

Take your Switches to the Cloud

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Technical Leader
Cisco Switching



Agenda

- Introduction
- Cloud-native Catalyst
- Cloud Monitoring Transformation
- Platforms
- New Features
- Conclusion

Who is this guy?



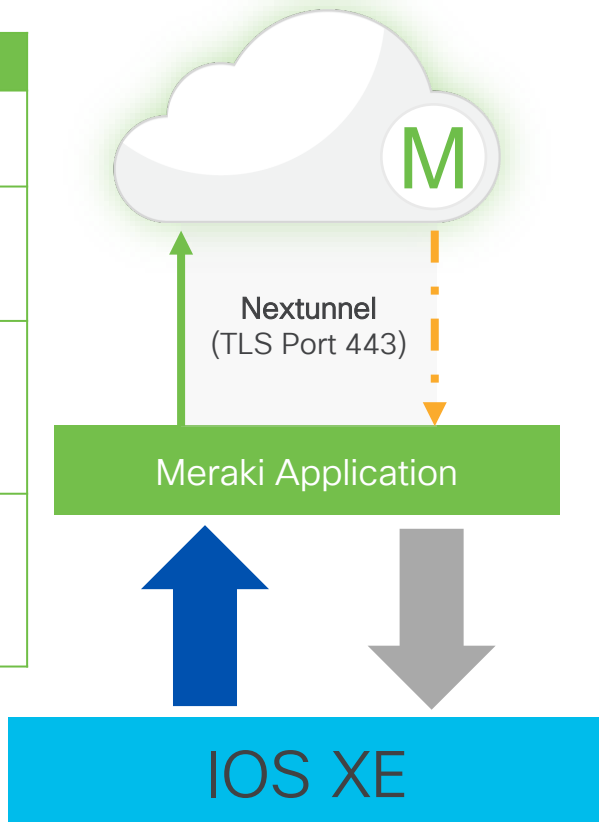
I'm a Canadian that loves building networks

- Based in Saskatoon, Saskatchewan – Canada
- 20+ years building networks
- CCIE R/S #50782
- More time underground than in data centers
- Ask me about potash

Cloud-native Catalyst

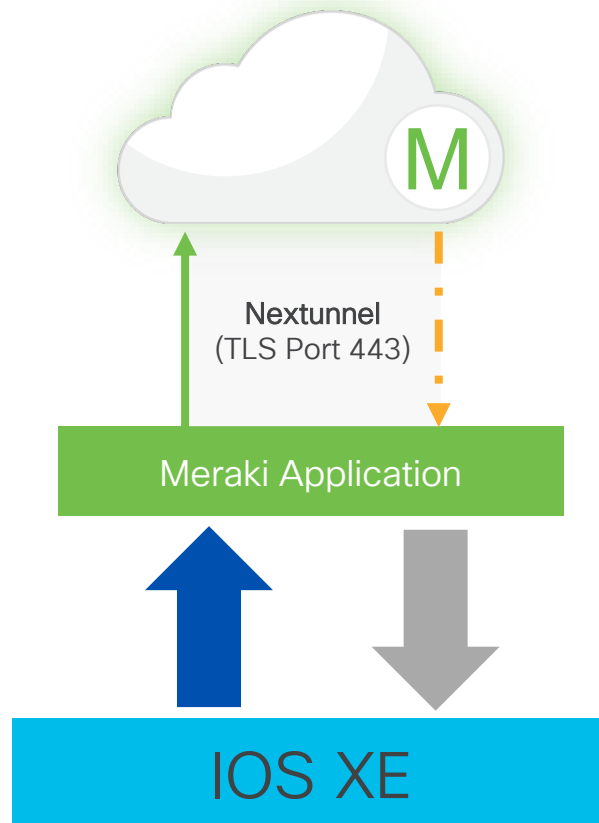
1st Gen Software Architecture - App to Cloud

Function	Use
Heartbeat	Checks in to dashboard and evaluates state flags
Packet Capture Stream	Stream packet capture to dashboard browser proxy
Config File Download	Pulls the configuration file and translates config lines to XML yang modeled configuration
Firmware Proxy	Downloads firmware and stages for either an app update or IOS XE + app update



Function	Use
Protobuf Grabber	Captures telemetry and stores in dashboard
Live Tool Execution	Proxy live tool command to Meraki App

1st Gen Software Architecture - App to XE



Function	Use
NetConf Oper Subscriptions	Telemetry capture and store as protobuf
Packet Capture	Stream packet capture to dashboard browser proxy
IPFIX Stream	Client and application visibility and tracking

Function	Use
NetConf Write Operations	Configuration Deploy & update
Live Tool Execution	Run Tools executed by admin in dashboard
Firmware Management	Deploys firmware installation to IOS XE

Challenges and Learnings



Platform dependent
development



Limited agility in
software architecture



Multiple abstraction layers
and software stacks

Cloud-native IOS XE

How did we improve the architecture?

Function	Use
Uplink Auto Configuration (UAC)	Dynamic interface creation using discovery mechanisms maintaining connectivity to dashboard
Connect Service	Checks in to dashboard and evaluates state flags
Packet Capture	Stream packet capture to dashboard browser proxy
Config File DL/UL and deployment	Uploads current configuration and pulls XML formatted configuration to deploy locally against NetConf Service
Local Status Page	Hosted in IOS XE instead of in app, providing local configuration tools
Telemetry Cache	Stores telemetry on box for Dashboard grabbers to retrieve



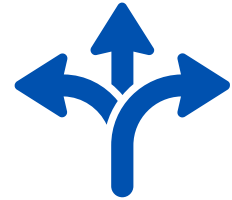
Nextunnel
(TLS Port 443)

Function	Use
Telemetry Grabbers	Pulls telemetry directly from IOS XE for presentation in Dashboard
Live Tool RPC	Executes Live Tools via NetConf RPC
Packet Capture Trigger	Executes packet capture process using NetConf RPC

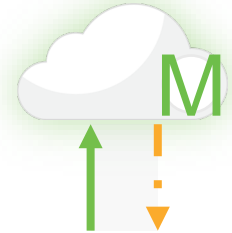


Resilient Connectivity to the Cloud

Uplink Auto Config (UAC) *Can I reach Dashboard?*



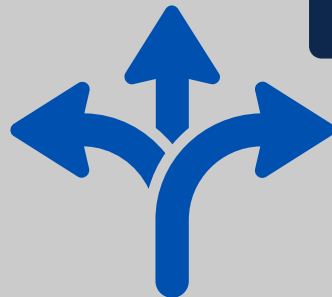
NexTunnel *Connect to Dashboard*



Config Updater Apply, Synchronize, and rollback config



Resilient connectivity to the Cloud



IOS XE 17.15

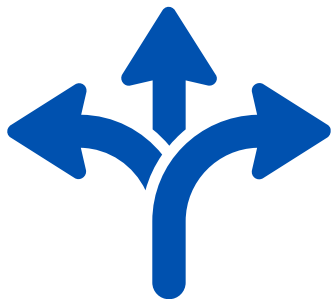
Uplink Auto Config (UAC)

- Automated discovery for dashboard connectivity
- Automated failover / path discovery
- Tunable for primary interface
- Creates a ranked/scored interface list

Uplink auto config

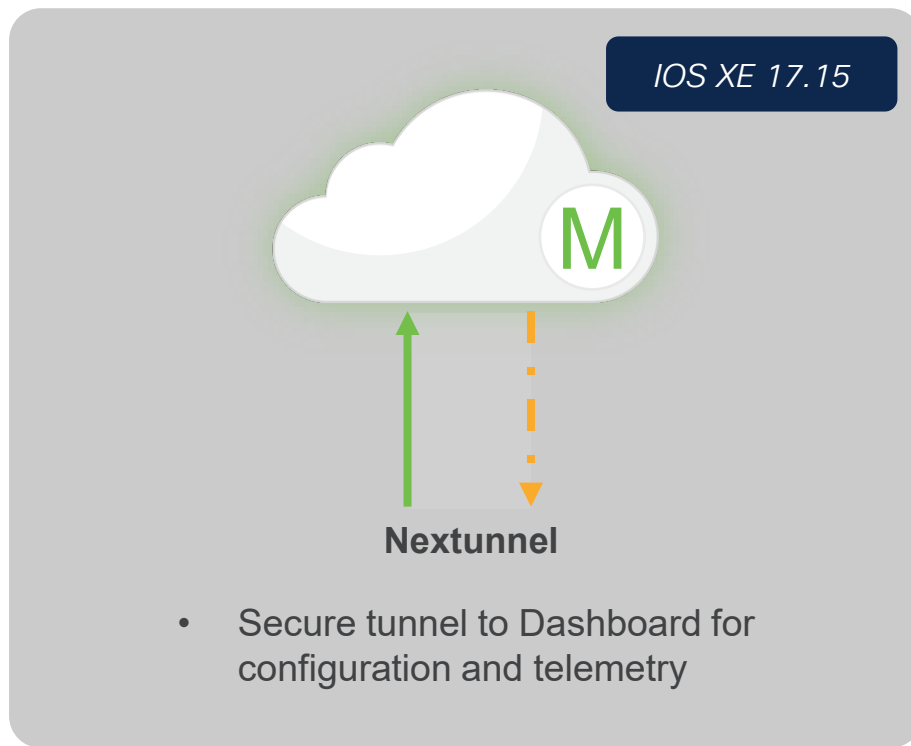
```
Rocky_and_Bullwinkle#show uac ?  
  active-vlan  Active vlans in network  
  uplink       Uplink Autoconfig Uplink info
```

show uac



- Which VLANs has UAC discovered?
- Which VLAN has the best score?
- Which SVI is being used to reach Meraki Dashboard?

Resilient connectivity to the Cloud



Nextunnel

show meraki connect

- Has the switch fetched tunnel config?
- Is the tunnel up?
- Are packets coming/going?

```
Rocky_and_Bullwinkle#sh meraki connect
Service meraki connect: enable
```

Meraki Tunnel Config

```
-----
Fetch State:           Config fetch succeeded
Fetch Fail:
Last Fetch(UTC):       2025-01-28 16:25:24
Next Fetch(UTC):       2025-01-28 17:28:58
Config Server:         cs46-2037.meraki.com
Primary:               usw.nt.meraki.com
Secondary:             use.nt.meraki.com
Client IPv6 Addr:      FD0A:9B09:1F7:1:2E3F:BFF:FE2B:9F80
Network Name:          Eh2 - switch
```

Meraki Tunnel State

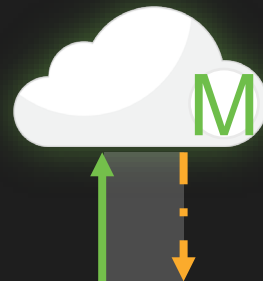
```
-----
Primary:               Up
Secondary:             Up
Primary Last Change(UTC): 2025-01-23 19:17:42
Secondary Last Change(UTC): 2025-01-23 19:17:42
Client Last Restart(UTC): 2025-01-22 19:25:10
```

Meraki Tunnel Interface

```
-----
Status:               Enable
Rx Packets:            22355237
Tx Packets:            35429584
Rx Errors:             0
Tx Errors:             0
Rx Drop Packets:       0
Tx Drop Packets:       0
```


Meraki Device Registration

```
-----
url:                  https://catalyst.meraki.com/nodes/register
```



Resilient connectivity to the Cloud

IOS XE 17.15



Config Updater

- Fetch and apply config from Dashboard
- Safe configuration rollback: 30 minute recovery mechanism for configuration error

Config Updater



show meraki config updater

- Can the switch fetch config?
- Can the switch upload the config?
- Does the switch need to upload config?

```
Rocky_and_Bullwinkle#sh meraki config updater
Config Updater
-----
Current state:                      Ready

Latest operation
-----
Upload running config

Get running config: Pass
  start time(UTC): 2025-01-29 22:22:15
  result time(UTC): 2025-01-29 22:22:33
  Running config location: /flash/meraki/config_updater/monitor/upload.config
Get presigned url: Not needed
  start time(UTC): 2025-01-29 22:22:33
  result time(UTC): 2025-01-29 22:22:36
  dashboard status code: 204
Upload config: Not started
```

Upgrade Path – CS to IOS XE



All Catalyst-based switches will have an upgrade to Cloud-native IOS XE

Runtime Improvements with architecture changes

Configuration Updates		
Type	1 st Gen	2 nd Gen
Small config update	30s	15s
Full configuration deployment	120s	60s

50% Improvement
on standalone switches

Boot Times		
Stack Size	1 st Gen	2 nd Gen
Single switch	6 min	4 min
8M stack	11 min	4 min

More than 50%
Improvement on stacks

Easy Cloud Onboarding

```
WV_CORE_9300(config)# service meraki connect
```

Switch 1 has been successfully registered

Meraki MAC: AABBCDDDEEFF

Cloud ID: QXXX-XXXX-YYYY

*May 7 00:16:03.519: %MERAKEI-5-SWITCH_REGISTER_SUCCESS: Switch 1 has been successfully registered.

*May 7 00:16:03.519: %MERAKEI-5-MAC_ADDR: Meraki MAC: AABBCDDDEEFF

*May 7 00:16:03.519: %MERAKEI-5-CLOUD_ID: Cloud ID: QXXX-XXXX-YYYY

Device Registration Status:

Switch Num	PID	Serial Number	Cloud ID	Mac Address	Migration Status	Mode
1	C9300-24UX	XXYYQCCXXC	QXXX-XXXX-YYYY	aabb.ccdd.eeff	Registered	C9K-C [Monitoring]

Cloud Management App-less Onboarding

- Automated Registration and Nextunnel creation
(`service meraki connect`)
- Simply claim the Cloud ID and add to a network

```
Service meraki connect: enable
```

```
Meraki Tunnel Config
```

```
Fetch State:
```

```
Fetch Fail:
```

```
Last Fetch(UTC):
```

```
Next Fetch(UTC):
```

```
Config Server:
```

```
Primary: usw.nt.meraki.com
```

```
Secondary: use.nt.meraki.com
```

```
Client IPv6 Addr: FD0A:9B09:1F7:1:9A18:88FF:FE00:CC00
```

```
Network Name: .Corrin - switch
```

```
Meraki Tunnel State
```

```
Primary:
```

```
Up
```

```
Secondary:
```

```
Up
```

```
Primary Last Change(UTC): 2024-05-29 23:34:02
```

```
Secondary Last Change(UTC): 2024-05-29 23:34:02
```

```
Client Last Restart(UTC): 2024-05-29 23:33:56
```

```
Meraki Tunnel Interface
```

```
Status:
```

```
Enable
```

```
Rx Packets:
```

```
795767
```

```
Tx Packets:
```

```
600246
```

```
Rx Errors:
```

```
0
```

```
Tx Errors:
```

```
0
```

```
Rx Drop Packets:
```

```
0
```

```
Tx Drop Packets:
```

```
0
```

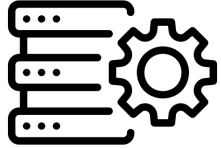
```
Meraki Device Registration
```

```
url:
```

```
https://catalyst.meraki.com/nodes/register
```

Connection State
(`show meraki connect`)

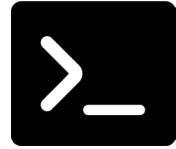
Optimizations



Management Interface
Architecture Change



Default Network Module

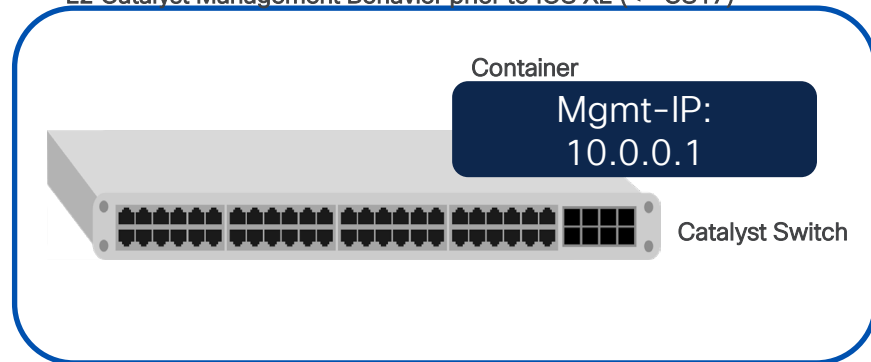


Show CLI / Command
Runner

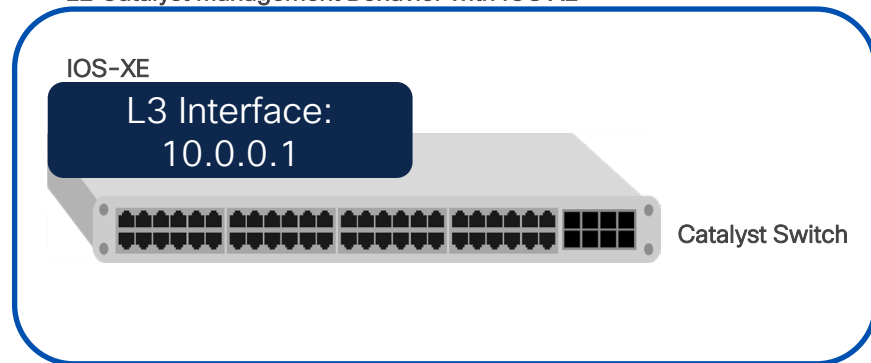
Management Interface Architecture Change

- Switches running CS firmware used a dedicated management interface, also called the *uplink*
- The uplink is now any IOS XE L3 Interface.
- All configuration for uplink connectivity and L3 interfaces is now on the **Routing & DHCP page**.
- If a switch is L2 only, DHCP will work 👍 but enabling L3 requires first setting a static uplink IP

L2 Catalyst Management Behavior prior to IOS XE (<= CS17)



L2 Catalyst Management Behavior with IOS XE



Management Interface Architecture Change

IPv4

V4 Uplink ☒

Subnet

Interface IP

Default gateway

DNS server 1

DNS server 2

Multicast routing

Uplink interfaces
include DNS and
Default Gateway
settings

Easily move the
uplink to a different
interface

IPv4

V4 Uplink ☒

Subnet

Interface IP

Default gateway

DNS server 1

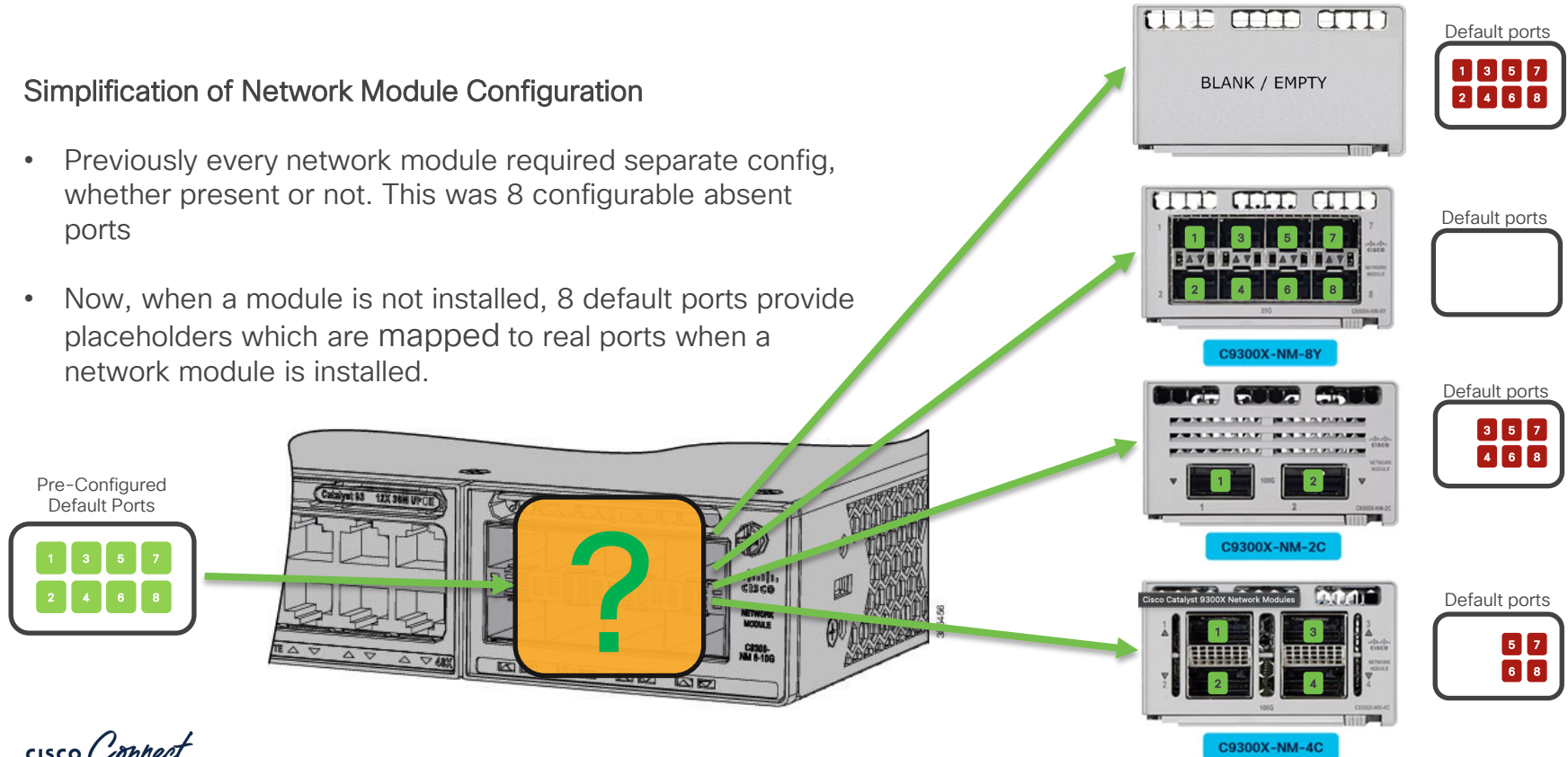
DNS server 2

Multicast routing

Default Network Module

Simplification of Network Module Configuration

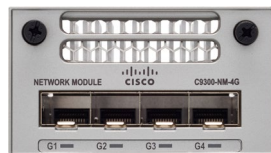
- Previously every network module required separate config, whether present or not. This was 8 configurable absent ports
- Now, when a module is not installed, 8 default ports provide placeholders which are mapped to real ports when a network module is installed.



Default Network Module

The old way:

- Which module is installed?
- Is any module installed?



C9300-NM-4G



C9300X-NM-8Y



C9300X-NM-2C

- ☐ [STACK-MS390-RR / 4×10G / 1 details](#)
- ☐ [STACK-MS390-RR / 4×10G / 2 details](#)
- ☐ [STACK-MS390-RR / 4×10G / 3 details](#)
- ☐ [STACK-MS390-RR / 4×10G / 4 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 1 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 2 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 3 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 4 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 5 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 6 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 7 details](#)
- ☐ [STACK-MS390-RR / 8×10G / 8 details](#)
- ☐ [STACK-MS390-RR / 2×40G / 1 details](#)
- ☐ [STACK-MS390-RR / 2×40G / 2 details](#)

Default Network Module

The IOS XE 17.15.2+ way:

- ☐ [Mr Peabody / 8x10G / 1 details](#)
- ☐ [Mr Peabody / 8x10G / 2 details](#)
- ☐ [Mr Peabody / 8x10G / 3 details](#)
- ☐ [Mr Peabody / 8x10G / 4 details](#)
- ☐ [Mr Peabody / 8x10G / 5 details](#)
- ☐ [Mr Peabody / 8x10G / 6 details](#)
- ☐ [Mr Peabody / 8x10G / 7 details](#)
- ☐ [Mr Peabody / 8x10G / 8 details](#)

8x10G installed



No module installed



- ☐ [Bullwinkle / DEFAULT / 1 details](#)
- ☐ [Bullwinkle / DEFAULT / 2 details](#)
- ☐ [Bullwinkle / DEFAULT / 3 details](#)
- ☐ [Bullwinkle / DEFAULT / 4 details](#)
- ☐ [Bullwinkle / DEFAULT / 5 details](#)
- ☐ [Bullwinkle / DEFAULT / 6 details](#)
- ☐ [Bullwinkle / DEFAULT / 7 details](#)
- ☐ [Bullwinkle / DEFAULT / 8 details](#)

Cloud CLI *IOS XE 17.15*

Securely proxied CLI access in Dashboard

Enhancing troubleshooting with
common CLI show commands

Ensuring accessibility to detailed information

Terminal

Opens a troubleshooting console to this device, similar to an IOS-XE CLI window.

Close Terminal

Detach

i This terminal allows limited access to read-only IOS-XE commands, such as **show**.

```
WW_CORE_9300X#show ip route bgp
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, m - OMP
       n - NAT, Ni - NAT inside, No - NAT outside, Nd - NAT DIA
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       H - NHRP, G - NHRP registered, g - NHRP registration summary
       o - ODR, P - periodic downloaded static route, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR
       & - replicated local route overrides by connected

Gateway of last resort is 10.10.254.2 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 86 subnets, 7 masks
B    10.10.0.0/16 [200/0] via 10.10.250.11, 02:09:58
B    10.12.5.0/24 [20/0] via 10.10.0.30, 08:31:41
```

Cloud monitoring Transformation

Cloud Monitoring for Catalyst *Transformation*

One Cloud platform, One OS, multiple paths to cloud

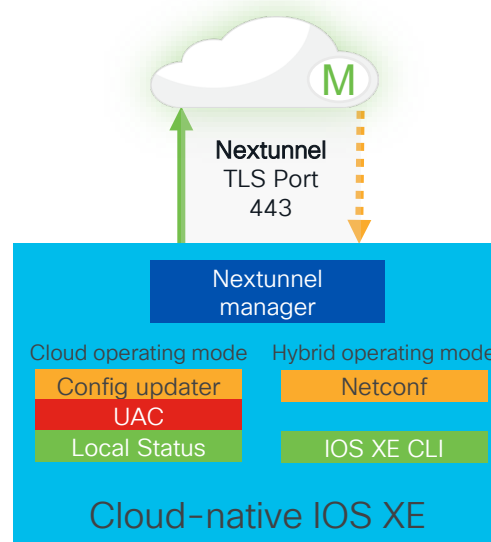
Cloud Monitored Catalyst



Cloud Monitoring

Transformation

Cloud-managed Switching



Operating Modes *One Cloud platform, One OS*

Cloud Operating Mode



C9200L



C9300/X/L

Full Dashboard-driven management

UI / API-driven configuration

Cloud CLI: Show Commands

Formerly Cloud Monitoring

Hybrid Operating Mode



C9200/L/C
X



C9300/X/L/LM

Coming Soon



C9500/
X

Configuration remains local to device

Non-destructive onboarding

Cloud CLI: Show + Config Mode Commands

Powerful Catalyst hardware with flexible cloud operation modes

Operating Modes



Cloud operating mode

Exclusively managed by Dashboard

Config stored in cloud and synced to IOS XE

Perform configurations with Dashboard UI

Uplink auto configuration



Hybrid operating mode

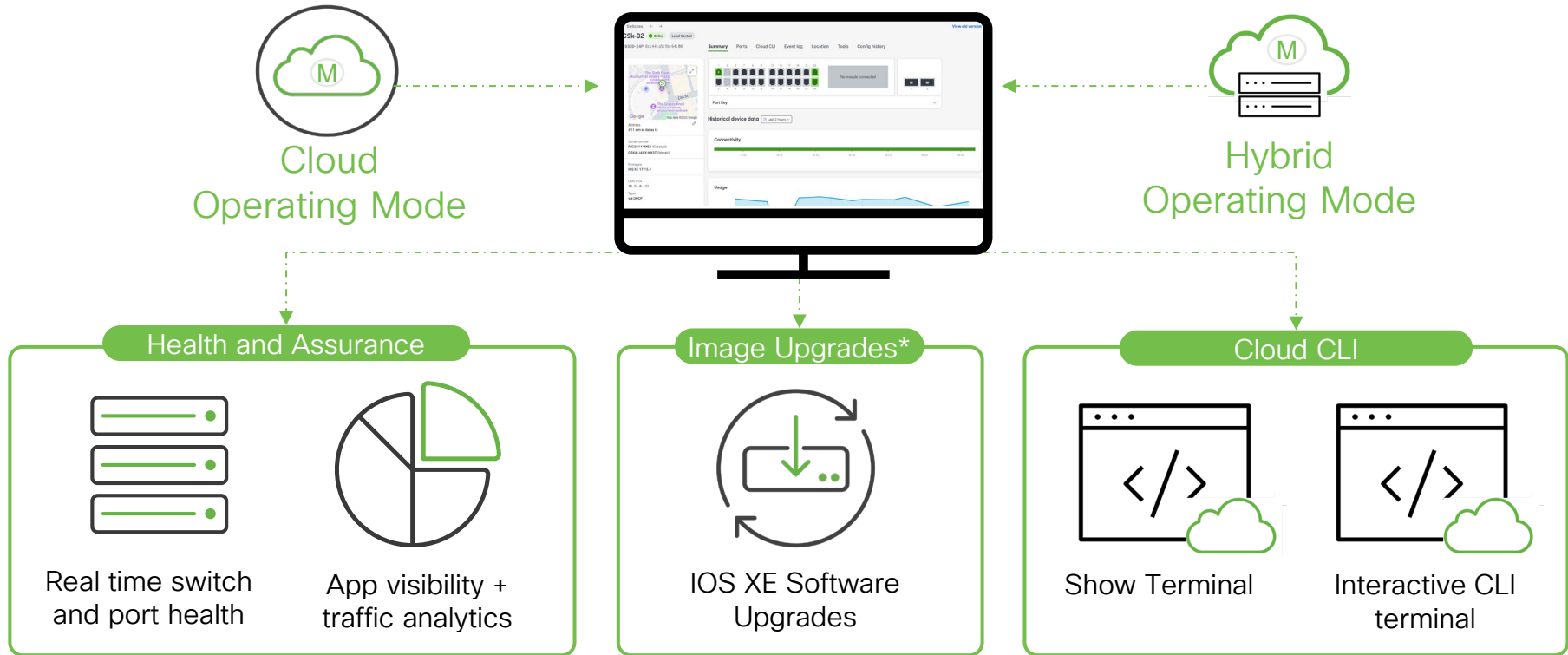
Management flexibility

Config stored in IOS XE with cloud backup

Perform configurations with Cloud CLI terminal

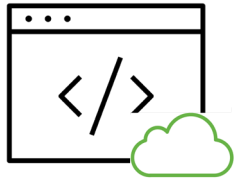
Uplink discovery

Operating Modes



Cloud CLI for Hybrid Operating Mode

Interactive CLI terminal for hybrid operating mode with configuration commands



[Summary](#) [Ports](#) [Cloud CLI](#) [Event log](#) [Location](#) [Tools](#) [Config history](#)

Cloud terminal Opens the interactive cloud CLI terminal in read-only mode for read-only users or configuration mode for full users

[Close terminal](#) [Detach terminal](#)

☐ Capture the session to output a text file

```
Welcome to the interactive CLI IOS XE terminal
You are in Configuration Mode
Connecting to 154226464089088...

C9K-02#conf t
Enter configuration commands, one per line. End with CNTL/Z.
C9K-02(config)#
C9K-02(config)#vlan 240
C9K-02(config-vlan)#name office_core_1
C9K-02(config-vlan)#exit
C9K-02(config)#
C9K-02(config)#int g1/0/15
C9K-02(config-if)#sw acc vlan 240
C9K-02(config-if)#sw mode access
C9K-02(config-if)#
C9K-02(config-if)#end
C9K-02#wr mem
Building configuration...
[OK]
```

Secure direct terminal with
IOS XE Meraki tunnel

CLI access from anywhere

Complete config commands
with audit logging

Demo: Cloud CLI

Terminal

Opens a troubleshooting console to this device, similar to an IOS-XE CLI window.

Close Terminal

Detach

i This terminal allows limited access to read-only IOS-XE commands, such as **show**.

```
WW_CORE_9300X#show ip route bgp
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
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        o - ODR, P - periodic downloaded static route, l - LISP
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Gateway of last resort is 10.10.254.2 to network 0.0.0.0

    10.0.0.0/8 is variably subnetted, 86 subnets, 7 masks
B       10.10.0.0/16 [200/0] via 10.10.250.11, 02:09:58
B       10.12.5.0/24 [20/0] via 10.10.0.30, 08:31:41
```

Easy Cloud Onboarding

```
WV_CORE_9300(config)# service meraki connect
```

Switch 1 has been successfully registered

Meraki MAC: AABBCDDDEEFF

Cloud ID: QXXX-XXXX-YYYY

*May 7 00:16:03.519: %MERAKE-5-SWITCH_REGISTER_SUCCESS: Switch 1 has been successfully registered.

*May 7 00:16:03.519: %MERAKE-5-MAC_ADDR: Meraki MAC: AABBCDDDEEFF

*May 7 00:16:03.519: %MERAKE-5-CLOUD_ID: Cloud ID: QXXX-XXXX-YYYY

Device Registration Status:

Switch Num	PID	Serial Number	Cloud ID	Mac Address	Migration Status	Mode
1	C9300-24UX	XXYYQCCXXC	QXXX-XXXX-YYYY	aabb.ccdd.eeff	Registered	C9K-C [Monitoring]

Cloud Management App-less Onboarding

- Automated Registration and Nextunnel creation
(`service meraki connect`)
- Simply claim the Cloud ID and add to a network

Service meraki connect: enable

Meraki Tunnel Config

Fetch State:

Fetch Fail:

Last Fetch(UTC):

Next Fetch(UTC):

Config Server:

Primary: usw.nt.meraki.com

Secondary: use.nt.meraki.com

Client IPv6 Addr: FD0A:9B09:1F7:1:9A18:88FF:FE00:CC00

Network Name: .Corrin - switch

Meraki Tunnel State

Primary:

Up

Secondary:

Up

Primary Last Change(UTC): 2024-05-29 23:34:02

Secondary Last Change(UTC): 2024-05-29 23:34:02

Client Last Restart(UTC): 2024-05-29 23:33:56

Meraki Tunnel Interface

Status:

Enable

Rx Packets:

795767

Tx Packets:

600246

Rx Errors:

0

Tx Errors:

0

Rx Drop Packets:

0

Tx Drop Packets:

0

Meraki Device Registration

url:

<https://catalyst.meraki.com/nodes/register>

Connection State
(`show meraki connect`)

Easy Cloud Onboarding

Choose Your Operating Mode When Onboarding

Add devices to network

1

2

3

Select networkConfigure IOS-XE devicesSummary

Device operating mode

Operating mode determines how the device operates, what features are active, and how it interacts with other systems or networks. [Learn more about operating modes](#)

C9500/C9800 devices

Hybrid operating mode only

C9200/C9300 devices

☐ Cloud operating mode

☒ Hybrid operating mode

Hybrid operating mode device credentials

Please provide the [level 15 configuration access credentials](#) so the Meraki dashboard can make necessary configuration changes to these devices.

Username

Password

Show

IOS-XE enable password (optional)

Show

☒ I accept the [Terms and Conditions](#)

Cancel

BackNext

Cloud operating mode

Switch configuration removed

Reloads into Cloud operating mode
Full cloud configurations synced to IOS XE

Hybrid operating mode

Enter switch local credentials
Hybrid operating mode IOS XE configurations
provisioned by Dashboard

Cloud Monitoring for Catalyst *Transformation*

One Cloud platform, One OS

Cloud Monitoring

Downloadable onboarding application

Claim/add supported Catalyst switches to monitoring within the onboarding application

Hybrid Operating Mode

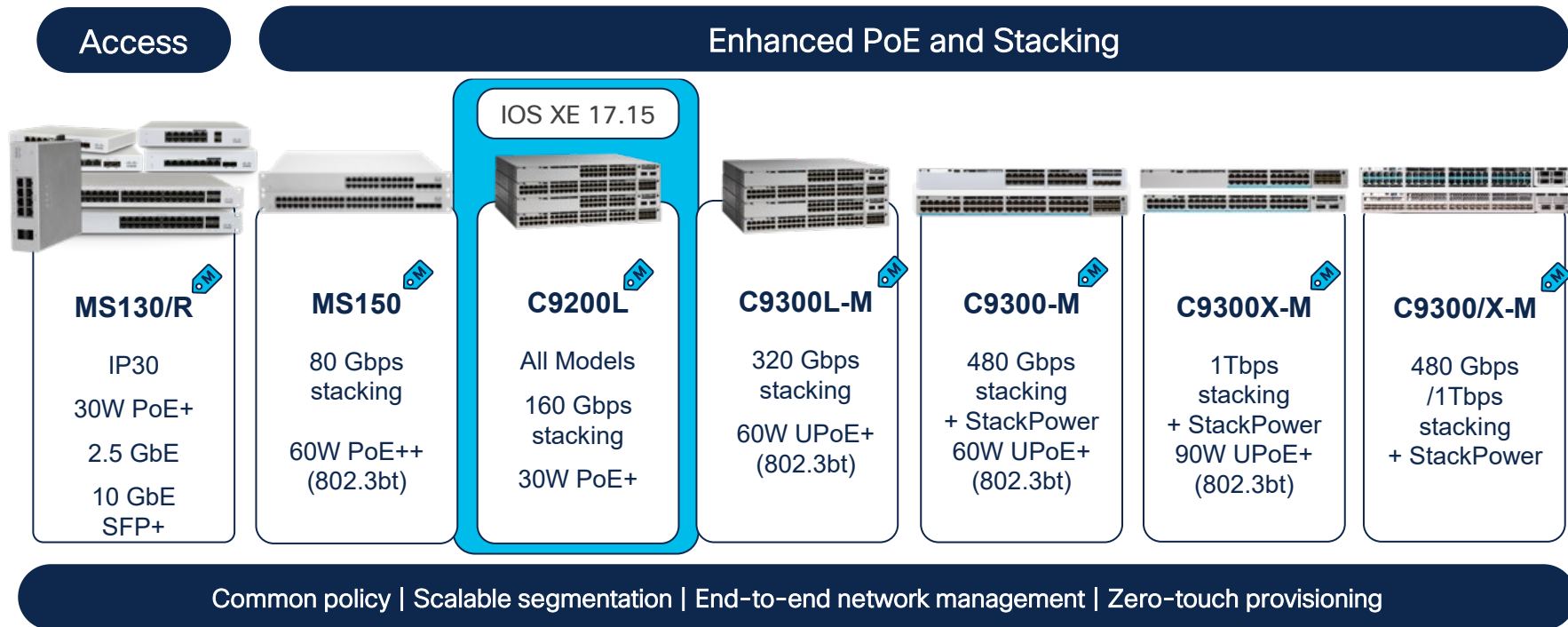
Connect switches to Dashboard with *One* CLI command

Simply claim the Cloud ID and add to a network and select your operating mode

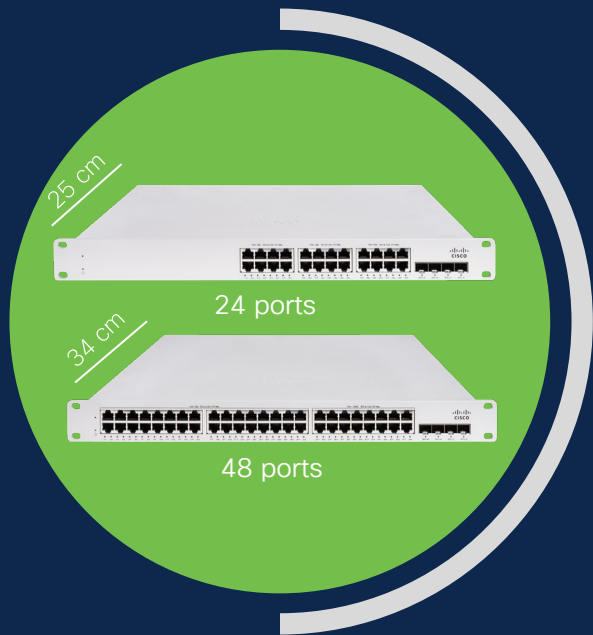


Platforms

A next-gen model for every network need



Introducing MS150



60W PoE++ (802.3bt)

Power the latest IoT devices with up to **740W** power budget

Multigigabit

Speeds

Increased throughput with **5GbE mGig** and **10GbE SFP+** options

Static Routing*

Configure predictable network paths **up to 16 routes**

Perpetual and Fast PoE

Minimize potential loss of connectivity and power with perpetual and fast PoE

Stackable

Stack up to 8 x MS150 switches with **2x dedicated stacking ports**

Adaptive Policy

Mircosegmentation of users, devices, and applications to simplify security and access policies

MS150 Series Overview

Gigabit SKUs

10G SFP+



MS150-24T-4X

- 24 x 1 GbE
- 4 SFP+
- Data only



MS150-24P-4X

- 24 x 1 GbE
- 4 SFP+
- PoE+ (370W)



MS150-48T-4X

- 48 x 1 GbE
- 4 SFP+
- Data only



MS150-48LP-4X

- 48 x 1 GbE
- 4 SFP+
- PoE+ (370W)



MS150-48FP-4X

- 48 x 1 GbE
- 4 SFP+
- PoE+ (740W)

1G SFP



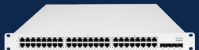
MS150-24T-4G

- 24 x 1 GbE
- 4 SFP
- Data only



MS150-24P-4G

- 24 x 1 GbE
- 4 SFP
- PoE+ (370W)



MS150-48T-4G

- 48 x 1 GbE
- 4 SFP
- Data only



MS150-48LP-4G

- 48 x 1 GbE
- 4 SFP
- PoE+ (370W)



MS150-48FP-4G

- 48 x 1 GbE
- 4 SFP
- PoE+ (740W)

Multigigabit SKUs



MS150-24MP-4X

- 16 x 1 GbE + 8 x 5 GbE
- 4 SFP+
- POE++ (370W)



MS150-48MP-4X

- 32 x 1 GbE + 16 x 5 GbE
- 4 SFP+
- POE++ (740W)

Stacking Cables



MA-CBL-100G-50CM



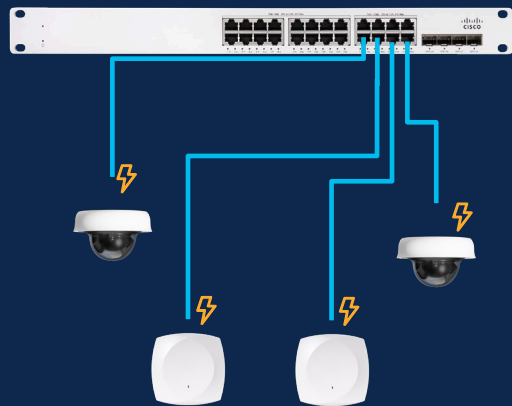
MA-CBL-100G-1M



MA-CBL-100G-3M

Business Continuity with Perpetual and Fast PoE

supported on MS150



Reduce downtime
by more than
60%



Perpetual PoE: Maintain uninterrupted power to security cameras while performing firmware upgrades



Fast PoE: Restore power to PDs quickly in the event power cannot be maintained



No configuration required! Perpetual + Fast PoE are enabled out of the box

New Features

Meraki Early Access Program

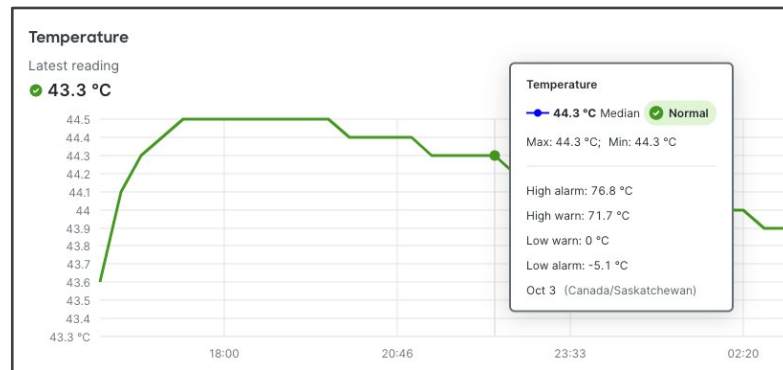
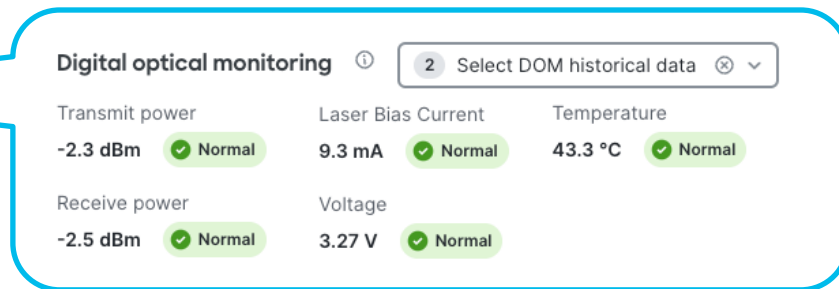
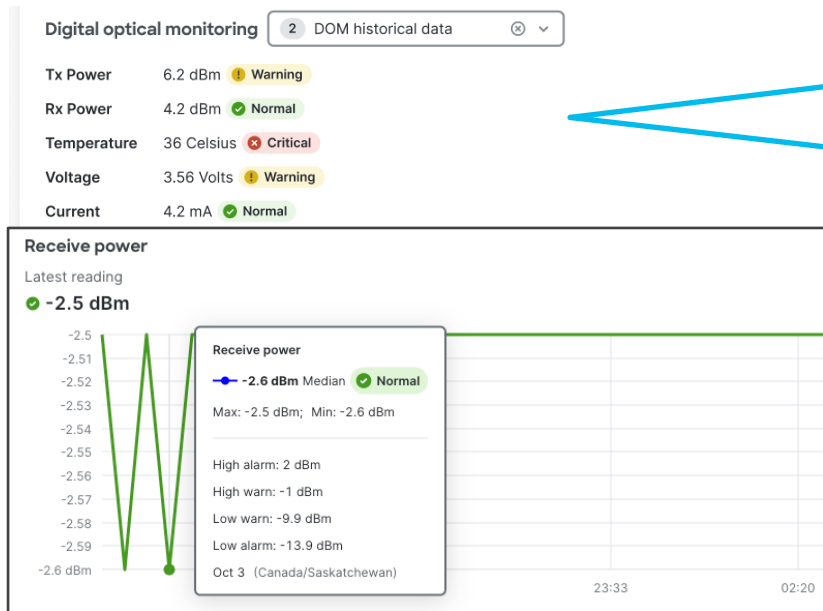
The screenshot displays the Meraki dashboard interface. On the left, the 'Insight' sidebar is visible, with the 'Organization' link highlighted by a callout bubble labeled '1'. In the main content area, a 'Cloud On-Ramp' section contains a list of links: 'Cloud Integrations', 'Early Access' (which is highlighted by a callout bubble labeled '2' and includes a 'New' button), and 'Certificates'. Below this, the 'SmartPorts - Automations' section is shown, with the description 'Enable automated application of port profiles on MS devices'. Further down, there are two sections under the 'Switching' category: 'Switch Device Health' (described as offering a comprehensive view of key metrics to evaluate the control) and 'VLAN Database' (described as enabling the VLAN DB Feature for pruning VLANs on Cloud Managed Catalyst Switches).

Test-drive new features

Digital Optical Monitoring

MS17

Soon to IOS XE



- Compare multiple metrics
- Real-time and historical values
- Thresholds for supported modules

Port Management at Scale with SmartPort Profiles

The screenshot displays the Cisco SmartPorts web interface. On the left, the 'Profiles' tab is active, showing a table of 15 total profiles. The 'Name' column is highlighted with an orange box. Below the table, three network switch icons are shown, labeled 'Site 1', 'Site 2', and 'Site n'. An orange line connects the 'Name' column header to the 'Profile' dropdown in the 'Edit switch port' window on the right. This window shows the configuration for a switch port named 'IoT Device' on switch 'SFO22-M51-FLOOR1 / 1', with the profile 'My_switch_port_profile_A' selected. The configuration includes settings for Port status (Enabled), Type (Access), Access policy (Open), VLAN (1), Voice VLANs (All), Link negotiation (Auto negotiate), RSTP (Enabled), STP guard (Disabled), Port schedule (Unscheduled), Adaptive policy group (IoT IoT), Port isolation (Disabled), Trusted DAI (Disabled), Peer SGT capable (Enabled), UDLD (Alert only), Tags (Two X, Three X), and PoE (Enabled). A 'Save' button is at the bottom right.

Name	Date created	# ports
My_switch_port_profile_A	January 12, 12:34 AM	2
My_switch_port_profile_B	January 12, 12:34 AM	5
Switch port profile name 3	January 12, 12:34 AM	0
Switch port profile name 4	January 12, 12:34 AM	12
Switch port profile name 5	January 12, 12:34 AM	33
Switch port profile name 6	January 12, 12:34 AM	

Building-blocks
containing configuration
settings for switchports
that can be applied to
one or thousands of
ports.

SmartPorts

MS17

Soon to IOS XE

Automations for configuring ports based on connected device recognition

← Automations

Edge port automation

Automate port configuration for Cisco Phones, Workstations, and Printers.

Triggers & actions	#	Match type ⓘ	Match criteria	Profile to apply ⓘ
		LLDP system description	"Meraki MR*" OR "Meraki Wireless" OR "cisco-al...	
	1	MAC Address OUI	"00:18:0a*"; "00:18:0b*"; "00:18:0c*"	Wireless port profile
	2	LLDP system description	"Meraki MX450 Cloud Managed Security Applian..."	Firewall port config
	3	LLDP system description	"Cisco IP Phone *"	Phones profile
		LLDP system description	"Cisco ASR1000 Series *"	
	4	MAC Address OUI	"00:18:0a:12:7c:41"	HSRP Primary uplink
		LLDP system description	"Cisco ASR1000 Series *"	
	5	MAC Address OUI	"00:18:0a:fa:3c:a3"	HSRP Secondary uplink

+ Add trigger

Default action

Settings to apply if no triggers match

Use existing port configuration ▼

Target port range

2 networks, 5 switches, 30 ports ✎ 📄

Automation sequence

Match type ⓘ

LLDP system description

Match criteria

"Meraki MR*" OR "Meraki Wireless" OR "cisco-al..."

Match type ⓘ

MAC Address OUI

Match criteria

"00:18:0a*";
"00:18:0b*";
"00:18:0c*"

Match type ⓘ

Match criteria

+ Add conditions

Profile to apply

Wireless port profile ▼

Cancel Add

CDP/LLDP

MAC OUI

RADIUS*

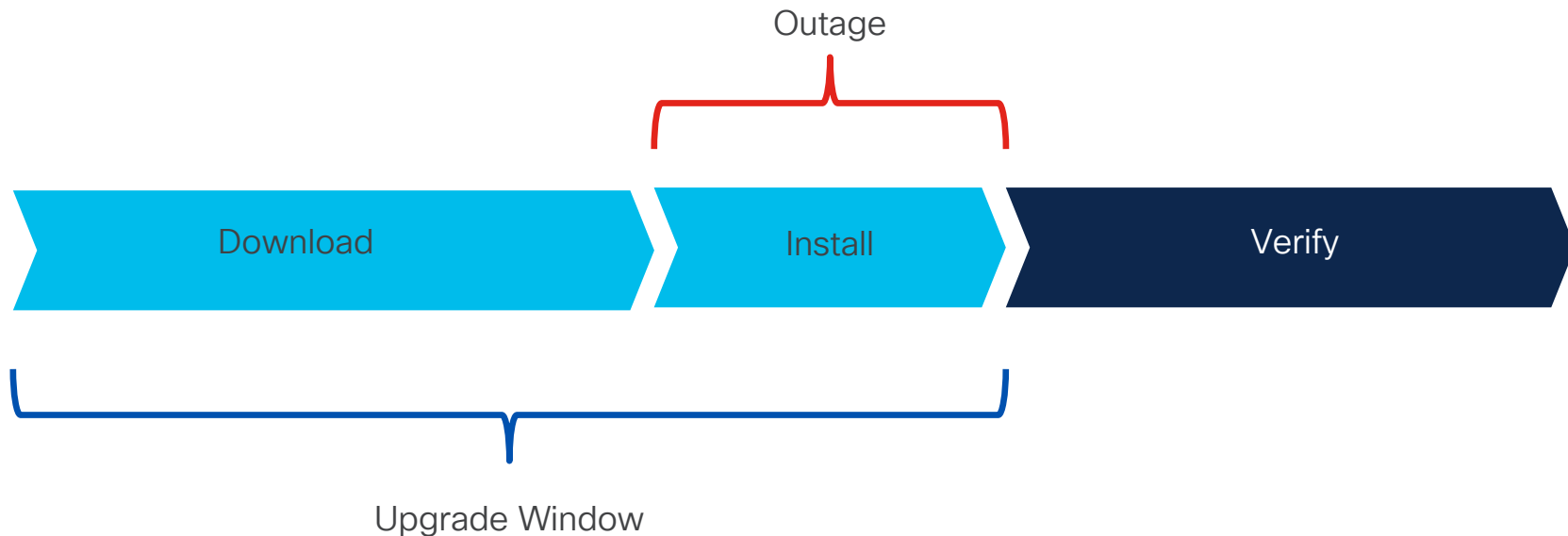
*Coming soon

How about shorter upgrade windows?

IOS XE 17.15

MS TBD

Firmware Predownload

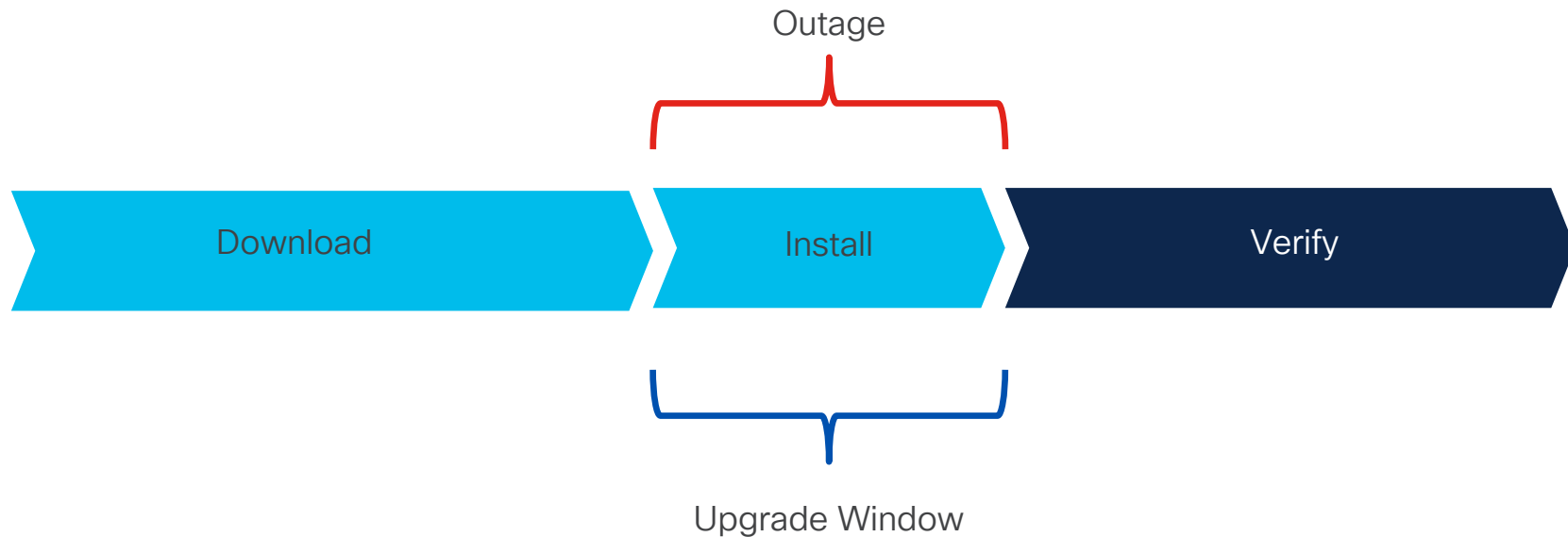


How about shorter upgrade windows?

IOS XE 17.15

MS TBD

Firmware Predownload



How about shorter upgrade windows?

IOS XE 17.15

MS TBD



Napkin math

100 switches with 100Mbps goodput:

- MS 30 min > 5 min
- IOS XE 2h44 min > 10 min



MS Device Health


Visibility into switch health metrics

MS120-8FP Online

MS120-8FP 2c:3f:0b:

Summary Ports **Device Health** Event log Location Tools

System resources



Santuario Histórico de Machu Picchu
Iconic sprawling Inca city ruins

Google 5 Templo del Sol Map data ©2024

Address
Machu Picchu

Serial number
Q2CX-I

Device uptime
19d 2h 21m

Last device boot Sep 15 14:10:51 (CST)
Last boot reason [View in Event log](#)

CPU Poor

150 dropped packets
 1 last 5 mins
Number of CPU packets dropped has increased by 1 over 5 mins.

9680 total packets
 2542 last 5 mins
The total traffic to CPU increased by 2542 packets over 5 mins.

Last updated at: Oct 4 2024 16:35

Protocols	Status	Dropped	Total	Dropped/Total
LACP	Good	0	38	0 %
STP	Poor	150	299	50.2 %
ARP	Good	0	28	0 %
OSPF	Good	0	0	0 %
Management	Good	0	1105	0 %
All Protocols	Fair	150	9680	1.5 %

[Historical Data](#)

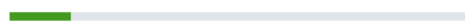
Real-time metrics

Memory

Memory Good

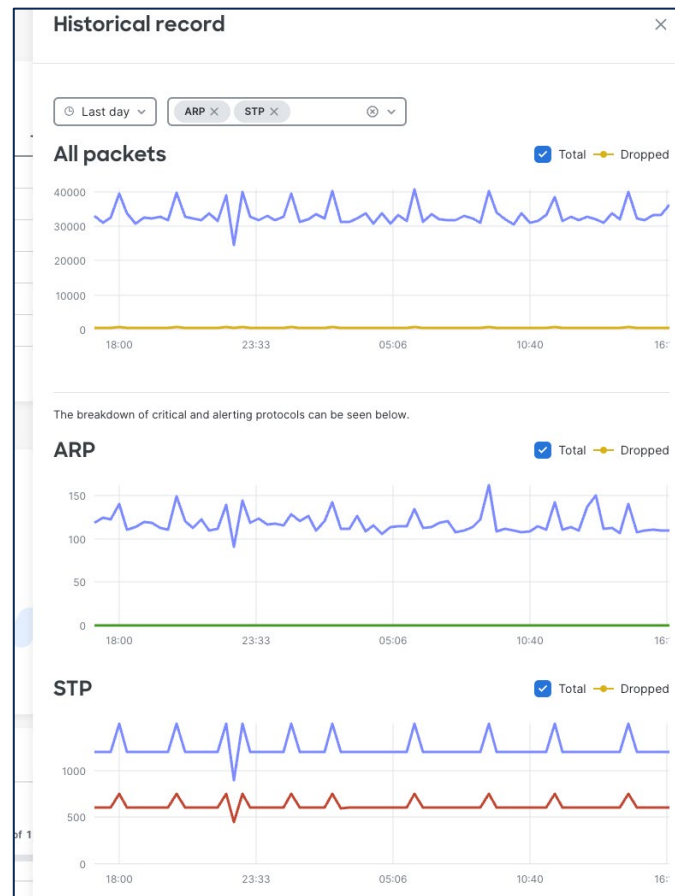
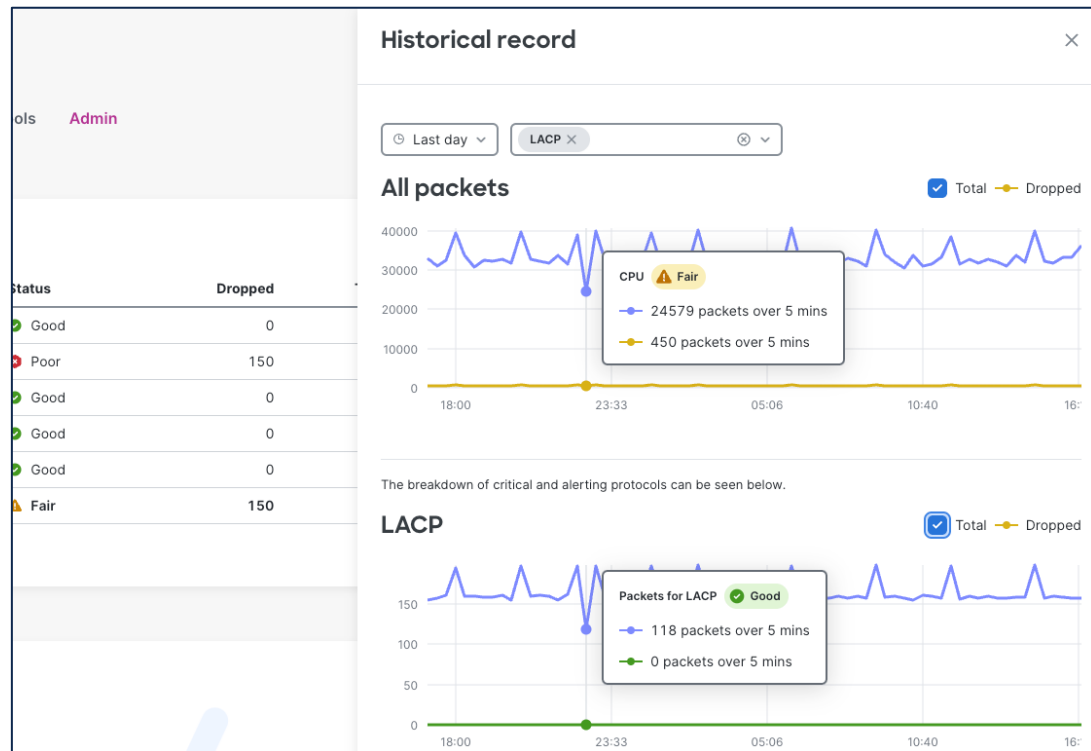
Software (RAM)

69 MB out of 513 MB

 13%

MS Device Health

Historical Benchmarking



MT sensor integration

Name	Model	Latest reading	
Rack 3	MT40	Apparent power	59.5 VA
		Current	0.49 A
		Frequency	60 Hz
		Power factor	99%
		Real power	✖ 59.1 W
		Voltage	121.4 V
Data Center AQ	MT14	Humidity	30% RH
		Indoor air quality	75
		Ambient noise	✖ 59 dBA
		PM2.5	0 µg/m³
		Temperature	✖ 30.94°C
		TVOC	50 µg/m³
Data Center water sensor	MT12	Water leak	✖ Present

Environment readings on the switch details page

Is it too hot in the network closet?

How loud is the data center?

Assign relevant sensors to any switch

Ports [Configure ports on this switch](#)

Assign a sensor

Select sensors to monitor the environment of this device.

Q Search by name, tag, or device information

1 Item selected [Select all 18 items](#) [Cancel](#)

	Name	Model	Tags
<input type="checkbox"/>	Server Room Door	MT20	—
<input type="checkbox"/>	Furnace Vent	MT11	recently-added
<input type="checkbox"/>	Fridge internal temp	MT11	—
<input type="checkbox"/>	Short Freezer internal temp	MT11	—
<input type="checkbox"/>	Tall Freezer internal temp	MT11	—
<input type="checkbox"/>	Kitchen air	MT14	—
<input type="checkbox"/>	Furnace Room air	MT14	—
<input checked="" type="checkbox"/>	Data Center AQ	MT14	—

< 1 2 >

[Cancel](#) [Save](#)

Intelligent Capture

Streamlined packet captures with a cloud-hosted option

MS17

IOSXE 17.15

Scheduled Captures

Packet Captures Switches ▾

New capture Schedules Stored captures

Switch
Closet 2.2.4 ▾

Ports
2-8

Output
Save to cloud ▾

Duration (secs) ⓘ
60

Capture filters

[View example filters](#)

File name
<default file name here>

Comments
We recommend including a description of the reason for your capture, this will help us improve the analysis capabilities of our capture tool.

Start capture **Schedule capture**

Packet Captures Switches ▾

New capture **Schedules** Stored captures

Q Search

 6 schedules

<input type="checkbox"/>	Schedule name	Username	Start time (UTC-8)	Frequency	End time (UTC-8)
<input type="checkbox"/>	Schedule 1	tonyc@cisco.com	Oct 20, 2023 08:20	Occurs every Tuesday	Jan 20, 2024 08:20
<input type="checkbox"/>	Schedule 2	tonyc@cisco.com	Oct 12, 2023 08:20	Occurs on day 1 of every month	Nov 24, 2023 08:20
<input type="checkbox"/>	Schedule 3	davidz432@gmail.com	Oct 12, 2023 08:20	Once	—
<input type="checkbox"/>	Schedule 4	lij@gmail.com	Oct 12, 2023 08:20	Occurs on day 1 of every month	Nov 24, 2023 08:20
<input type="checkbox"/>	Schedule 5	davidz432@gmail.com	Oct 12, 2023 08:20	Once	—
<input type="checkbox"/>	Schedule 6	tonyc@cisco.com	Oct 12, 2023 08:20	Occurs on day 1 of every month	Nov 24, 2023 08:20

Packet Captures Switches ▾

New capture Schedules **Stored captures**

Q Search

Filter ▾

 124 captures

<input type="checkbox"/>	Time (UTC-8)	Name	Switch / Ports	Username	Status	Output type	Sources	Packet size	Packet count
<input type="checkbox"/>	Aug 20, 09:00	Capture name	Closet 1.2 / 1	jl342@cisco.com	✔ Saved to cloud	Streaming tcpdump	Auto capture by Meraki cloud	3.2 MB	1,163
<input type="checkbox"/>	Aug 20, 08:25	Meraki-appliance	Closet 2.2 / 3	Meraki tech support	✔ Saved to cloud	raw pcap	davidz432@gmail.com	4.5 MB	2,312
<input type="checkbox"/>	Aug 20, 08:20	Packets 2	Closet 1.2 / 1	tonyc@cisco.com	❌ Failed	Streaming tcpdump	Auto capture by Meraki cloud	3.2 MB	1,163
<input type="checkbox"/>	Aug 20, 08:19	Packets 1	Closet 2.2 / 3	lizlev@cisco.com	✔ Saved to cloud	raw pcap	davidz432@gmail.com	4.5 MB	2,312

IOSXE 17.15

Coloring Profiles

Intelligent Capture

MS17

IOSXE 17.15

Packet Capture Analysis

The packet capture analytics tool currently reports on DHCP, ARP, ICMP and DNS issues. This is not a complete list of possible issues within your packet capture.

Packet Capture Analysis Summary

Tests summary

Protocols

- 2 protocols with issues

DHCP

- No issues

ARP

- 3 issues

ICMP

- No issues

DNS

- 1 issue

MAC address summary

These MAC addresses appeared in at least one of the failed tests.

e8:ea:6a:24:e3:32 cc:9c:3e:ec:31:10
00:c0:17:c5:01:61 00:18:0a:4f:00:02

Device summary

These devices appeared in at least one of the failed tests

-

Q Search Issue Type MAC address Device 4 results

DHCP No issues

- DHCP Transactions completed No issues
- Multiple DHCP servers seen No issues

ARP 3 issues

- ARP Requests have responses Issues 3

ICMP No issues

- Missing ICMP res
- Constant ICMP c

DNS 1 issue

- Client constantly failing to resolve URL No issues
- Multiple responses for UR No issues
- Multiple clients failing to resolve URL Issues 1

Multiple clients failing to resolve URL

1 total issue

Multiple clients failing to resolve URL: BRENNMAR-M-6V3V_companion-link_tcp.local

Frame No. 104, 105

Details Multiple clients (10.20.30.17) failing to resolve URL: BRENNMAR-M-6V3V_companion-link_tcp.local.

ARP Requests have responses

3 total issues

No response for IP address 10.20.30.26

Frame No. 11, 17, 22

Details ARP request from 00:c0:17:c5:01:61 to 10.20.30.26 has no response

AI rule-based analyzer

Demo: Intelligent Capture



VLAN Database

Early Access

Uses VLAN profiles


VLAN profiles

Edit profile

Profile name

Iname
TwentyVLANs

Active VLANs



Maximum Active VLANs
Catalyst 9300 = 1000
Catalyst 9200 = 512

Dashboard
intelligently handles
active VLAN limits

Lower broadcast
and multicast
overhead

Simpler trunk
configs

Easier out-of-box
deployment

VLAN Database

Early Access

Active VLANs per Trunk

Port profile

Disabled

Port schedule

Unscheduled

Allowed VLANs

all

Active VLANs

1,10,20

Allow all on trunks

☒ Trunk ☐ Access

Native VLAN

default - 1

Allowed VLANs

all

Alerts

Bullwinkle



Online

MS390-48UX 38:84:79:6e:57:00



The switch's VLAN Profile is missing required VLANs "1011". Add the required VLANs to the Active VLANs to resolve the issue.

Twenty VLANs

Lower broadcast and
multicast overhead

Simpler trunk configs

Early Access

Opens a troubleshooting console to this device, similar to an IOS-XE CLI window.

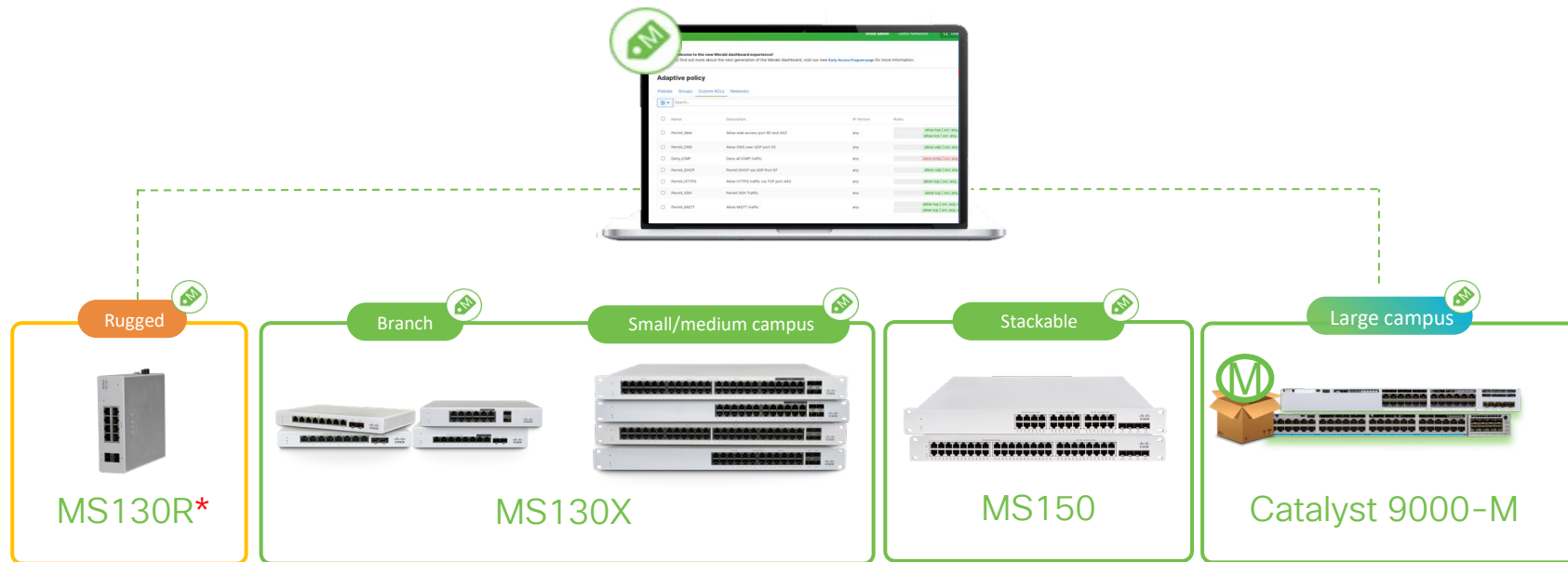
Detach (full)

```
Rocky#sh vlan brief
VLAN Name                        Status      Ports
-----
1  default                        active     Te1/0/2, Te1/0/3, Te1/0/4, Te1/0/5, Te1/0/6, Te1/0/7,
1/0/15, Te1/0/16, Te1/0/17, Te1/0/18, Te1/0/19, Te1/0/20, Te1/0/21, Te1/0/22, Te1/0/23, Te1/0/24, Te1/
1/0/1, Gi2/0/1, Gi2/0/2, Gi2/0/3, Gi2/0/4, Gi2/0/5, Gi2/0/6, Gi2/0/7, Gi2/0/8, Gi2/0/9, Gi2/0/10, Gi2/
0/18, Gi2/0/19, Gi2/0/20, Gi2/0/21, Gi2/0/22, Gi2/0/24, Ap2/0/1, Tw3/0/2, Tw3/0/4, Tw3/0/5, Tw3/0/6, T
0/14, Tw3/0/15, Tw3/0/16, Tw3/0/17, Tw3/0/18, Tw3/0/19, Tw3/0/20, Tw3/0/21, Tw3/0/22, Tw3/0/23, Tw3/0/
1, Tw3/0/32, Tw3/0/33, Tw3/0/34, Tw3/0/36, Te3/0/37, Te3/0/38, Te3/0/39, Te3/0/40, Te3/0/41, Te3/0/42,
e3/1/2, Te3/1/3, Te3/1/4, Te3/1/5, Te3/1/6, Te3/1/7, Te3/1/8, Ap3/0/1
10  VLAN0010                      active
20  VLAN0020                      active
1002 fddi-default                  act/unsup
1003 token-ring-default          act/unsup
1004 fddinet-default              act/unsup
1005 trnet-default                act/unsup Tw3/0/3
```

Adaptive Policy on MS130X/R, MS150

MS17

Leverage Cisco TrustSec across the entire wired network, from the core to any type of edge



Adaptive Policy Enhancements CS17

VLAN name				
+ Add Named VLAN				
#	VLAN name	VLAN ID	Adaptive policy group	Actions
1	default	1	▼	🗑️
2	ise-client	21	▼	🗑️
3	Cisco-Server	39	▼	🗑️
4	User1	10	▼	🗑️
5	Server	2	▼	🗑️
6	Cat-wifi	3	▼	🗑️
7	Cat-wifi-user	4	7 : Production_Users	🗑️
8	Routing	9	▼	🗑️
9	Meraki-wifi	18	▼	🗑️
10	user	11	▼	🗑️

#	Policy	Protocol	Source port	Destination port	Log	TCP Established	Act
1	Deny	TCP	any	any	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Cancel Done
2	Deny	UDP	any	any	<input checked="" type="checkbox"/>	<input type="checkbox"/>	...
3	Deny	ICMP	any	any	<input checked="" type="checkbox"/>	<input type="checkbox"/>	...
4	Deny	Any	any	any	<input checked="" type="checkbox"/>	<input type="checkbox"/>	...

Add ACL Rule

Adaptive Policy Counters

Run

AdP Hit Counters

Filter by: Source SGT 7

Source SGT	Destination SGT	IPv4 Allow	IPv4 Deny	IPv6 Allow
7	7	0	0	0
7	14	0	0	0
7	18	0	0	0
7	29	0	25	0

Hit Counter Live Tool

SGACL Logging

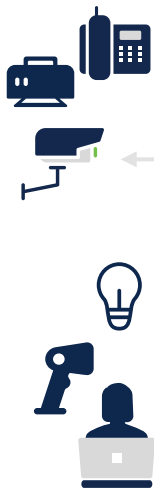
TCP Established

VLAN to SGT mapping

What makes it all work?

Endpoints

- Users
- Devices
- Things



Network Devices

- Cloud Managed
 - Switching
 - Wireless



Your NAC/RADIUS
servers in a data
center



Identity Services

- Microsoft EntraID (certificate | user/password)
- Dashboard dB for Endpoints and Endpoint Groups
- EAP-TLS cert match



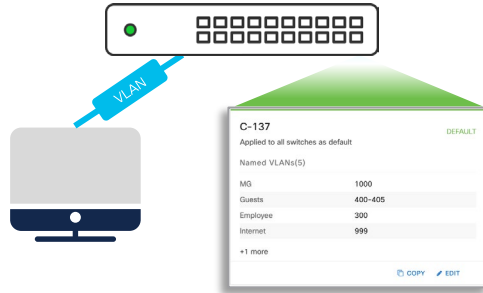
Authorization

- Adaptive Policy (SGT)
- Group Policy Assignment
- VLAN assignment
- iPSK passphrase
- Interface Template*

802.1X and RADIUS Support is not new to Meraki



Per-Session VLAN Assignment



Per-Session Dynamic L3/L4 ACL

Name ⓘ

IOT_Restricted

Schedule ⓘ

Scheduling disabled ▾

Bandwidth ⓘ

Use network default ▾

unlimited

details

Hostname visibility ⓘ

Use network default ▾

Firewall and traffic shaping ⓘ

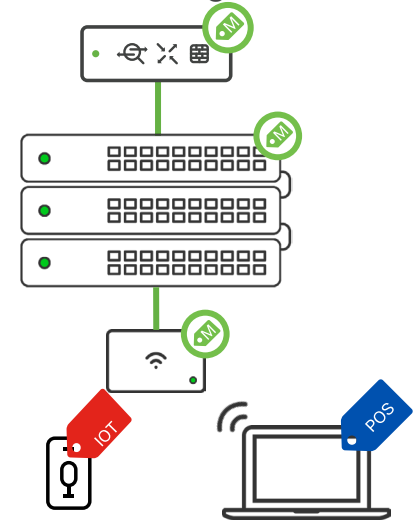
Custom network firewall & shaping rules ▾

Layer 3 firewall ⓘ

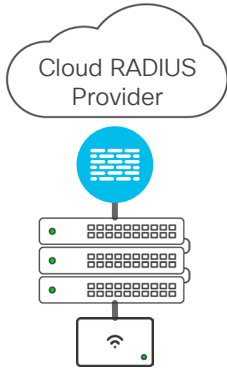
#	Policy	Protocol	Destination	Port	Comment	Actions
1	Allow ▾	TCP ▾	10.10.1.4	1883	MQTT-1883	⌵ ⌵
2	Allow ▾	TCP ▾	10.10.1.4	1884	MQTT-1884	⌵ ⌵
3	Deny ▾	Any ▾	10.0.0.0/8	Any	Block 10-8	⌵ ⌵
4	Deny ▾	Any ▾	172.16.0.0/12	Any	Block 172-12	⌵ ⌵
5	Deny ▾	Any ▾	192.168.0.0/16	Any	Block 192-16	⌵ ⌵
Allow				Any	Any	Any
Default rule						

[Add a firewall rule](#)

Zero-Trust micro-segmentation



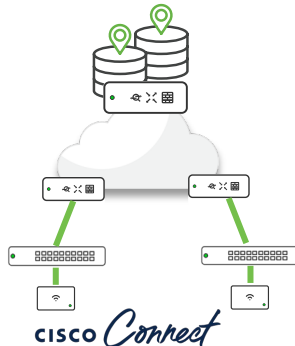
External RADIUS can be complex



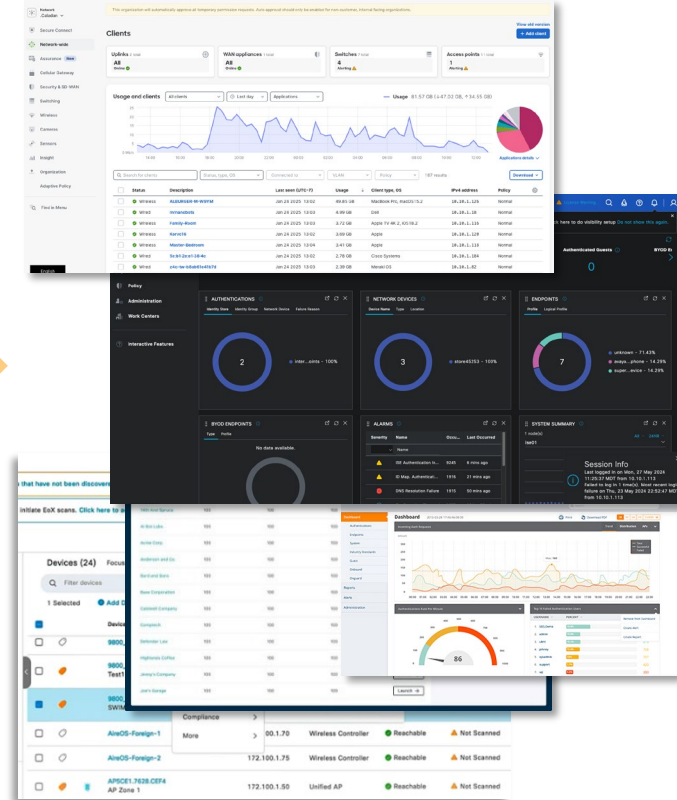
- Complex firewall rulesets
- Complex connectivity configurations
- Potential in-transit security implications
- Manual input of network and security contexts

Overhead from console pivots

On-premises AAA



- Complex deployment management and Operations
- Connectivity complexity in distributed deployments
 - VPN tunnel management
 - Load-balancers
 - Etc.
- Manual input of network and security contexts



Meraki Access Manager

Endpoints

- Users
- Devices
- Things

Network Devices

- Cloud Managed
 - Switching
 - Wireless

Meraki Access Manager

Scalable Meraki Cloud Service

HA Multi-Tenant Service

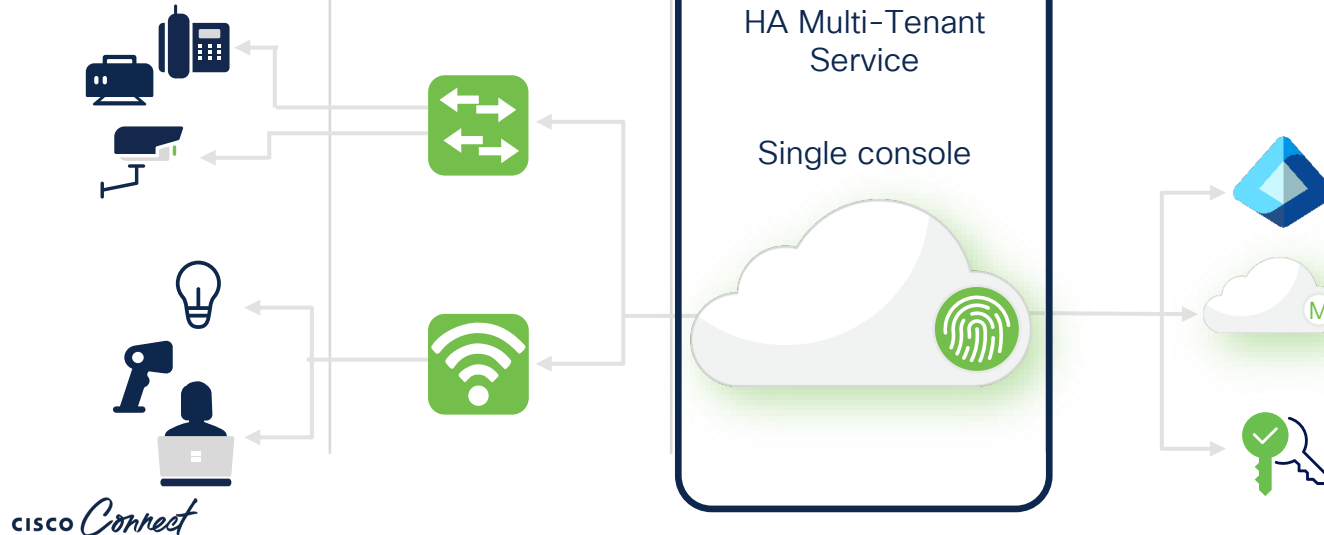
Single console

Identity Services

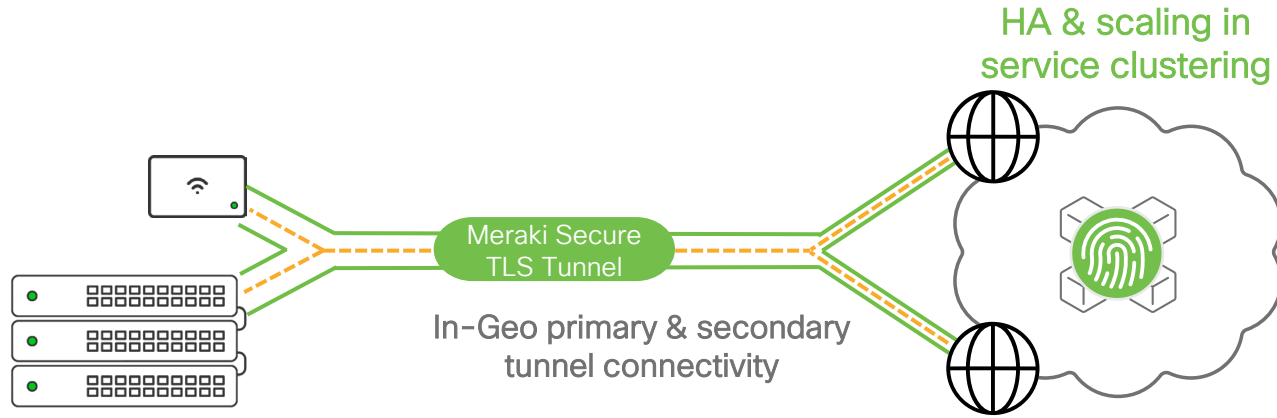
- Microsoft EntraID (certificate | user/password)
- Dashboard dB for Endpoints and Endpoint Groups
- EAP-TLS cert match

Authorization

- Adaptive Policy (SGT)
- Group Policy Assignment
- VLAN assignment
- iPSK passphrase
- Interface Template*



Highly Available Cloud Architecture



Network Device Resiliency

- Tunnel connectivity to primary and secondary tunnel servers in the same geographic region
- 802.1X resiliency through RADIUS caching and critical-auth/fallback functionality

Cloud Service Resiliency

- Service clustering leveraging Kubernetes
- Horizontal scaling

Features Overview

Platforms

All Current Generation MS
CS (catalyst management V1)
Cloud native XE (support being finalized)

Firmware

MS16+
CS17
Cloud native IOS XE17.15.3



Authentication methods

Authenticate users and devices using:



EAP-TLS (certificate)



EAP-TTLS
(Username/Password)



MAB (MAC Authentication Bypass)



Identity & Context

Match identity & context attributes:



Certificate Attributes



RADIUS attributes



Entra ID attributes



Networks, SSIDs,
connection details etc.



Endpoints and their groups



Authorization Results

Apply authorizations:



Adaptive Policy Group



L3 ACL/Group Policy



VLAN Assignment



iPSK passphrase

Meraki Access Manager

Beta



Reduced management overhead & costs

Eliminates the need for deploying and maintaining external RADIUS servers, Load-balancers for high-availability, VPN tunnels for multi-site deployments etc.



One dashboard for everything

Eliminates the complexity and effort involved in configuring, monitoring and troubleshooting across multiple products



Built-in Scalability and high-availability

Cloud-delivered services offer scalability and high-availability to support growing number of users and devices without the need for additional hardware



Rapid adoption of micro-segmentation

Enables rapid adoption of micro-segmentation to implement zero-trust policies through Adaptive Policy and restrict ransomware propagation



Immediate conventional access controls

Provides immediate ability to apply conventional access controls like VLANs, ACLs, etc. without having to configure additional integrations

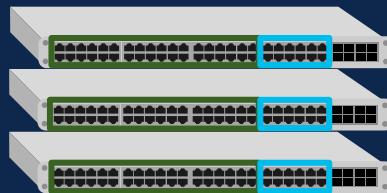


Seamless external cloud-based integrations

Provides a more seamless way to integrate with external cloud-based services

Get ready for Cloud-native IOS XE

Get Intelligent help
analyzing packet captures



Check out the CLI in Dashboard

```
Bullwinkle# show meraki connect

Service meraki connect: enable

Meraki Tunnel Config
-----
Fetch State:           Config fetch succeeded
Fetch Fail:
Last Fetch(UTC):       2024-10-05 16:45:40
Next Fetch(UTC):       2024-10-05 18:10:56
Config Server:         cs46-2037.meraki.com
Primary:               usw.nt.meraki.com
Secondary:             use.nt.meraki.com
Client IPv6 Addr:      FD0A:9B09:1F7:1:3A84:79FF:FE6E:5700
Network Name:          Eh2 - switch

Meraki Tunnel State
-----
Primary:               Up
Secondary:             Up
```

