



The bridge to possible

# Service Assurance with ThousandEyes on Catalyst 9000

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# Cisco Webex App

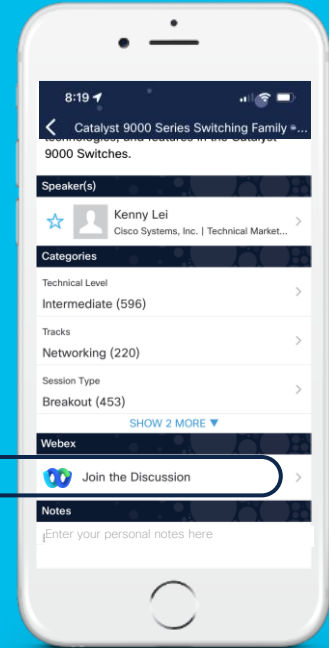
## Questions?

Use Cisco Webex App to chat with the speaker after the session

## How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated until February 24, 2023.

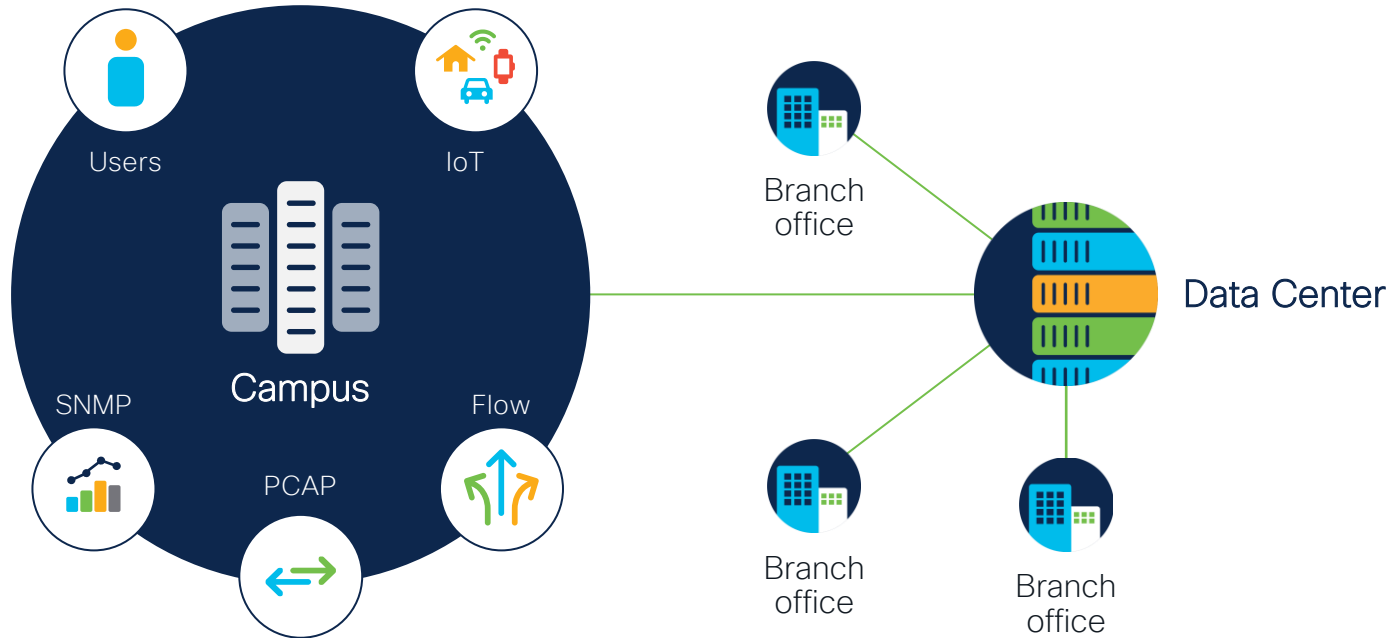




# Agenda

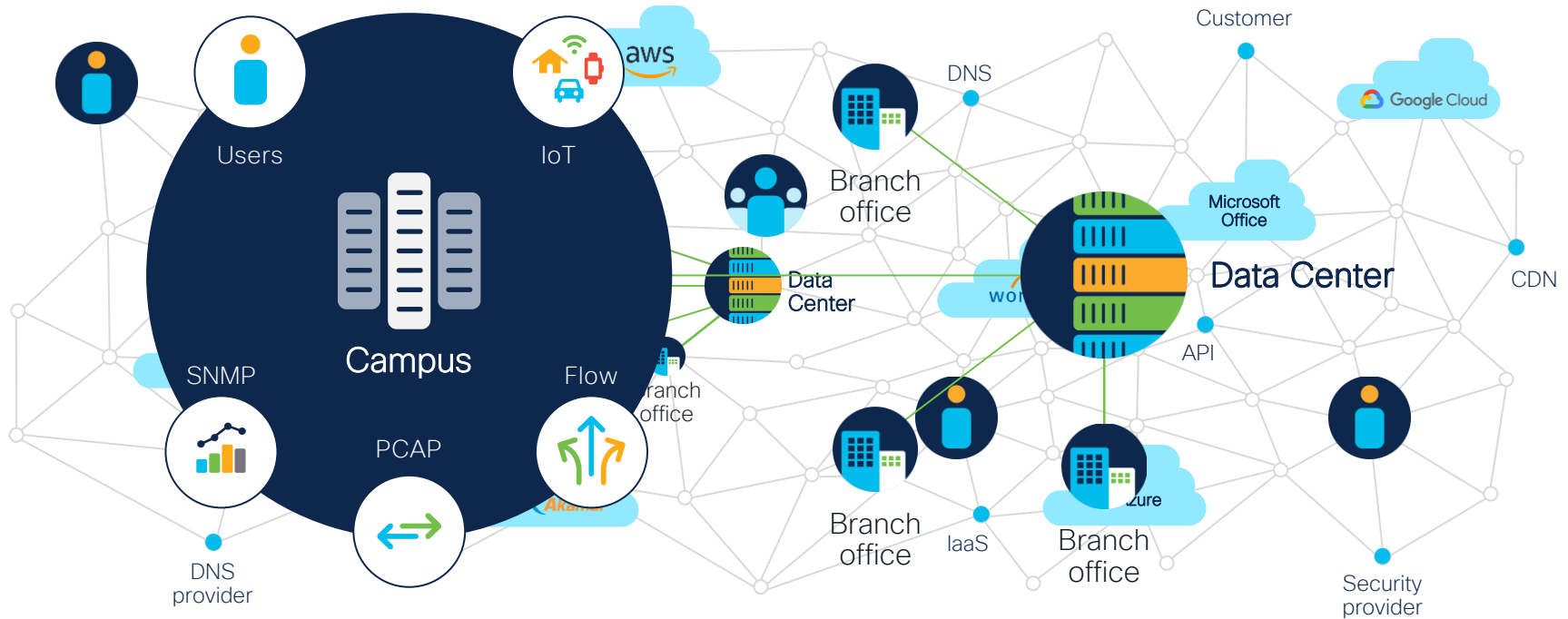
- What is ThousandEyes?
- Use Cases in Enterprise Campus
- Integration with Catalyst 9K
- Catalyst 9000 App Hosting Infra
- Deployment
- Demo
- Conclusion

# You used to control everything



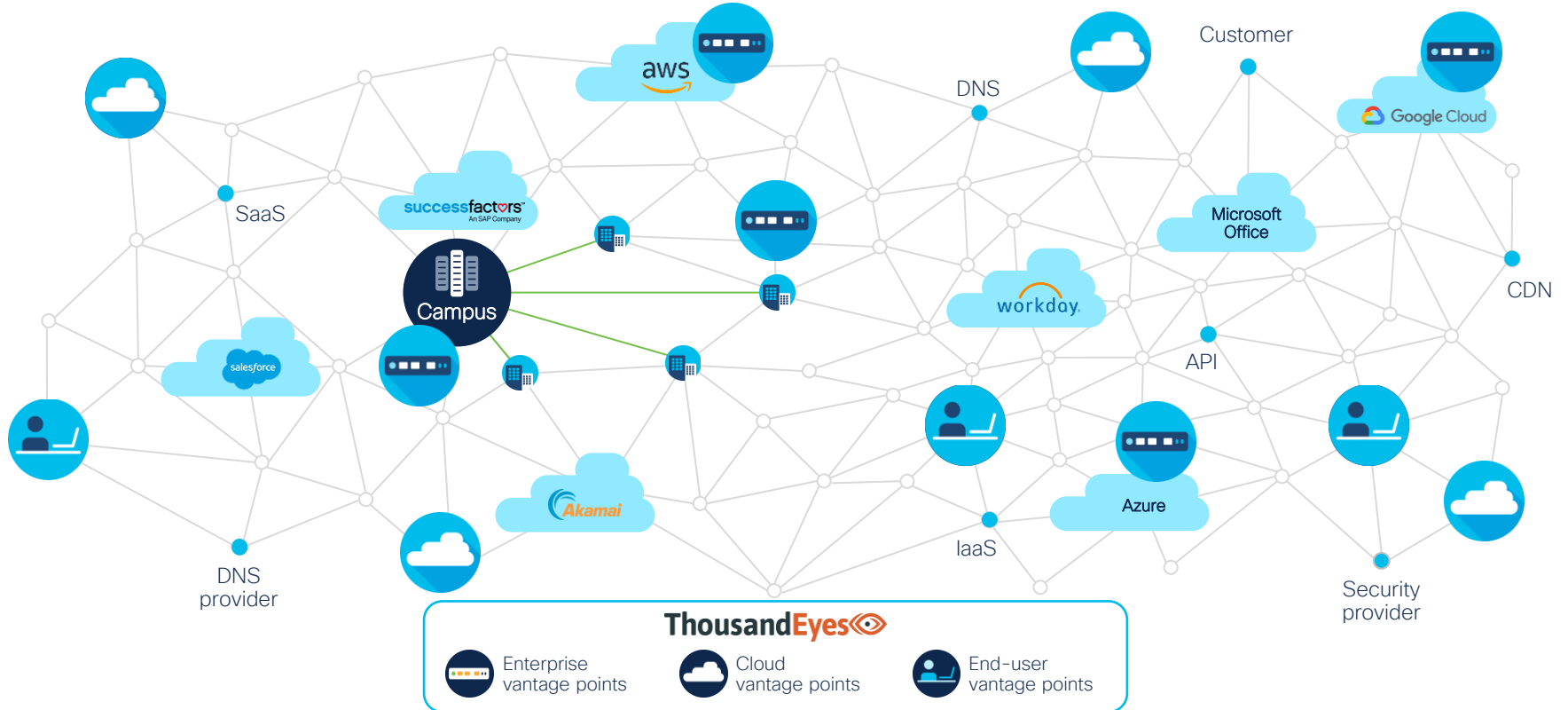
IT managed digital experience by controlling networks and applications

# Now your world has changed



Digital experience relies on service providers and networks outside of IT's control

# Delivering visibility for the new enterprise reality



# Actionable insights across any network and app

ThousandEyes

## Network visibility

- End-to-end network path and metrics across any network
- Identify issues down to the service provider, location, and interfaces



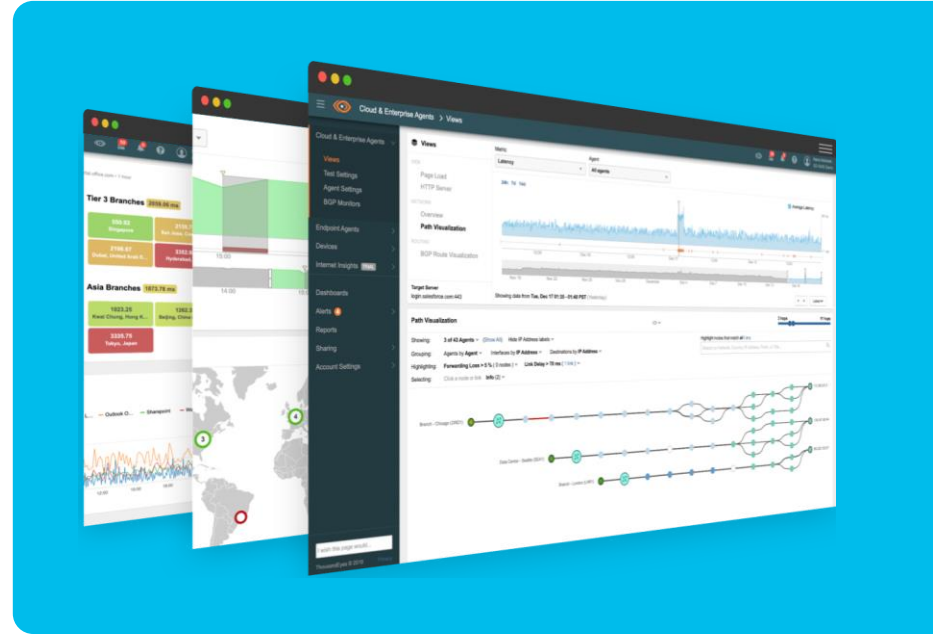
## App experience

- Quickly isolate issues to application, network, or other service
- Understand performance of user interactions with applications



## Correlated insights

- Correlate network and app issues with internet routing, internal network devices, and global outage events



# Deep visibility into every layer

Time Correlated

App Experience

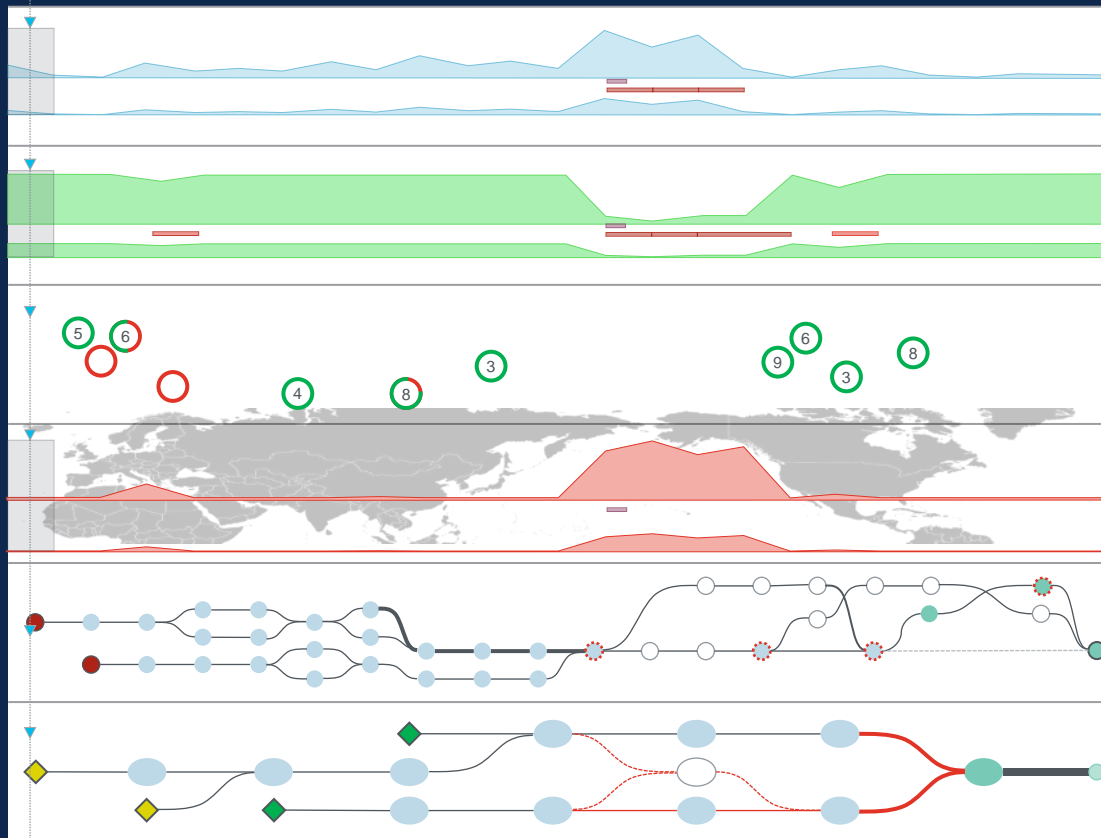
HTTP/DNS/RTP Server

Scope and Domain

Network Metrics

Network Path

BGP Monitoring



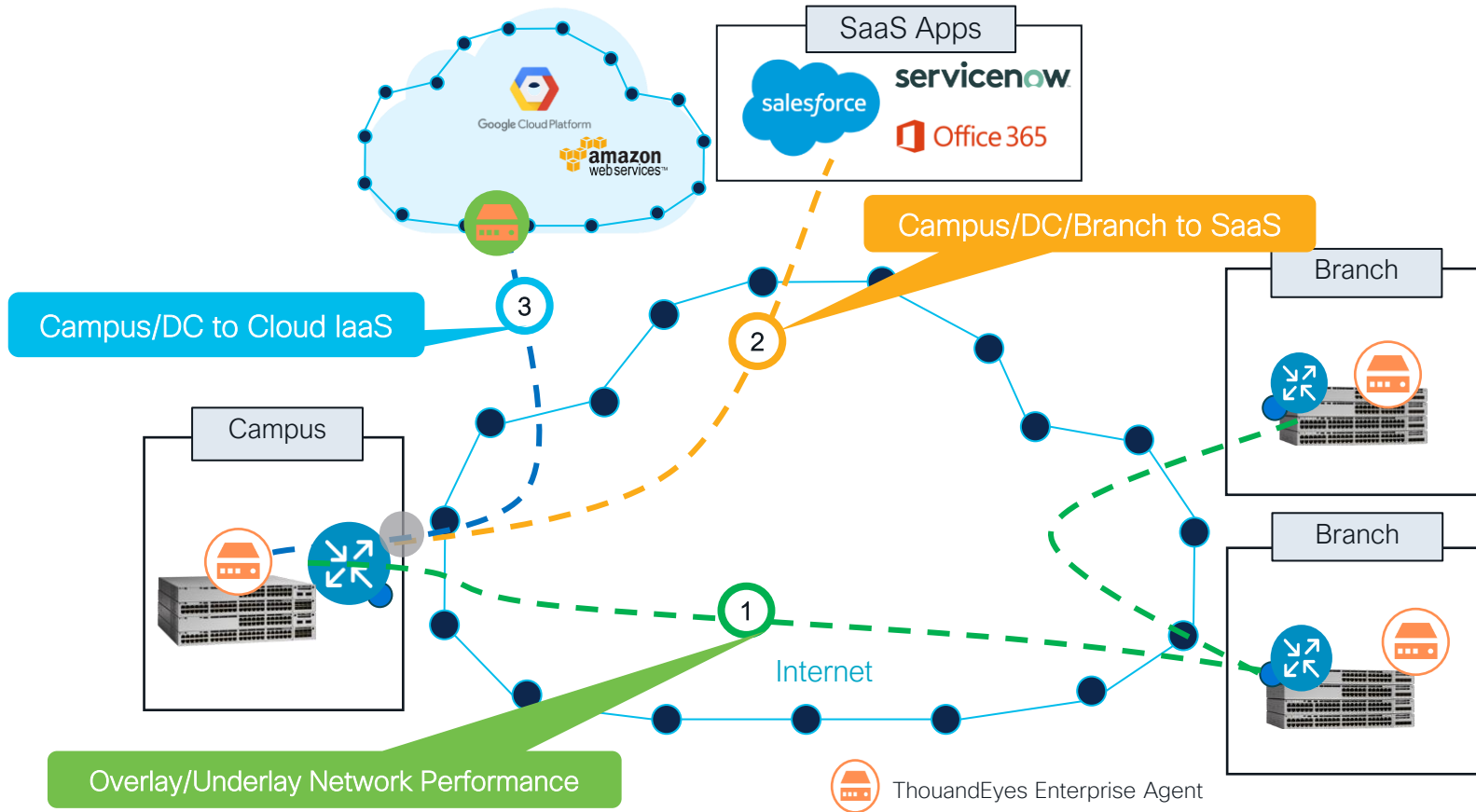


# Use Cases in Enterprise Campus



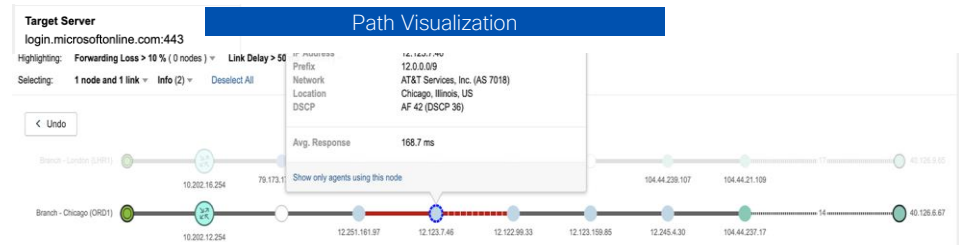
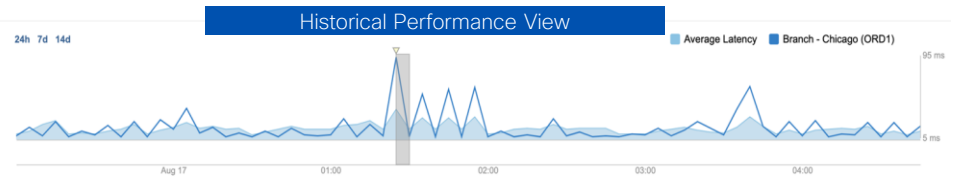
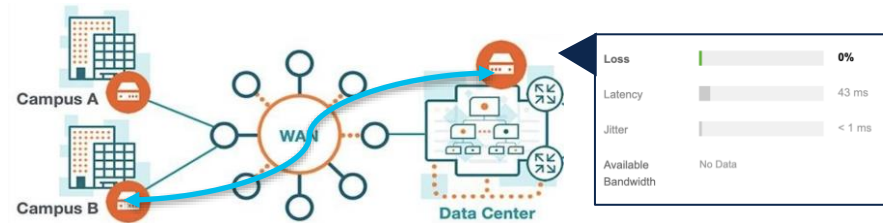
# Service assurance is beyond the enterprise domain

Use cases for ThousandEyes Enterprise Agent



# Troubleshooting SaaS & monitoring campus

- Identifying **poor user experience**
  - Did traffic handoff to SaaS app optimally?
  - Was there an outage within Enterprise, WAN or SaaS backbone?
- **Full path visibility** to identify and resolve issues
- Active monitoring for **Latency, Loss, Bandwidth, Jitter**

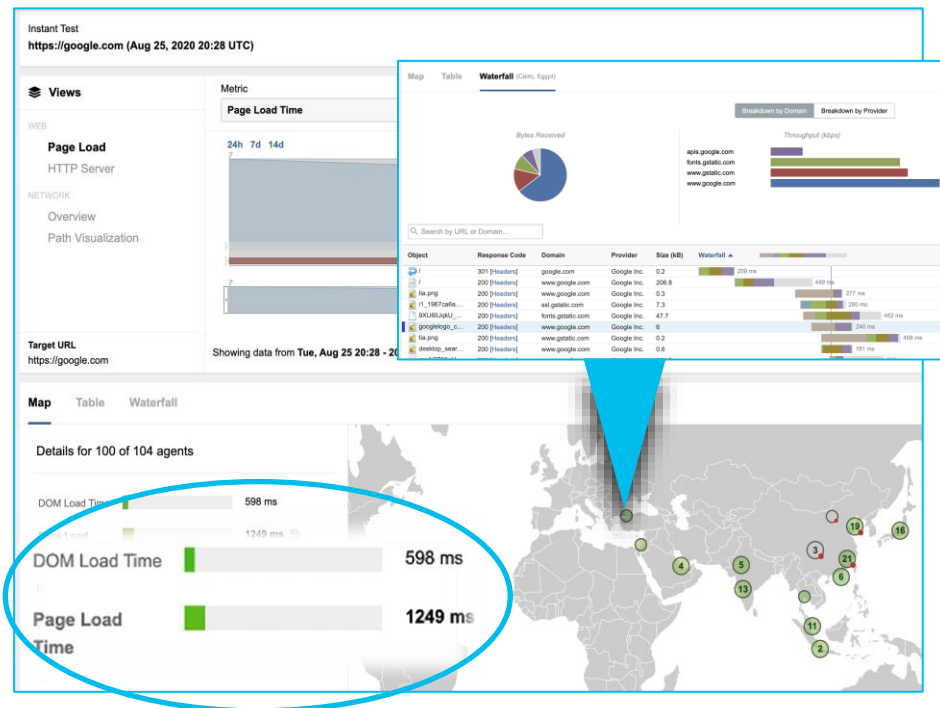


Hop-by-hop view of network paths and performance with Proactive Customizable Alerts

# Web performance monitoring

- **Web Tests** – HTTP, Page Load, Transaction
- Emulate user interactions with transaction tests
- In-depth metrics regarding the **in-browser user experience** with waterfall chart available for page load and transaction tests
- Identify objects preventing or **prolonging page load** completion
- **HTTP Server Performance** – measures availability, response time and throughput of an HTTP service.

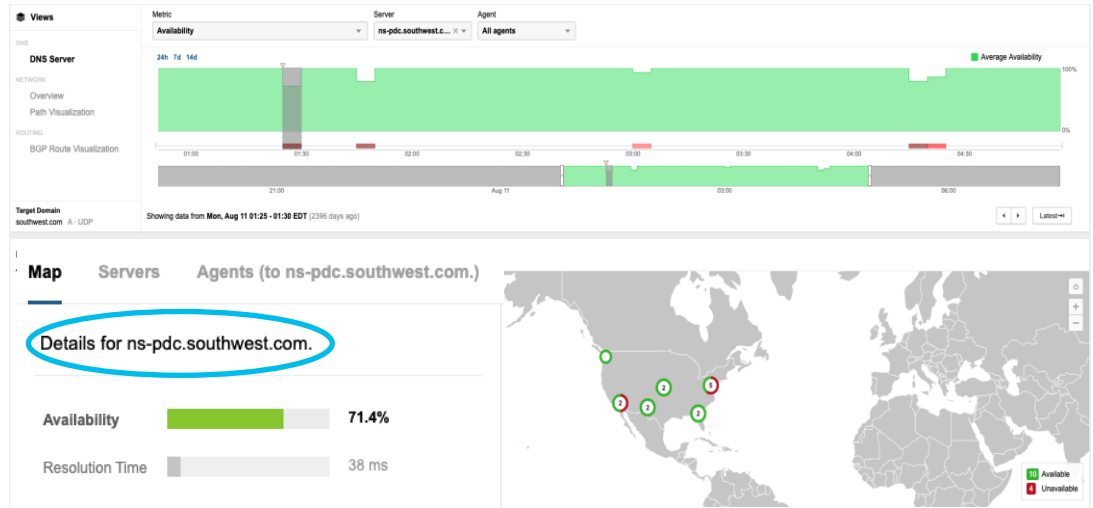
Page Load Test View



# DNS performance monitoring

- DNS – Critical component of app delivery and security.
  - Cannot access DNS records or the correct records? Service unavailable?
- **DNS Tests** – Server, Trace, DNSSEC
- Availability and response time of DNS servers, integrity of DNS responses

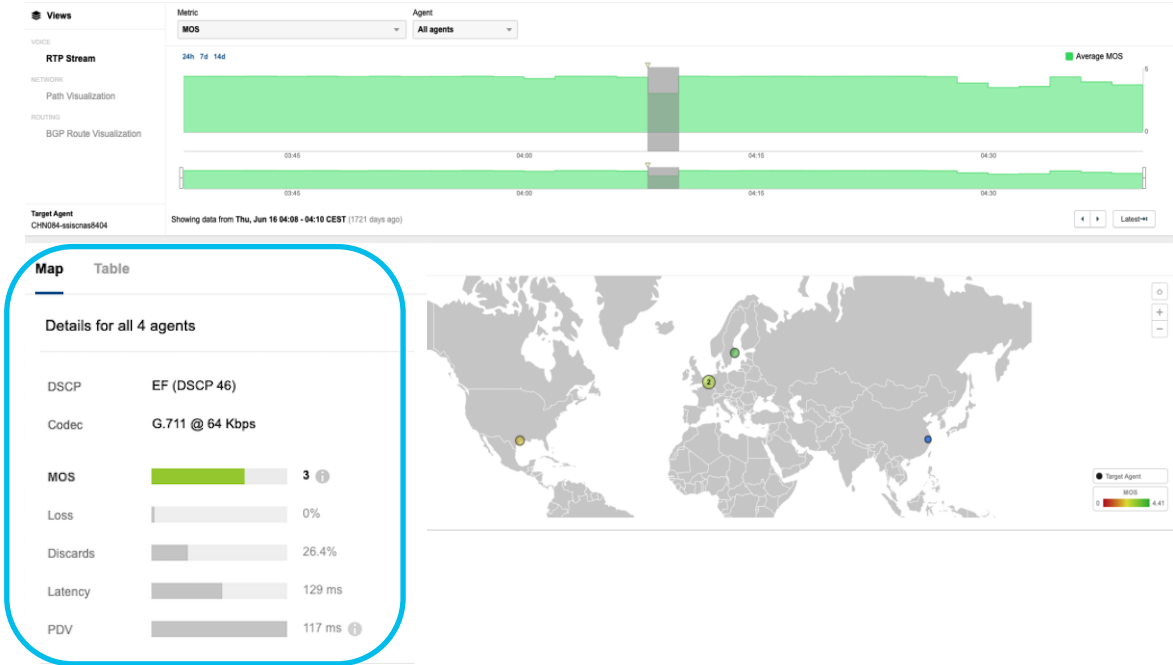
DNS Server Test View



Agent	Date (EDT)	Mappings	Error Details ↓	Resolution Time (ms)
Las Vegas, NV	2014-08-11 01:25:23	--	Could not reach name server	--
Charlotte, NC	2014-08-11 01:25:14	--	Could not reach name server	--
Philadelphia, PA	2014-08-11 01:25:27	--	Could not reach name server	--
Boston, MA	2014-08-11 01:26:05	--	Could not reach name server	--

# Troubleshooting VOIP

- VoIP packets are **extremely susceptible** to underlying network conditions that traditional VoIP monitors can't detect
- **Simulate VoIP calls** between Enterprise Agents in branch office
- Measure **SIP and RTP server availability**.



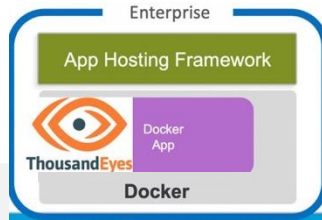
# Integration with Catalyst 9K



# ThousandEyes now included with Cisco DNA licenses

## New and existing Catalyst 9000 switches now include ThousandEyes service assurance

### App hosting: no extra hardware




- Run ThousandEyes agent natively on flash of 9300/9400 switches
- Out of the box access to ThousandEyes for new switches

### DNA subscription benefits



DNA Essentials

DNA Advantage 

DNA Premier 

- Includes 22 x ThousandEyes Units for a month
- Pool entitled test capacity to deploy anywhere within your network

### Data Visualization



- License to ThousandEyes SaaS-based management platform
- Access to Dashboards, alerts and reporting tools



Campus connectivity



Modern WAN

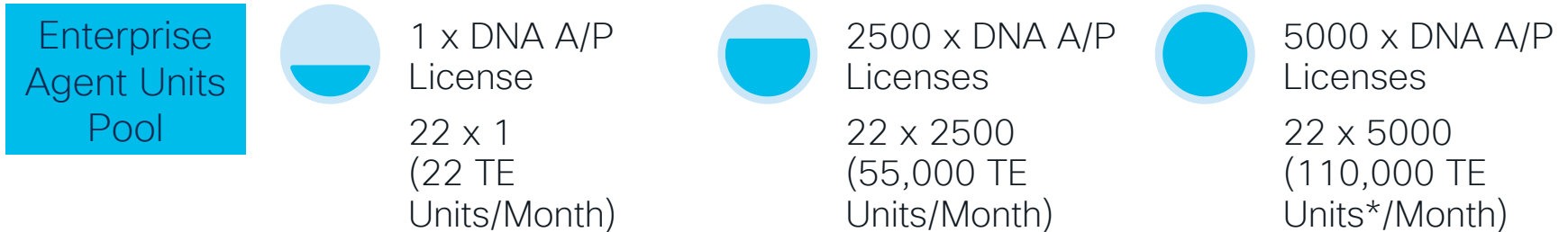


Application experience

\*Choose from a menu of several networking, web and voice tests  
Browser-based tests need the use of SSD and consume more ThousandEyes units



# DNA subscription benefit



- Provide ThousandEyes Enterprise Agent units every month based on active DNA A/P license in CSSM
- Units will not rollover to next month.
- Not require to host TE Agents on every C9300/C9400.

\* Maximum TE Enterprise Agent units offer per customer. Can purchase extra TE units on Cisco GPL

# Enterprise Agent units consumption

- Flexibility of choosing different test intervals
- Option to purchase more TE units on Cisco GPL
- ThousandEyes Units Calculator:  
<https://app.thousandeyes.com/calculator/>

Test Description	Interval	Details	Agents	No. of tests	Monthly Usage
Web - HTTP Server Demo Test	5 min	5 s Timeout	0 1	1	22
Web - HTTP Server Demo Test	1 min	5 s Timeout	0 1	1	112
Web - HTTP Server Demo Test	1 hour	5 s Timeout	0 1	1	2

# Platform support for Integrated ThousandEyes agent



IOS-XE 17.6.1

Catalyst 9300X



IOS-XE 17.3.3

Catalyst 9300  
Catalyst 9300L



IOS-XE 17.8.1

Catalyst 9400X

IOS-XE 17.5.1

Catalyst 9400

	Running on Flash	Running on SSD
Docker size	~ 200MB	~ 1.2 GB
CPU	1-2 vCPUs	2 vCPUs
RAM	1-2 GB	2GB
Storage	Flash ~4GB (1GB app data)	SSD (120GB/240GB/..)
IOS	C9300:17.3.3 C9400:17.5.1 C9300X: 17.6.1 C9400X:17.8.1	Starting from 17.6.1
Tests	Network DNS Voice HTTP (Page Load and Transaction tests are not included)	All Tests including Page Load and Transaction tests

ThousandEyes agent preloaded on flash

# Moving App from Flash to SSD for BrowserBot

- 1 Upgrade to 17.6.1 or later
- 2 Insert SSD
- 3 Configure “no iox” then “iox” , TE version in Flash will auto transfer to SSD.
- 4 Once transfer completed, Upgrade to latest TE version.  
Upgrade via “app-hosting upgrade <url>” CLI or DNA-C
- 5 Same TE instant will upgrade, and test will continue.

# ThousandEyes access for new Catalyst 9300/9400 Series switches



1  
New 9300/9400 purchased with DNA-A or DNA-P on CCW



2  
ThousandEyes agent Preloaded in flash by manufacturing



3  
Account login received via email



4  
Day 1 access to ThousandEyes account

# ThousandEyes access for existing Catalyst 9300/9400 Series switches

1



Accept  
ThousandEyes  
entitlement in  
CSSM

2



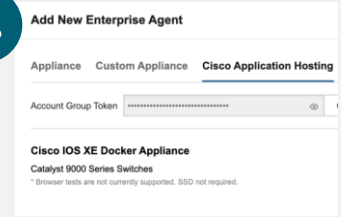
Account login  
received  
via email

3



Upgrade  
IOSXE on the  
switch  
17.3.3 – 9300  
17.5.1 – 9400  
17.6.1 – 9300X

4

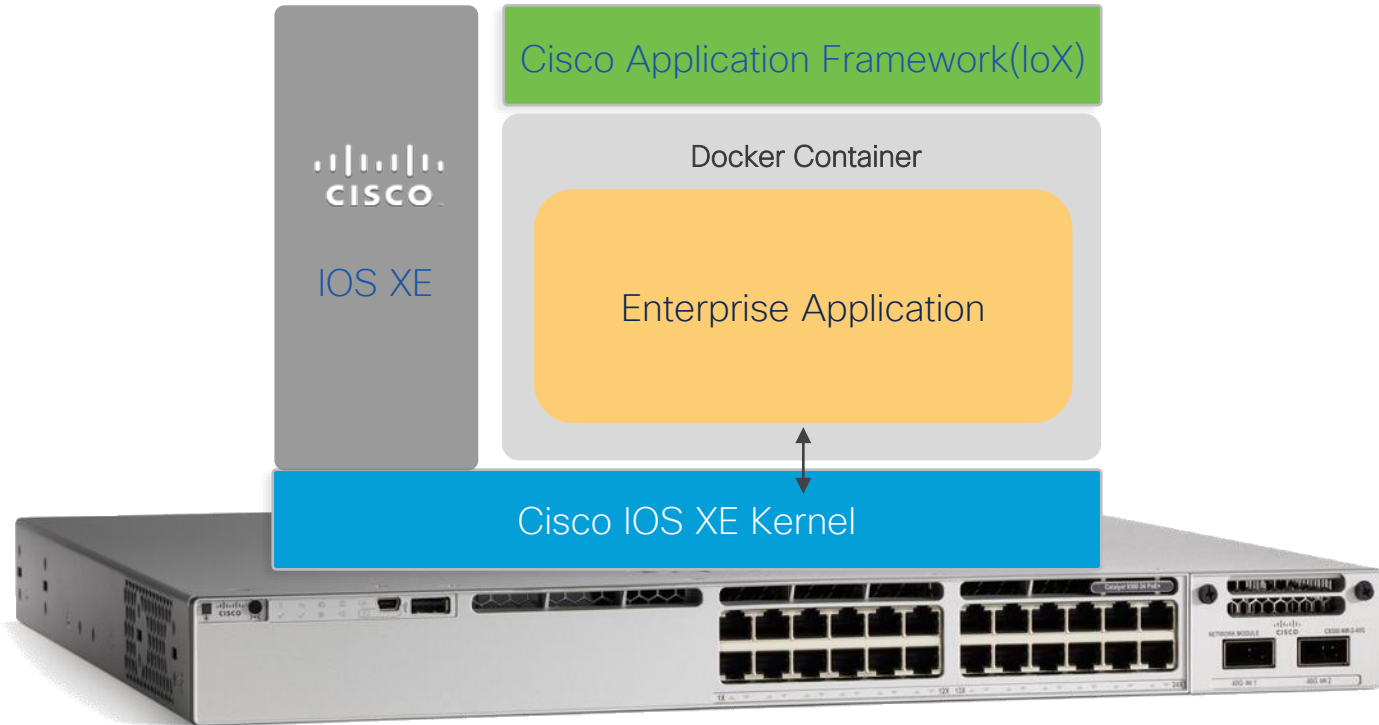


Download and  
install  
enterprise  
agent from the  
TE portal

# Catalyst 9000 App Hosting Infra

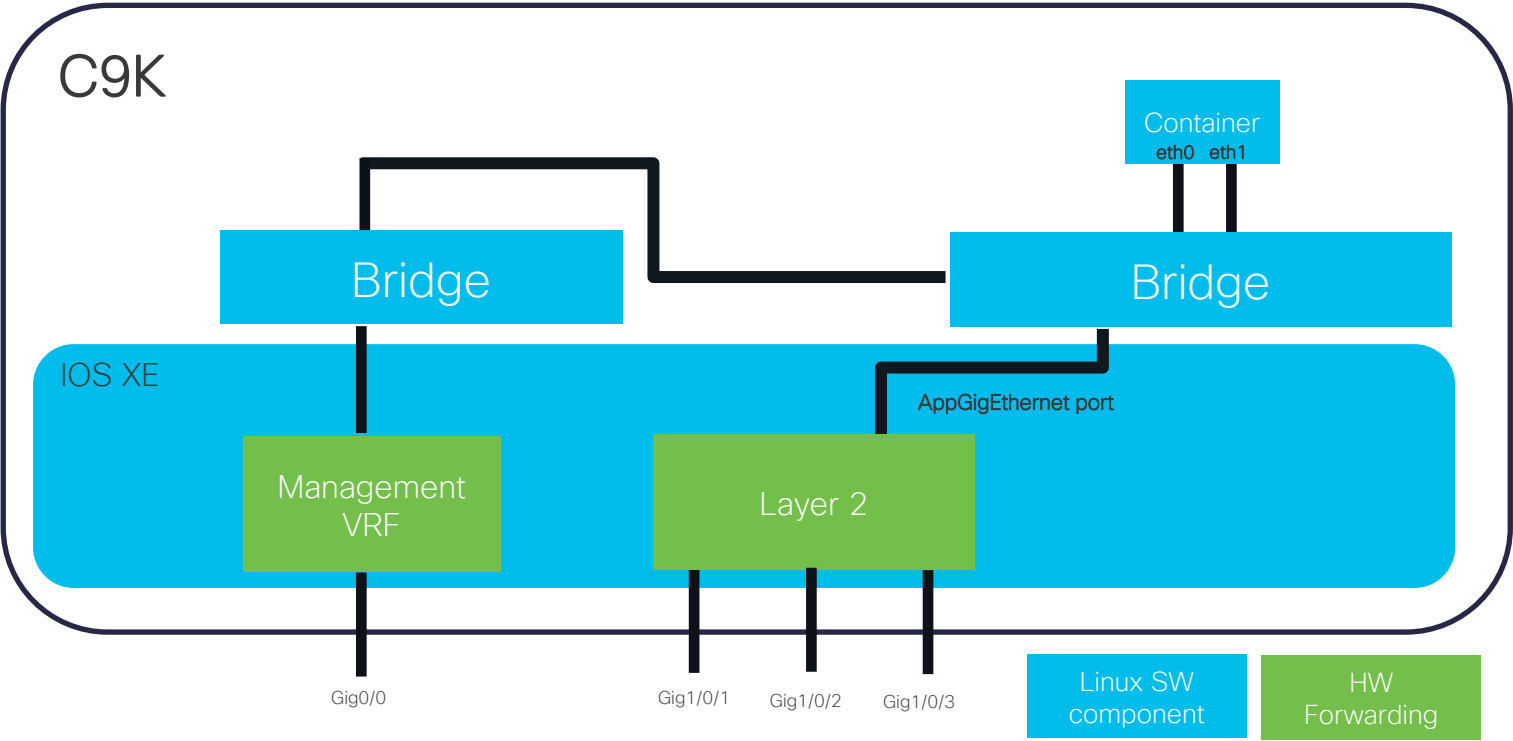


# Catalyst 9000 Application Hosting Infra



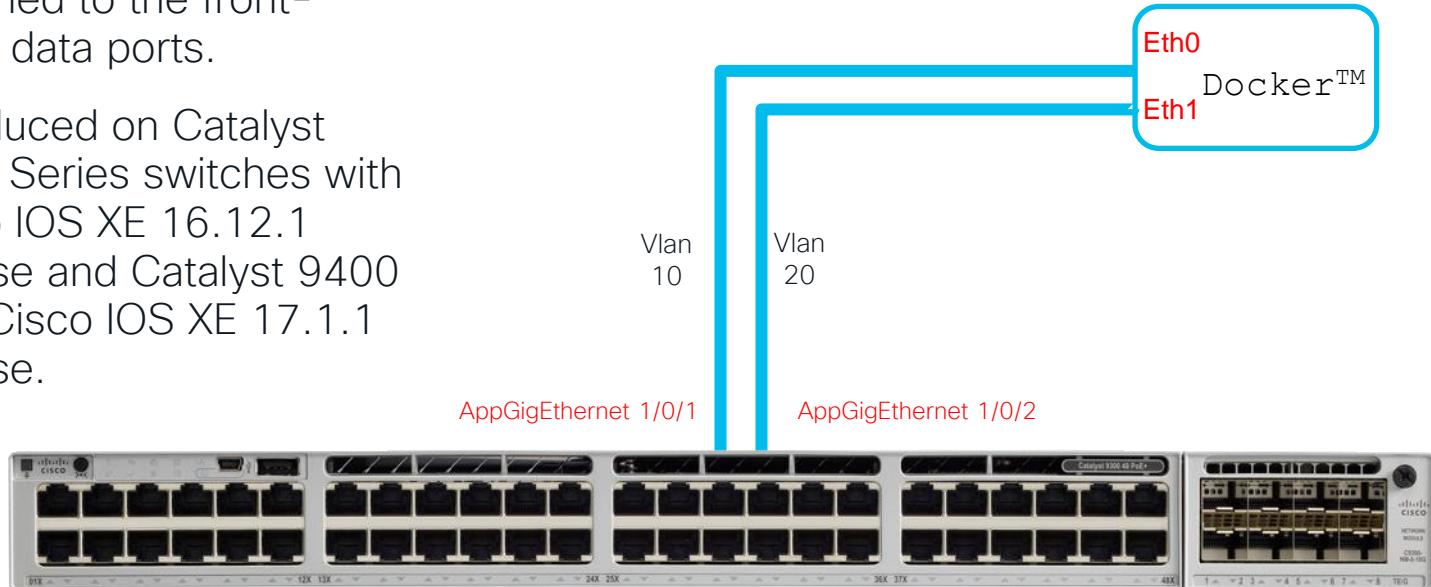


# Catalyst 9000 Containers Networking



# AppGigEthernet Port

- An internal hardware data port which is hardware-switched to the front-panel data ports.
- Introduced on Catalyst 9300 Series switches with Cisco IOS XE 16.12.1 release and Catalyst 9400 with Cisco IOS XE 17.1.1 release.




# C9K HW resources for App Hosting

	Resource type	Catalyst 9300	Catalyst 9300-X	Catalyst 9400	Catalyst 9400-X	Catalyst 9500	Catalyst 9500-X	Catalyst 9600	Catalyst 9600-X
Networking	AppGig Port	1x1G	2x10G	1x1G	2x10G	Mgmt Port*	2x10G	Mgmt Port*	Mgmt Port* (2x10G CPU ports)
Resources	Memory	2GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB
	CPU	1 core	2 core	1 core	1 core	1 core	1 core	1 core	1 core
	Storage	240GB (USB3.0/SSD)	240GB (USB3.0/SSD)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)

\* Using loopback with any external ports

**Catalyst 9300-X**

USB 3.0  
240GB




Back panel



**Catalyst 9400-X**

M2 SATA  
480/960GB




Plug into removable SUP



**Catalyst 9500-X**

M2 SATA  
480/960GB




Back panel



**Catalyst 9600-X**

M2 SATA  
480/960GB

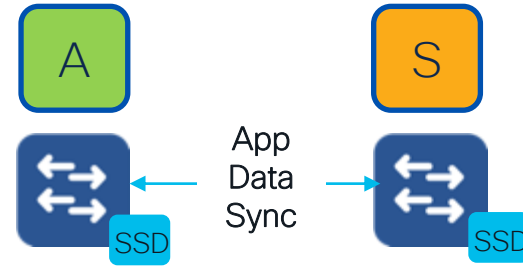


Plug into removable SUP



# App Hosting High Availability with Auto-Restart

- Provides cold restartability of application and the underlying app hosting framework
- Retain the last configured operational state of app in the event of system switchover or restart
- 1+1 redundancy mode
- Same storage type (Flash\* or SSD) required on both Active and Standby
- Enabled by default



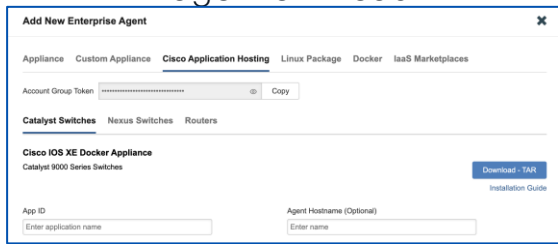
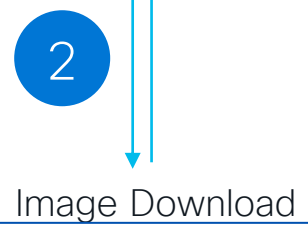
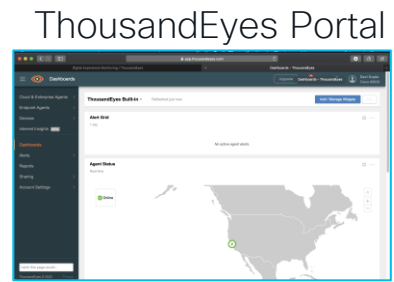
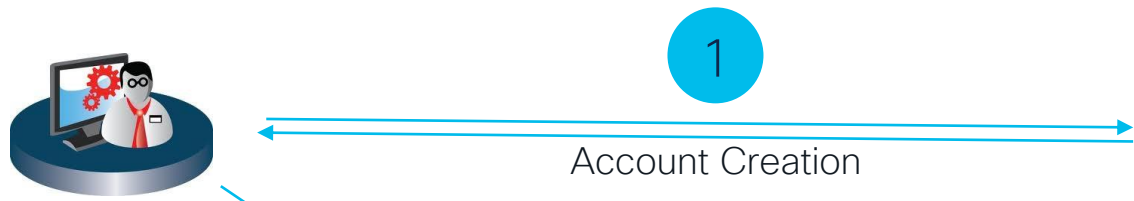
Supported Platforms	Release
9300 StackWise (1+1 mode only)	17.2.1
9400 Dual Sup (Single Chassis & StackWise Virtual)	17.5.1
9500H StackWise Virtual	17.5.1
9600 Dual Sup (Single Chassis & StackWise Virtual)	17.5.1

\* Flash is only for Cisco Singed app

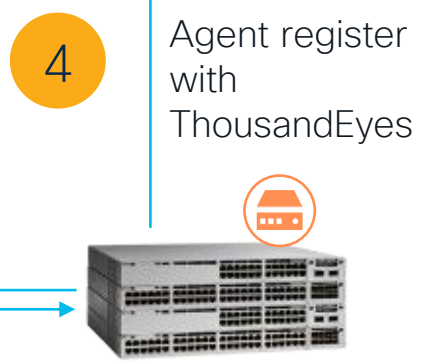
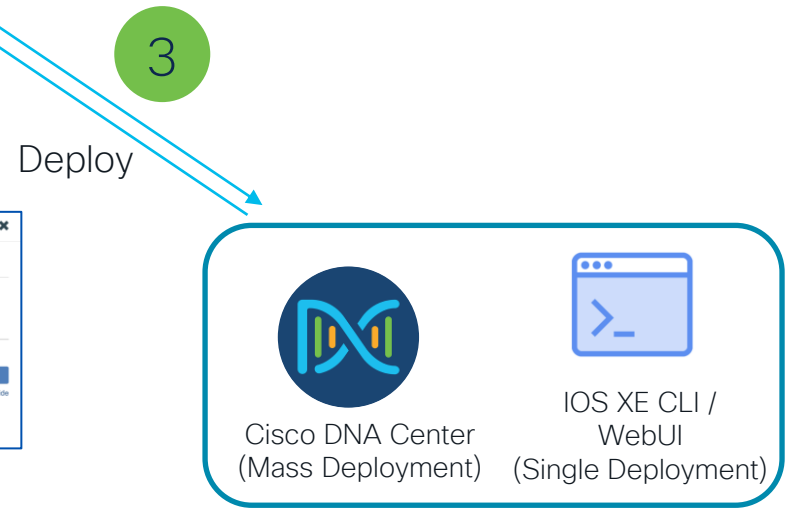
# Deployment



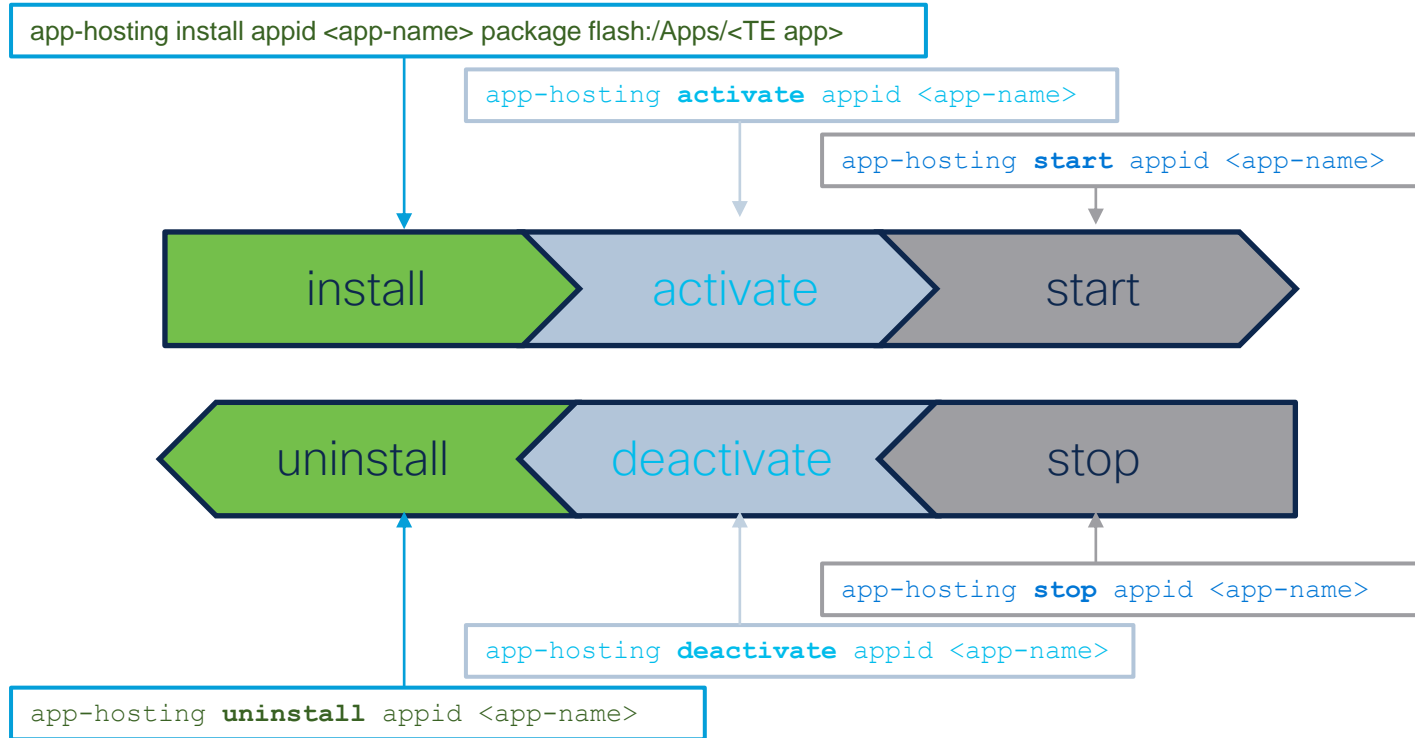
# ThousandEyes deployment workflow



ThousandEyes Docker Image Download  
(only if not present in Flash)



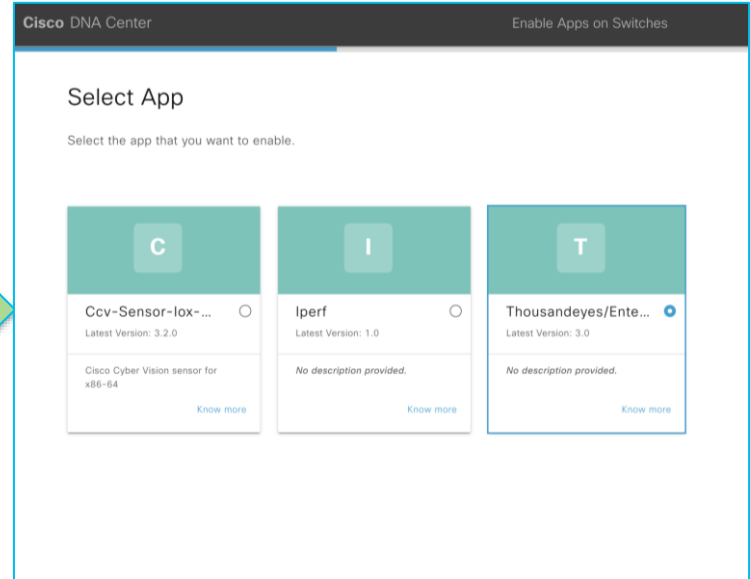
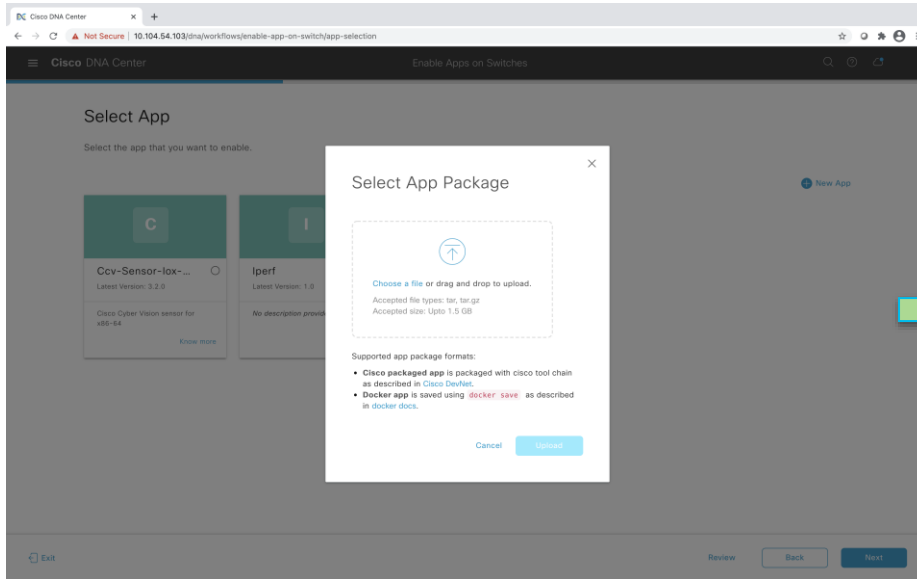
# App lifecycle management – state transitions



# Cisco DNA Center Deployment

Step

1





# Select switches and configure app

DNA Center Enable Apps on Switches

## Select Switches

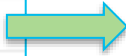
Select switches where you want to enable **thousandeyes/enterprise-agent**.

Switches (2) 0 Selected

Search Table

<input type="checkbox"/>	Device Name	Site	IP Address	Serial Number
<input type="checkbox"/>	197-CAT-DOG.cisco.com	.../BLR-18/FLR-1	10.78.106.197	FCW2221G0HJ
<input type="checkbox"/>	198-CAT.cisco.com	.../BLR-18/FLR-1	10.78.106.198	FOC2221Z072

2 Records



Cisco DNA Center Enable Apps on Switches

## Configure App

Configure app specific settings to bootstrap **thousandeyes/enterprise-agent**.

**Add Application Vlan**

Network Settings

Interface Name: eth0  
 VLAN: VLAN0299  
 Address Type: Dynamic

App Resources

App Data

Docker Runtime Options

If the app requires docker runtime options add/edit them here.

```
-e TEAGENT_ACCOUNT_TOKEN=ADD_DATA --hostname=$(SYSTEM_NAME) --cap-add=NET_ADMIN --mount type=tmpfs,destination=/var/roq/agent,tmpfs-size=1kum --mount type=tmpfs,destination=/var/lib/te-agent/data,tmpfs-size=200m -v $(APP_DATA)/data:/var/lib/te-agent -e TEAGENT_PROXY_TYPE=DIRECT -e TEAGENT_PROXY_LOCATION= -e
```

**Add Account Token from ThousandEyes Account**

The app will be started by default. Deselect this option only if you do not want the app to be started after installation.

Start app on installation

# Cisco DNA Center Deployment

Cisco DNA Center Enable Apps on Switches

## Track Provisioning Status

Provisioning of **thousandeyes/enterprise-agent** is completed.

### Task Progress

✓ 1 Provisioned 🔄 0 In-Progress ✗ 0 Failed [View Details](#)

Site	Switches	Task Progress
Bengaluru		
BLR-18	1	<span>✓</span>

# ThousandEyes dashboard

The screenshot shows the ThousandEyes dashboard interface. On the left is a dark sidebar with a menu. The main content area displays the 'AGENT STATUS' section, which includes a world map with agent locations and a summary box showing 5 Online and 1 Offline agents. Below the map is a table of agents with columns for Agent Name, Hostname, Utilization, and Status/Last Contact. The 'CBK-Demo' agent is highlighted with a green border.

**Dashboard Menu:**

- Cloud & Enterprise Agents (highlighted with an orange box)
- Views
- Test Settings
- Agent Settings
- BGP Monitors
- Endpoint Agents
- Devices
- Internet Insights
- Dashboards
- Alerts
- Reports
- Sharing
- Account Settings

**AGENT STATUS Summary:**

- 5 Online
- 1 Offline

**Agents Table:**

Agent Name	Hostname	Utilization	Status/Last Contact
London (Cat9k agent)	ip-12-0-0-86	General 1%	1 minute ago
Target Agent- S2S	C93CSR-Client02	General 1%	1 minute ago
CBK	CBK	General 1%	1 minute ago
<b>CBK-Demo</b>	CBK-Demo	General 1%	<b>Just now</b>
CBK-CL_Demo	CBK-Demo	General 1%	1 minute ago
teye_pod10	teye_pod10	N/A	Yesterday

Agent registered with ThousandEyes Account

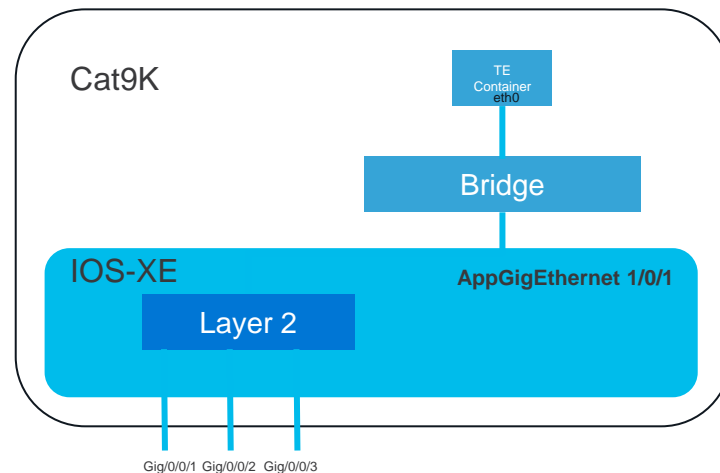
# CLI deployment

## New Deployment

- Image will be copied in **flash:Apps** directory by Manufacturing
- app-hosting install appid <app-name> package **flash:/Apps/<embedded-thousand-eyes-image>**

## Existing Deployment

- Download image from ThousandEyes portal
- app-hosting install appid <app-name> package <https-url-of-thousand-eyes-image>



### Enable IOX :

```
conf t
iox
```

### AppGigEthernet Configuration :

```
interface AppGigabitEthernet1/0/1
  switchport trunk allowed vlan <vlan-id>
  switchport mode trunk
```

# App configuration

## App Configuration :

```
app-hosting appid <app-name>
  app-vnic AppGigabitEthernet trunk
  vlan <vlan-id> guest-interface 0 ← refer to eth 0
  guest-ipaddress <app-ip> netmask <mask>
  app-default-gateway <gateway-ip> guest-interface 0

app-resource docker
  run-opts 1 "-e TEAGENT_ACCOUNT_TOKEN=<token-id>*"
  prepend-package-opts
```

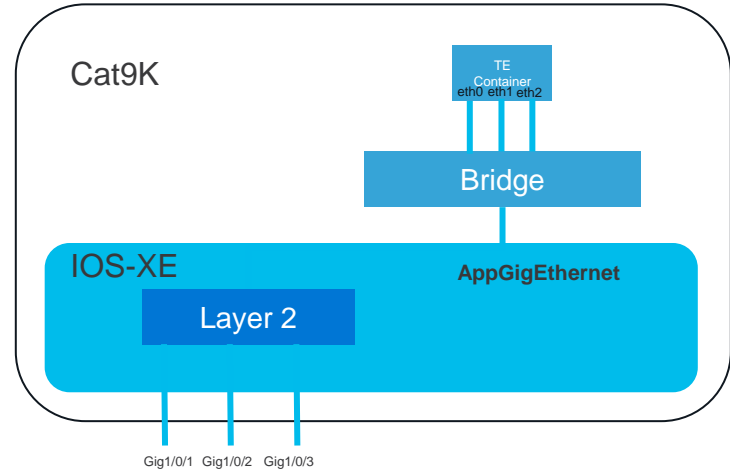
## Run TE App:

```
app-hosting activate appid <app-name>
app-hosting start appid <app-name>
```

## Verify TE App:

```
Show app-hosting list
```

\* <token-id> is available in ThousandEyes Account



Virtual NIC inside containers are seen as standard Ethernet interfaces (“eth#”)

# ThousandEyes dashboard

The screenshot shows the ThousandEyes dashboard interface. On the left is a dark sidebar with navigation options: Cloud & Enterprise Agents (highlighted with an orange box), Views, Test Settings, Agent Settings, BGP Monitors, Endpoint Agents, Devices, Internet Insights, Dashboards, Alerts, Reports, Sharing, and Account Settings. The main content area is titled 'Default (Example)' and 'Refreshed just now'. It features an 'AGENT STATUS' section with a world map showing 5 Online and 1 Offline agents. A callout box on the map shows a green circle with '5' and a red circle with '1'. Below the map is a table of agents.

Agent Name	Hostname	Utilization	Status/Last Contact
London (Cat9k agent)	ip-12-0-0-86	General 1%	1 minute ago
Target Agent- S2S	C93CSR-Client02	General 1%	1 minute ago
CSK	CSK	General 1%	1 minute ago
<b>CSK-Demo</b>	CSK-Demo	General 1%	<b>Just now</b>
CSK-CL_Demo	CSK-Demo	General 1%	1 minute ago
teye_pod10	teye_pod10	N/A	Yesterday

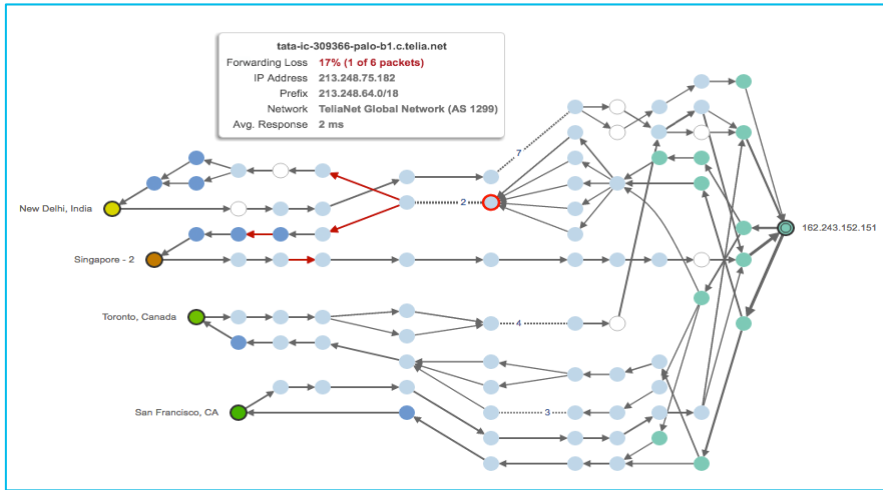
Agent registered with Thousand Account

Demo



# Conclusion

End-to-end visibility with ThousandEyes



## Key Benefits

- **Service assurance** – Ensure performance of critical business apps with groundbreaking observability across LAN, WAN, service providers and cloud/SaaS networks
- **Rapid remediation** – Quickly locate issues across LAN, service providers, and cloud/SaaS networks
- **Simple deployment**– ThousandEyes enterprise agent is natively hosted on your Cisco Catalyst 9300 and 9400 series switches with Cisco DNA Center



# Complete your Session Survey

- Please complete your session survey after each session. Your feedback is important.
- Complete a minimum of 4 session surveys and the Overall Conference survey (open from Thursday) to receive your Cisco Live t-shirt.
- All surveys can be taken in the Cisco Events Mobile App or by logging in to the Session Catalog and clicking the "Attendee Dashboard" at <https://www.ciscolive.com/emea/learn/sessions/session-catalog.html>



# Continue Your Education



Visit the Cisco Showcase for related demos.



Book your one-on-one Meet the Engineer meeting.



Attend any of the related sessions at the DevNet, Capture the Flag, and Walk-in Labs zones.



Visit the On-Demand Library for more sessions at [ciscolive.com/on-demand](https://ciscolive.com/on-demand).



The bridge to possible

Thank you

CISCO *Live!*

CISCO *Live!*

ALL IN