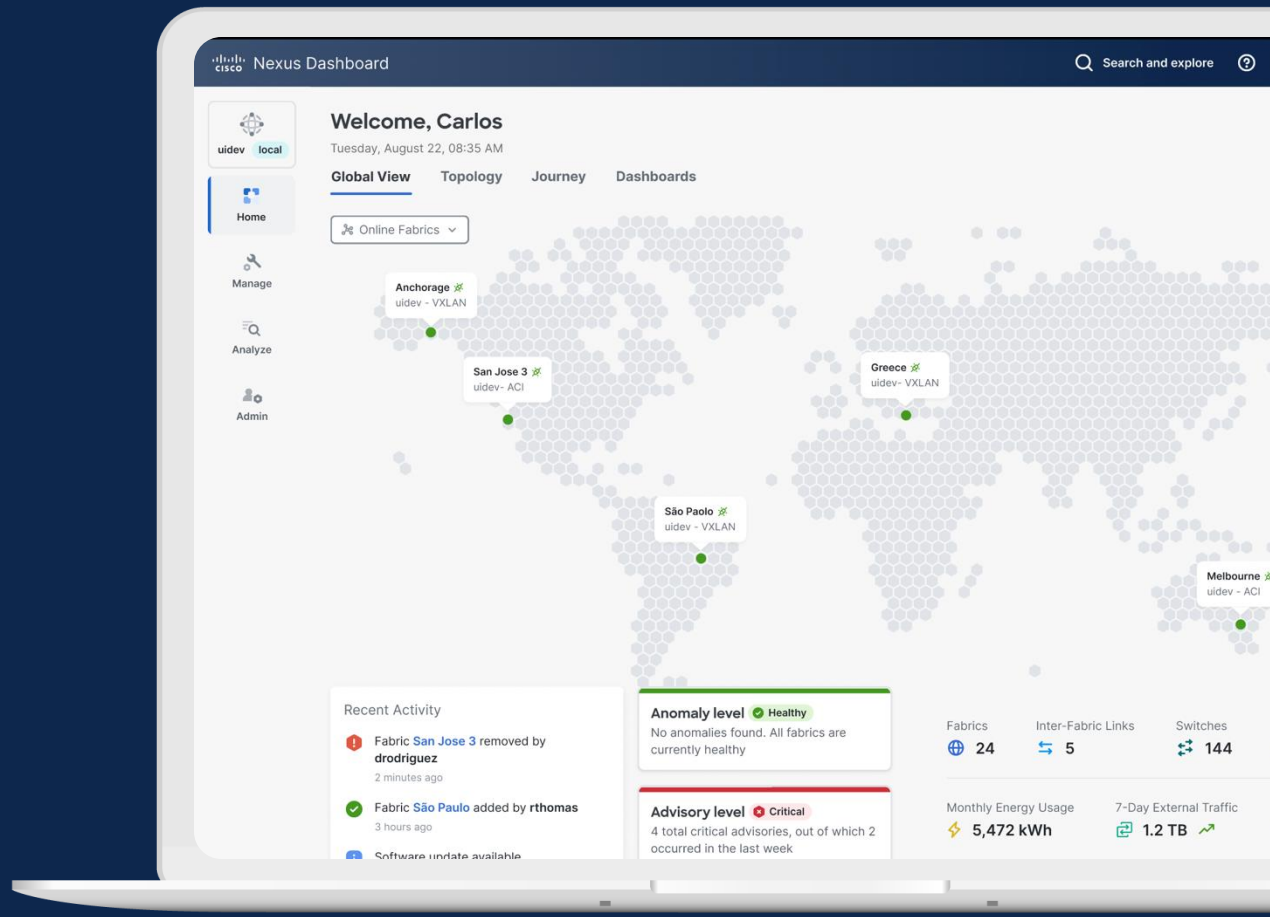
Start with one physical node or three VMs and scale from there

Innovate and minimize risk and downtime

Leverage the power of automation and analytics

Go beyond the switch port

Always connected to Cisco TAC[1]



[1] When connected to Cisco Intersight® and leveraging Cisco TAC Assist

Nexus 9000 Series Switches

Front-end network | Back-end network | Storage network

Cisco brings an open, flexible infrastructure to the Secure AI-ready Data Center

Cisco Silicon (S1 and Cloud Scale) & Cisco Optics fully validated as part of Spectrum-X

The only 3rd party switch validated as part of the reference architecture

Support packet spraying and adaptive routing capabilities in Cisco Silicon Nexus Switches

Co-develop future Cisco Nexus switches based on Spectrum-X ASIC

Nexus 9000 Modular Switches

Cisco Nexus 9000 Series – Modular Switch Evolution

Compact

800G Ready
High Port Density

Nexus 9408

Optimized for
100G/200G/400G

Nexus 9500

Optimized for 1G through 400G

4-slot, 8-slot, 16-slot chassis

Nexus 9800

Very high density 400G & 100G ports

800G ready

4-slot and 8-slot chassis

Cisco Nexus 9800 Series

Performance | Port Density | Scalability | Efficiency

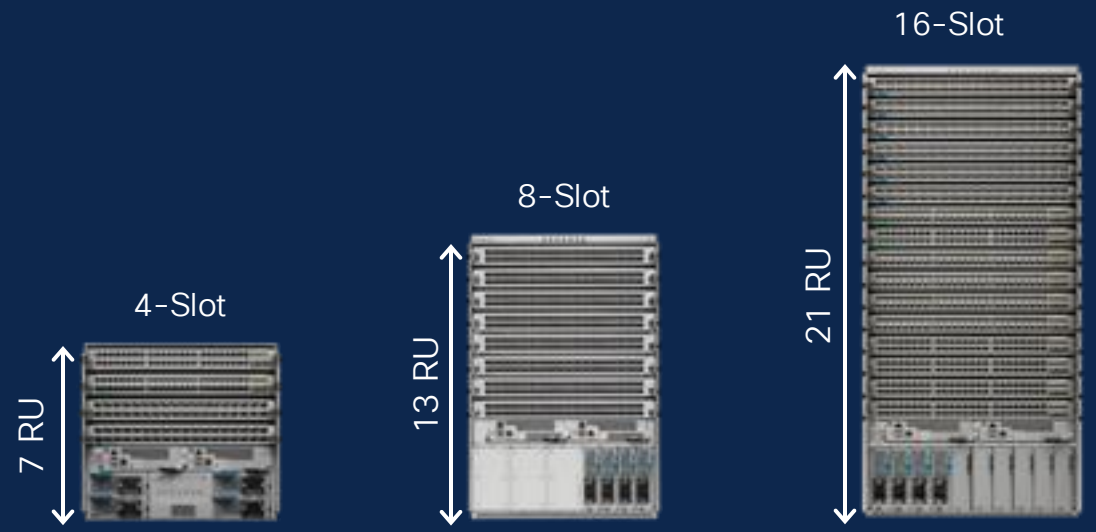
8-slot & 4-slot chassis option

Highly Redundant – n+1 fabric module, 1+1 supervisor, n+n power supply

36 native QSFP-DD 400G or 48 native QSFP28 100G ports per slot

800G ready – future proof design – power, cooling, mechanicals

Cisco Nexus 9500 cloud scale modular portfolio



	Nexus 9504	Nexus 9508	Nexus 9516
	FM-E (100G flows)	FM-E2 (100G flows)	FM-E2 (100G flows)
	FM-G (400G flows)	FM-G (400G flows)	N/A

	NX-OS	ACI	MACsec
 X9716D-GX 16p 400G	✓	✓	✓
 X9736C-FX3 36p 100G	✓	✓	✓
 X9788TC-FX 48p 1/10GT + 4p 100G	✓		✓
 X97160YC-EX 48p 25G + 4p 100G	✓		

Cisco Nexus 9400 Centralized Modular Switch

8x 400G QSFP-DD

16x 200G QSFP56

22x 50G SFP56

N9K-C9408

- 4RU 600mm Deep Chassis
- Powered by one Cisco 25.6T ASIC
- Up to 64 400G ports or 128 200G ports or 176 50G ports
- Line Rate MACsec on all ports
- Sync-E, PTP, Class-C Timing
- Field Replaceable Supervisor, Switch Card, and LEM
- Cisco NXOS and ACI Spine, Leaf support

Nexus 9000 Series Fixed Switches

800G, 400G, 100G

Shipping

Cisco Nexus 9300 **64-port 800G** Switch

512-wide radix | **Fully shared packet buffer** | **Advanced load balancing** | **Low Latency**

N9364E-SG2-Q or N9364E-SG2-O

Compact 2RU 51.2T Switch

G200 ASIC (5nm) | 100G SerDes | 256MB packet buffer

64 800G ports | Up to 128 line-rate 400G ports (2x400G breakout)

Choice of QSFP-DD800 or OSFP ports

Multi Core x86 CPU | 32GB RAM | 128GB SSD

Cisco NXOS spine and AI/ML spine/leaf capable

27C | 50% load | 64x DAC	995W
27C | 100% load | 64x DAC	1,186W
27C | 100% load | 64x 16W optics	2,332W
40C | 100% load | 64x 16W optics	2,567W

Ultra Ethernet Consortium READY

Cisco Nexus 9300 Series – 400G Fixed Switches

N9K-C9364D-GX2A

25.6T ASIC

2 RU 64 400G ports

MACsec on 16 ports

120MB on-die packet buffer

N9K-C9348D-GX2A

25.6T ASIC

2 RU 48 400G ports

MACsec on 48 ports

120MB on-die packet buffer

N9K-C9332D-H2R
N9K-C9332D-GX2B

12.8T ASIC

1 RU 32 400G ports

MACsec on 32 ports (H2R)
MACsec on 8 ports (GX2B)

80MB on-die packet buffer + 8GM HBM (H2R)
120MB on-die packet buffer (GX2B)

Cisco Nexus 9300 Series – 1RU 32p 400G Switches

N9K-C9332D-GX2B

- 32-port 400G 1RU switch
- 120MB on-die packet buffer
- Line-rate MACsec on 8 ports
- ZR and ZR+ support
- 4x 100G, 4x 25G, and 4x 10G breakout
- 6K ingress and 3K egress TCAM
- Port-side intake and port-side exhaust
- ACI Spine, ACI Leaf, and NXOS

N9K-C9332D-H2R

- 32-port 400G 1RU switch
- 80MB on-die packet buffer + 8GB HBM packet buffer
- Line-rate MACsec on all ports
- ZR and ZR+ support
- 4x 100G, 4x 25G, and 4x 10G breakout
- Sync-E, IEEE 1588, PTP, Class-C Timing
- 14K shared TCAM
- Port-side intake
- ACI Spine and Leaf (ACI 6.1.4) and NXOS

Cisco Nexus 9300 Series – 2RU 64p 100G Switches

N9K-C9364C-GX

- 64-port 100G 2RU switch
- 80MB on-die packet buffer
- 5K ingress and 2K egress TCAM
- 4x 25G, and 4x 10G breakout on odd numbered ports
- ACI Spine, ACI Leaf, and NXOS

N9K-C9364C-H1

- 64-port 100G 2RU switch
- 40MB on-die packet buffer
- 14K shared TCAM
- 4x 25G, and 4x 10G breakout on 1 out of every 4 ports
- Line-rate MACsec on 16 ports
- NXOS and ACI Spine/ACI Leaf (ACI 6.1.3)

Cisco Nexus 9300 Series – 100G/400G Fixed Switches

	NXOS | ACI leaf	NXOS | ACI spine | ACI Leaf
2RU Switches	 Nexus 9364C-H1 64p 100G	 Nexus 9348D-GX2A 48p 400G  Nexus 9364D-GX2A 64p 400G
1RU Switches	 Nexus 9336C-FX2 36p 100G  Nexus 93600CD-GX 28p 40/100G & 8p 400G	 Nexus 9316D-GX 16p 400G  Nexus 9332D-H2R Nexus 9332D-GX2B 32p 400G

Nexus 9000 Series Fixed Switches

Leaf/TOR

Cisco Nexus 9300 Series – 1RU TOR Switches

N9K-C93180YC-FX3

- 48-port 1/10/25G + 6-port 100G 1RU switch
- Sync-E, PTP, Class-B Timing
- Line-rate MACsec on all ports
- 40MB on-die packet buffer
- 5K ingress and 2K egress TCAM
- 4x 25G and 4x 10G breakout on 100G ports
- ACI Leaf and NXOS

N9K-C93400LD-H1

- 48-port 10/25/50G + 4-port 400G 1RU switch
- Sync-E, PTP, Class-C Timing
- Line-rate MACsec on all ports
- 40MB on-die packet buffer
- 14K shared TCAM
- ZR and ZR+ support
- 4x 100G, 4x 25G, and 4x 10G breakout on 400G ports
- ACI Leaf and NXOS

Cisco Nexus 9000 Series – 10G/25G/50G Fixed Switches

NXOS (no VXLAN) | NXOS and ACI Leaf

2RU Switches

Nexus 93216TC-FX2
96p 1/10GG + 12p 40/100G

Nexus 93360YC-FX2
96p 10/25G + 12p 40/100G

Nexus 93240YC-FX2 (1.2RU)
48p 10/25G + 12p 40/100G

Nexus 93400LD-H1
48p 50G + 4p 400G

1RU Switches

Nexus 93108TC-FX3P/Nexus 93108TC-FX3
48p 1/10GT + 6p 40/100G

Nexus 93180YC-FX3
48p 10/25G + 6p 40/100G

Nexus 9348GC-FX3/Nexus 9348GC-FX3PH
48p 100M/1GT + 4p 1/10/25G + 2p 40/100G

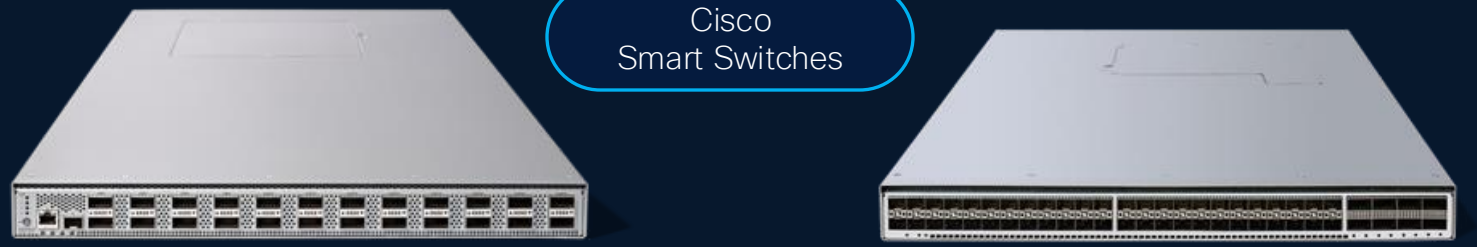
Nexus 92348GC-FX3
48p 100M/1GT + 4p 1/10/25G + 2p 40/100G

Smart Switches, Hypershield, Live Protect

Nexus Smart Switch

Unmatched Flexibility, Performance, and Efficiency

Cisco
Smart Switches



Networking

Cisco Silicon One

Hypershield

AMD PENSANDO

Cisco Nexus 9300 Services Accelerated Switches

- Rich NX-OS Features and Services
- High-speed connectivity and scalable performance
- Optimized for latency and power efficiency

Routing Switching | EVPN/MPLS/ VXLAN/SR | Rich Telemetry | Line-rate Encryption | Power Efficiency

- Software-defined Stateful Services
- Programmable at all layers: add new services without HW change
- Scale-out services with wire-rate performance
- Power down DPU complex when not used

Distributed Security

IPSEC Encryption | Large-Scale NAT | Event-Based Telemetry | DoS Protection

Future Use Cases

Cisco Smart Switches Integrated with Hypershield Security

Ultra Ethernet Consortium

Cisco N9300 Series Smart Switches

Shipping

N9324C-SE1U

24-port 100G

800G Services Throughput

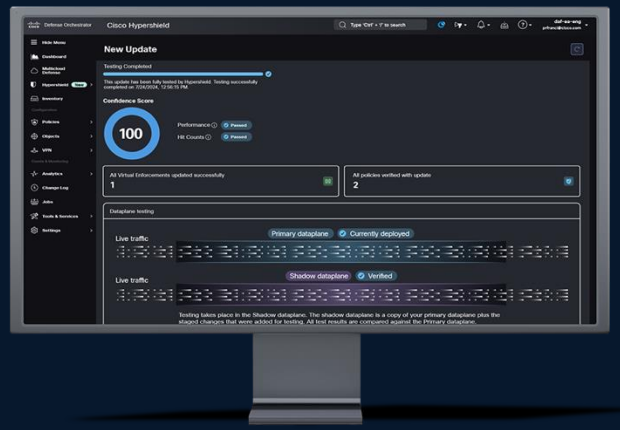
Orderable

N9348Y2C6D-SE1U

48-port 1G/10G/25G, 6-port 400G, 2-port 100G

800G Services Throughput

Cisco Hypershield



Use Cases

- Top of Rack segmentation and enforcement
- Cloud Edge
- Zone-based segmentation

cisco

Cisco Hypershield

Security Cloud Control

AI

Autonomous Segmentation

AI

Distributed Exploit Protection

AI

Zone-based Segmentation

AI

Future services

Public Cloud | Private Cloud

Workload Enforcement

Linux Kubernetes Windows (soon)

Network Enforcement

VM appliance Cisco Smart Switches Server DPU NIC (soon)

Platform

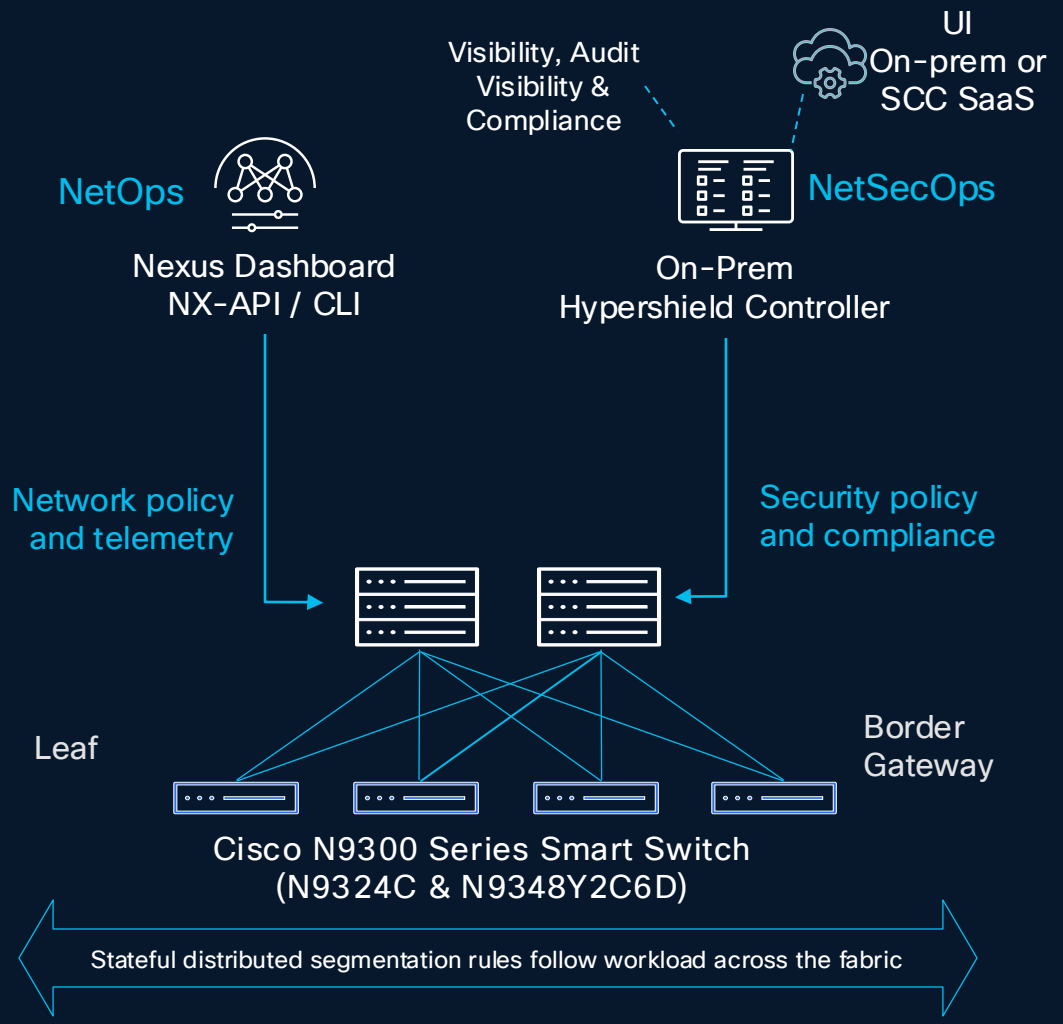
AI

Integrated network security | Kernel-level enforcement (built on Isovalent)

AI-native security | Self-qualifying updates | SaaS-based

Smart Switch “Networking & Security” Use Case

Top of Rack L4 Segmentation – November GA



Security Infused in Data Center Fabric

Version: NXOS 10.6(2), Hypershield 1.2

Smart Switches: N9348Y2C6D-SE1U, N9324C-SE1U

Fabric: VXLAN-EVPN, VXLAN-multi-site, BGP fabric, brownfield

Segmentation: VRF/VLAN + CIDR rules, stateful/stateless, 100K rules, 800G throughput (final scale based on benchmarking)

Policy: CRD schema, policy validation and canary rollout/rollback

Hypershield: Air-gap ready on-prem controller* and optional Security Cloud Control SaaS

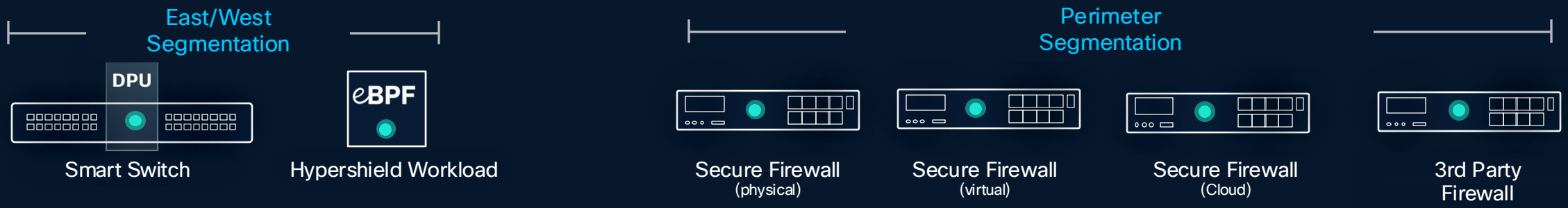
Upgrade: NXOS CLI for DPU load, SMU for Hypershield agent

Observability: Nexus Dashboard, Splunk, Prometheus/Grafana

*More On-prem controller details coming soon

Cisco Hybrid Mesh Firewall goes broader and deeper

SECURITY CLOUD CONTROL



Only Cisco Fuses Security Into Both the Network & Workload

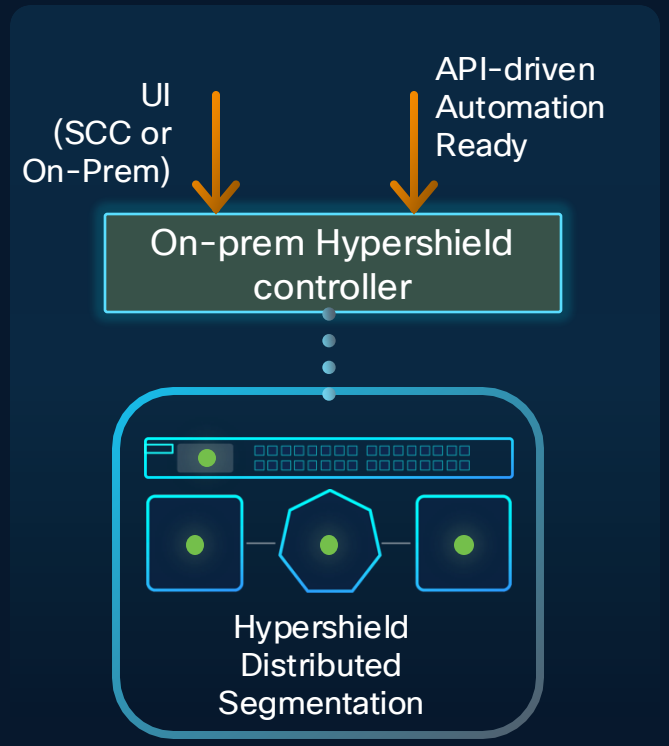
"Cisco's Boxes managed as one"

Cisco also manages 3rd-Party Firewalls

Smart Switches work in Cisco's Hybrid Mesh Firewall solution for customers that still want advanced firewall features implemented in the network along with Smart Switches (e.g L7 AppID, IDS/IPS, URL Filtering, SSL Decryption)

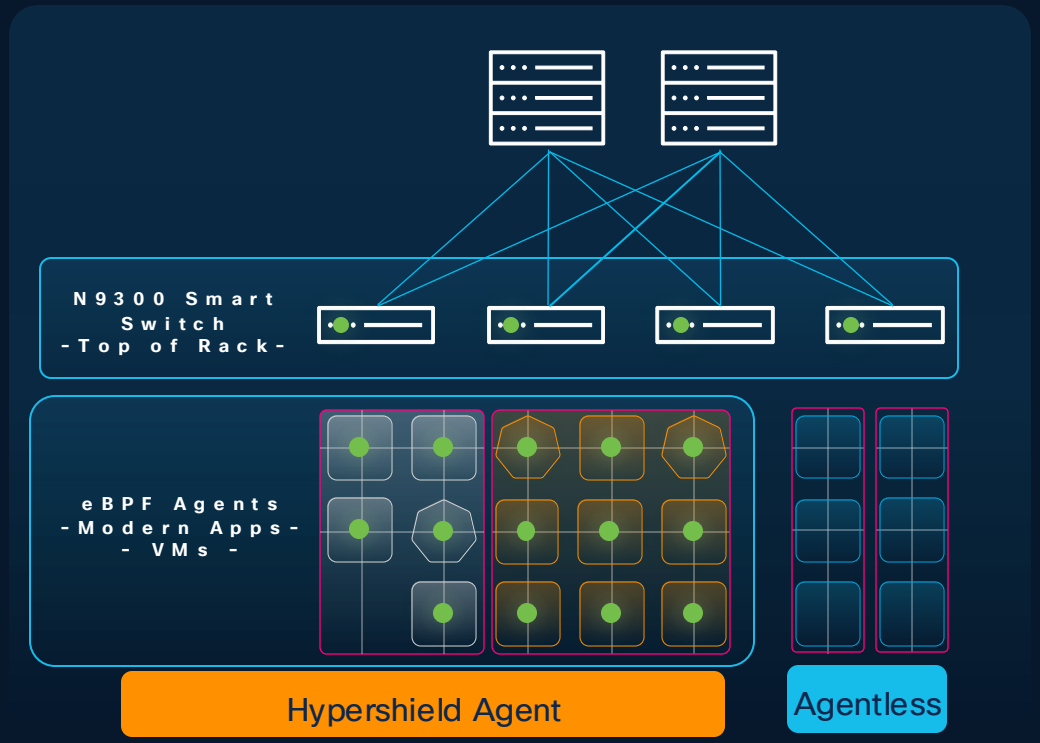
Write policy once, enforce across the mesh

Hypershield: Distributed Segmentation Architecture



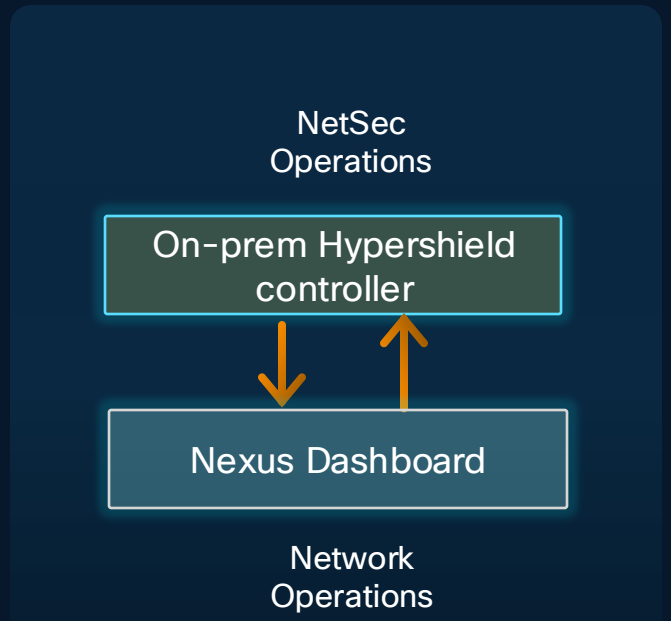
Global Control

Unified visibility and global policy across agents and smart switch



Distributed

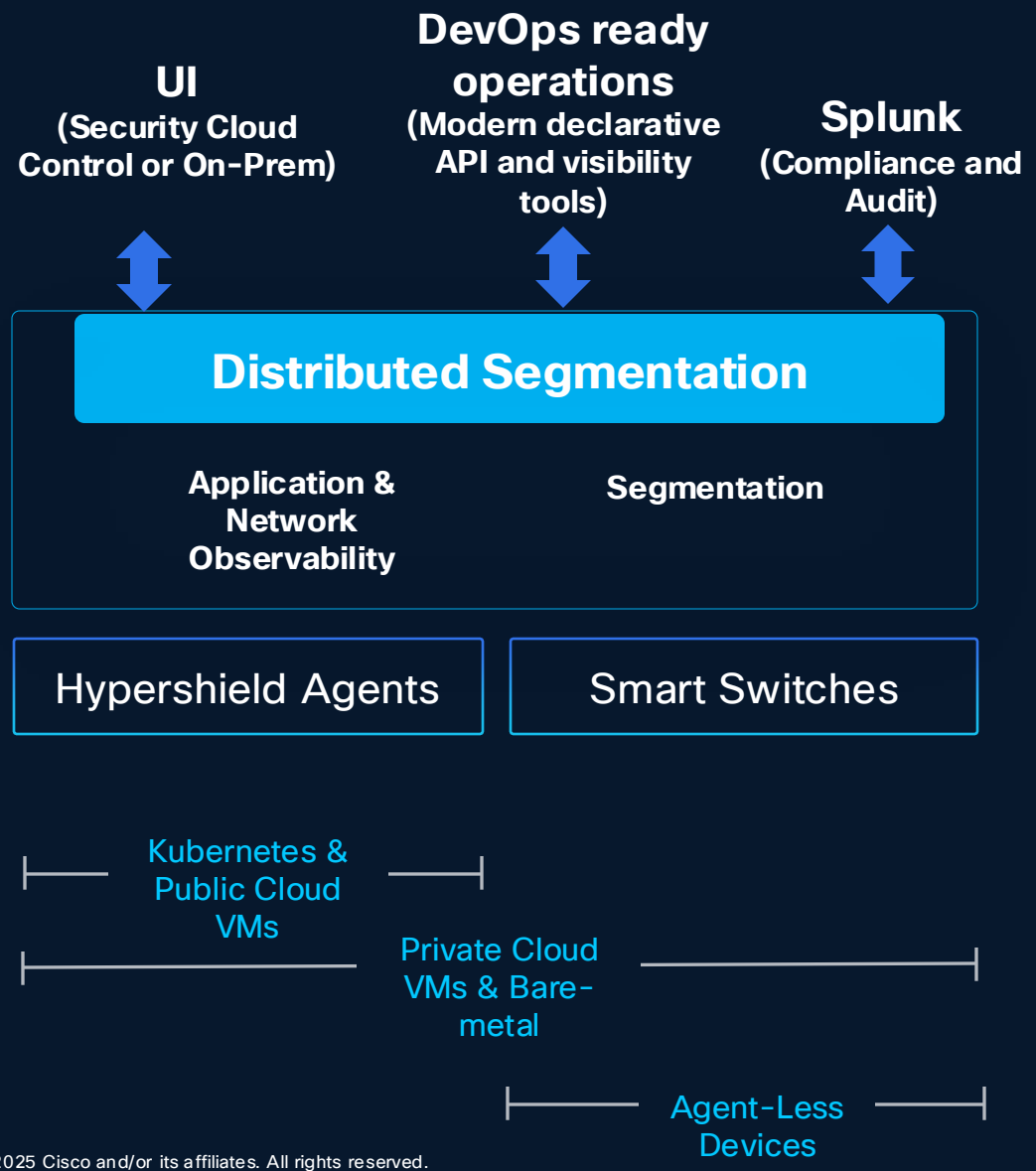
Eliminate blind spots with fully distributed enforcement
– Inline everywhere, kernel and network fabric –



Unified operations

Separation of control with combined operations and troubleshooting

Hypershield Policy



Segmentation Policy:
Distributed segmentation policy model – Order independent
- Stateful or stateless policy
- Per VRF/VLAN + Source/Destination CIDR rules
- Policy canary rollout/rollback

Traffic redirection:
- VLAN or VRF redirection to DPU
- Segmentation of traffic across 2 VRFs with route leak or 2 vlans in a VRF or between VRFs

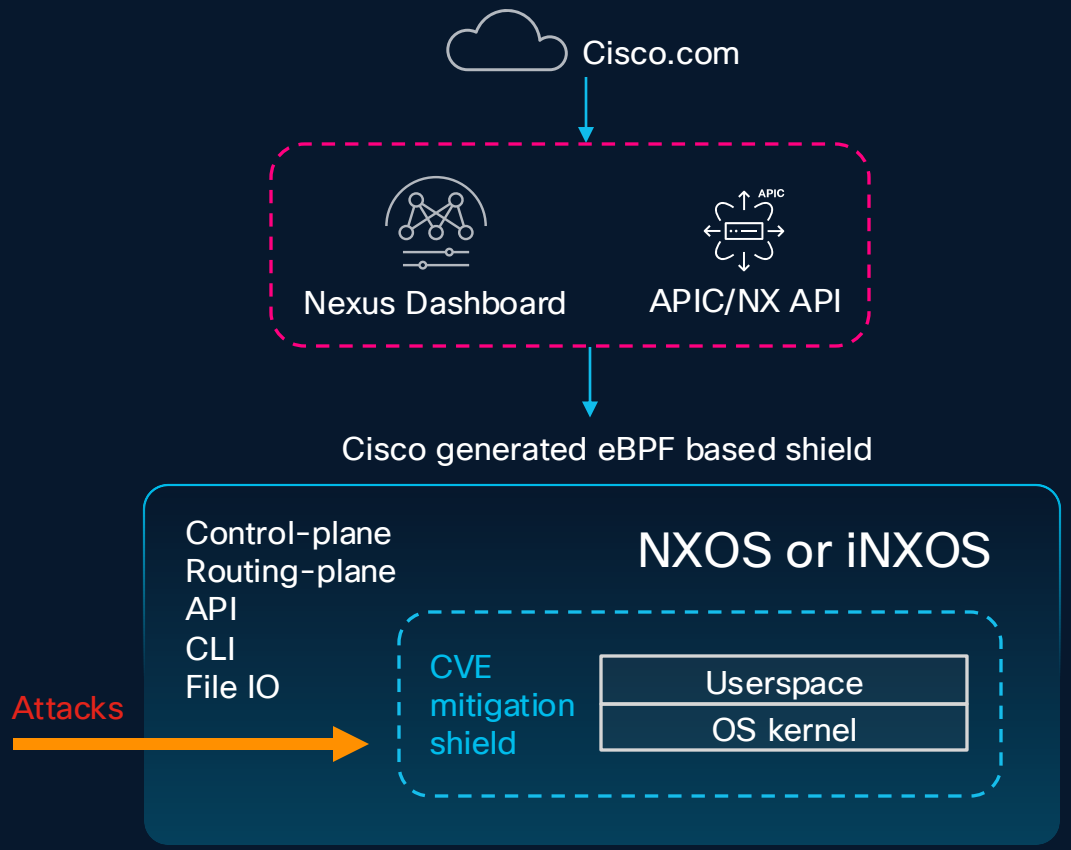
Policy Sync and HA:
- State sync of active-active HA (vPC & HSRP)

Hypershield On-prem Controller:
- Full on-prem option – API and UI
- Optional Security Cloud Control SaaS hookup for global policy management
- Agent and DPU Upgrade

Visibility
- “Cloud Native” with Grafana and Promethus
- Application and Network Observability UI – On-prem controller
- Splunk – Security compliance and audit logs

Live Protect – CVE Mitigation for Nexus NXOS Switches

No Downtime or Immediate PSIRT Software Upgrades



Data Center is critical infrastructure:

- PSIRTs require large switch fleet upgrades (100s-1000s)
- Require testing, planning, multiple maintenance windows
- High cumulative downtime (high MTTR)

Live Protect workflow:

- Support on Nexus CloudScale and Silicon1 switches
- Download compensating controls from cisco.com
- Tetragon agent applies eBPF policy CVE shields
  - Monitor mode
  - Enforce mode
- Privilege escalation CVEs (NXOS 10.6(2))
- Network control DDoS CVEs (future)

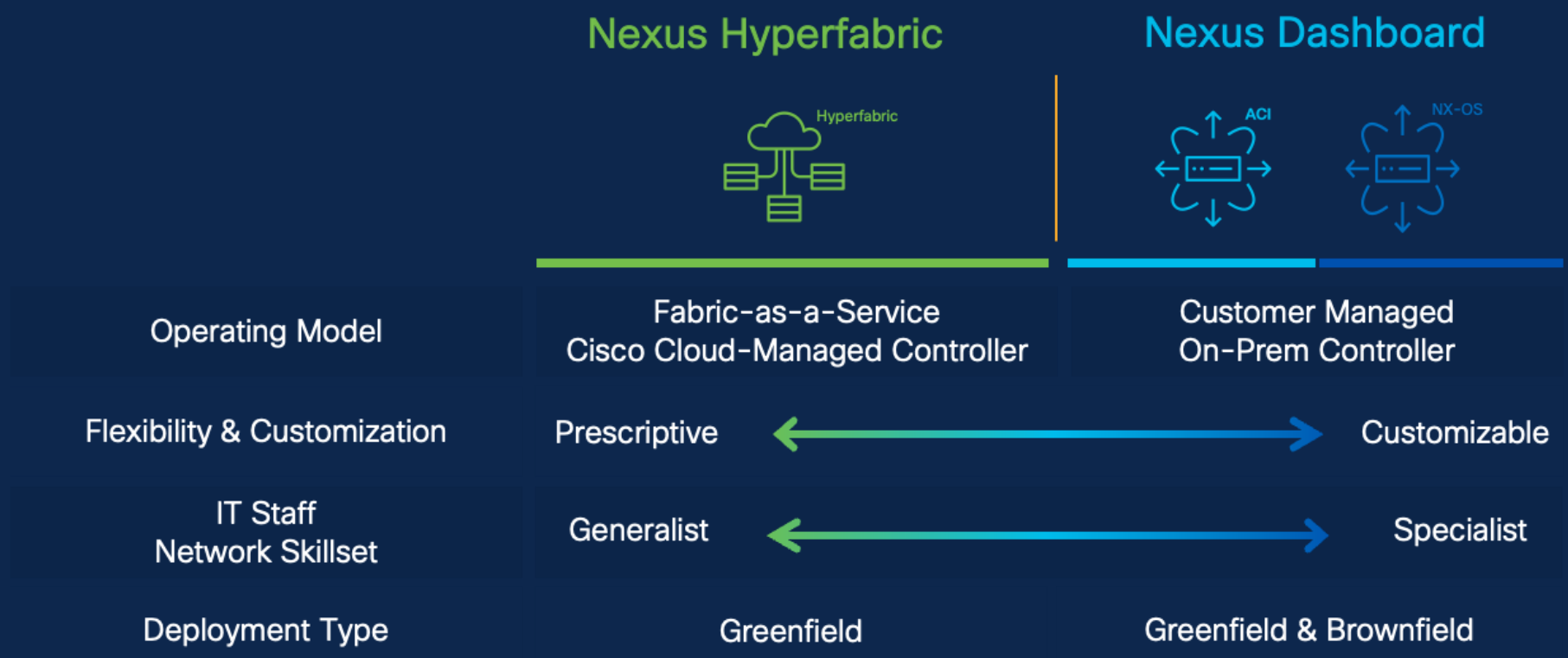
Benefits:

- Nexus is 1st to market
- CVE mitigation with no downtime
- Upgrades during regular maintenance window

Live Protect Demo

Nexus Hyperfabric

Cisco Data Center Networking Portfolio

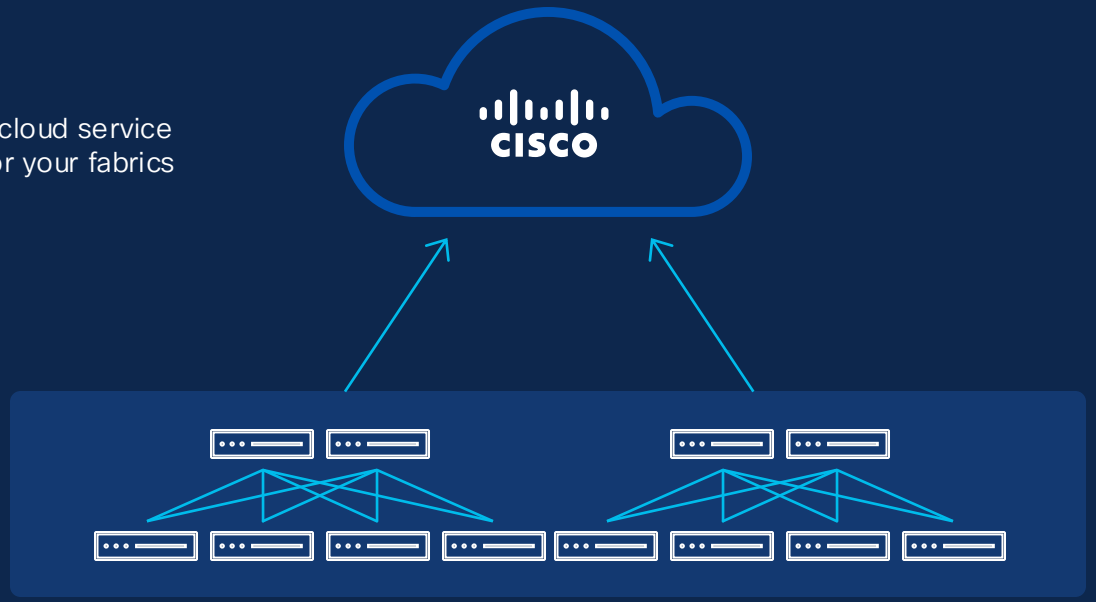


Greenfield: new fabrics not being managed by Nexus Dashboard

Nexus Hyperfabric Components

Cloud Controller

- Scalable, globally distributed multi-tenant cloud service
- Design, plan, control, upgrade, and monitor your fabrics
- Browser, API, and mobile access



Cloud-managed 6000 Switch

- Boot-strapped from cloud
- Full visibility and control from the cloud

High-performance Fabrics

- Initially thousands of 10/25/100/400 GbE host ports
- EVPN/VXLAN, layer 2 VLANs, IPv4/IPv6 routing
- Mesh and spine leaf fabrics

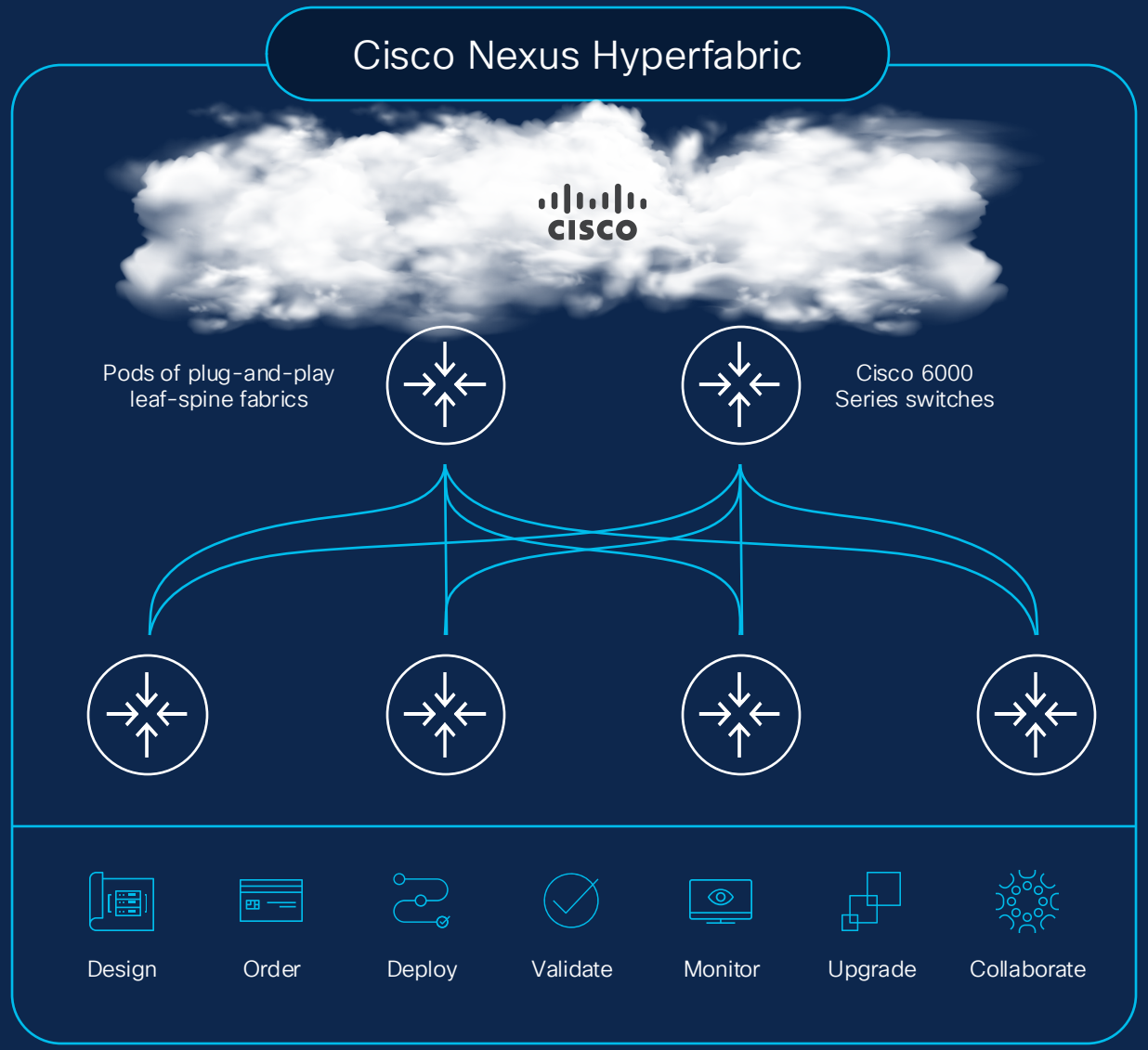
On-Site Web Portal

- Step-by-step deployment tasks
- Registration and cabling
- Real-time validation

AVAILBLE NOW

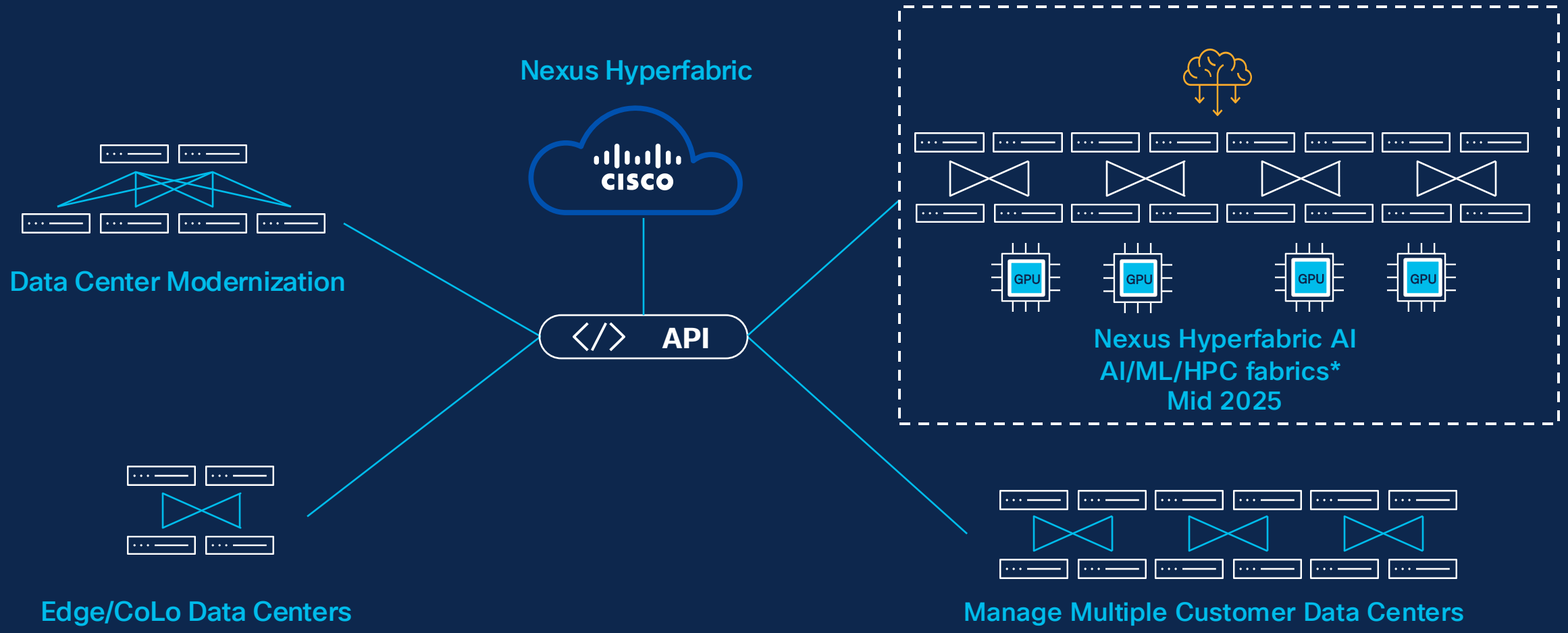
Cisco Nexus Hyperfabric

- Design, deploy and operate on-premises fabrics located anywhere
- Easy enough for IT generalists, application and DevOps teams
- Outcome driven by a purpose-built vertical stack



Use Cases

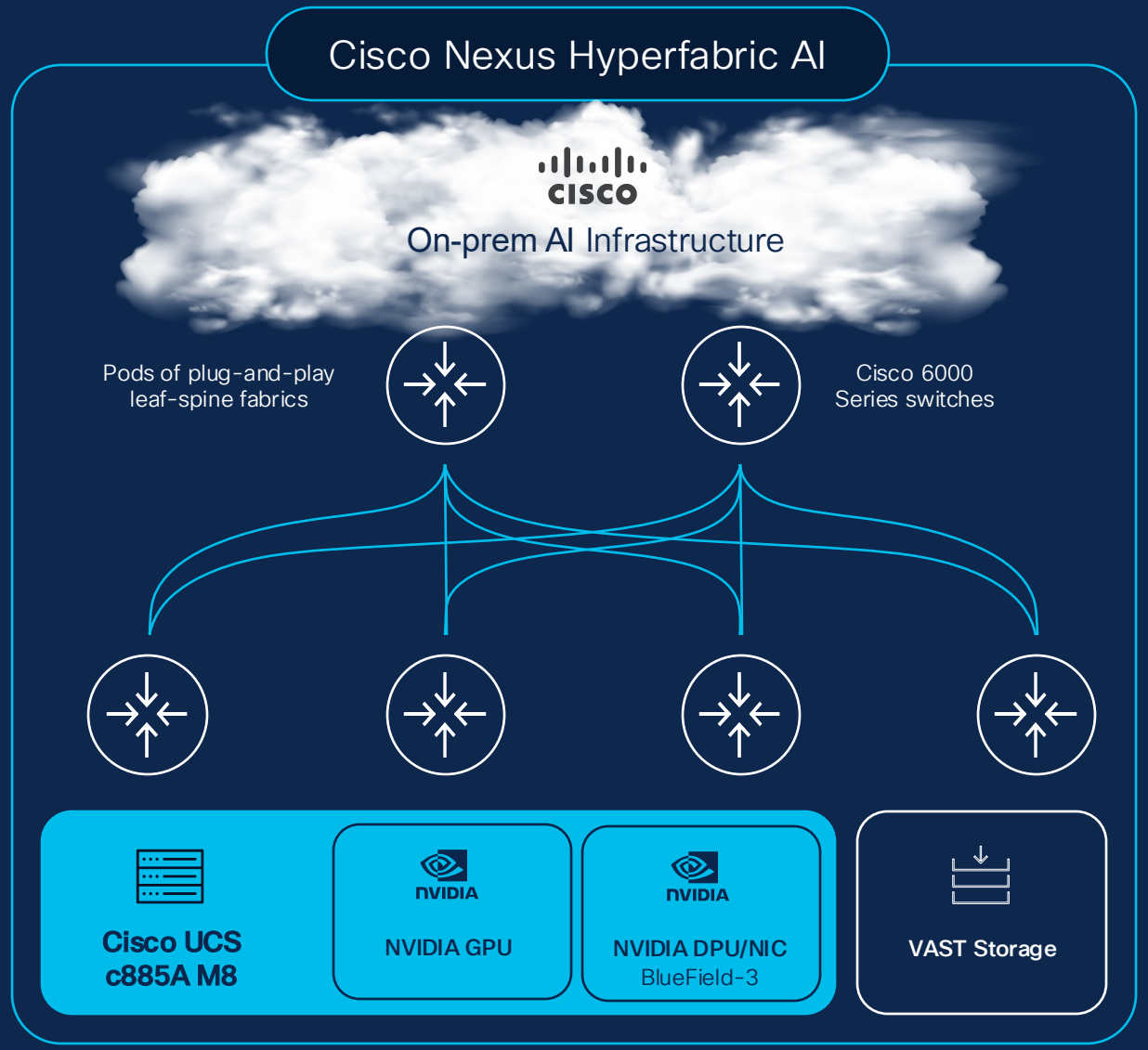
Single global GUI / API endpoint for all owned fabrics



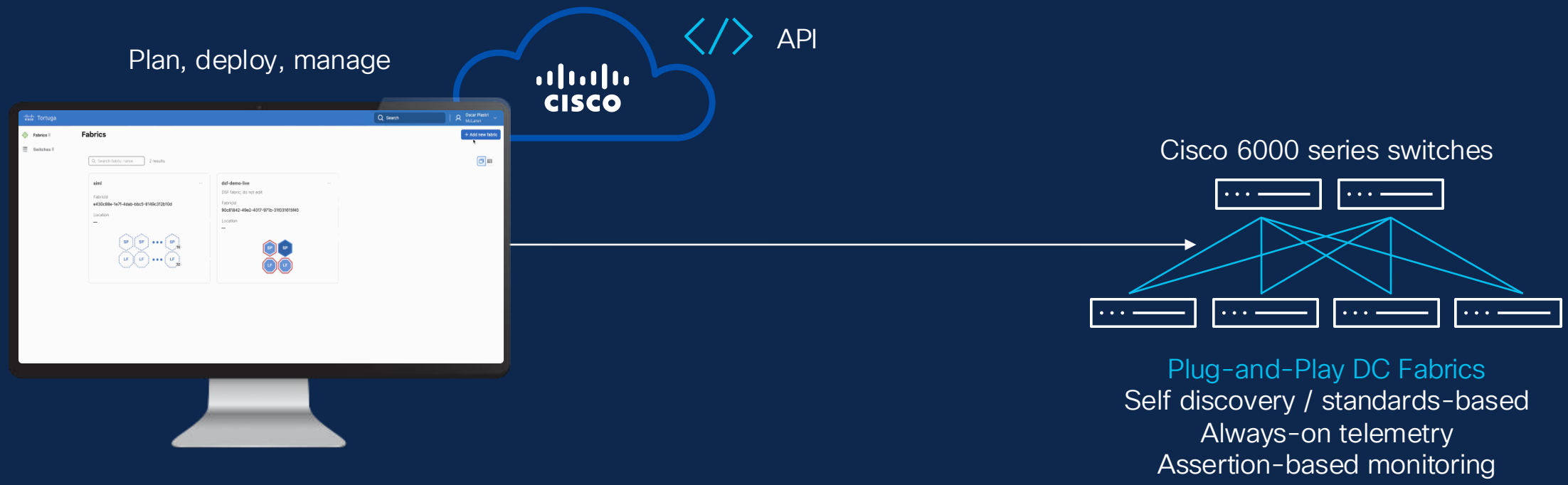
ORDERABLE 2H FY25

Cisco Nexus Hyperfabric AI

- High-performance Ethernet
- Cloud-managed operations
- Unified stack including NVAIE
- AI-native operational model
- Democratize AI infrastructure
- Visibility into full stack AI



How It Works



Purpose-built for predictable outcomes optimized for ease of use

Complete Lifecycle Experience

Cloud-managed controller

- Scalable, globally distributed multi-tenant cloud service
- GUI, mobile, and API access
- **Helping hands** for smart remote hands visibility

Cloud-managed switch

- Cisco 6000 series
- Boots from cloud
- Full visibility & control from the cloud

Design to BOM

Integrated design to BOM feature
reduces errors and shortens transaction time

Flexible Architectures

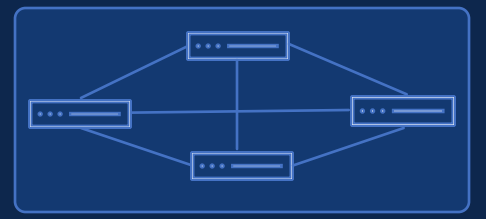
Deploy any fabric, anywhere

Mesh / spine-less fabrics

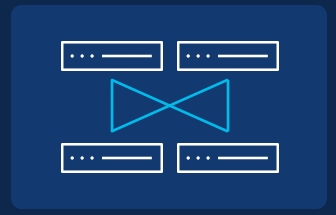
"A Fabric of One"

2-switch fabric
120 host ports

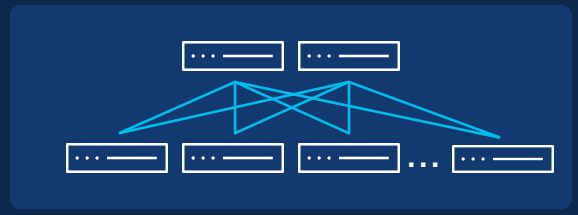
4-switch fabric
240 host ports



2 spine, 2 leaf



2- or 4-way spine, 2-32 leaf
Nearly 2000 host ports



Leaf-spine DC fabrics

Demo

Why Hyperfabric for Data Center Modernization

Simple

Zero Touch Provisioning

Everything is Automated

Analytics and Insights

Flexible

Cloud controlled; SaaS delivered

Manage any site, anywhere

Fabric scale from 1 to many

Future Proof

400G/800G fabrics

Scale at speed

Foundational to Cisco's AI strategy

Next steps

1

Ask questions

I along with others are here today to answer questions.

2

Engage with your account team

Want to schedule a demo? Come up with new questions? Reach out!

3

Try Nexus Dashboard

Setup a virtual instance or test in dCloud.

Thank you