Accelerating TAC Case Resolution with Innovative Cisco Wireless Tools and Solutions

Madhuri C
Principal Engineer, Linkedin-Madhuri

Session ID: BRKEWN-2430

Cisco Webex App

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

How

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2. Click “Join the Discussion”
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4. Enter messages/questions in the Webex space

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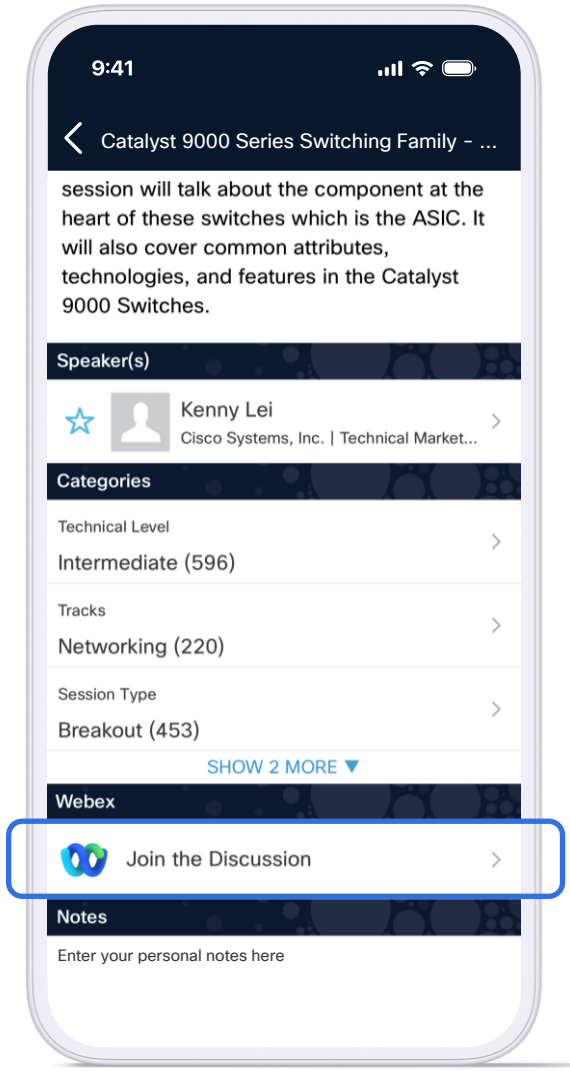

https://ciscolive.ciscoevents.com/
ciscolivebot/**#BRKEWN-2430**

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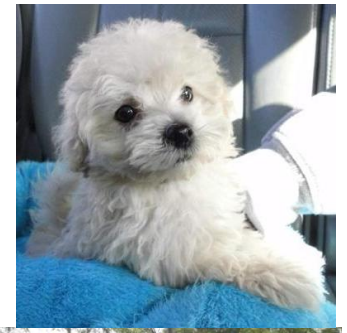
About Madhuri

Started in 2008 & currently working as Principal Engineer



Leo & his Family

CL Melbourne

CCIE 10 Years

First Patent

Industry Recognition (Asia pacific Stevie, Pinnacle, NASSCOM Finalist & featured in NASSCOM coffee table book, Times of India)

My Family

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Agenda

01 Troubleshooting Basics

02 Flexible Options Overview

03 Proactive Engagement

04 In-Product Assistance

05 Diagnostic Tools

06 Dashboards
-Catalyst Center, Meraki

07 Advanced Scripts

08 RADKit

09 Cisco AI Assistant

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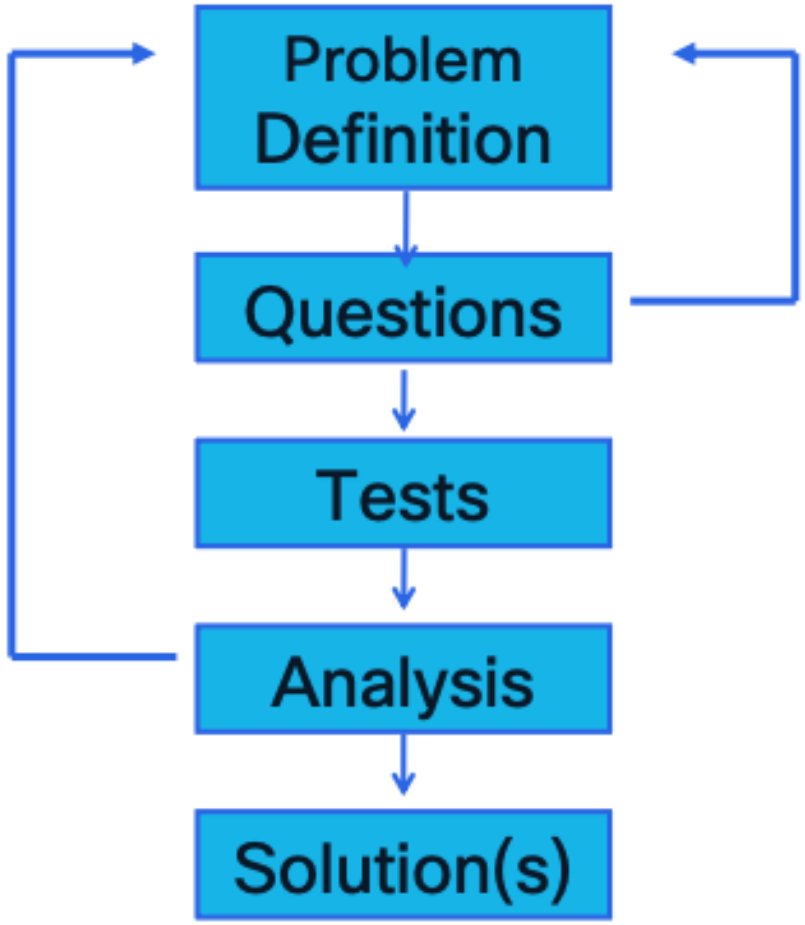
Troubleshooting Basics



Approach

- Clearly define the problem
  - Understand any possible triggers
  - Question & seek clarity
  - Know the expected behaviour
  - Reproducibility - Intermittent/Consistent ?
- Test various scenarios & combinations
- Analysis
- Arrive at the solution

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Flexible Options to Self-Serve & Accelerate Case Resolution

Proactive Engagement
- Log Advisor
- Vulnerability Checker
- Talk to cisco.com

DignosticTools
- AP, WLC Debugs
- Wireless Config Analyzer Express
- Debug Analyzer
- WiFi Hawk-Over the air

Advanced Scripts
- EEMs
- Guest Shell
- WLAN Poller

Case Open

A

In-Product Assistance
- WalkMe
- Cisco Support Assistant Extension

B

C

Monitoring Dashboards
- Catalyst Center
- Meraki Dashboard

D

E

Cloud Like Tool
- RADKit

Case Closure

1. Prevent TAC case

2. Gather and Analyze Data

3. KPI Monitoring, Workarounds, TAC Handoff

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Proactive Engagement

Flexible Options to Self-Serve & Accelerate Case Resolution

Proactive Engagement

- Log Advisor
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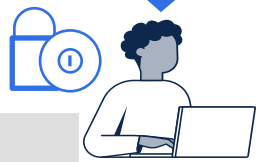

A

In-Product Assistance

- WalkMe
- Cisco Support Assistant Extension

B

C

Monitoring Dashboards

- Catalyst Center
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E

Cloud Like Tool

- RADKit

1. Prevent TAC case

2. Gather and Analyze Data

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Proactive Engagement

Scenario : Engage before case open or perhaps prevent a case ?

1. Log Advisor

- Gather insights on right data to be gathered before opening TAC Case
- Helps resolve TAC case faster

2. Check Vulnerability

- Verify if your hardware and software is impacted.
- Get additional details on CVE, Bug, Workarounds, Fix
- Prevent TAC case

3. Talk to Cisco.com

- Talk to virtual assistance to understand compatibility on hardware, software, Field Notice Applicability
- Prevent TAC case

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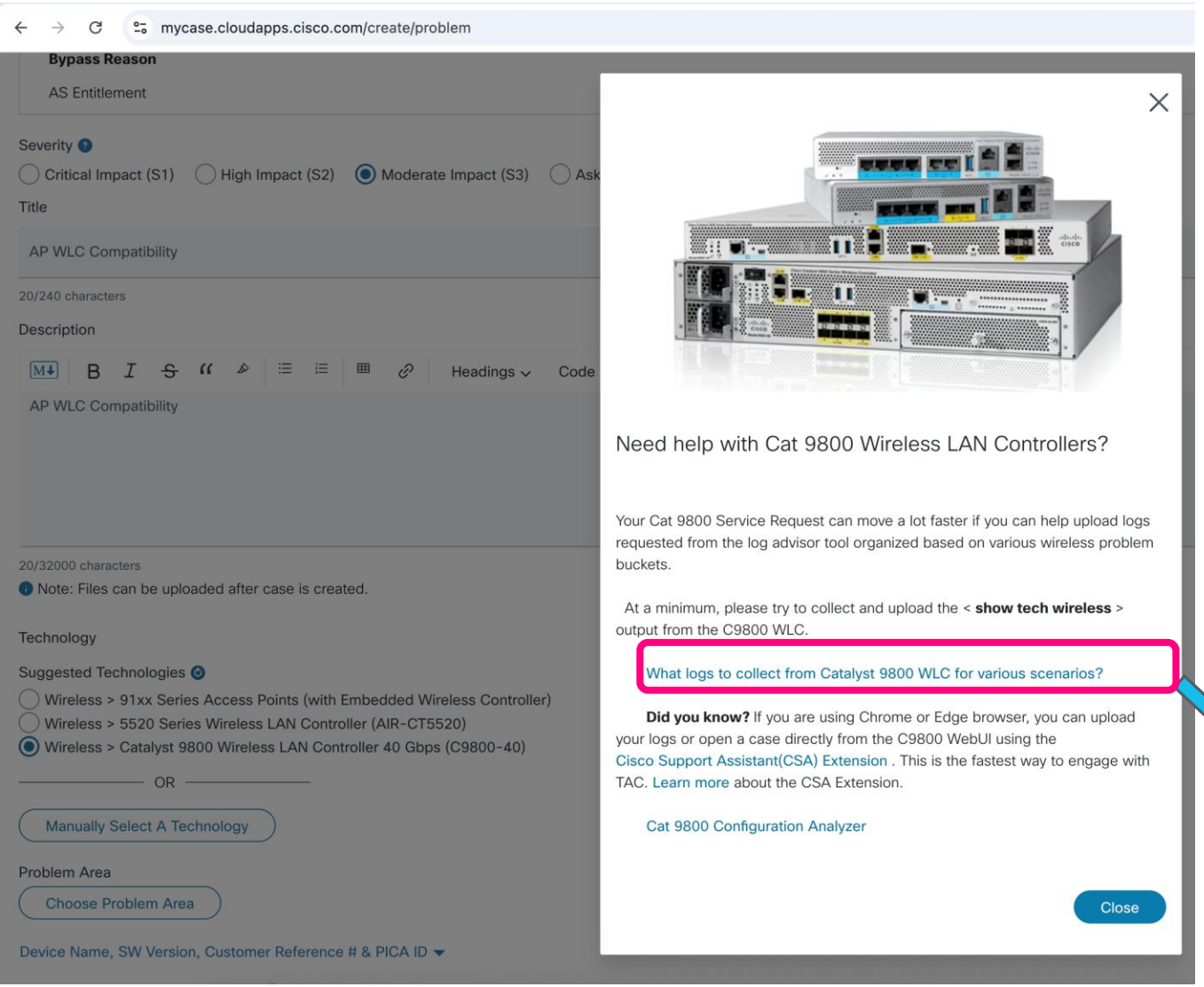
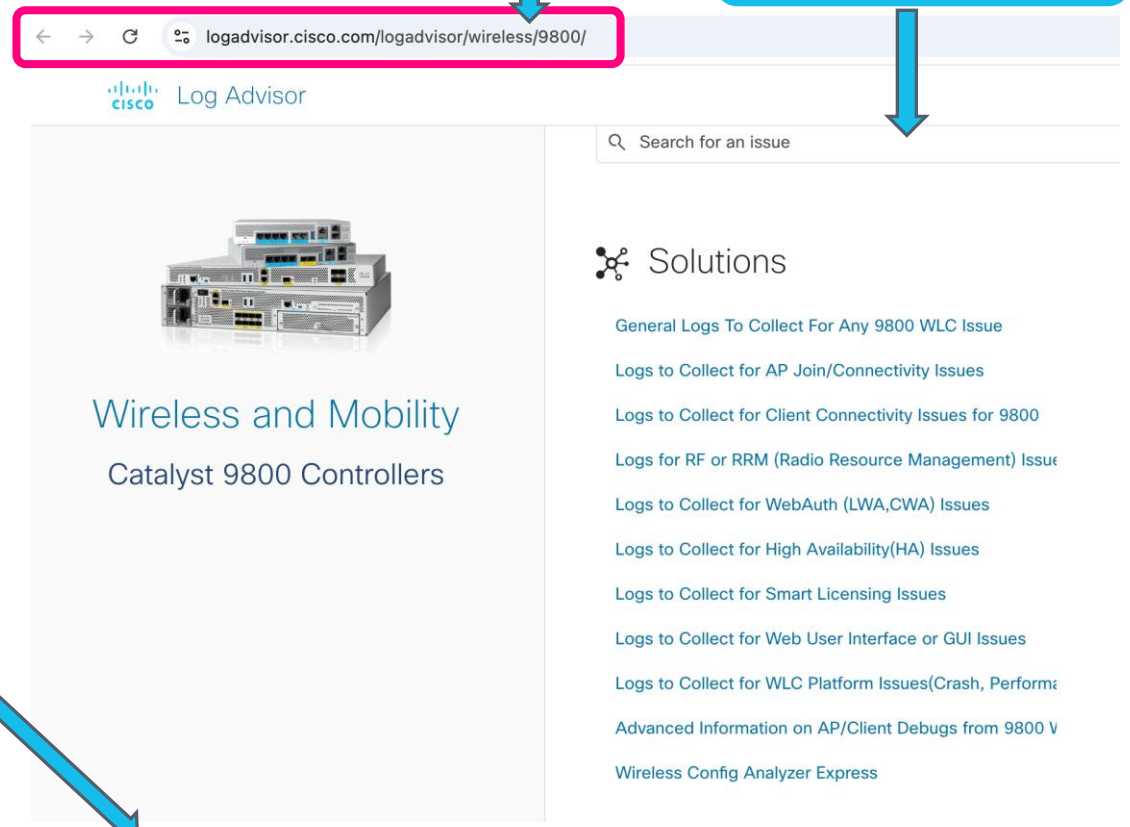
1. Log Advisor – Log Collection Insights



https://logadvisor.cisco.com/

Menu of Scenarios



In SCM (Support Case Manager)

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Log Collection Insights - Log Advisor

Wireless and Mobility / Catalyst 9800 Controllers / Logs to Collect for Client Connectivity Issues for 9800

Self-service and validation

This scenario will cover client connectivity issues, association issues, authentication issues, disconnections, roaming issues.

Outputs to check key performance indicators KPIs to identify if there could be client connectivity issues:
Check for client delete reasons, identify top delete reason and see if counters are increasing

```
show wireless stats client delete reasons | ex 0
```

Additional logs to collect for client connectivity issues.

```
Always-On Tracing:
show logging profile wireless filter mac <Client_MAC> to-file always-on-<FILENAME.txt>
RadioActive Tracing:
debug wireless mac <Client_MAC>
Embedded Captures filtered by client MAC:
monitor capture MYCAP clear
monitor capture MYCAP interface Po1 both
monitor capture MYCAP buffer size 100
monitor capture MYCAP match any
monitor capture MYCAP mac <Client_MAC>
monitor capture MYCAP start
!!Reproduce
monitor capture MYCAP stop
monitor capture export flash:|tftp:|http:.../filename.pcap
```

Data to be gathered for Client connectivity issues

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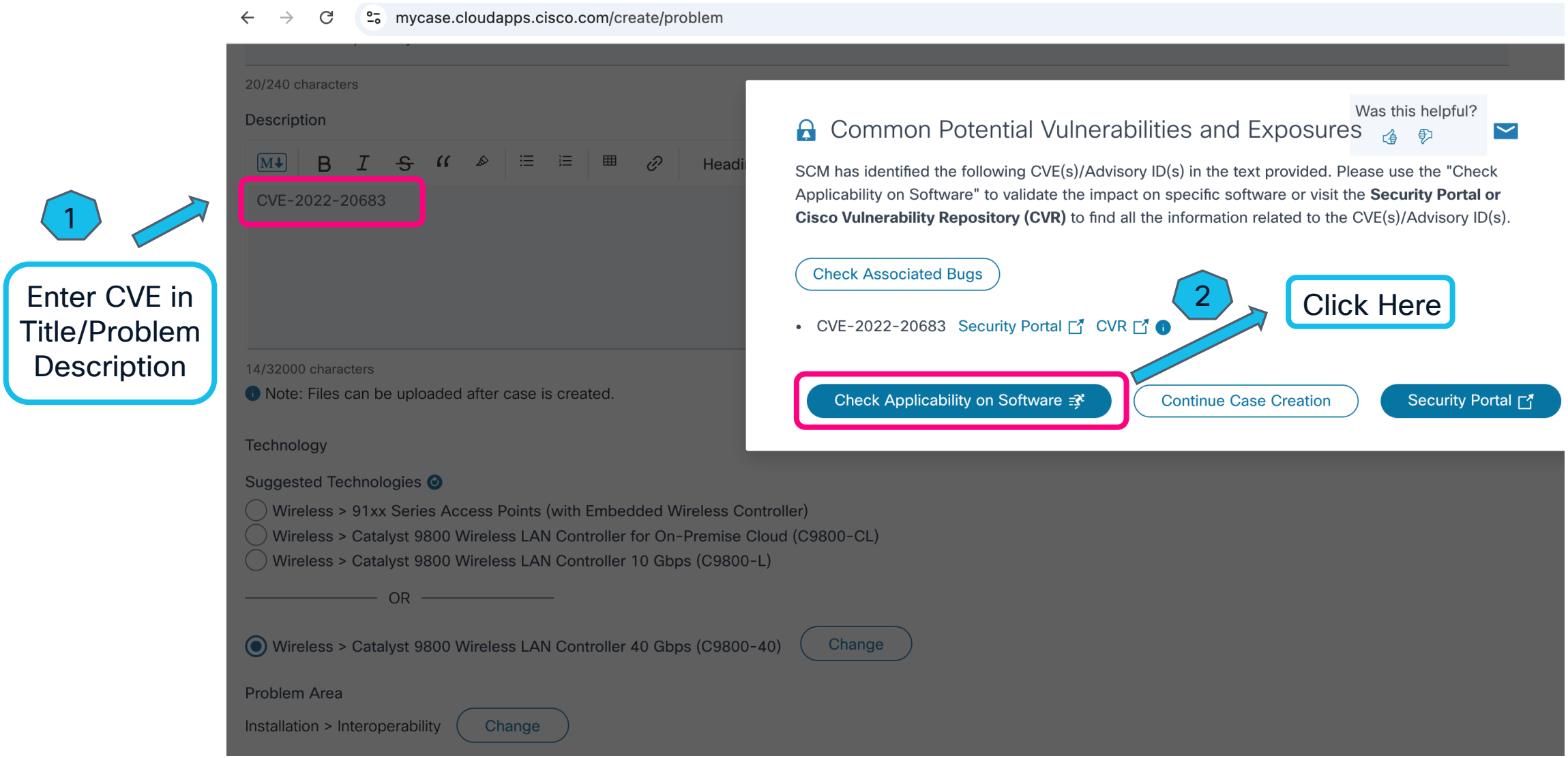
2. Vulnerability – Check Applicability



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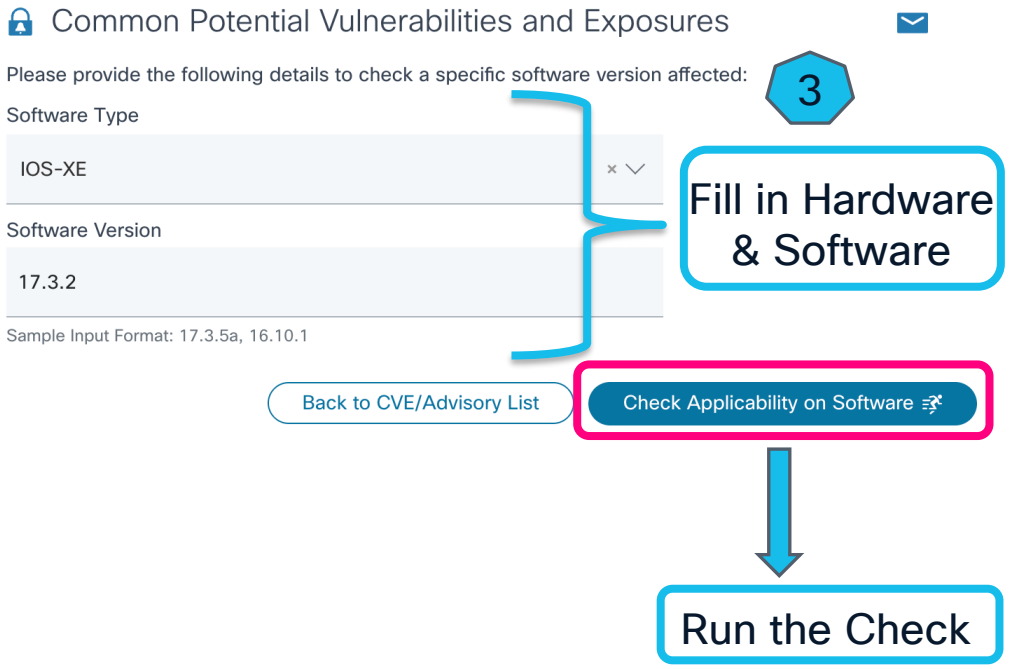
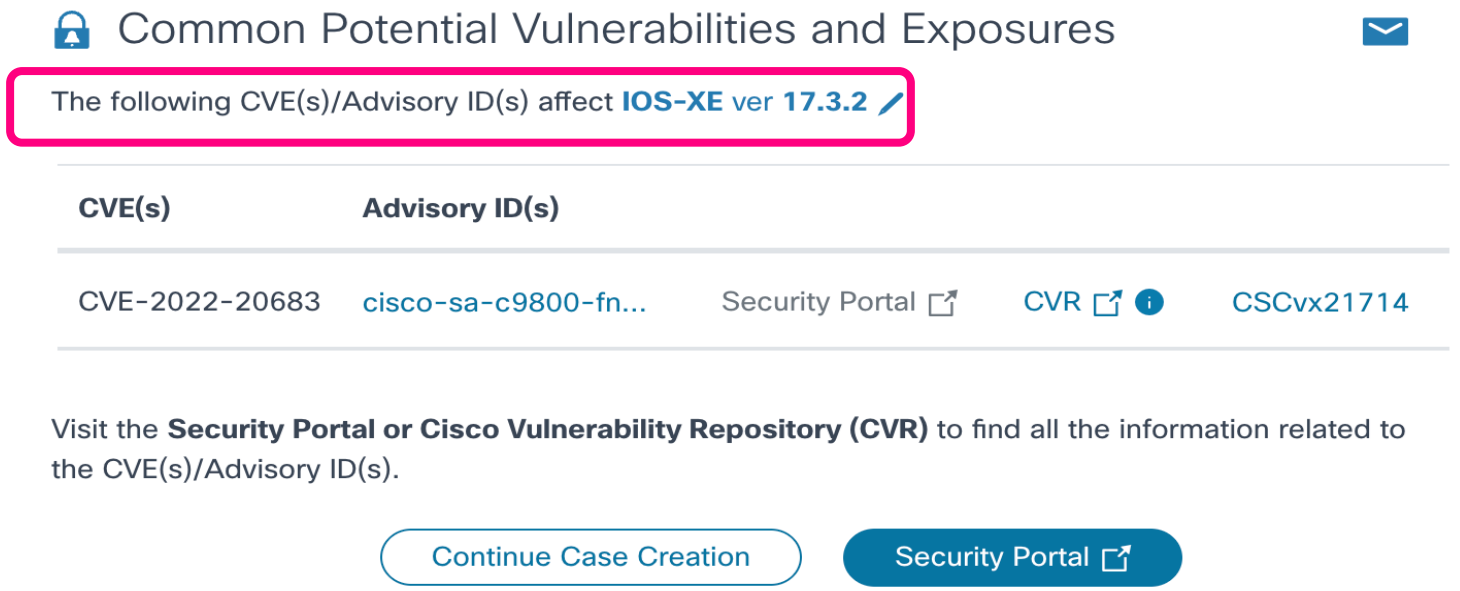
Vulnerability Applicability

Impacted in 17.3.2





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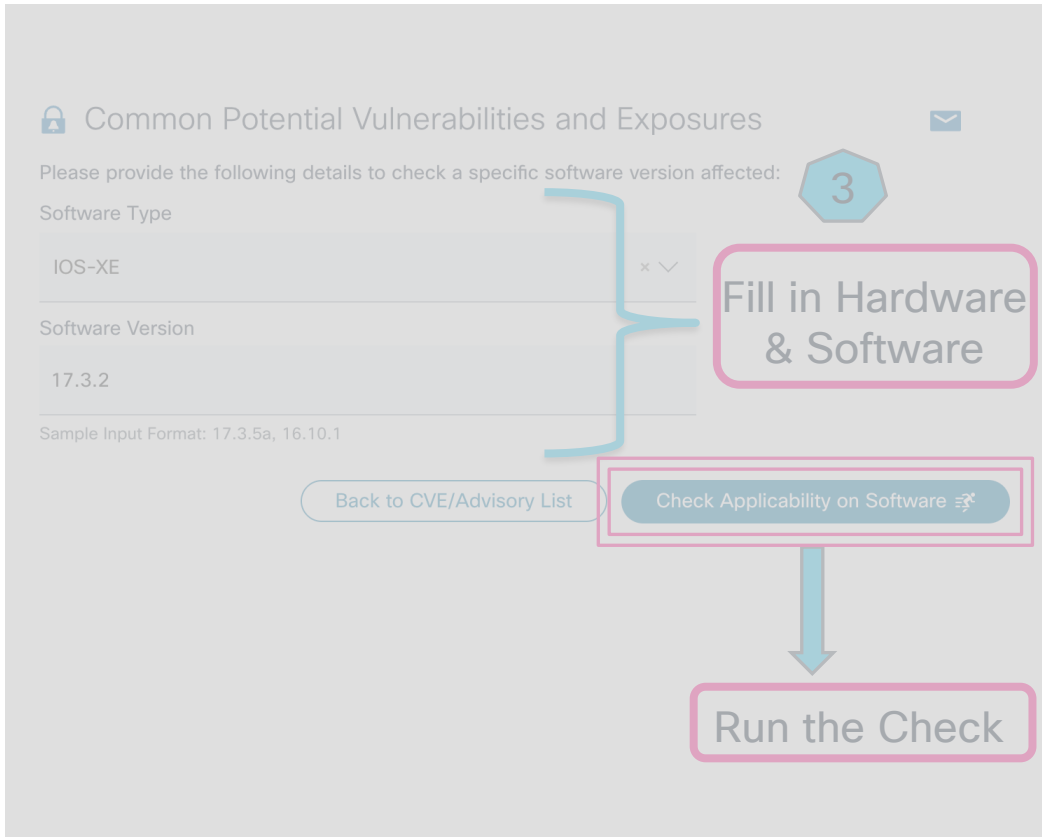
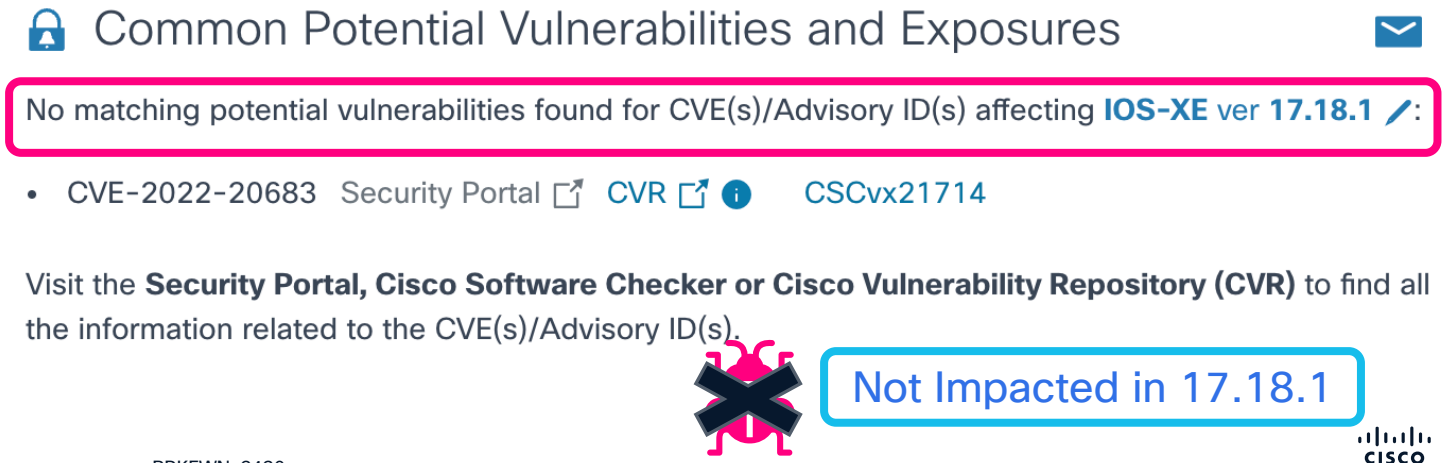
Vulnerability Applicability





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3. Check Compatibility: Virtual Assistance in Cisco.com

Talk to Virtual Assistance in Cisco.com

... / Cisco Wireless LAN Controller Software / Compatibility Information /

Cisco Wireless Solutions Software Compatibility Matrix

Save Download Print

Updated: July 22, 2025

Bias-Free Language

Contents

- **Cisco Wireless Solutions Software Compatibility Matrix**
  - Conventions
  - Cisco Catalyst 9800 Series Wireless Controller Matrix
  - Cisco Catalyst 9800 Wireless Controller Specific Software Release Support
  - Cisco Embedded Wireless Controller Matrix
  - Cisco Access Points Supported in Cisco Wireless Controller Platform Software Releases
    - Supported Access Points in Cisco Catalyst 9800 Series Wireless Controller Software Releases
    - Supported Access Points in Cisco Catalyst 9800 Embedded Wireless Controller
    - Supported Access Points in Cisco AireOS Wireless Software Releases
    - Supported Cisco Integrated Service Router 1100 Series and Embedded AP Models
    - Related Information
  - Access Point Specific Wireless Controller Software Support
  - Cisco AireOS Wireless Controller Specific Software Release Support
  - Cisco Aironet 1800s Active Sensor Compatibility Matrix
  - Inter Release Compatibility Matrix within Platforms
    - Inter Release Compatibility Matrix between IOS-XE Software Releases
    - Inter Release Compatibility Matrix between AireOS Releases
  - Cisco Spaces Compatibility Matrix
  - Cisco Connected Mobile Experiences Compatibility Matrix
    - Important Notes for Connected Mobile Experiences Platform
    - Cisco CMX Compatibility Matrix

Was this Document Helpful?

Yes No Feedback

Customers Also Viewed

- Recommended Cisco IOS XE Releases for Catalyst 9800 Wireless LAN Controllers
- Troubleshoot a Lightweight AP that Fails to Join a WLC

Contact Cisco

Open a Support Case

(Requires a Cisco Service Contract)

This Document Applies to These Products

2500 Series Wireless Controllers

Unleash the Power of TAC's Virtual Assistance
Login to enable assistance >

8500 Series Wireless Controllers

Aironet Active Sensor

+ Show All 15 Products

Login Here for Virtual Assistance

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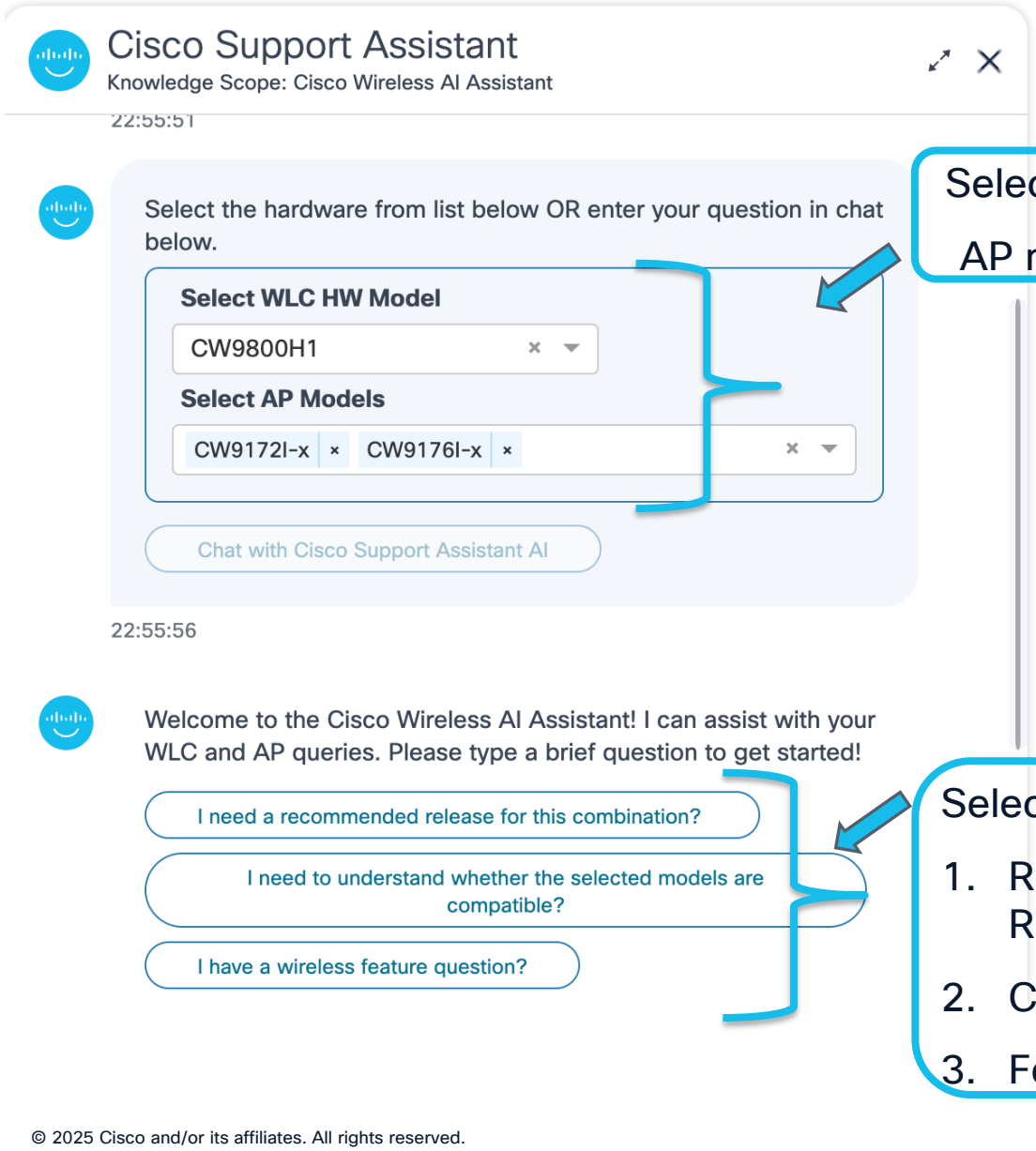
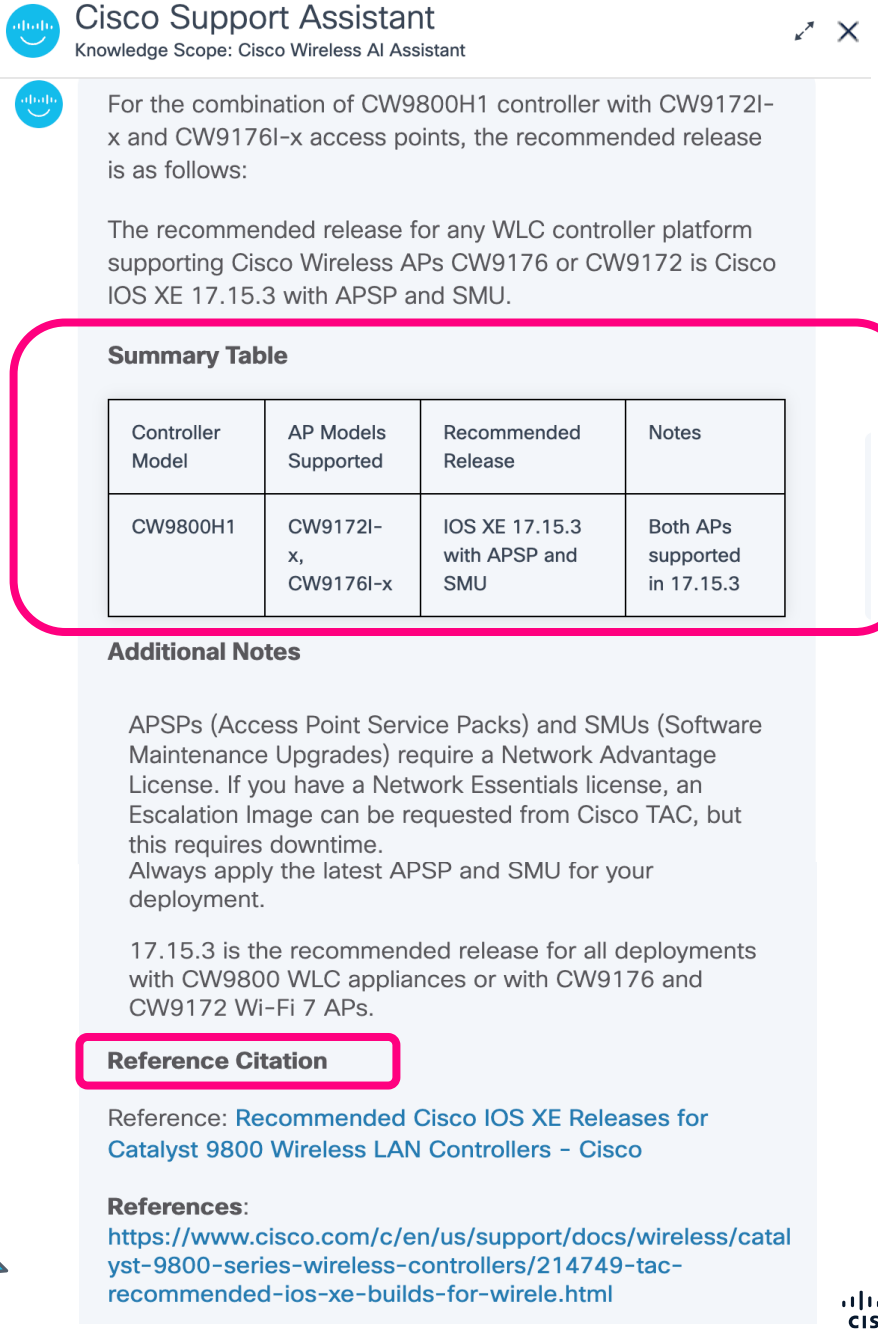
Compatibility Check



Select WLC, AP models

Select :

1. Recommended Release
2. Compatibility
3. Feature Qn



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Recommendation - Emailed

Wireless compatibility result - Chat with Cisco Support Assistant AI

N

no-reply@cisco.com <no-reply@cisco.com>

To: Madhuri C (madc)

Saturday, 9 August 2025 at 10:58 PM

Summary mail

For the combination of CW9800H1 controller with CW9172I-x and CW9176I-x access points, the recommended release is as follows:

The recommended release for any WLC controller platform supporting Cisco Wireless APs CW9176 or CW9172 is Cisco IOS XE 17.15.3 with APSP and SMU.

Summary Table

Controller Model	AP Models Supported	Recommended Release	Notes
CW9800H1	CW9172I-x, CW9176I-x	IOS XE 17.15.3 with APSP and SMU	Both APs supported in 17.15.3

Summary Table & Reference Citation

Additional Notes

- APSPs (Access Point Service Packs) and SMUs (Software Maintenance Upgrades) require a Network Advantage License. If you have a Network Essentials license, an Escalation Image can be requested from Cisco TAC, but this requires downtime.
- Always apply the latest APSP and SMU for your deployment.
- 17.15.3 is the recommended release for all deployments with CW9800 WLC appliances or with CW9176 and CW9172 Wi-Fi 7 APs.

Reference Citation

Reference: Recommended Cisco IOS XE Releases for Catalyst 9800 Wireless LAN Controllers - Cisco

References:

1. https://www.cisco.com/c/en/us/support/docs/wireless/catalyst-9800-series-wireless-controllers/214749-tac-recommended-ios-xe-builds-for-wirele.html
2. https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-12/release-notes/rn-17-12-9800.html
3. https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-13/release-notes/rn-17-13-9800.html
4. https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-9/release-notes/rn-17-9-9800.html

Source links:

1. https://www.cisco.com/c/en/us/support/docs/wireless/catalyst-9800-series-wireless-controllers/214749-tac-recommended-ios-xe-builds-for-wirele.html
2. https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-12/release-notes/rn-17-12-9800.html
3. https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-13/release-notes/rn-17-13-9800.html
4. https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-9/release-notes/rn-1 7-9-9800.html

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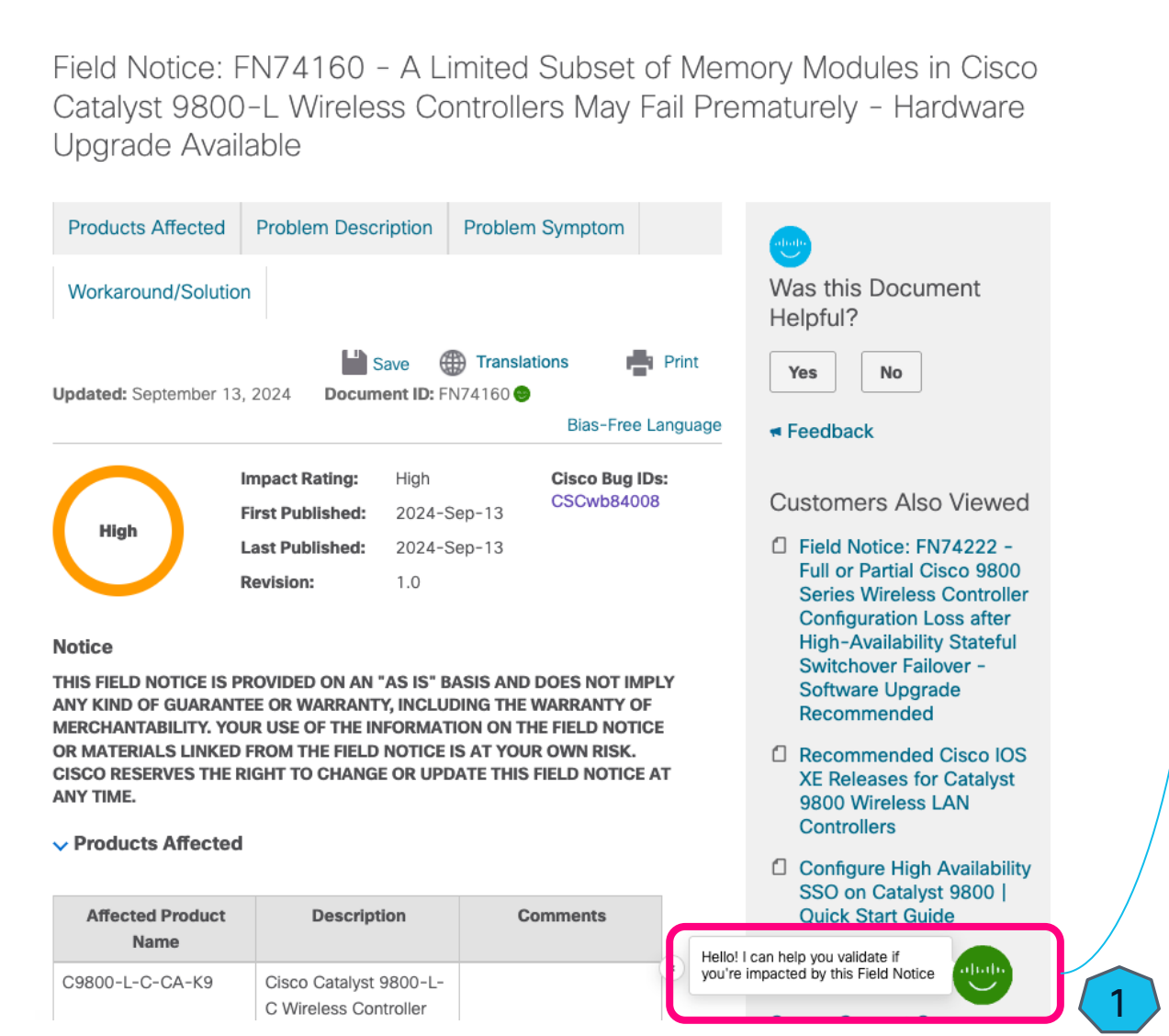
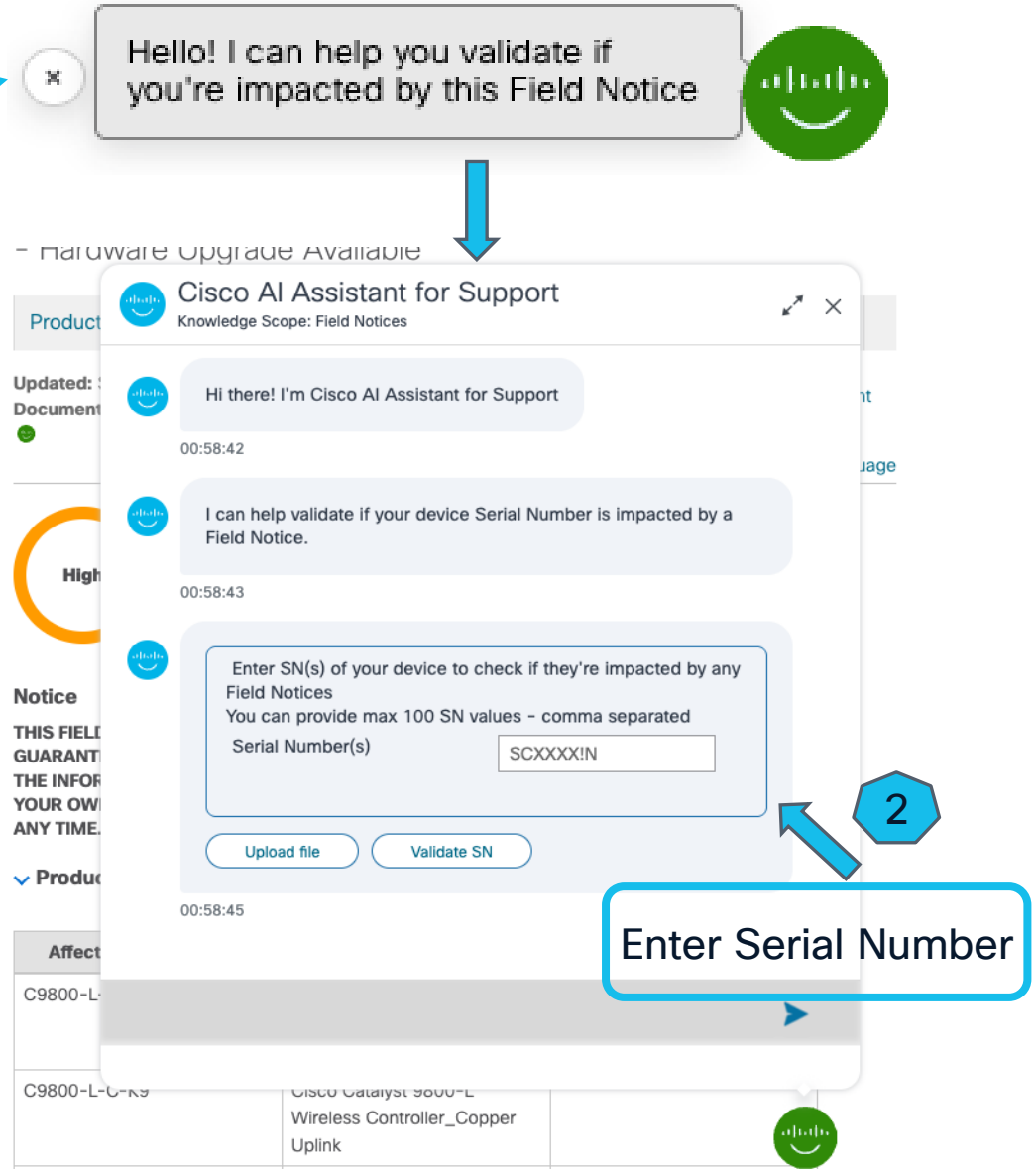
Field Notice - SN Validation:





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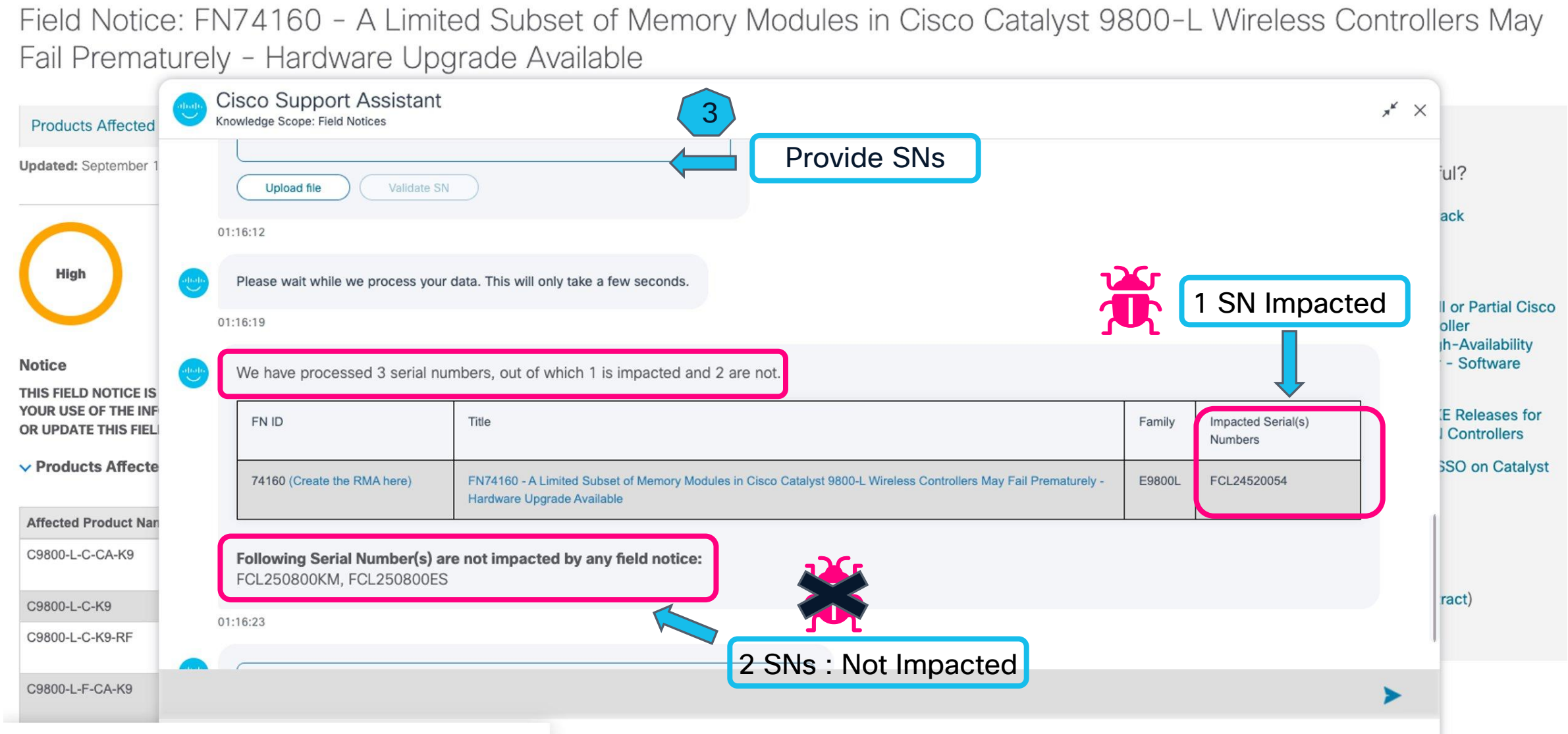
Field Notice: SN Validation (continued)



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Proactive Engagement : Summary

1. Use Log Advisor

- Leverage **Log Collection Modules (Log Advisor)** to gather insights on logs needed in SCM during case open.
- Helps resolve TAC case faster

2. Vulnerability Check

- Know if your hardware and software is impacted by CVE, Workarounds, Fix.
- Prevent TAC case

3. Talk to Cisco.com

- Talk to virtual assistance to get compatibility of hardware, software, recommended code, Field Notice(FN) Applicability
- Prevent TAC case

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Option A : In-Product Insights

Flexible Options to Self-Serve & Accelerate Case Resolution

Proactive Engagement

- Log Advisor
- Vulnerability Checker
- Talk to cisco.com

Case Open

DignosticTools

- AP, WLC Debugs
- Wireless Config Analyzer Express
- Debug Analyzer
- WiFi Hawk-Over the air

Advanced Scripts

- EEMs
- Guest Shell
- WLAN Poller

Case Closure

A

In-Product Insights

- WalkMe
- Cisco Support Assistant Extension

B

C

Monitoring Dashboards

- Catalyst Center
- Meraki Dashboard

D

E

Cloud Like Tool

- RADKit

1. Prevent TAC case

2. Gather and Analyze Data

3. KPI Monitoring, Workarounds, TAC Handoff

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In-Product Insights

Scenario : How to get insights in product and upload data from box directly ?

1. WalkMe (Guided Assistance)

- Provide insights or resources in product at right time and only if impacted
- Helps prevent issues and guide or walk you through config

2. Cisco Support Assistant Extension

- CSAE helps record screen, upload data, open TAC case etc directly.
- 17.18.2- Natively supported and integrated in product.

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In-Product Insights

Proactive, Predictive and Preemptive

Right Relevant Content → Right Person → Right Time

Detect

- Find relevant catastrophic defects, applicable insights

Assess

- Assess via automated, interactive multi-conditional check

Notify

- Real-time notification within product for user to take action

Outcome

- Prevent Outages, Save time, Deflect Cases, Self-Serve

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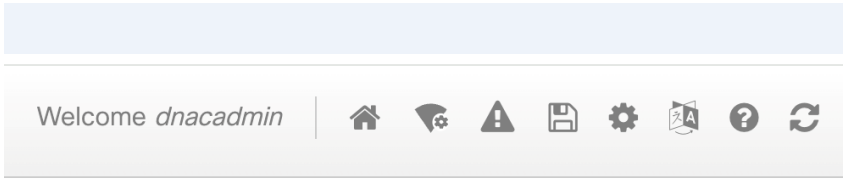
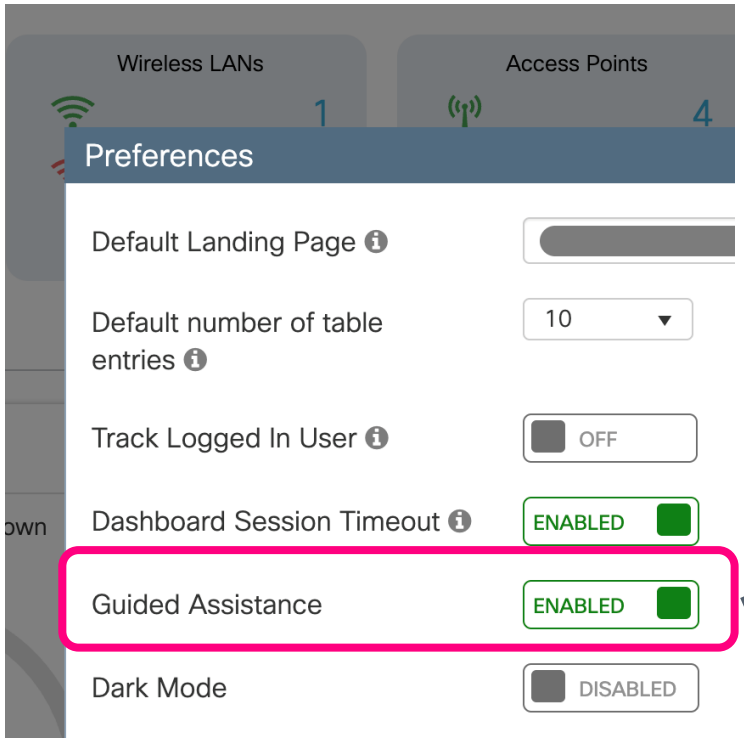
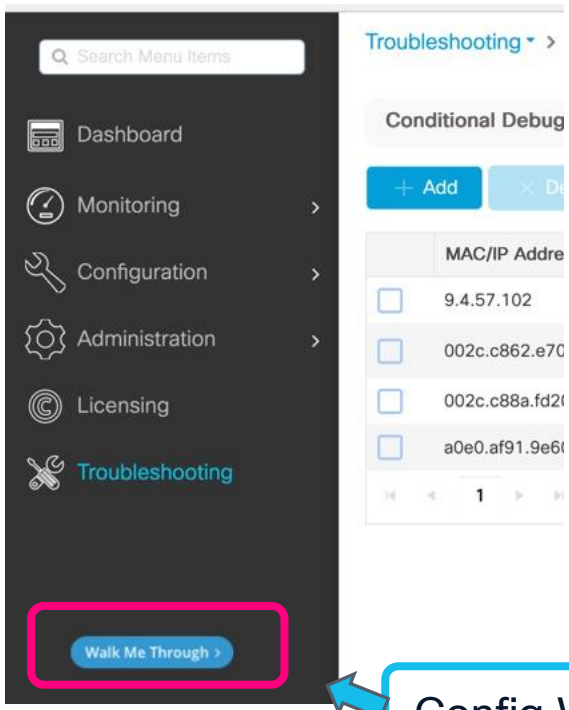
WalkMe or Guided Assistance





On by default



Config Walkthroughs

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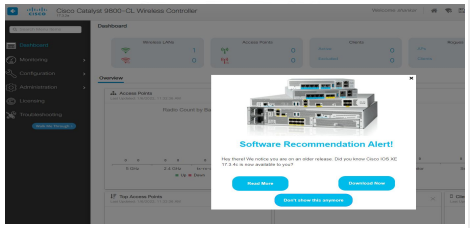
WalkMe In-Product Insights

Steering to Latest Software



Software Recommendation Alert!

Hey there! We notice you are on an older release. Did you know Cisco IOS XE 17.3.5a + SMU is now available to you?

Read More | Download Now | Don't show this anymore

Alerting on Catastrophic Defects

Detected AP name >=32 characters. Please be aware of (

wpa-agent112345678912345678901234 AIR-AP2802I-D-K9 2

Configuration Tips

ENABLED

RMI IP must be in the same subnet as Wireless Management Interface (WMI). For more information, see here.

10.201.234.155

Shoutouts

Need help on what logs to collect for various scenarios?

Onboarding newer 9105/9120/9130 APs? Click here.

Relevant Warning !!

TCP MSS Configuration

Adjust MSS Enable

Warning! Potential for client throughput issues owing to CSCwd37092 . Please upgrade APSP patch or refer workaround to prevent this issue.

Adjust MSS* 1250

Self Serve Tools

Licensing

Troubleshooting

Walk Me Through >

Wireless Debug Analyzer

Last Run Result

Field Notice

Cisco is aware of an issue affecting image validation at software upgrades or downgrades in the Cisco 1702, 2702, 3702, 1572, IW3702 Wave 1/IOS Access Points. We recommend following the workarounds mentioned in the bug CSCwd80290.

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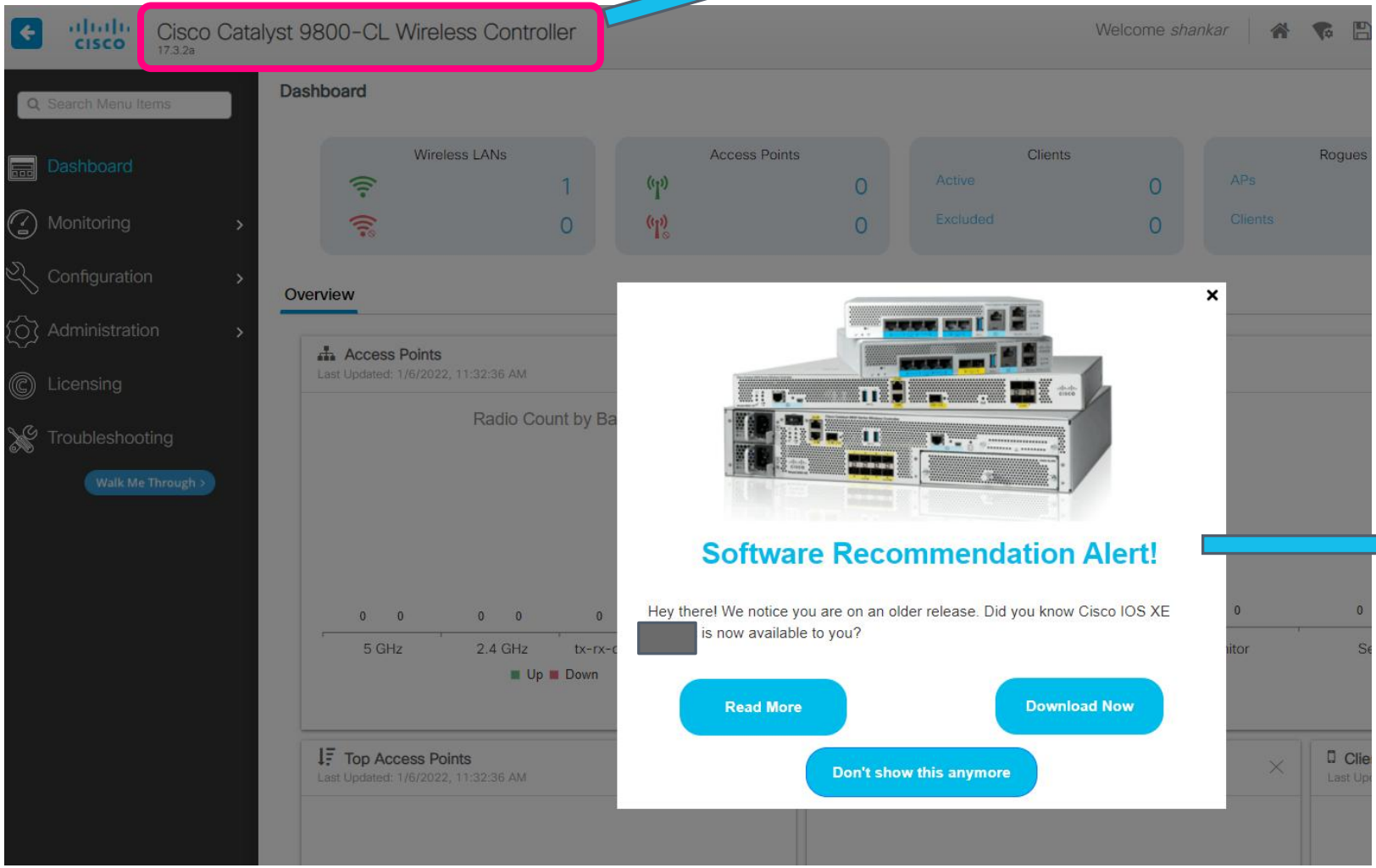
Intelligent Software Steering

Match Hardware + Software



Thousands of customers downloaded recommended software

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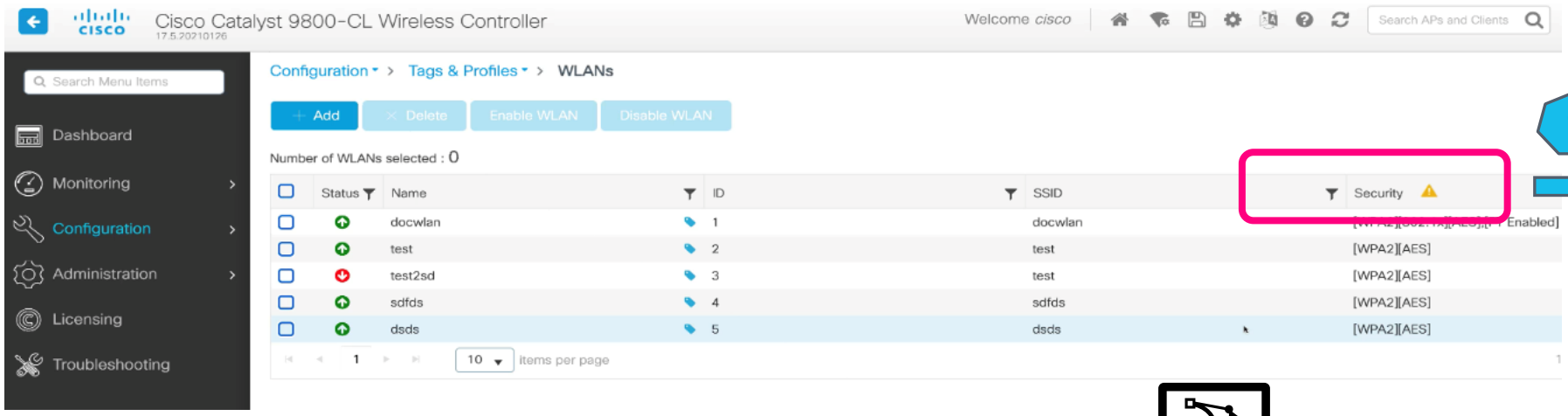
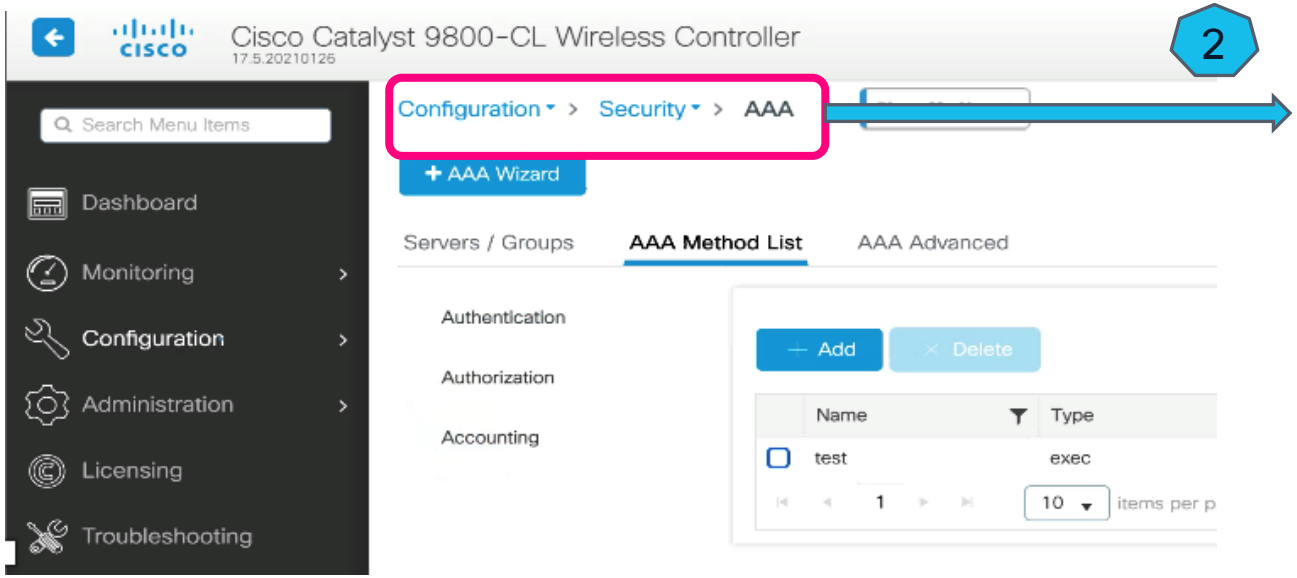
Multipage Conditional Check of a Catastrophic Defect



1

Click on warning icon to trigger validation



2

Auto navigation to AAA in Security Page

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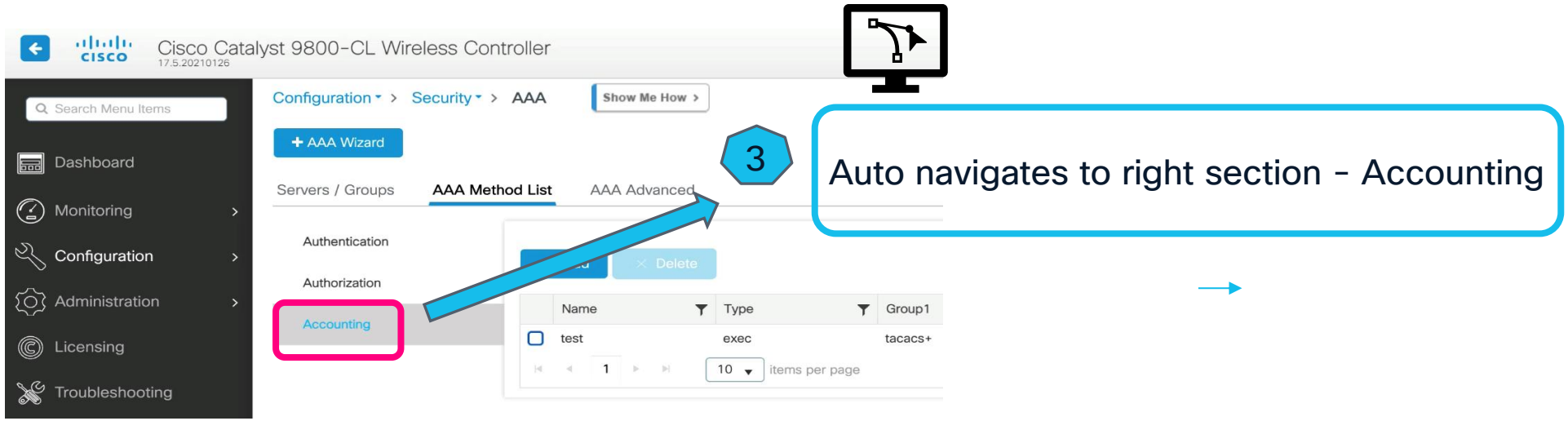
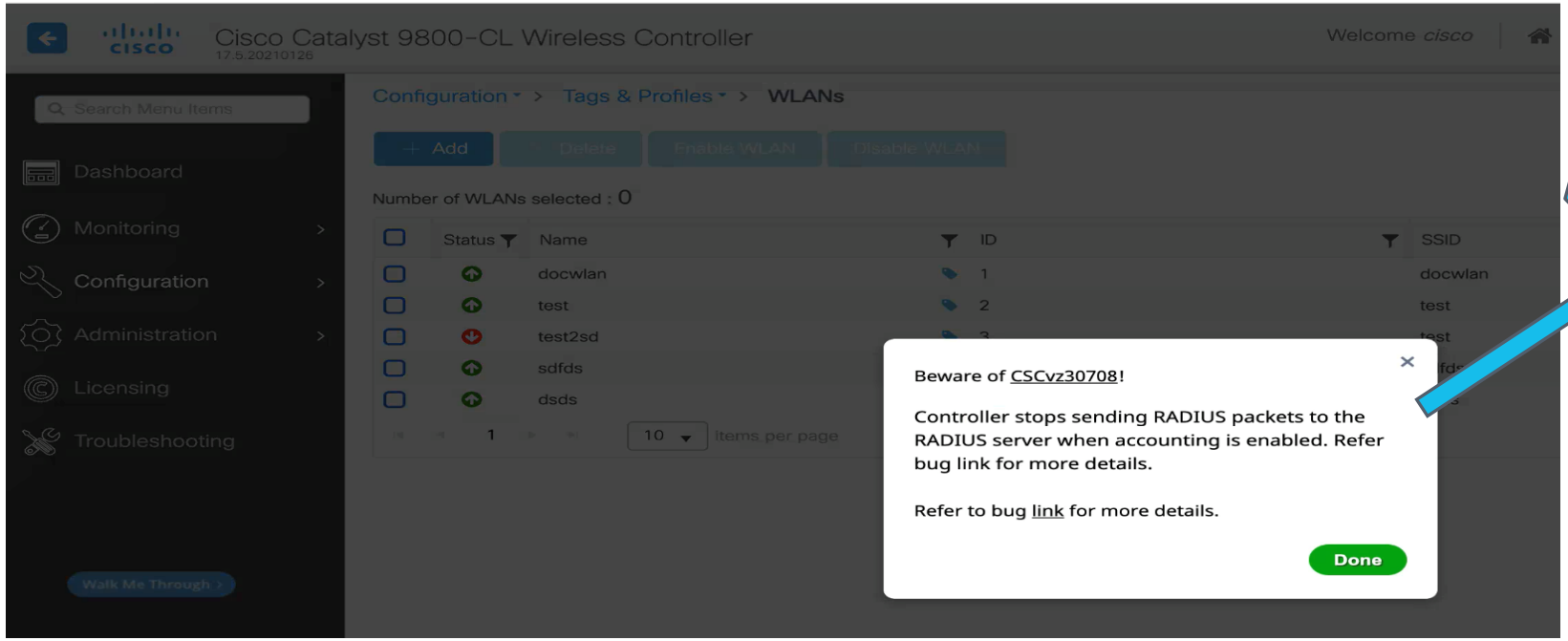
Multipage Conditional Check of a Catastrophic Defect (Contd)



3

Auto navigates to right section – Accounting



4

Auto navigates back to original page and displays bug alert

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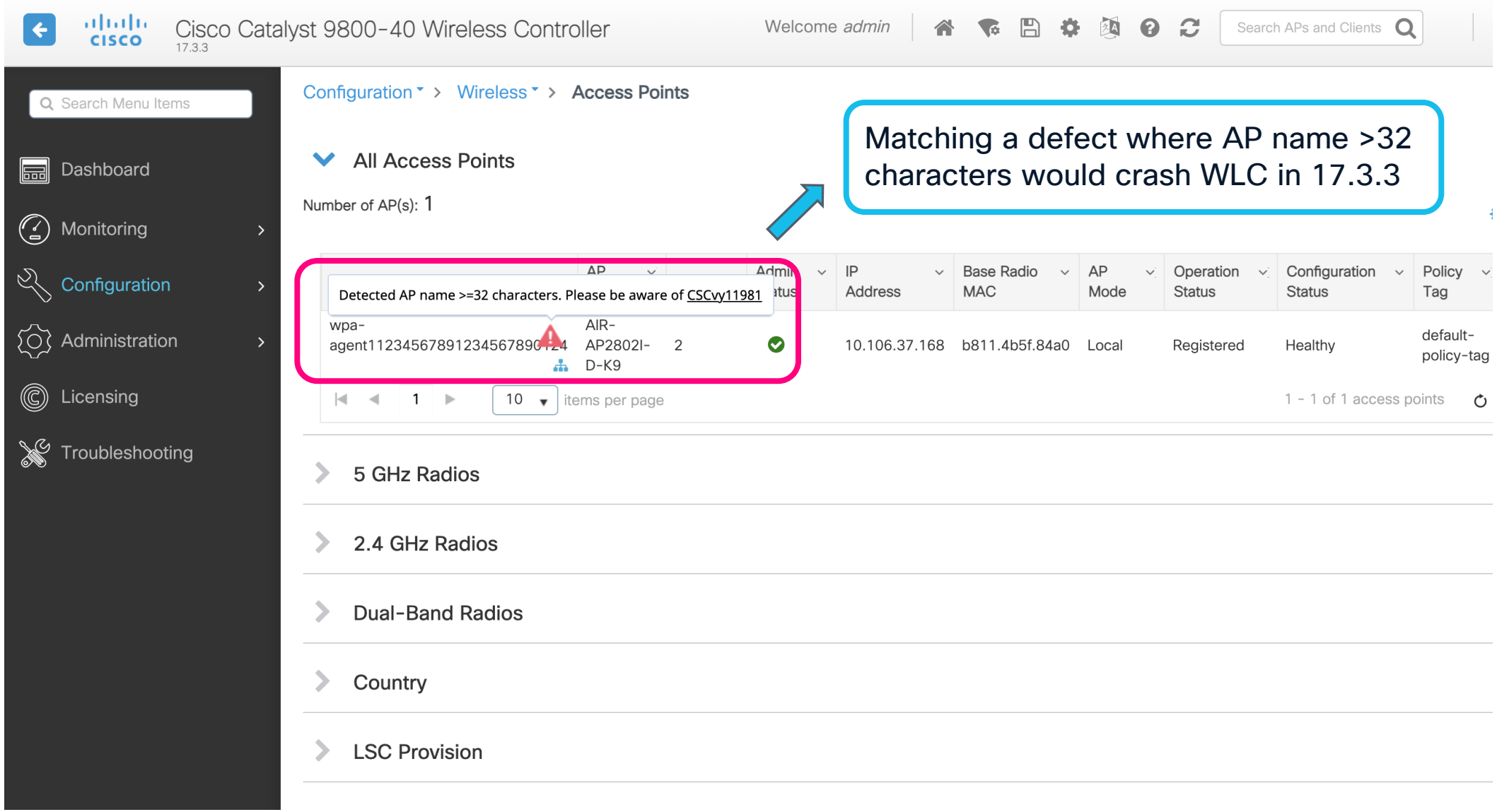
Alerting a Defect – Prevent Outage



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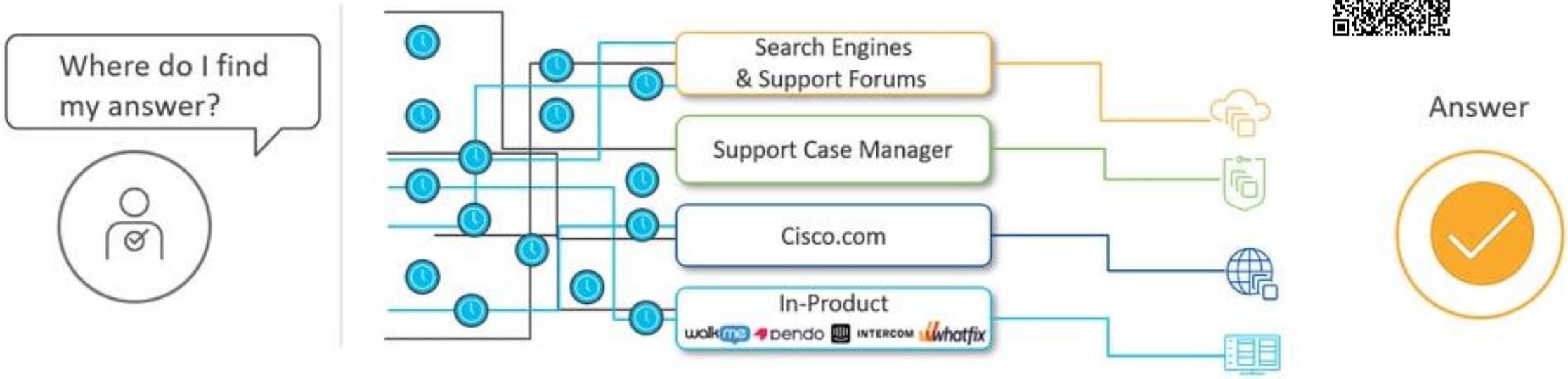
2. Cisco Support Assistant Extension (CSAE) :



CSAE Availability

1. Browser Extension

- Prior to 17.18.2
- Supported on Chrome, Microsoft Edge

2. Native Product Integration

- 17.18.2- Natively supported and integrated in 9800 WLC.

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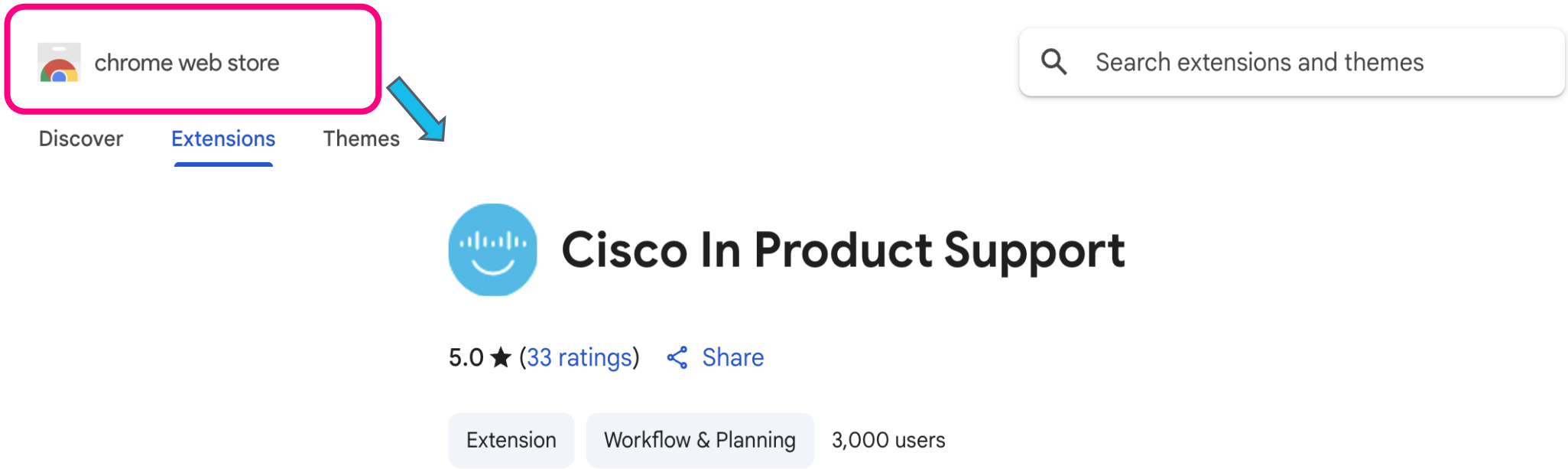
Install CSAE

Download from chrome web store



More info : CSAE

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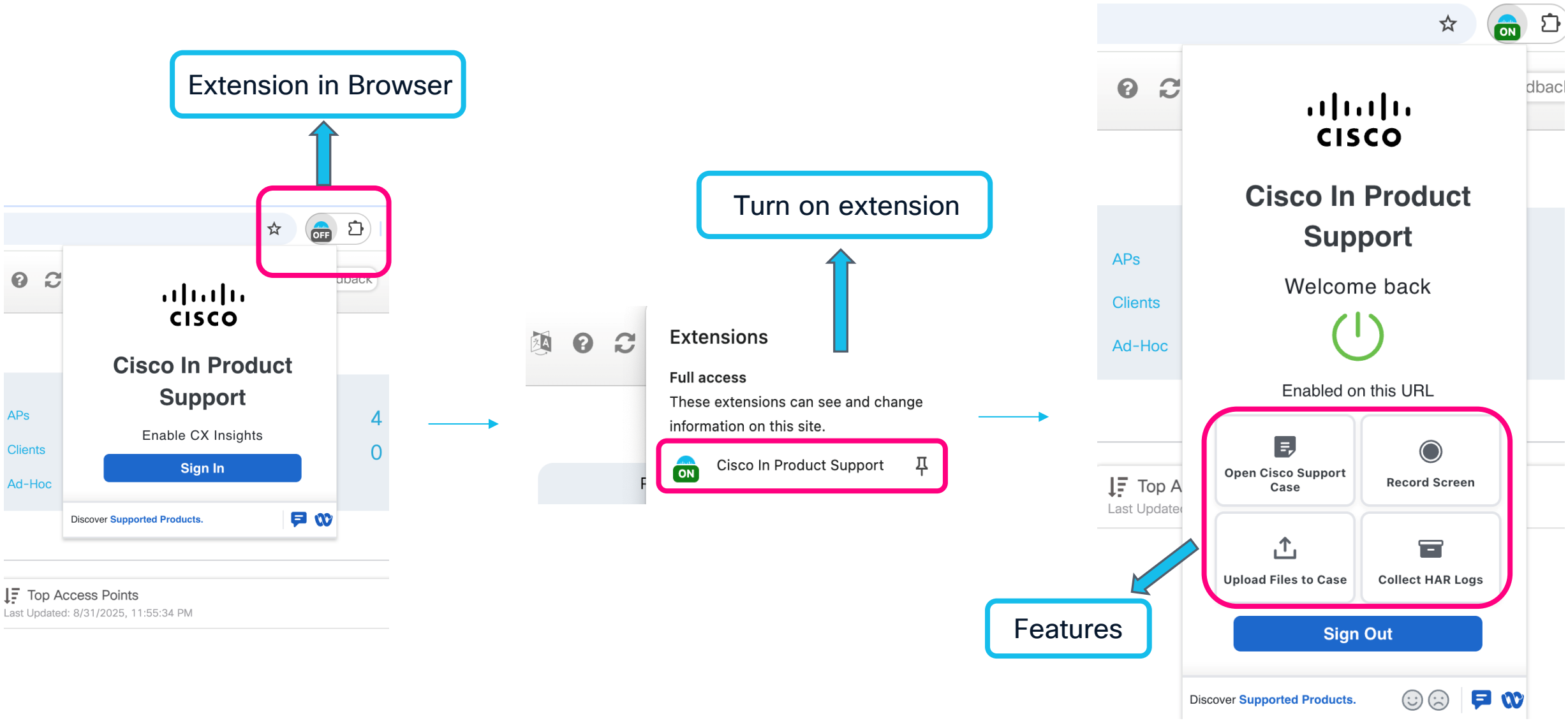
CSAE – Install & Enable



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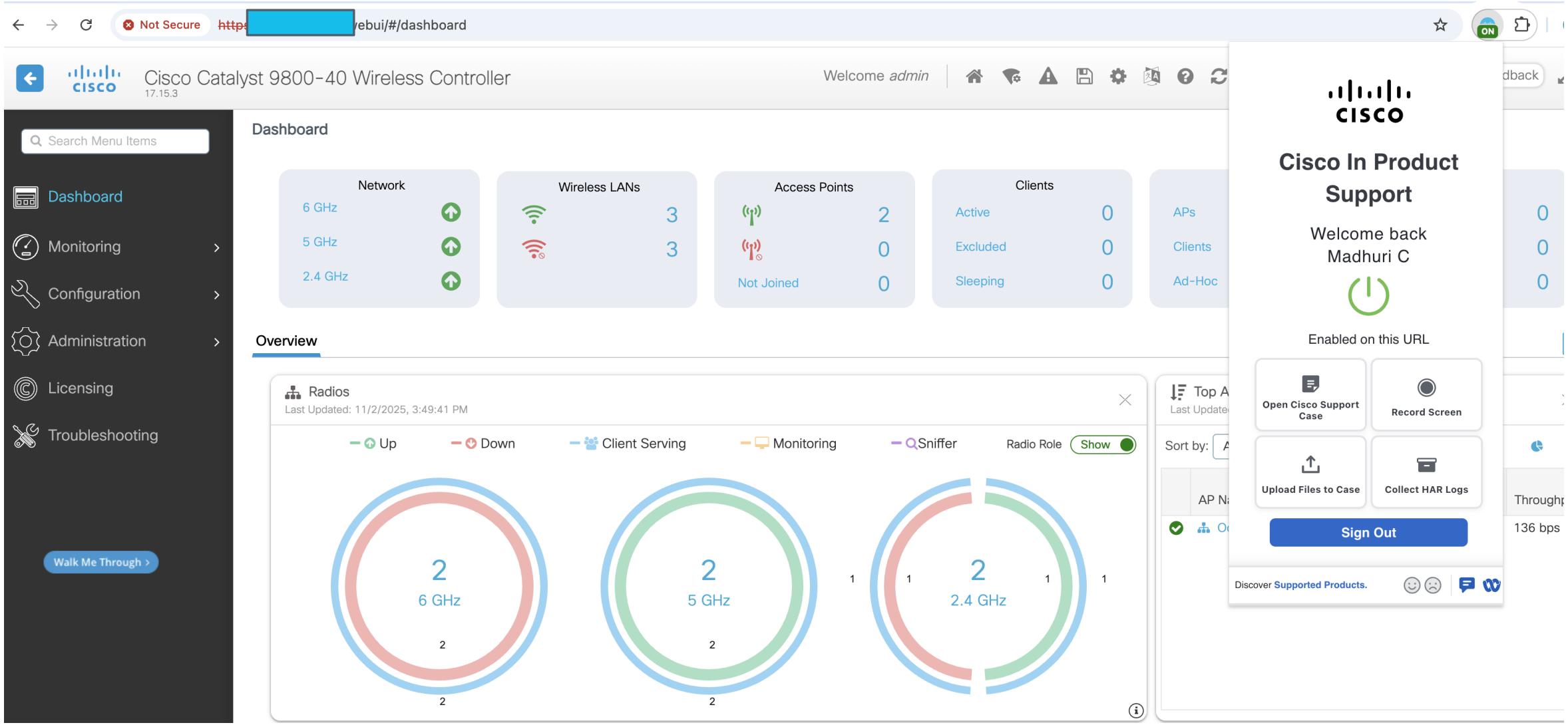
CSAE View



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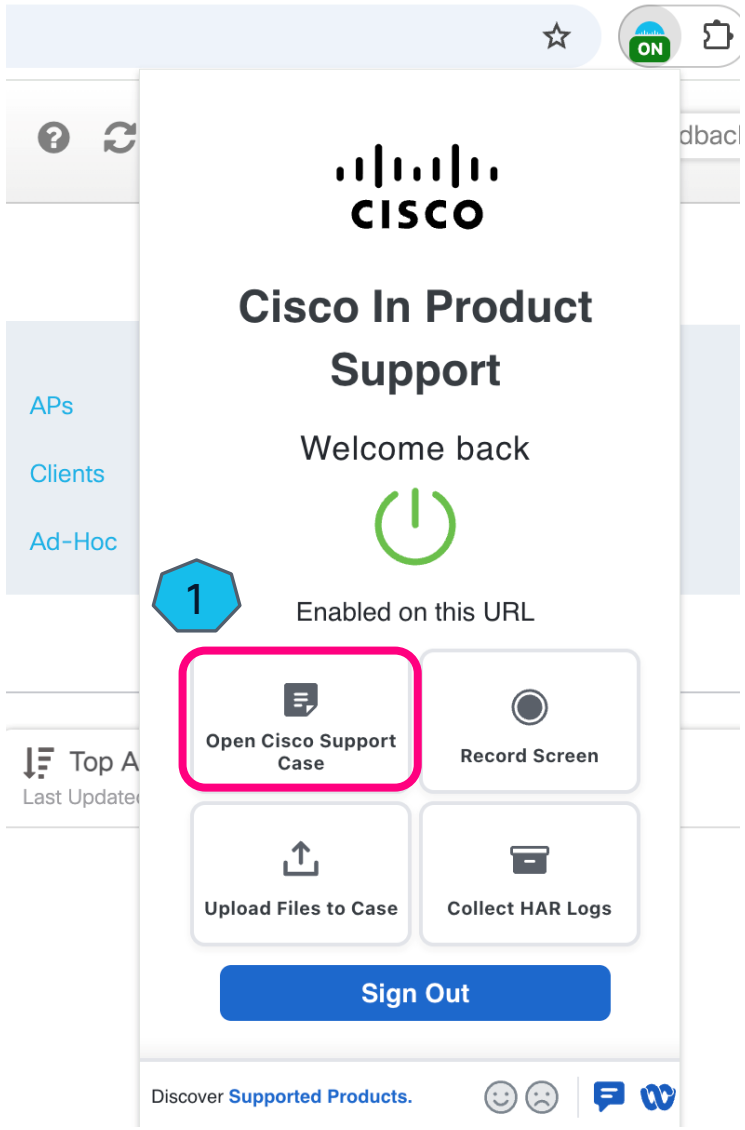
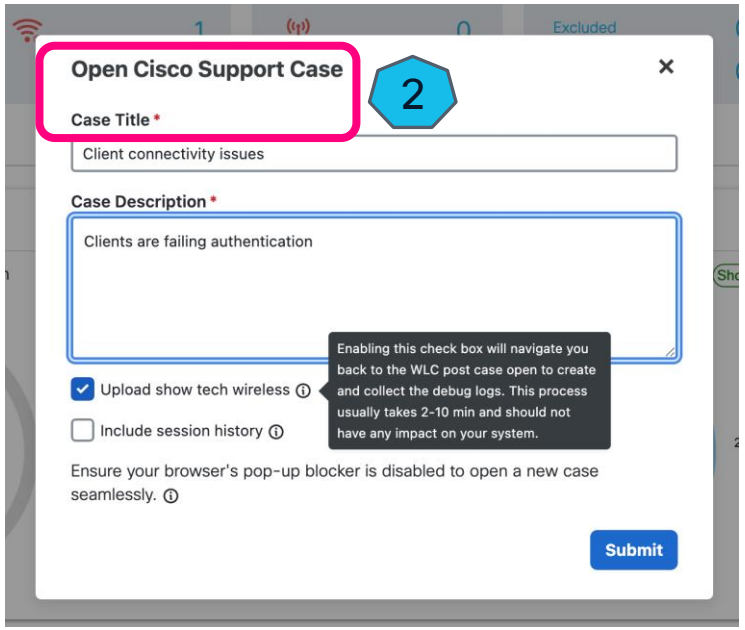
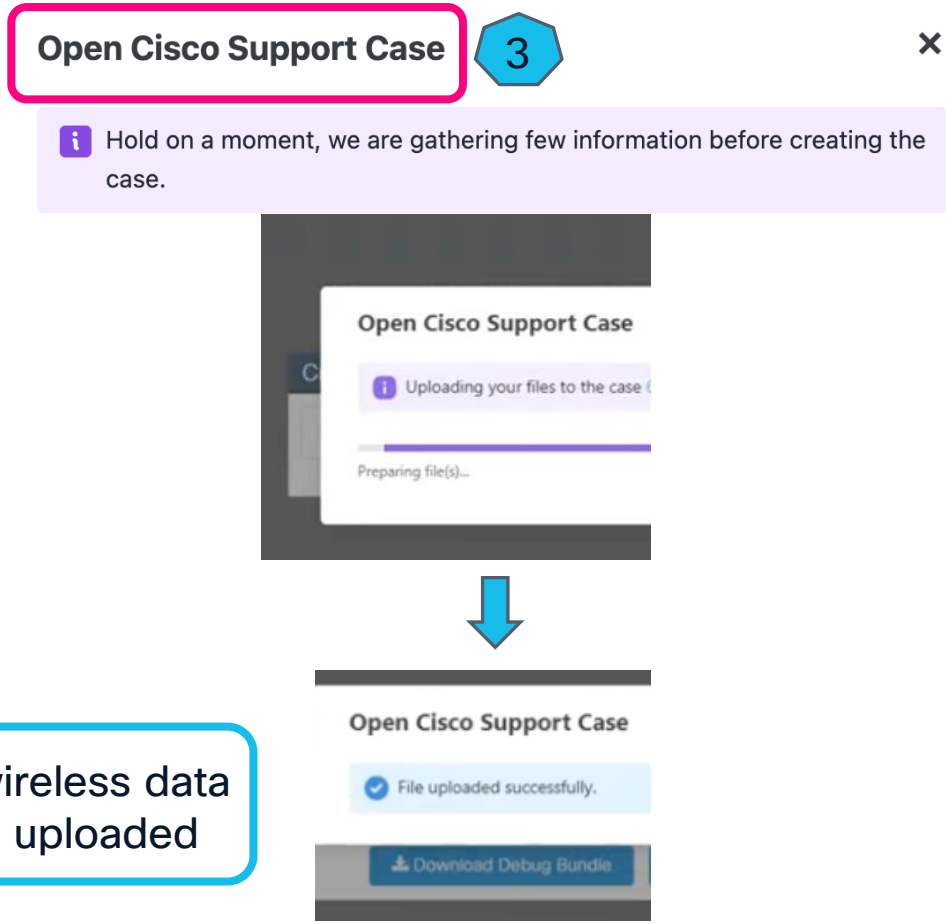
CSAE – Open TAC SR from WLC







Show tech wireless data collected & uploaded

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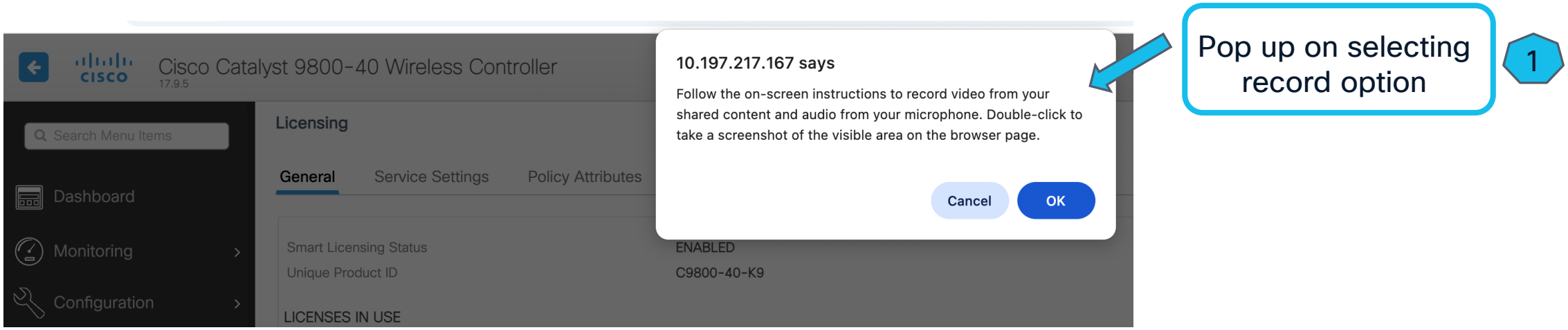
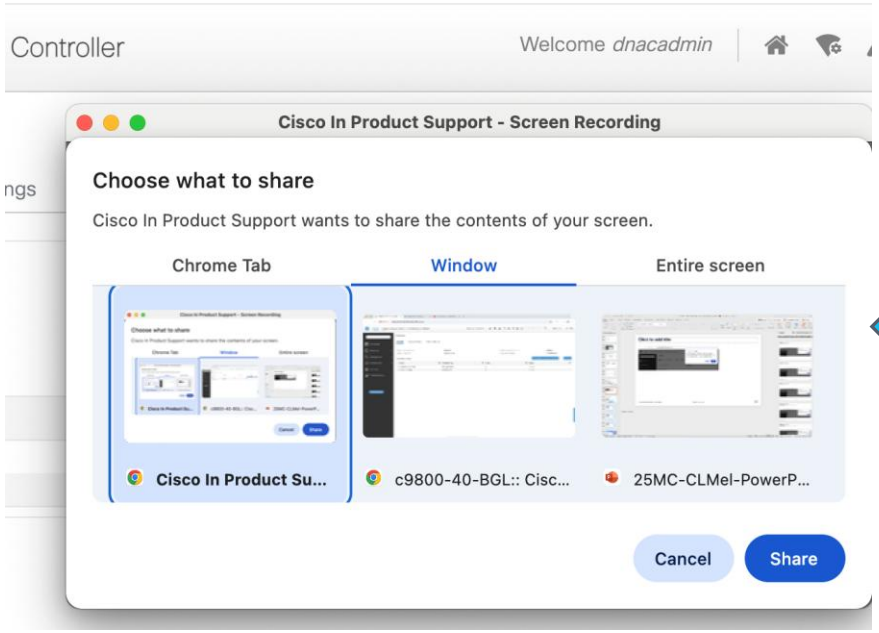
CSAE – Upload Recording (Screen & Audio)



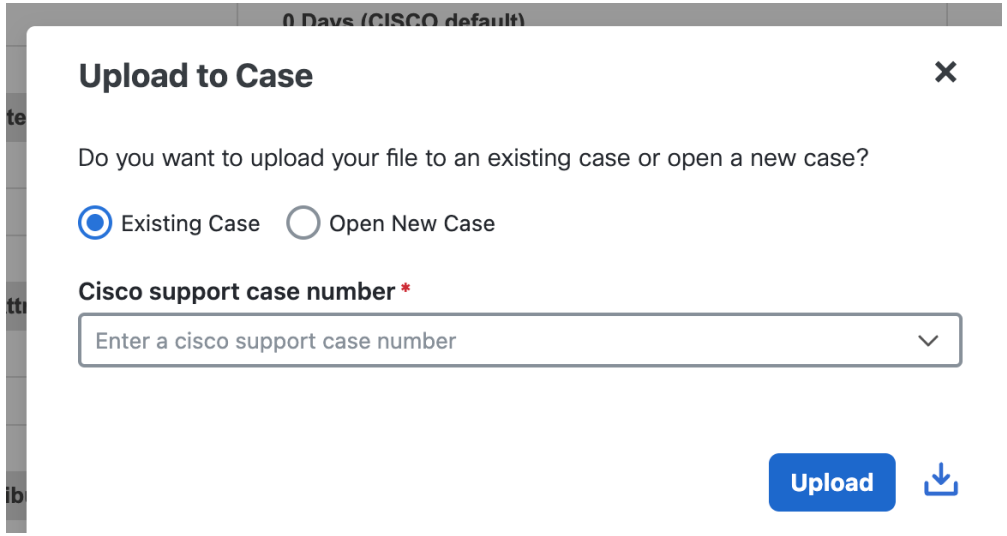
Pop up on selecting record option

1



2

- Select Screen
- Allow audio
- Upload to SR



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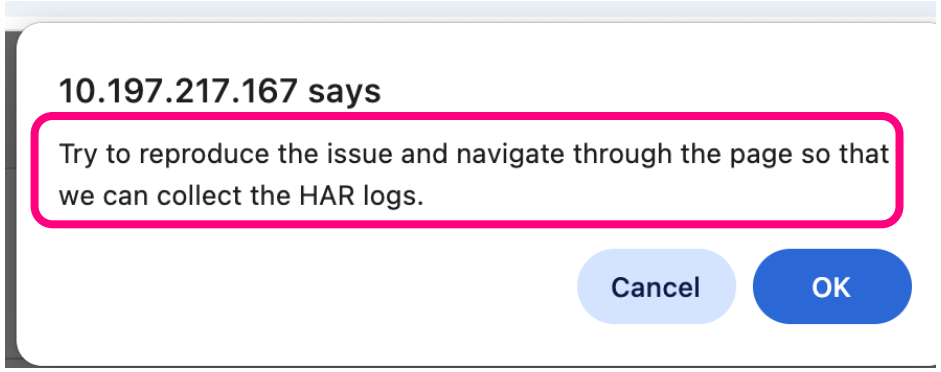
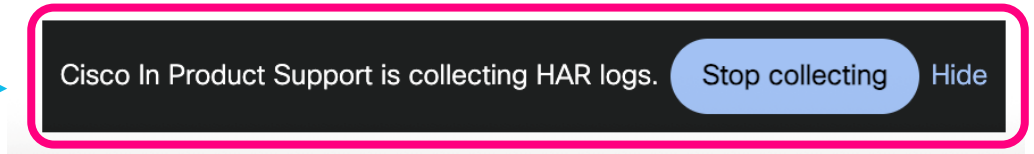
CSAE – Collect HAR Logs, Upload Debug Files

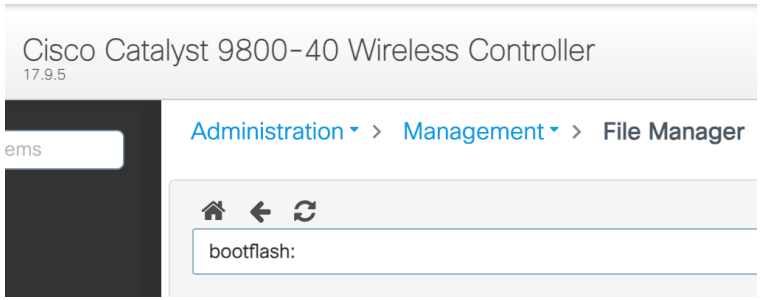
1 Collect Har Logs for GUI Issues



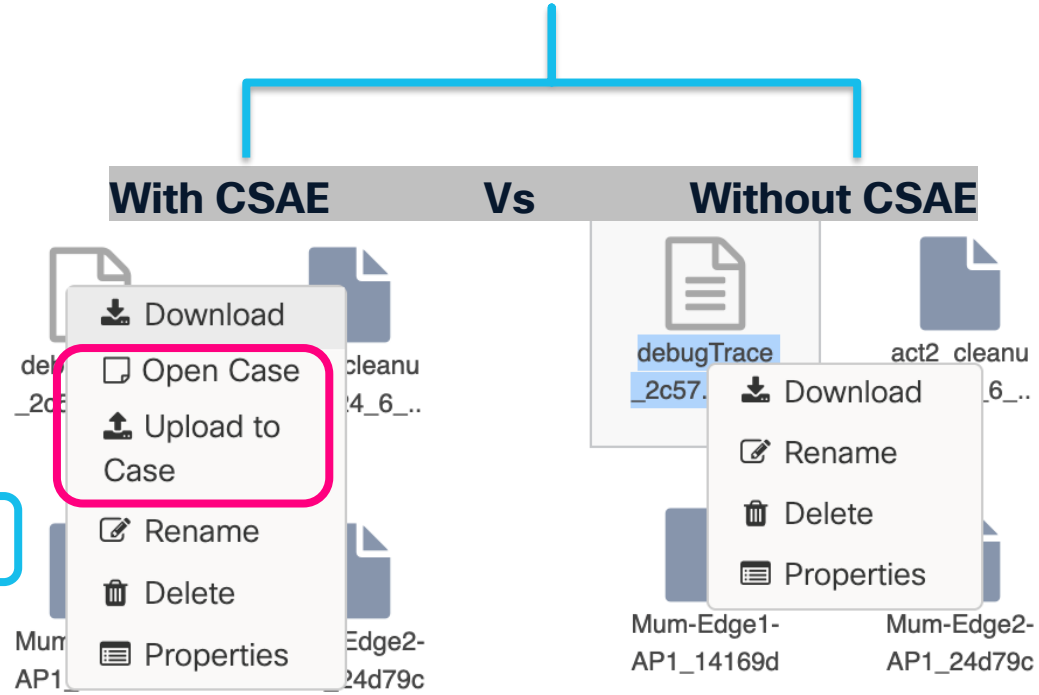
Pop up on selecting record option



2 Uploading Debug File



2 New Options



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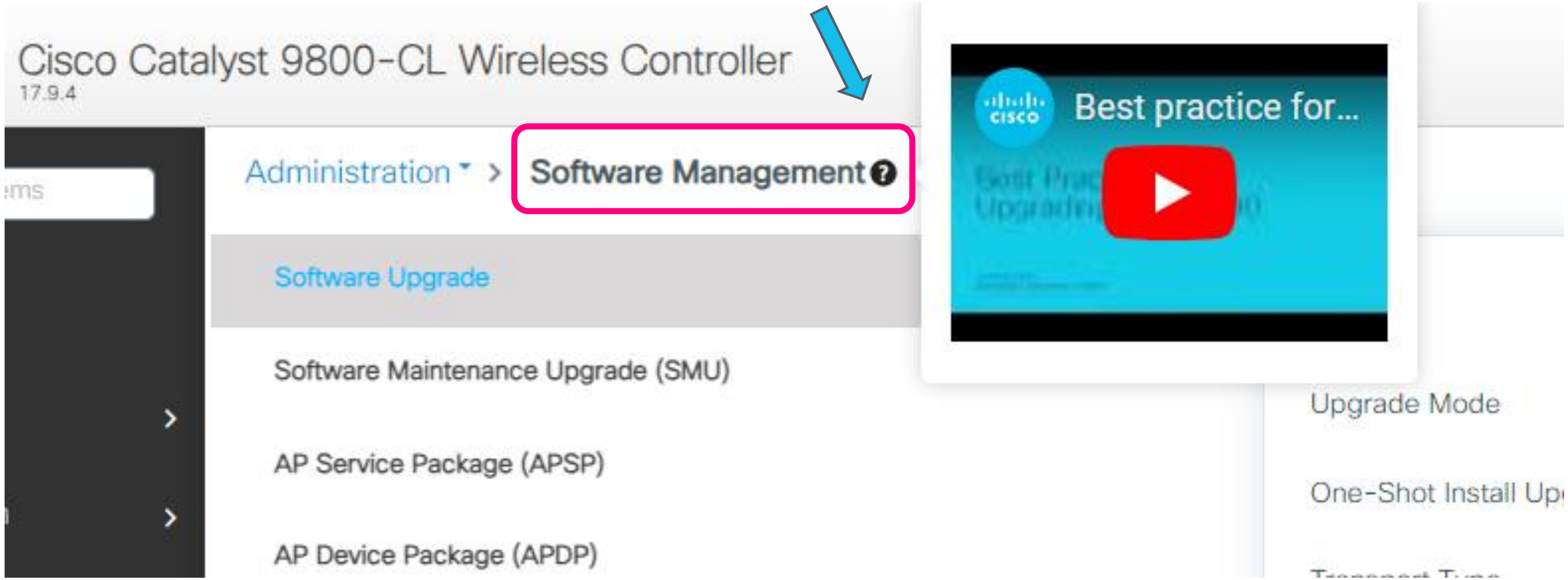
Play video in product



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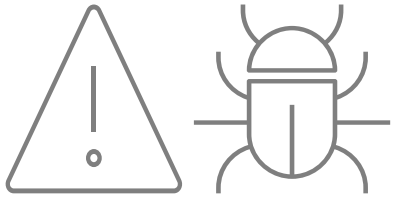
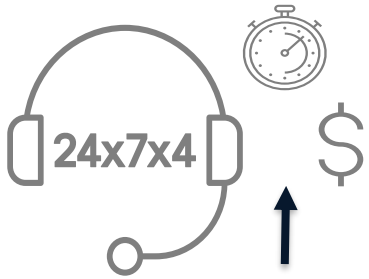
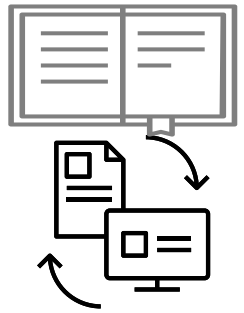
In-Product Insights Benefits



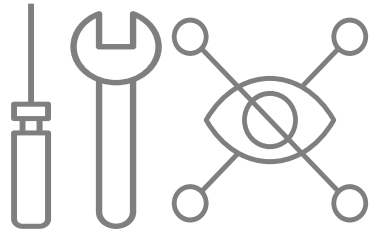
Prevent Network Outages due to Known Issues



Prevent time consuming TAC Cases



Better consumption of Documentation



Better tools Adoption

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Option B : Diagnostic Tools

Flexible Options to Self-Serve & Accelerate Case Resolution

Proactive Engagement

- Log Advisor
- Vulnerability Checker
- Talk to cisco.com

DignosticTools

- AP, WLC Debugs
- Wireless Config Analyzer Express
- Debug Analyzer
- WiFi Hawk-Over the air

Advanced Scripts

- EEMs
- Guest Shell
- WLAN Poller

Case Open

Case Closure

A

B

C

D

E

In-Product Assistance

- WalkMe
- Cisco Support Assistant Extension

Monitoring Dashboards

- Catalyst Center
- Meraki Dashboard

Cloud Like Tool

- RADKit

1. Prevent TAC case

2. Gather and Analyze Data

3. KPI Monitoring, Workarounds, TAC Handoff

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Diagnostic Tools

Scenario : Troubleshooting AP Join, Best Practices, Client Connectivity, PCAPs

AP/WLC Debugs

- Correlating AP and WLC side of debugs
- Example : AP join issues

WCAE

- Gain insights on best practices, warnings, RF, performance issues
- Example : Checking WLC Performance and High WNCd CPU Issues

Debug Analyzer

- Analyze client RA traces in table, graphical format for quick and easy consumption with various statistics
- Example : Client connectivity

WiFi-Hawk (OTA)

- Get insights on over the air packet capture, outputs from AP
- Example : Debugging an RF Issue

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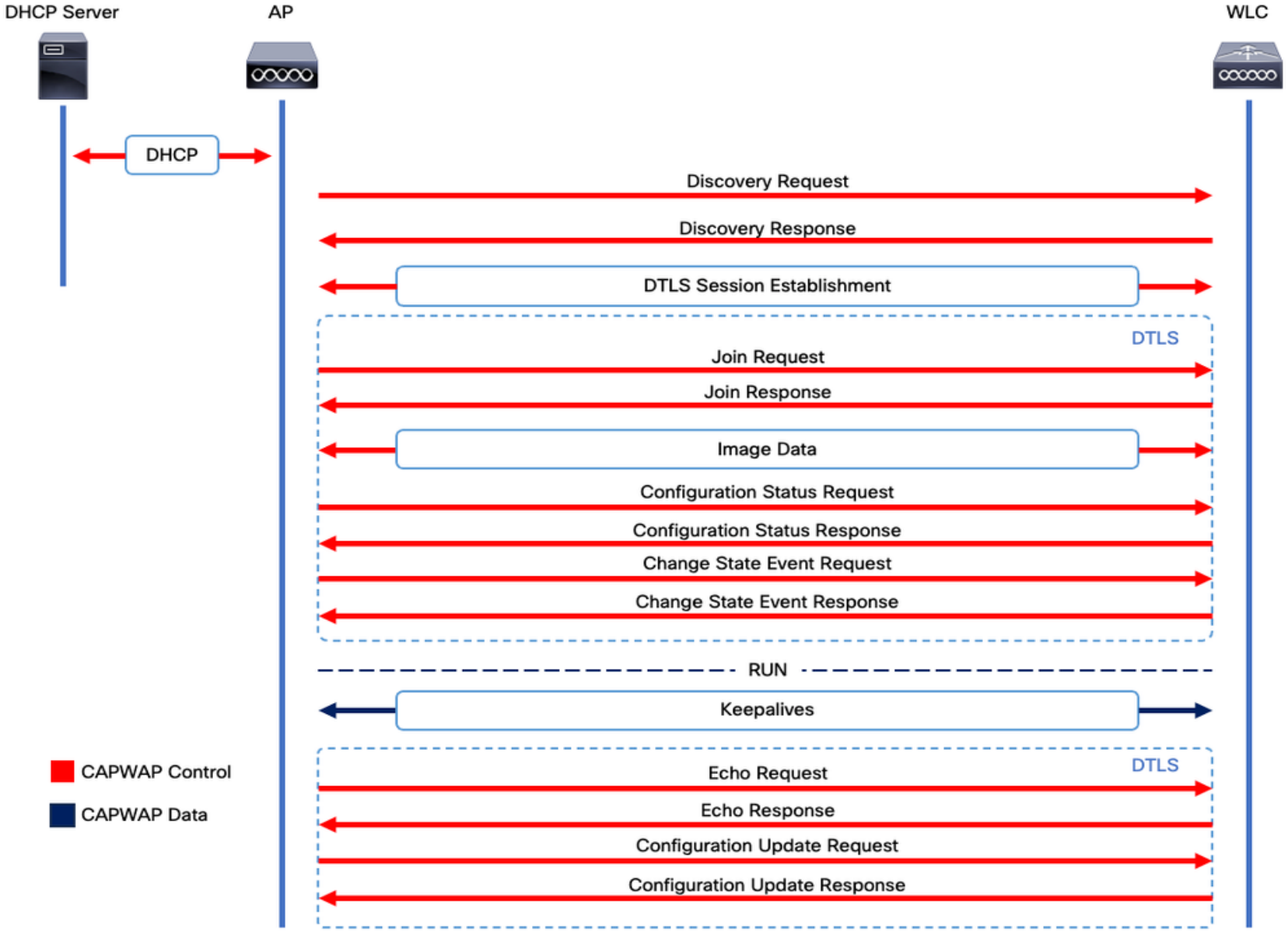
Quick Look : AP Join Flow



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Correlating AP Debugs & WLC Traces

- **AP side debugs** : In AP CLI : “**debug capwap client events**” and “**debug capwap client error**”
- **WLC side** : In WLC : **RA trace** for AP mac address from WLC : **Troubleshooting > RA trace**

1. Discovery Phase

AP Debugs :

Sep 7 12:57:46 kernel: [*09/07/2025 12:57:46.1638] CAPWAP State: Discovery

Sep 7 12:57:46 kernel: [*09/07/2025 12:57:46.1666] Discovery Request sent to 10.127.84.20, discovery type STATIC_CONFIG(1)

Sep 7 12:57:46 kernel: [*09/07/2025 12:57:46.1877] Discovery Response from 10.127.84.20

Sep 7 12:57:46 kernel: [*09/07/2025 12:57:46.1879] Found Configured MWAR 'c9800-40-BGL' (respIdx 0).

WLC RA Trace :

2025/09/07 12:57:47.156982498 {wncmgrd_R0-0}{1}: [capwapac-discovery] [14867]: (note): MAC: 1416.9d2a.bf80 IP:10.127.85.77[5256], Discovery Request received

2025/09/07 12:57:47.157593433 {wncmgrd_R0-0}{1}: [capwapac-discovery] [14867]: (note): MAC: 1416.9d2a.bf80 IP:10.127.85.77[5256], Discovery Response sent

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Correlating AP Debugs & WLC Traces

2. DTLS Phase

AP Debugs :

Sep 7 12:57:47 kernel: [*09/07/2025 12:57:47.0099] CAPWAP State: DTLS Setup

Sep 7 12:57:47 kernel: [*09/07/2025 12:57:47.0240] DTLS connection created sucessfully local_ip: 10.127.85.77 local_port: 5256 peer_ip: 10.127.84.20 peer_port: 5246, app_tag: 2C5741582524 CN:Cisco Manufacturing CA III

Sep 7 12:57:47 kernel: [*09/07/2025 12:57:47.0649] dtls_verify_server_cert: Controller certificate verification successful

Sep 7 12:57:47 kernel: [*09/07/2025 12:57:47.4022] Dtls Session Established with the AC 10.127.84.20, port 5246

WLC RA Trace :

2025/09/07 12:57:47.222608830 {wncd_x_R0-0}{1}: [capwapac-smgr-srvr] [15069]: (note): MAC: 1416.9d2a.bf80 DTLS session create callback received.

2025/09/07 12:57:47.284328730 {wncd_x_R0-0}{1}: [ewlc-dtls-sessmgr] [15069]: (info): Remote Host: 10.127.85.77[5256] MAC: 1416.9d2a.bf80 Completed cert verification, status:CERT_VALIDATE_SUCCESS

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Correlating AP Debugs & WLC Traces

3. Join Phase

AP Debugs :

Sep 7 12:57:47 kernel: [*09/07/2025 12:57:47.4135] CAPWAP State: Join

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.3521] Sending Join request to 10.127.84.20 through port 5256, packet size 1376

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.3565] Join Response from 10.127.84.20 packet size 1397

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.3873] Starting Post Join timer

WLC RA Trace :

2025/09/07 12:57:48.550108207 {wncd_x_R0-0}{1}: [capwapac-smgr-sess] [15069]: (note): MAC: 1416.9d2a.bf80 Received CAPWAP join request

2025/09/07 12:57:48.553214349 {wncd_x_R0-0}{1}: [apmgr-capwap-join] [15069]: (note): MAC: 1416.9d2a.bf80 Successfully processed Join request. AP name: BGL-Edge1-AP1, Model: C9130AXE-D, radio slots: 3, rlan slots: 0, site tag name: ST_Banga_BGL18_caba6_0, policy tag name: PT_Banga_BGL18_BGL18-Se_52ab9, rf tag name: TYPICAL

2025/09/07 12:57:48.553368425 {wncd_x_R0-0}{1}: [capwapac-smgr-srvr] [15069]: (info): MAC: 1416.9d2a.bf80 Join Response generated with MTU 1485. as per MTU payload, update flag: 0

2025/09/07 12:57:48.553386207 {wncd_x_R0-0}{1}: [capwapac-smgr-srvr] [15069]: (note): MAC: 1416.9d2a.bf80 Join processing complete. AP in joined state

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Correlating AP Debugs & WLC Traces

4. Image

AP Debugs :

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.3962] CAPWAP State: Image Data

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.3968] AP image version 17.9.5.47 backup 17.9.3.50, Controller 17.9.5.47

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.3969] CAPWAP Image Data: MWAR Controller image running version 17.9.5.47 is accepted.

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.3969] Version is the same, do not need update.

WLC RA Trace :

2025/09/07 12:57:48.554127571 {wncd_x_R0-0}{1}: [apmgr-capwap-join] [15069]: (info): 1416.9d2a.bf80 Retrieved AP SW version: 17.9.5.47, for AP model: C9130AXE-D, AP image type: ap1g6a, site-tag: ST_Banga_BGL18_caba6_0

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Correlating AP Debugs & WLC Traces

5. Configure & Run

AP Debugs :

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.5007] CAPWAP State: Configure

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.8400] Configuration Status sent to 10.127.84.20 (part 0)

Sep 7 12:57:48 kernel: [*09/07/2025 12:57:48.8434] Configuration Status Response from 10.127.84.20

Sep 7 12:57:49 kernel: [*09/07/2025 12:57:49.3048] CAPWAP State: Run

Sep 7 12:57:49 kernel: [*09/07/2025 12:57:49.3395] CAPWAP data tunnel ADD to forwarding SUCCEEDED

Sep 7 12:57:49 kernel: [*09/07/2025 12:57:49.3543] **AP has joined controller c9800-40-BGL**

WLC RA Trace :

2025/09/07 12:57:49.038381077 {wncd_x_R0-0}{1}: [capwapac-smgr-sess] [15069]: (note): MAC: 1416.9d2a.bf80 Received CAPWAP config status request

2025/09/07 12:57:49.038455973 {wncd_x_R0-0}{1}: [capwapac-smgr-srvr] [15069]: (note): MAC: 1416.9d2a.bf80 Successfully handled Config status request.

2025/09/07 12:57:49.040192648 {wncd_x_R0-0}{1}: [lisp-agent-api] [15069]: (info): **AP Join Successful for MAC: 1416.9d2a.bf80**

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Wireless Config Analyzer Express (WCAE)

- How to leverage WCAE
- Using WCAE to troubleshoot WNCd utilization

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WCAE – Cloud Version

Download Full Report

Wireless Analyzer Results

- WLC Messages
- AP Message Summary
- RF Stats WLC Level Summary
- RF Stats AP Site Summary
- RF Stats Flex Profile Summary
- RF Health WLC Level Summary
- RF Health AP Site Summary
- RF Health Flex Profile Summary
- AP Models Summary
- AP Modes Summary
- WLC Logs Summary
- Show All
- Hide All

Total Unique Messages

Message Type	Count
Error	4
Warning	28
Info	16
Parsing Errors	0
Processing Errors	0

230038	Management: To prevent WebUI issues while using some large GUI options (VLANs for example), it is advisable to increase the VTY count to 50 **Action:** Use the command 'line vty 0 50' to increase the VTY count
230044	Security: Management over Wireless is enabled, this is not recommended from a security point of view **Action:** Management over wireless should be used with care, only enable if absolutely required. Check 9800 Best practices guide for more information
230056	Management: Service tcp-keepalive in/out, should be enabled to reduce lingering inactive connections to management points **Action:** Add: service tcp-keepalives in/service tcp-keepalives out to configuration
60020	RF: WLC has 80.0% of APs with failed Interference Profile for 2.4GHz Band **Action:** None

RF Health WLC Level Summary

		2.4GHz Band			5GHz Band		
Stats	Total Radios			15			74
	Health Assessment						
	Lowest Metric Average			0			0
		Low	Medium	High	Low	Medium	High
AP Radio Count per RF Health Metrics	Co-Channel Neighbor Utilization	0	0	15	0	2	72
	Co-Channel Overlapping	0	1	14	16	2	56
	Side Channel Overlapping	0	0	15	0	0	74
	Noise Same Channel	0	0	15	0	0	74
	Noise Side Channel	0	0	15	0	0	74
	Interference Same Channel	0	0	15	0	0	74

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WCAE –Excel Download

Table of contents

Generated: 2025-09-12 12:28
WCAE Version: 0.41

Total Message Counts
Errors: 12
Warnings: 39
Informational: 23
Program Execution
Parsing Errors: 4
Processing Errors: 680
Debug Data

Back to Content tab

	A	B	C	D	
1				Back to Content Tab	
2	Type	Count	Log Signature		Explanation
3	Client 8021x Fail(ed/ures)	348223	CO_CLIENT_DELETE_REASON_CLIENT_8021X_FAILURE	May happen during Normal Onboarding	Client reported authentication error on deauth frame
4	Inter Instance Roam Success	251715	CO_CLIENT_DELETE_REASON_INTER_WNCD_ROAM_SUCCESS	May happen during Normal Onboarding	Client roamed across WNCD instances. This is normal scenario for default tag, or roaming across tags
5	Incorrect Credentials	121346	CO_CLIENT_DELETE_REASON_CLIENT_CREDENTIAL_FAILURE	May need validation	Wrong username or password
6	Client Eap Timeout	114699	CO_CLIENT_DELETE_REASON_CLIENT_EAP_TIMEOUT_FAILURE	May happen during Normal Onboarding	Client reported EAP error on deauth frame
7	L2-auth Connection Timeout	104621	CO_CLIENT_DELETE_REASON_L2AUTH_CONNECT_TIMEOUT	May happen during Normal Onboarding	Client did not complete L2 auth like PSK or 802.1x, in time. Could be normal if client roamed or went out of coverage
8	Mic Validation Fail(ed/ures)	60916	CO_CLIENT_DELETE_REASON_KEY_MGMT_MIC_VALIDATION	May need validation	if WLAN is PSK, possible invalid password. For 802.1x, this is client side supplicant issue
9	L3 Authentication Fail(ed/ures)	59426	CO_CLIENT_DELETE_REASON_L3AUTH_FAIL	May need validation	Security processing for a L3 Auth failed (Webauth/guest)
10	Inter Controller Roam Success	50018	CO_CLIENT_DELETE_REASON_INTER_CTRL_ROAM_SUCCESS	May happen during Normal Onboarding	Successful inter controller client roam
11	Due To Mobility Fail(ed/ures)	18204	CO_CLIENT_DELETE_REASON_MOBILITY_FAILURE	May happen during Normal Onboarding	Client delete, either due to roaming while on IP learning state, or due to policy configuration mismatch
12	Client Miscellaneous Reason	12607	CO_CLIENT_DELETE_REASON_CLIENT_MISC_REASON	May happen during Normal Onboarding	Client reported generic reason in deauth frame
13	Wpa Group Key Update Timeout	10186	CO_CLIENT_DELETE_REASON_GROUP_KEY_UPDATE_TIMEOUT	May need validation	Client did not complete Broadcast key rotation. This may happen if client was sleeping or out of coverage
14	Supplicant Request(s)	10084	CO_CLIENT_DELETE_REASON_USER_REQUEST	May happen during Normal Onboarding	Client deleted due to supplicant sending EAP Logoff. This may happen during machine authentication
15	Due To Ssid Change	8476	CO_CLIENT_DELETE_REASON_WLAN_CHANGE	May happen during Normal Onboarding	Client changed WLANs/SSID
16	Ip-learn Connection Timeout	8163	CO_CLIENT_DELETE_REASON_IPLEARN_CONNECT_TIMEOUT	May happen during Normal Onboarding	Controller did not learn client IP address in the allowed time
17	Dot11r Pre-authentication Fail(ed/ures)	5454	CO_CLIENT_DELETE_REASON_FT_AUTH_RESPONSE	May happen during Normal Onboarding	Client failed pre-authentication during FT roaming
18	Mac Authentication Fail(ed/ures)	5074	CO_CLIENT_DELETE_REASON_MAB_FAILED	May happen during Normal Onboarding	Client failed Mac Authentication Bypass
19	Wpa Key Exchange Timeout	4599	CO_CLIENT_DELETE_REASON_KEY_XCHNG_TIMEOUT	May happen during Normal Onboarding	This can happen during normal scenarios. Client deleted due to EAPoL M1 retries. Possible client side issue, or it roamed during
20	Wrong Psk	3528	CO_CLIENT_DELETE_REASON_EXCLUDE_WRONG_PSK	Possible defect or config error	Client excluded due to wrong PSK password

Client delete reasons breakup

Configuration Checks:

Controller Checks Results
APs Checks Results

Controller: 9800WLC

Data Summary
Log Summary
Upgrade Advisor
Best Practices
WLAN Summary
Interface Summary
RF Profiles 2.4 GHz
RF Profiles 5 GHz
RF Profiles 6 GHz
Site Tags
Hardware State
Resources
Client Stats
WNCD Load Distribution
Client Delete Reasons
Tag/Policy Usage
RF Stats 2.4GHz
RF Stats 5GHz
RF Stats 6GHz
RF Health 2.4GHz
RF Health 5GHz
RF Health 6GHz
Channel Stats 2.4GHz
Channel Stats 5GHz
Channel Stats 6GHz
Rogue Report
RF Neighborhood 2.4GHz
RF Neighborhood 5GHz
RF Neighborhood 6GHz

Client Audit

Apple IOS
Cisco 8821
Drager
Spectralink
Vocera

AP Information

APs Configuration
APs Slot Configuration
APs Interface Status
APs RF Summary 2.4GHz
APs RF Summary 5GHz
APs RF Summary 6GHz
APs RF Health Details
APs NDP Summarization 2.4GHz
APs NDP Summarization 5GHz
APs NDP Summarization 6GHz
APs RF Neighbors 2.4GHz
APs RF Neighbors 5GHz
APs RF Neighbors 6GHz

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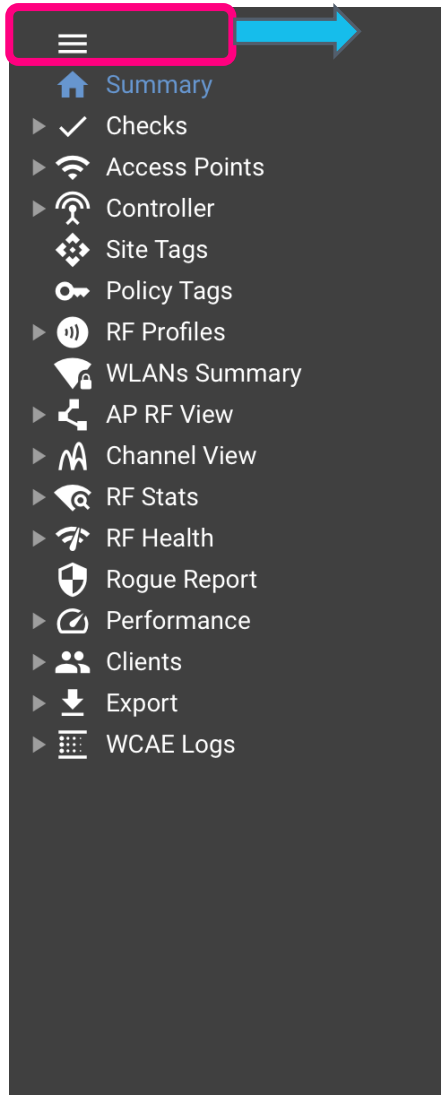
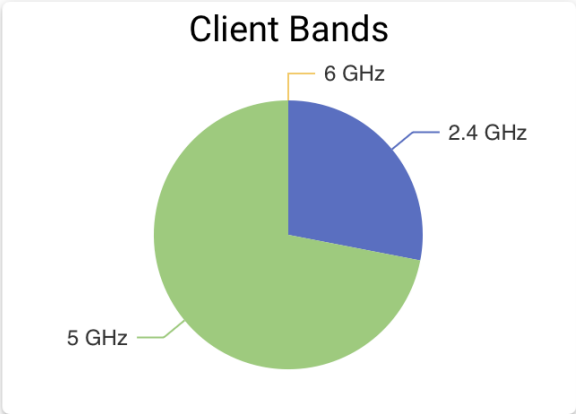
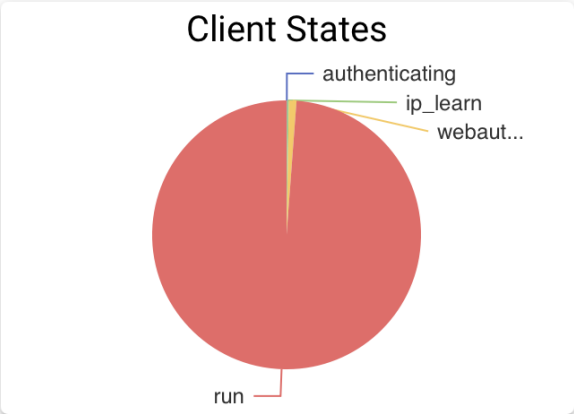
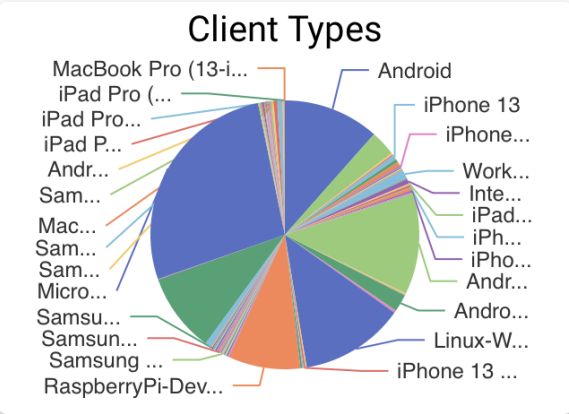
Wireless Config Analyzer Express (WCAE) – Summary









Total Messages	Count
Controller Messages	44
APs Messages	31
Processing Errors	4967
Parsing Errors	4
AP Missing Config	0
AP Missing RF Data	0

Controller Information	
Model	C9800-80-K9
Serial	FOX2803P0TQ
Version	17.15.3
Rommon Version	17.12(2r)
Days Uptime	1
System Name	9800_WLC

General Info	
AP Count	1577
Active Clients	5103
Site Tags	16
Policy Tags	147
Redundancy	Duplex
Multicast/Broadcast	Disabled/Disabled

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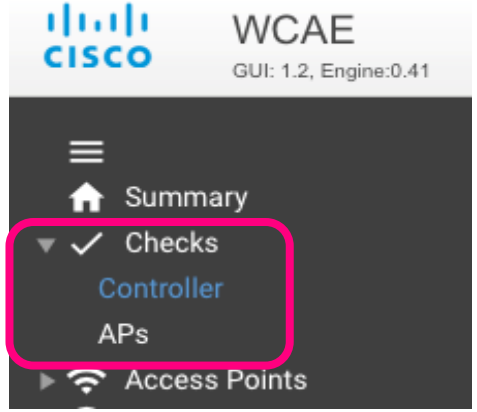
WCAE – WLC and AP Checks



WLC Checks

Level	Category	Feature	Message	Action
Error	Operational	HW	Controller has a ROMMON version lower than the recommended for the platform	Check ROMMON Software section for your controller, in the Cisco Software Download page, and upgrade to latest version available, otherwise this may prevent future IOS-XE upgrade scenarios
Warning	Operational	RF	WLC has 13.0% of APs with high channel utilization for 2.4GHz Band	
Warning	Operational	RF	WLC has 32.1% of APs with failed Interference Profile for 2.4GHz Band	
Info	Config Error	Tags	More than 100 Site tags detected. Large counts are supported, but they may have a performance impact on some conditions	

AP Checks

Low coverage detected, action on AP placement recommended

+	60029	Warning	Operational	RF	AP shows low coverage (all neighbors < -75 dBm) on 5GHz band. This could affect roaming and be indication of poor RF design or NDP issues	This message is intended to flag APs that don't have a smooth coverage transition to other APs. This may be result of AP physical placement

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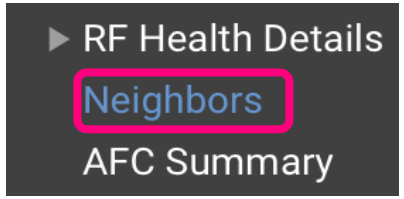
RF Summarization

Path : Access Points > RF Summary/ RF Health Details/Neighbors or Rogue Report in home page

For every AP :
- Channel, Power, Utilization, Interference
- Number of RX/TX Neighbors, Number of clients at SNR X

For every AP :
- Health score(0 to 100), co-channel utilization/noise



For every AP :
- Neighbor info - names with channel, width, power

For every Rogue :
- Rogue MAC, Number of detecting APs, strongly heard AP
- Classification, Heard RSSI, Channel, Band

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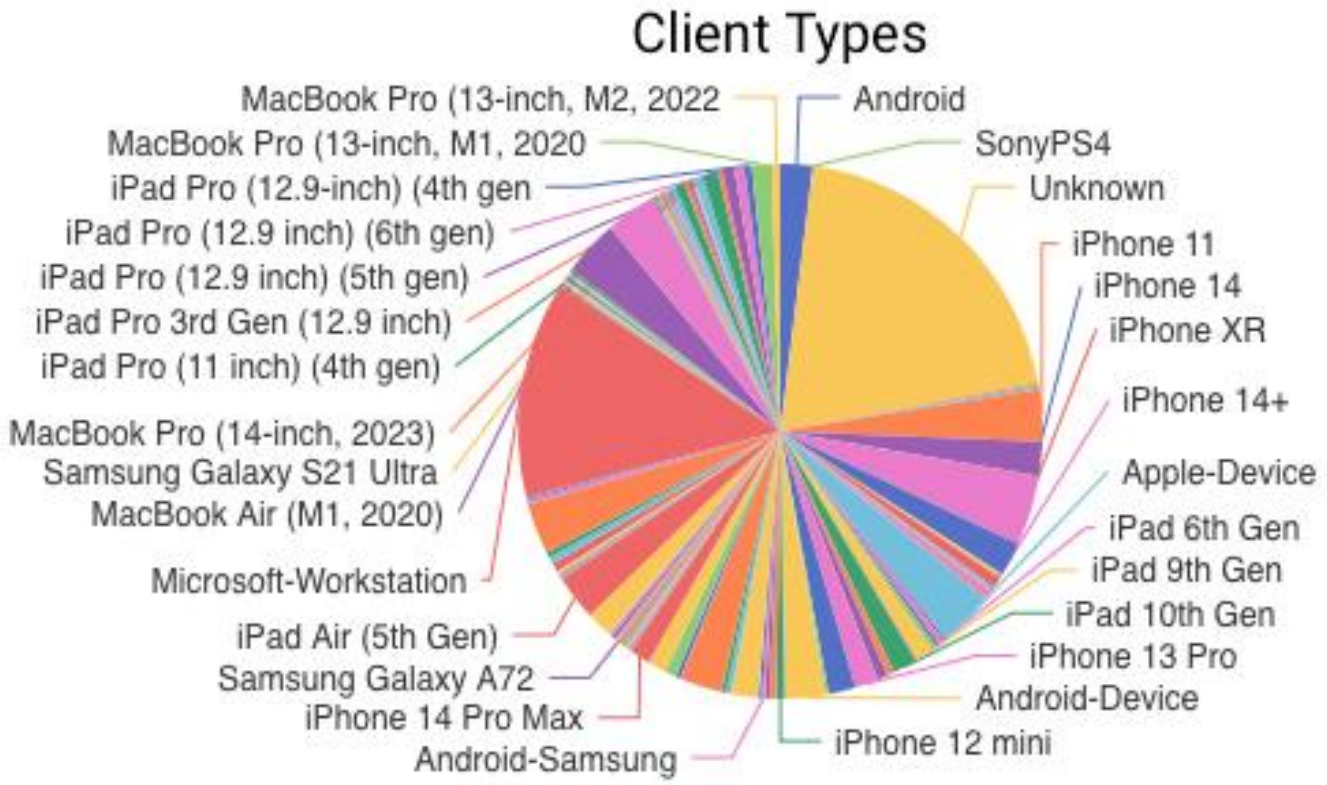
Client Types And Count



Client Type	Count
Android	297
SonyPS4	2
Unknown	3005
iPhone 7	20
iPhone 8	29
HP-Device	1
iPhone 11	467
iPhone 12	310
iPhone 13	634
iPhone 14	304
iPhone 7+	10
iPhone 8+	23
iPhone XR	108
iPhone XS	28

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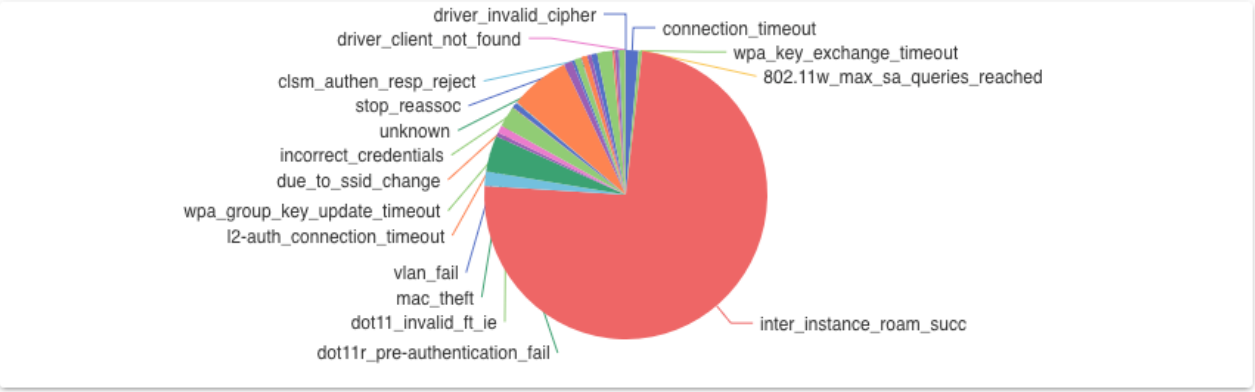
Client Delete Reasons

Client Delete Reasons



- Count per delete reason
- Reason
- Explanation

Delete Reason	Count	Log Signature	Level	Explanation
Connection Timeout	3314	CO_CLIENT_DELETE_REASON_CONNECT_TIMEOUT	May need validation	Client associated to Flex AP, and did not complete onboarding process, may be triggered if client
Wpa Key Exchange Timeout	942	CO_CLIENT_DELETE_REASON_KEY_XCHNG_TIMEOUT	May happen during Normal Onboarding	This can happen during normal scenarios. Client deleted due to EAPoL M1 retries. Possible client
802.11w Max Sa Queries Reached	2	CO_CLIENT_DELETE_REASON_MAX_SAQUERIES	May happen during Normal Onboarding	For PMF clients, triggered when client did not reply to SA queries and reached max retries. Could
Inter Instance Roam Success	169437	CO_CLIENT_DELETE_REASON_INTER_WNCD_ROAM_SUCCESS	May happen during Normal Onboarding	Client roamed across WNCD instances. This is normal scenario for default tag, or roaming across
Due To Mobility Fail(ed/ures)	3699	CO_CLIENT_DELETE_REASON_MOBILITY_FAILURE	May happen during Normal Onboarding	Client delete, either due to roaming while on IP learning state, or due to policy configuration mism
Dot11r Pre-authentication Fail(ed/ures)	9219	CO_CLIENT_DELETE_REASON_FT_AUTH_RESPONSE	May happen during Normal Onboarding	Client failed pre-authentication during FT roaming
Dot11 Fail(ed/ures)	2	CO_CLIENT_DELETE_REASON_DOT11_UNSPECIFIED_FAILURE	May need validation	Association response creation fail, possible due to client malformed request
Dot11 Invalid Akm	1030	CO_CLIENT_DELETE_REASON_DOT11_AKMP_INVALID	Possible defect or config error	Client requested invalid Authentication Key Management during association
Dot11 Received Invalid Pmkid In The Received Rsn Ie	1950	CO_CLIENT_DELETE_REASON_DOT11_INVALID_PMKID	Possible defect or config error	Controller could not validate PMKID provided by client. This may have different triggers
Dot11 Invalid Mdie	1	CO_CLIENT_DELETE_REASON_DOT11_INVALID_MDIE	May need validation	802.11r(FT) client sent invalid mobility domain
Dot11 Invalid Ft Ie	5353	CO_CLIENT_DELETE_REASON_DOT11_INVALID_FTIE	May need validation	Failure during FT processing for client. This may have different triggers
Client Eap Id Timeout	55	CO_CLIENT_DELETE_REASON_CLIENT_EAP_ID_TIMEOUT	May happen during Normal Onboarding	Client did not reply to EAP requests in the specified retries/time
Wrong Replay Counter	44	CO_CLIENT_DELETE_REASON_MN_AP_WRONG_REPLAY_COUNTER	May need validation	Invalid replay counter received during EAPoL negotiation. Client should recover on new attempt
Mic Validation Fail(ed/ures)	4	CO_CLIENT_DELETE_REASON_KEY_MGMT_MIC_VALIDATION	May need validation	if WLAN is PSK, possible invalid password. For 802.1x, this is client side supplicant issue

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Usecase : Troubleshooting High WNCd Utilization

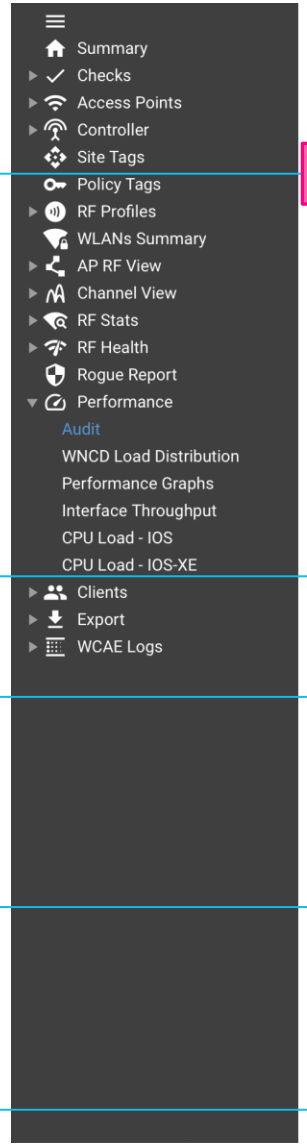
mDNS :- IPv6, >120 services, gateway, Apple Cont

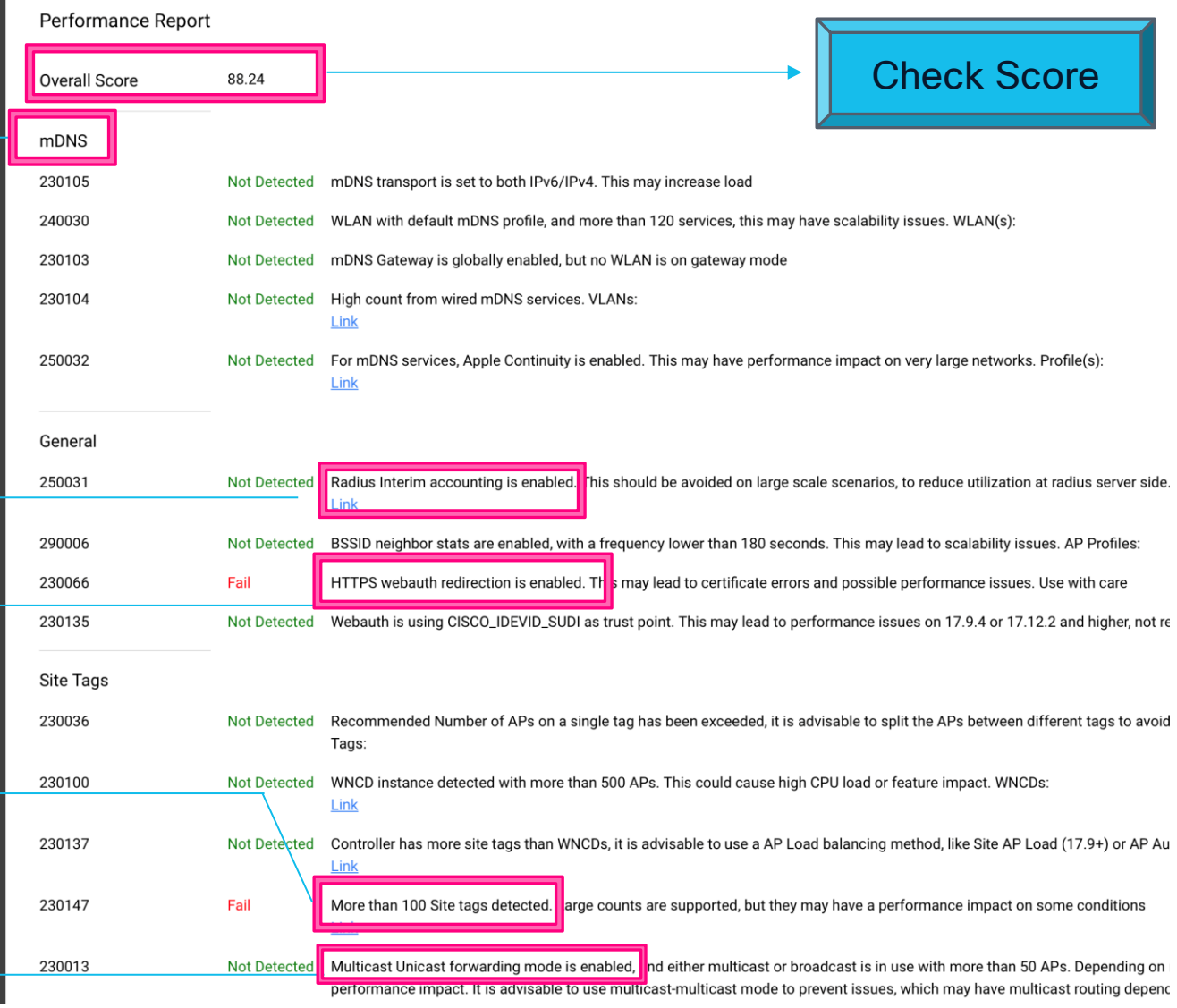
Interim Accounting

HTTPS redirect

Site Tag Count

Multicast Mode





Check Score

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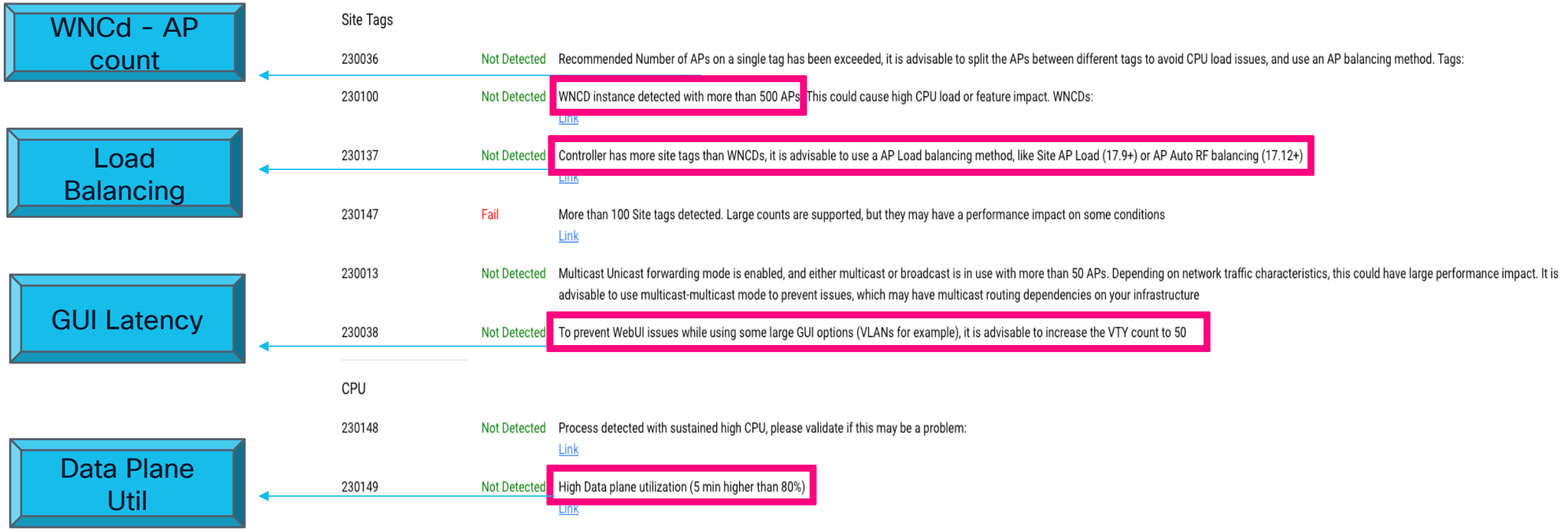
Troubleshooting High WNCd Utilization (Continued..)



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WNCd view

RF View - Band: 5 GHz

AP Classified per : WNCD. NDP RSSI: -85

Radio Count: 3498
Link Count: 14740

WNCD	AP Count	Client Count
wncd0	278	1262
wncd1	700	1843
wncd2	119	1800
wncd3	194	2210
wncd4	682	11152
wncd5	241	461
wncd6	270	1132
wncd7	481	1576

☐ Show Legend | View Type: WNCD | Link RSSI Filter: -85

High Inter WNCd expected(expensive)

Fairly balanced WNCds

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WNCd Load Balancing Options

17.3.X:

- The controller load balances the site-tags across the WNCds in a **round robin fashion**
- not always optimal for large networks.

17.9.3 and higher:

- To prevent unbalanced site-tag assignment to WNCds, the **site load command** was introduced in 17.9.3 and higher.
- This allows administrators to predefine the expected load of each site tag.

17.12.X and higher:

- The RF based **Automatic AP Load Balancing** feature uses **Radio Resource Management (RRM)** neighbor report-based AP grouping and load-balancing across WNCd instances.
- When this feature is enabled, it forms AP clusters based on the RSSI received from AP neighbor reports. These clusters or neighborhoods are further split into sub-neighborhoods and smaller areas.
- The resulting groups of APs are then distributed evenly across the WNCd processes

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Debug Analyzer

- RA Trace Analyzer
- Obtain quick insights

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Simplified Data Collection - Debug Bundle

Log collection in a single command :

RA Traces & Client Tech Support

- This collects and captures both RA traces(debug level) and internal RA for the configured clients
- Show tech wireless client MAC of two instances, one before RA trace is enabled and once after RA trace is stopped are captured
- C9800# debug wireless bundle client <client_mac1 ...client_mac5>

Packet Capture

- Packet captures at the WLC control plane is collected for the clients
- C9800# debug wireless bundle include epc client <client_mac1 ...client_mac5>

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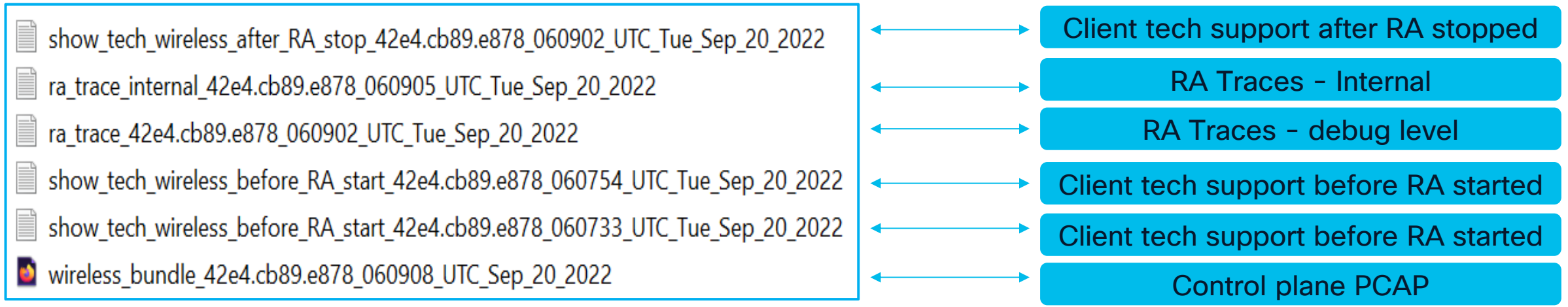
Bundle Contents

i. Two sets of RA traces for all the clients
   ii. Two sets of clients tech support
      iii. WLC control plane captures



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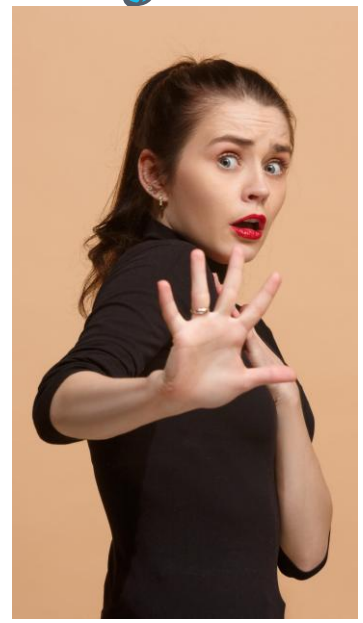
RA Trace – Raw File

~/Downloads/debugTrace_ec63.d7fc.f729 (2).txt

```
Logging display requested on 2025/06/23 12:00:04 (IST) for Hostname: [c9800-40-SJC], Model: [C9800-40-K9         ], Version: [17.09.05], SN: [JAE271507TK], MD_SN: [TTM265101FM]
2025/06/20 18:28:15.073514051 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Association received. BSSID 889c.ade7.9281, WLAN SJ_Corp_SSID_profile, Slot 0 AP 889c.ade7.9280, SJ-E
2025/06/20 18:28:15.073746134 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_INIT -> S_CO_ASSOCIATING
2025/06/20 18:28:15.074469577 {wncd_x_R0-0}{1}: [dot11] [15082]: (note): MAC: ec63.d7fc.f729  Association success. AID 1, Roaming = False, WGB = False, 11r = False, 11w = False Fast roam = False
2025/06/20 18:28:15.074852467 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_ASSOCIATING -> S_CO_L2_AUTH_IN_PROGRESS
2025/06/20 18:28:15.075299006 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  ADD MOBILE sent. Client state flags: 0x41  BSSID: MAC: 889c.ade7.9281 capwap IFID: 0x90000003, Add mobil
2025/06/20 18:28:15.079588340 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  L2 Authentication initiated. method DOT1X, Policy VLAN 1, AAA override = 1 , NAC = 0
2025/06/20 18:28:15.080450179 {wncd_x_R0-0}{1}: [site-manager-ap] [15082]: (ERR): Failed to get flex interface name vlan table root
2025/06/20 18:28:15.081349113 {wncd_x_R0-0}{1}: [ewlc-infra-evq] [15082]: (note): Authentication Success. Resolved Policy bitmap:11 for client ec63.d7fc.f729
2025/06/20 18:29:45.082253726 {wncd_x_R0-0}{1}: [errmsg] [15082]: (note): %DOT1X-5-FAIL: R0/0: wncd: Authentication failed for client (ec63.d7fc.f729) with reason (No Response from Client) on Interface ca
2025/06/20 18:29:45.082531498 {wncd_x_R0-0}{1}: [ewlc-infra-evq] [15082]: (ERR): SANET_AUTHC_FAILURE - No Response from Client, audit session id 15547F0A0000005A8D6B16A7
2025/06/20 18:29:45.082550762 {wncd_x_R0-0}{1}: [errmsg] [15082]: (note): %SESSION_MGR-5-FAIL: R0/0: wncd: Authorization failed or unapplied for client (ec63.d7fc.f729) on Interface capwap_90000003 AuditS
2025/06/20 18:29:55.083275604 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Co client reap timer callback. Co client reap timer triggering E_CO_CLIENT_CONNECT_TIMEOUT event, cli
2025/06/20 18:29:55.083342500 {wncd_x_R0-0}{1}: [ewlc-infra-evq] [15082]: (ERR): ec63.d7fc.f729CLIENT_STAGE_TIMEOUT State = AUTHENTICATING, WLAN profile = SJ_Corp_SSID_profile, Policy profile = SJ_Corp_SS
2025/06/20 18:29:55.083369294 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Client delete initiated. Reason: CO_CLIENT_DELETE_REASON_L2AUTH_CONNECT_TIMEOUT, details: , fsm-state
2025/06/20 18:29:55.083519937 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Delete mobile payload sent for BSSID: 889c.ade7.9281 WTP mac: 889c.ade7.9280 slot id: 0
2025/06/20 18:29:55.083699299 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_L2_AUTH_IN_PROGRESS -> S_CO_DELETE_IN_PROGRESS
2025/06/20 18:29:55.084613832 {wncd_x_R0-0}{1}: [sanet-shim-translate] [15082]: (note): MAC: ec63.d7fc.f729  Session manager disconnect event called, session label: 0x34000050
2025/06/20 18:29:55.085742854 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_DELETE_IN_PROGRESS -> S_CO_DELETED
2025/06/23 06:41:02.209724436 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Association received. BSSID 889c.ade7.9280, WLAN EEC_Exp, Slot 0 AP 889c.ade7.9280, SJ-Edge2-AP1, Sit
2025/06/23 06:41:02.209964796 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_INIT -> S_CO_ASSOCIATING
2025/06/23 06:41:02.210705345 {wncd_x_R0-0}{1}: [dot11] [15082]: (note): MAC: ec63.d7fc.f729  Association success. AID 1, Roaming = False, WGB = False, 11r = False, 11w = False Fast roam = False
2025/06/23 06:41:02.211068931 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_ASSOCIATING -> S_CO_L2_AUTH_IN_PROGRESS
2025/06/23 06:41:02.211353370 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  L2 Authentication initiated. method PSK, Policy VLAN 352, AAA override = 0, NAC = 0
2025/06/23 06:41:02.213391451 {wncd_x_R0-0}{1}: [ewlc-infra-evq] [15082]: (note): Authentication Success. Resolved Policy bitmap:11 for client ec63.d7fc.f729
2025/06/23 06:41:02.213614721 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  ADD MOBILE sent. Client state flags: 0x71  BSSID: MAC: 889c.ade7.9280 capwap IFID: 0x90000003, Add mobil
2025/06/23 06:41:02.253665212 {wncd_x_R0-0}{1}: [client-keymgmt] [15082]: (note): MAC: ec63.d7fc.f729  EAP Key management successful. AKM:PSK Cipher:CCMP WPA Version: WPA2
2025/06/23 06:41:02.253808853 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  L2 PSK Authentication Success. EAP type: NA, Resolved VLAN: 352, Audit Session id: 15547F0A000000A59A56B
2025/06/23 06:41:02.254249467 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Mobility discovery triggered. Client mode: Local
2025/06/23 06:41:02.254254623 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_L2_AUTH_IN_PROGRESS -> S_CO_MOBILITY_DISCOVERY_IN_PROGRESS
2025/06/23 06:41:02.255433129 {wncd_x_R0-0}{1}: [mm-client] [15082]: (note): MAC: ec63.d7fc.f729 Mobility Successful. Roam Type None, Sub Roam Type MM_SUB_ROAM_TYPE_NONE, Client IFID: 0xa0000003, Client R
2025/06/23 06:41:02.255590673 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  ADD MOBILE sent. Client state flags: 0x72  BSSID: MAC: 889c.ade7.9280 capwap IFID: 0x90000003, Add mobil
2025/06/23 06:41:02.255766465 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_MOBILITY_DISCOVERY_IN_PROGRESS -> S_CO_DPATH_PLUMB_IN_PROGRESS
2025/06/23 06:41:02.255888594 {wncd_x_R0-0}{1}: [dot11] [15082]: (note): MAC: ec63.d7fc.f729  Client datapath entry params - ssid:EEC_Exp,slot_id:0 bssid ifid: 0x0, radio_ifid: 0x9000000a, wlan_ifid: 0xf0
2025/06/23 06:41:02.256196660 {wncd_x_R0-0}{1}: [dpath_svc] [15082]: (note): MAC: ec63.d7fc.f729 Client datapath entry created for ifid 0xa0000003
2025/06/23 06:41:02.256476894 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_DPATH_PLUMB_IN_PROGRESS -> S_CO_IP_LEARN_IN_PROGRESS
2025/06/23 06:41:02.404022207 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (ERR): MAC: 0000.0000.0000  vlan_mode_api: fsm_ctxt not found
2025/06/23 06:41:05.778682535 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (ERR): MAC: 0000.0000.0000  vlan_mode_api: fsm_ctxt not found
2025/06/23 07:17:22.705798404 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Re-Association received. BSSID 889c.ade7.9880, WLAN EEC_Exp, Slot 0 AP 889c.ade7.9880, SJ-Edge2-AP2,
2025/06/23 07:17:22.705935348 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_IP_LEARN_IN_PROGRESS -> S_CO_IP_LEARN_IN_PROGRESS
2025/06/23 07:17:22.706466185 {wncd_x_R0-0}{1}: [dot11] [15082]: (note): MAC: ec63.d7fc.f729  Association success. AID 2, Roaming = True, WGB = False, 11r = False, 11w = False Fast roam = False
2025/06/23 07:17:22.706695241 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Delete mobile payload sent for BSSID: 889c.ade7.9280 WTP mac: 889c.ade7.9280 slot id: 0
2025/06/23 07:17:22.707108086 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_IP_LEARN_IN_PROGRESS -> S_CO_L2_AUTH_IN_PROGRESS
2025/06/23 07:17:22.708088849 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  ADD MOBILE sent. Client state flags: 0x71  BSSID: MAC: 889c.ade7.9880 capwap IFID: 0x9000000c, Add mobil
2025/06/23 07:17:22.744876468 {wncd_x_R0-0}{1}: [client-keymgmt] [15082]: (note): MAC: ec63.d7fc.f729  EAP Key management successful. AKM:PSK Cipher:CCMP WPA Version: WPA2
2025/06/23 07:17:22.745019080 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  L2 PSK Authentication Success. EAP type: NA, Resolved VLAN: 352, Audit Session id: 15547F0A000000A59A56B
2025/06/23 07:17:22.745433966 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Mobility discovery triggered. Client mode: Local
2025/06/23 07:17:22.745438686 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_L2_AUTH_IN_PROGRESS -> S_CO_MOBILITY_DISCOVERY_IN_PROGRESS
2025/06/23 07:17:22.745697077 {wncd_x_R0-0}{1}: [mm-client] [15082]: (note): MAC: ec63.d7fc.f729 Mobility Successful. Roam Type None, Sub Roam Type MM_SUB_ROAM_TYPE_INTRA_INSTANCE, Previous BSSID MAC: 889
2025/06/23 07:17:22.745932349 {wncd_x_R0-0}{1}: [client-auth] [15082]: (note): MAC: ec63.d7fc.f729  ADD MOBILE sent. Client state flags: 0x76  BSSID: MAC: 889c.ade7.9880 capwap IFID: 0x9000000c, Add mobil
2025/06/23 07:17:22.746104443 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_MOBILITY_DISCOVERY_IN_PROGRESS -> S_CO_DPATH_PLUMB_IN_PROGRESS
2025/06/23 07:17:22.746429588 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_DPATH_PLUMB_IN_PROGRESS -> S_CO_IP_LEARN_IN_PROGRESS
2025/06/23 07:17:39.142919647 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Re-Association received. BSSID 2c57.4158.71a0, WLAN EEC_Exp, Slot 0 AP 2c57.4158.71a0, SJ-Edge1-AP2,
2025/06/23 07:17:39.143042319 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_IP_LEARN_IN_PROGRESS -> S_CO_IP_LEARN_IN_PROGRESS
2025/06/23 07:17:39.143657454 {wncd_x_R0-0}{1}: [dot11] [15082]: (note): MAC: ec63.d7fc.f729  Association success. AID 1, Roaming = True, WGB = False, 11r = False, 11w = False Fast roam = False
2025/06/23 07:17:39.143943419 {wncd_x_R0-0}{1}: [client-orch-sm] [15082]: (note): MAC: ec63.d7fc.f729  Delete mobile payload sent for BSSID: 889c.ade7.9880 WTP mac: 889c.ade7.9880 slot id: 0
2025/06/23 07:17:39.144396513 {wncd_x_R0-0}{1}: [client-orch-state] [15082]: (note): MAC: ec63.d7fc.f729  Client state transition: S_CO_IP_LEARN_IN_PROGRESS -> S_CO_L2_AUTH_IN_PROGRESS
```



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Debug Analyzer - Home Page

Show Advanced Debug Insights NEW!!

Select a client MAC Address and connection to see logs.

ec63.d7fc.f729

Download CSV

Connection 10 of 10 < 1 ... 9 10 >

Show Time | Show Task | Show Translated | Show Original | Show Prior First Connection | Show All

Time	Task	Translated
2025/06/23 12:08:05.797	client-orch-sm	Client made a new Association to an AP/BSSID: BSSID 889c.ade7.9881, WLAN SJ_Corp_SSID_profile, Slot 0 AP 889c.ade7.9880, SJ-Edge2-AP2, Site tag ST_SanJo_Corporat_9248f_0, Policy tag PT_SanJo_Corpo_Corporat_78519, Policy profile SJ_Corp_SSID_profile, Switching Local, old BSSID 889c.ade7.9881, Socket delay 0ms
2025/06/23 12:08:05.798	dot11	Association success for client, assigned AID is: 2
2025/06/23 12:08:32.420	client-auth	Starting EAPOL 4-Way Handshake
2025/06/23 12:08:32.436	client-keymgmt	Negotiated the following encryption mechanism: AKM:DOT1X Cipher:CCMP WPA Version: WPA2
2025/06/23 12:08:32.436	client-orch-state	Starting Mobility Anchor discovery for client
2025/06/23 12:08:32.439	client-orch-state	Entering IP learn state
2025/06/23 12:08:32.493	client-iplearn	Client got IP: 10.127.85.54, discovered through: IP Snooping

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Advanced Debug Insights

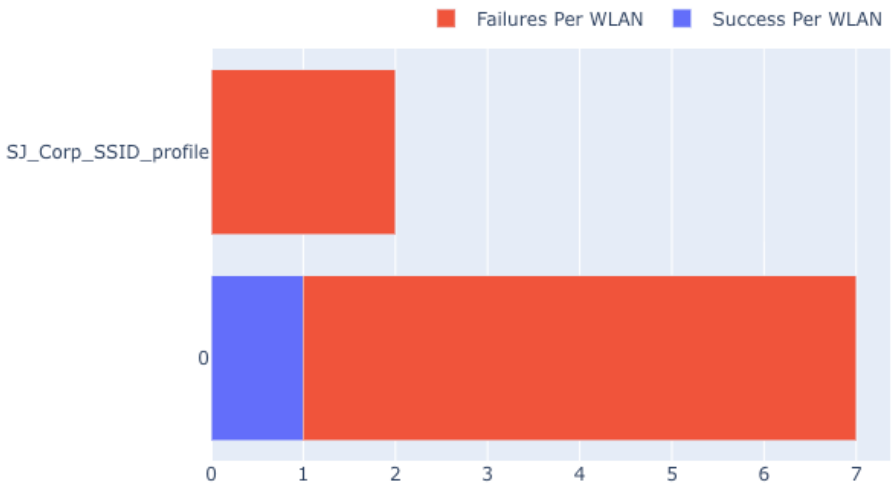
of success/failed sessions, start/end timestamp per client

Advanced Debug Insights

9800 WLC Advanced Debug Insights (Help)

Client MAC Address	Success Sessions	Failed Sessions	Start Time	End Time
ec63.d7fc.f729	1	8	June 23, 2025 11:50:4...	June 23, 2025 12:08:05...

Success/Failure stats per WLAN



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Advanced Debug Insights

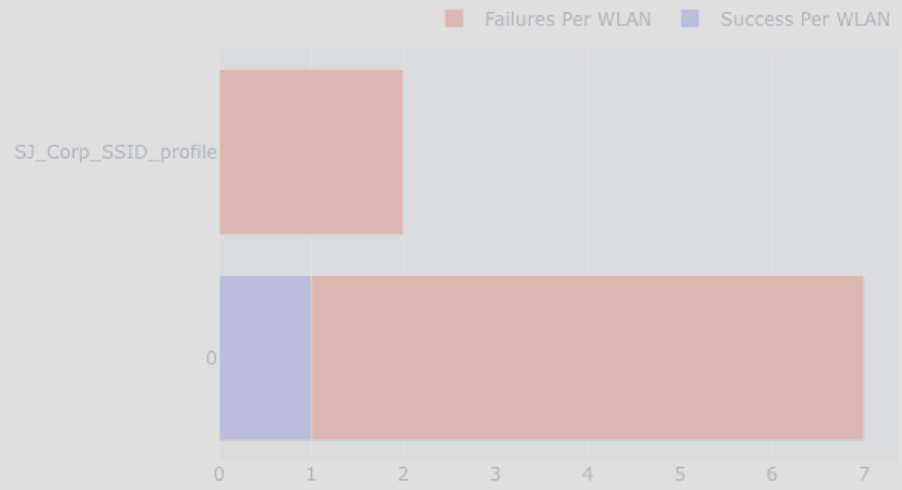
of success/failed sessions, start/end timestamp per client

Advanced Debug Insights

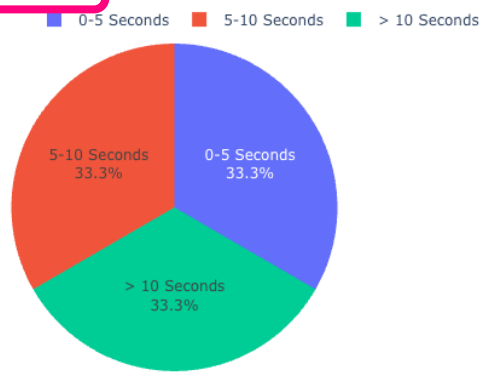
9800 WLC Advanced Debug Insights (Help)

Client MAC Address	Success Sessions	Failed Sessions	Start Time	End Time
ec63.d7fc.f729	1	8	June 23, 2025 11:50:4...	June 23, 2025 12:08:05...

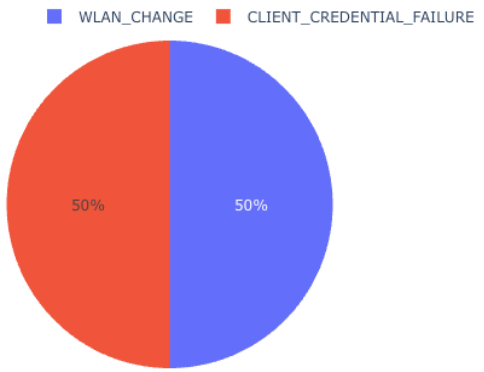
Success/Failure stats per WLAN



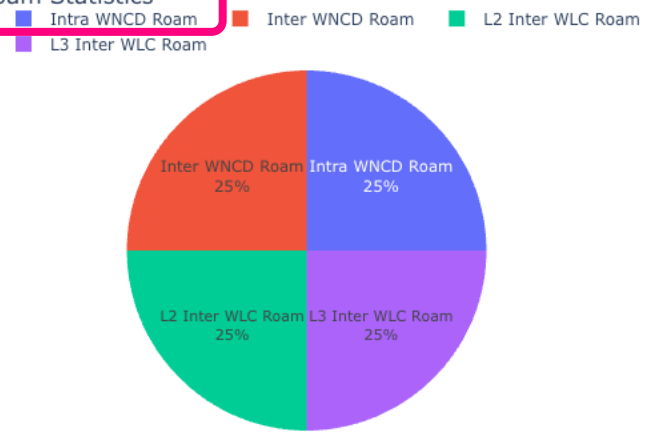
Client Onboarding Time



Delete Reasons



Client Roam Statistics



Client Onboarding time for 0-5/10 secs, Delete Reasons, Roam (Intra/inter WNCd/WLC stats

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Client Session Table

Client MAC: Ec63.D7fc.F729

Session	State	Auth Method	AP	WLAN	Mobility Role	IP Address	Onboarding Time	Start/Run Time	Delete Reason	Delete Time
1	IPLEARN	UNKNOWN	Site tag ST_SanJo_Corporat_9248f_0	0	Local-None		0 ms	11:50:47:555 /		
2	INIT	UNKNOWN	Site tag ST_SanJo_Corporat_9248f_0	0	NONE-NONE		0 ms	12:04:28:337 /	WLAN_CHANGE	12:04:28:000
3	L2AUTH	DOT1X	889c.ade7.9280	SJ_Corp_SSID_profile	NONE-NONE		0 ms	12:04:28:340 /		
4	L2AUTH	DOT1X	Site tag ST_SanJo_Corporat_9248f_0	0	NONE-NONE		0 ms	12:04:29:900 /	CLIENT_CREDENTIAL_FAILURE	12:04:43:000
5	L2AUTH	DOT1X	889c.ade7.9880	SJ_Corp_SSID_profile	NONE-NONE		0 ms	12:07:12:867 /		
6	L2AUTH	DOT1X	Site tag ST_SanJo_Corporat_9248f_0	0	NONE-NONE		0 ms	12:07:14:325 /		
7	L2AUTH	DOT1X	Site tag ST_SanJo_Corporat_9248f_0	0	NONE-NONE		0 ms	12:07:15:568 /		
8	L2AUTH	DOT1X	Site tag ST_SanJo_Corporat_9248f_0	0	NONE-NONE		0 ms	12:07:36:743 /		
9	RUN	DOT1X	Site tag ST_SanJo_Corporat_9248f_0	0	Local-None	10.127.85.54	26698 ms	12:08:05:797 / 12:08:32:495		

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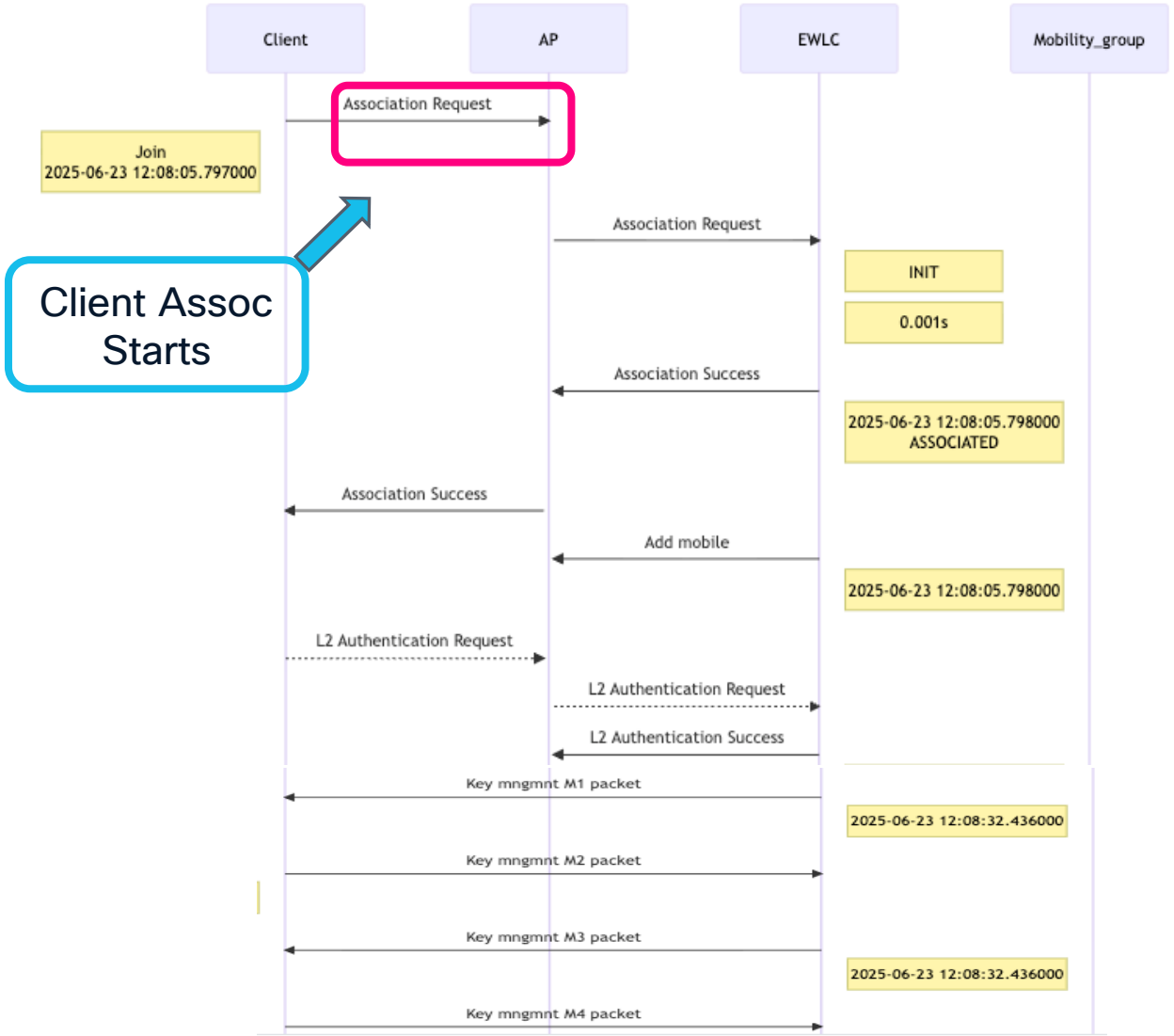
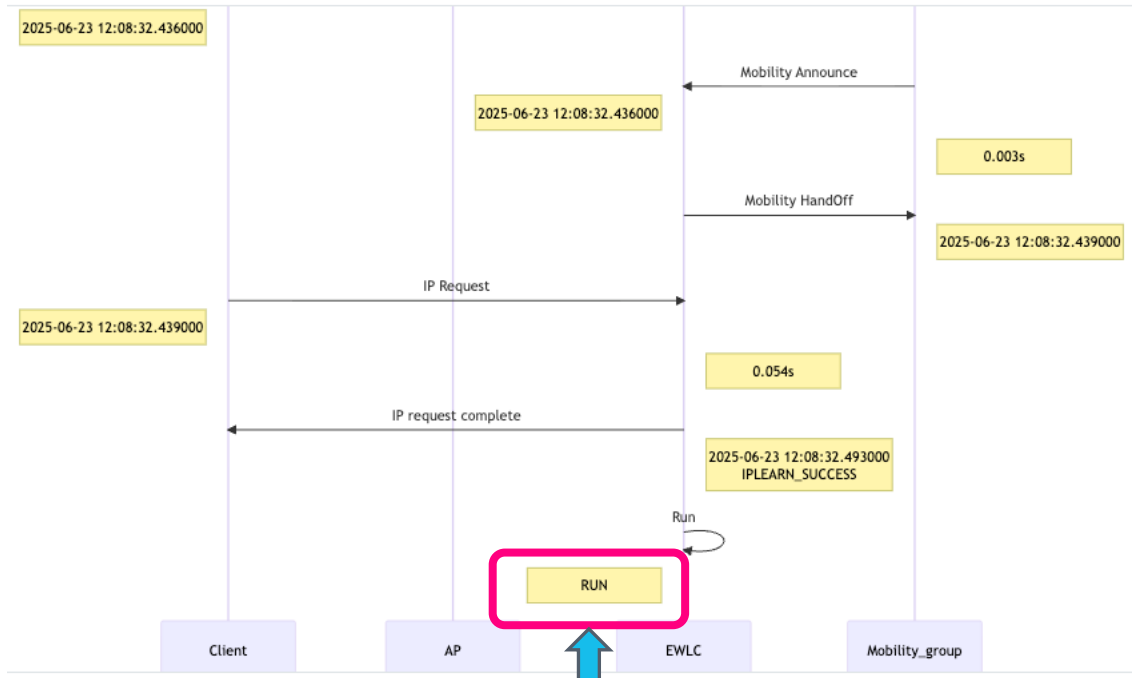
Packet Flow Between Client, AP, WLC



← → Transaction seen in the log file

<···> Transaction not seen in log file.(Doesn't mean this is expected or needed always)



Client in RUN state

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WiFi-HAWK

- Over the air capture analyzer

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WiFi-Hawk

- Expert system to identify problems over from a wireless capture
  - Hard to see issues found in huge files
  - Low level protocol analysis
  - Interoperability problems
- Generate a summary of events per client and AP WLANs
- Create expert reports

WiFi Hawk

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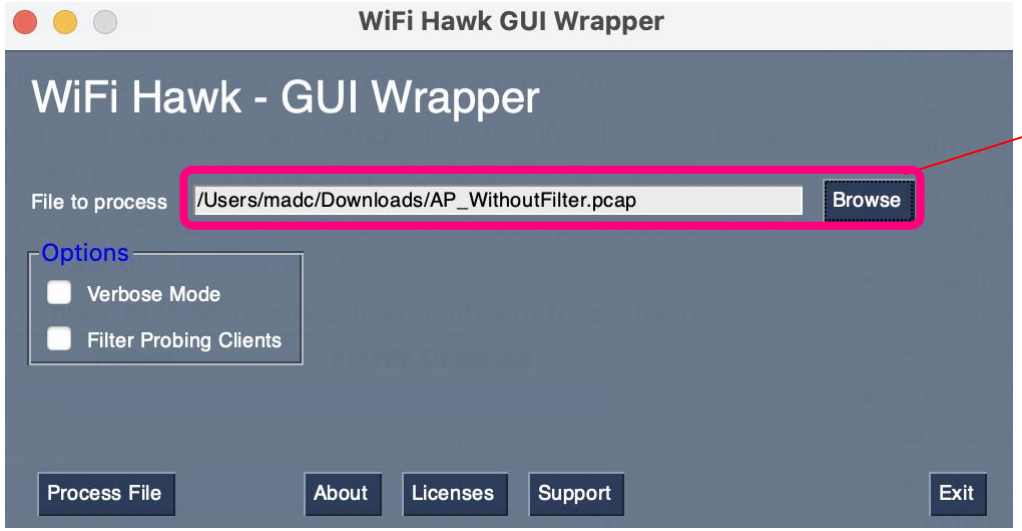
WiFi Hawk

How to use?



- Upload file
- View Excel Analysis

▷▷▷▷▷▷	Auth request	Info	2727	FT BSS Transition
◁◁◁◁◁◁	Auth resp-fail	Error	2729	Failed, Status code:Invalid pairwise master key identifier
------	General Warning	Warning	2731	Deauth sent from client, not to current AP. Reason:1 (Unspecified
▷▷▷▷▷▷	Auth request	Info	3367	FT BSS Transition
◁◁◁◁◁◁	Auth resp-fail	Error	3370	Failed, Status code:Invalid pairwise master key identifier
------	General Warning	Warning	3372	Deauth sent from client, not to current AP. Reason:1 (Unspecified

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Quick Index view

- List of BSSIDs (APs) and clients active during the capture
- Quick glance on who is having problems
- Last known state for each client (probing, auth, full traffic, etc)
- Click on each item for full details

Table of contents

Generated:	2022-03-11 10:28
Wireless Consultant Version:	0.7
Total Frames:	82685
File Type:	Radio Tap
Processing time:	131.21 seconds
Total BSSIDs seen:	76
Total Clients seen:175	175

Processing Errors:

Invalid Frames	0
Exceptions	75
Non Parsed Frames	0
Filtered Frames	0
FCS Errors	0

AP BSSIDs	SSID	Events	Errors	Warnings
e0:10:7f:65:61:53	SSID-island-256150	146	0	145
58:1d:91:6b:2d:10	SSID-AR5511_6B2D10	58	0	57
58:bf:ea:bb:c0:66	SSID-Rsecure	57	0	56
58:bf:ea:bb:c0:61	SSID-handheld	53	0	52
58:bf:ea:bb:c0:67	SSID-rjil-consultant	50	0	49
58:bf:ea:bb:c0:60	SSID-secure-impact	49	0	48
58:bf:ea:bb:c0:6d	SSID-jionet	43	0	40

Clients	Last State	Events	Errors	Warnings
a8:9f:ba:51:f1:b9	EAPoL 4-WAY completed	555	0	0
34:a8:4e:50:06:00	Deauthenticated	476	0	476
2c:54:cf:fa:fc:52	Association failed	445	0	0
ac:22:0b:5b:e7:fa	Probing	441	0	0
80:6c:1b:20:39:de	Probing	402	0	0
7c:7a:91:b3:69:ba	Bidirectional Traffic	250	2	0
90:48:9a:f6:e6:35	Probing	238	0	0

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Event Flow

- Color coded events registered per device
- Summary of repeated items for a more concise view
- Quick location in capture of important issues (frame/time)
- Added information for better understanding
- Translation of reason codes, failures, EAP types, etc

Event Flow:

Direction	Type	Severity	BSSID	Frame	Time	Info
>>>>>>	Probe requests	Info	NA	28669	NA	Consecutive requests:48
<<<<<<	Probe responses	Info	NA	28617	NA	Consecutive responses:223
>>>>>>	Auth request	Info	64:f6:9d:55:5c:f4	28688	Thu, 12 May 2016 11:22:33 CEST	Auth Open System
<<<<<<	Auth resp success	Info	64:f6:9d:55:5c:f4	28690	Thu, 12 May 2016 11:22:33 CEST	Auth Open System
>>>>>>	Assoc request	Info	64:f6:9d:55:5c:f4	28693	Thu, 12 May 2016 11:22:33 CEST	Type: 802.1x . To SSID:Jio_AKA-Ahmedabad
<<<<<<	EAP ID request	Info	64:f6:9d:55:5c:f4	28701	Thu, 12 May 2016 11:22:33 CEST	Identy request
>>>>>>	EAP ID response	Info	64:f6:9d:55:5c:f4	28715	Thu, 12 May 2016 11:22:33 CEST	Identy response
<<<<<<	EAP request	Info	64:f6:9d:55:5c:f4	28802	Thu, 12 May 2016 11:22:33 CEST	EAP-AKA
>>>>>>	EAP response	Info	64:f6:9d:55:5c:f4	28880	Thu, 12 May 2016 11:22:33 CEST	EAP-AKA
>>>>>>	EAP response	Info	64:f6:9d:55:5c:f4	28883	Thu, 12 May 2016 11:22:33 CEST	EAP-AKA
<<<<<<	EAP Success	Info	64:f6:9d:55:5c:f4	29201	Thu, 12 May 2016 11:22:34 CEST	Dot1x Auth success
<<<<<<	EAP KEY RX	Info	64:f6:9d:55:5c:f4	29203	Thu, 12 May 2016 11:22:34 CEST	EAPoL M1
<<<<<<	EAP Start	Info	64:f6:9d:55:5c:f4	29214	Thu, 12 May 2016 11:22:34 CEST	EAP START
<<<<<<	EAP Start	Info	64:f6:9d:55:5c:f4	29219	Thu, 12 May 2016 11:22:34 CEST	EAP START
<<<<<<	EAP ID request	Info	64:f6:9d:55:5c:f4	29221	Thu, 12 May 2016 11:22:34 CEST	Identy request
<<<<<<	EAP ID request	Info	64:f6:9d:55:5c:f4	29223	Thu, 12 May 2016 11:22:34 CEST	Identy request
>>>>>>	Client going to sleep	Info	64:f6:9d:55:5c:f4	39809	Thu, 12 May 2016 11:22:53 CEST	Signaling AP that is going to sleep
>>>>>>	Sleep Time	Warning	NA	48017	NA	Client slept for more than 0:00:12 seconds
>>>>>>	Sleep Time	Warning	NA	49805	NA	Client slept for more than 0:00:03 seconds
>>>>>>	Sleep Cycles	Info	NA		NA	Consecutive sleep-awake cycles:2
>>>>>>	Client awake	Info	64:f6:9d:55:5c:f4	49805	Thu, 12 May 2016 11:23:08 CEST	Signaling AP that is going to sleep

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Detecting easy to miss problems

Simplify finding issues across large captures

- Unencrypted traffic leak (client/AP)
- Beacon loss
- High co-channel
- Incorrect data rates

Event Flow

Direction	Type	Severity	Frame	Time	Info
------	High Channel Utilization	Warning	1	Fri, 15 Mar 2019 21:05:05 CET	Current Channel utilization: 94
>>>>>>	First Beacon	Info	1	Fri, 15 Mar 2019 21:05:05 CET	
>>>>>>	Beacon loss	Warning	2	Fri, 15 Mar 2019 21:05:06 CET	Beacon loss detected, Time delta:0.824816
------	High Channel Utilization	Warning	2	Fri, 15 Mar 2019 21:05:06 CET	Current Channel utilization: 95
>>>>>>	Beacon loss	Warning	3	Fri, 15 Mar 2019 21:05:08 CET	Beacon loss detected, Time delta:1.427207
------	High Channel Utilization	Warning	3	Fri, 15 Mar 2019 21:05:08 CET	Current Channel utilization: 95
>>>>>>	Beacon loss	Warning	9	Fri, 15 Mar 2019 21:05:11 CET	Beacon loss detected, Time delta:3.523894
------	High Channel Utilization	Warning	9	Fri, 15 Mar 2019 21:05:11 CET	Current Channel utilization: 94
>>>>>>	Beacon loss	Warning	13	Fri, 15 Mar 2019 21:05:16 CET	Beacon loss detected, Time delta:4.612270

<<<<<<	EAP KEY RX	Info	6c:8b:d3:3b:8a:a0	1271	Thu, 21 Jan 2021 00:51:56 CET	EAPoL M1	
<<<<<<	EAP KEY RX	Info	6c:8b:d3:3b:8a:a0	1273	Thu, 21 Jan 2021 00:51:56 CET	EAPoL M1	
>>>>>>	EAP KEY TX	Info	6c:8b:d3:3b:8a:a0	1330	Thu, 21 Jan 2021 00:51:56 CET	EAPoL M2	
<<<<<<	Unencrypted AP TX Traffic	Error	6c:8b:d3:3b:8a:a0	1333	Thu, 21 Jan 2021 00:51:56 CET	AP defect, traffic sent without encryption	
<<<<<<	EAP KEY RX	Info	6c:8b:d3:3b:8a:a0	1334	Thu, 21 Jan 2021 00:51:56 CET	EAPoL M3	

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Diagnostic Tools – Takeaways

Scenario : Troubleshooting Client Connectivity, AP Join, Best Practice miss etc

AP/WLC Debugs

- Correlating AP and WLC side of debugs, outputs
- Example : AP join issues

WCAE

- Gain insights on best practices, warnings, RF, performance issues
- Example : Checking WLC Performance and High WNCd CPU Issues

Debug Analyzer

- Analyze client RA traces in table, graphical format for quick and easy consumption with various statistics
- Example : Client connectivity

WiFi-Hawk (OTA)

- Get insights on over the air packet capture
- Example : Debugging an RF Issue/AP/Client issue

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C-Monitoring Dashboards

Flexible Options to Self-Serve & Accelerate Case Resolution

Proactive Engagement
- Log Advisor
- Vulnerability Checker
- Talk to cisco.com

DignosticTools
- AP, WLC Debugs
- Wireless Config Analyzer Express
- Debug Analyzer
- WiFi Hawk-Over the air

Advanced Scripts
- EEMs
- Guest Shell
- WLAN Poller

Case Open

Case Closure

A

In-Product Assistance
- WalkMe
- Cisco Support Assistant Extension

B

C

Monitoring Dashboards
- Catalyst Center
- Meraki Dashboard

D

E

Cloud Like Tool
- RADKit

1. Prevent TAC case

2. Gather and Analyze Data

3. KPI Monitoring, Workarounds, TAC Handoff

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Monitoring Catalyst Center, Meraki Dashboard

Scenario : Obtain insights, assurance information, various reports

Catalyst Centre

- Leverage CatC for 360 troubleshooting of networks and clients.
- Example : Network Reasoner, Reports, Assurance

Meraki Dashboard

- Manage Catalyst Products from Meraki Dashboard (Hybrid)
- Example : AP Live Tools, PCAPs, WLC CLI & UI

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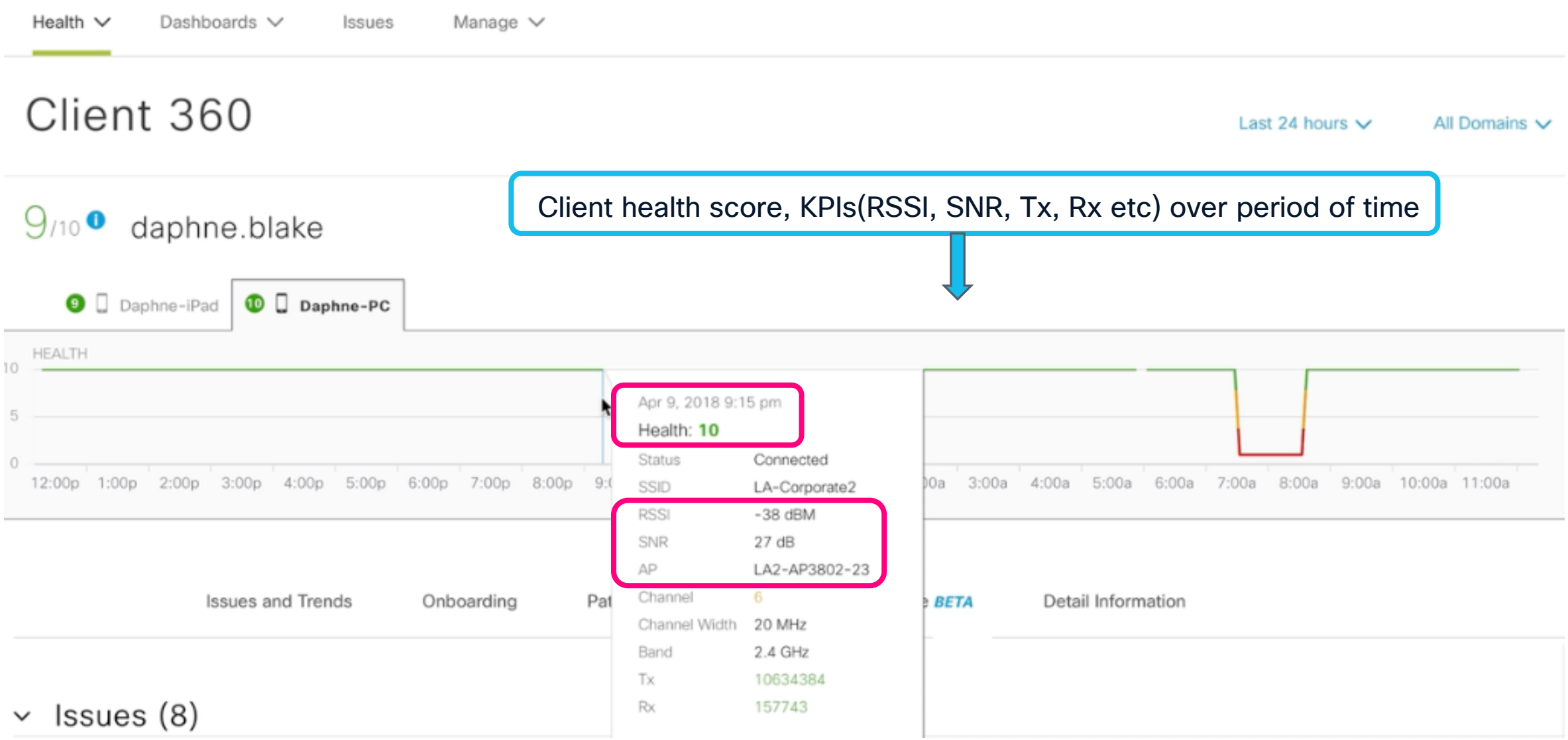
Client 360



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Client 360 - Issues Insights

- Client A took longer to authenticate due to network delay.
- Network latency for Netflix application above 387ms.
- Client B connectivity issue due to RF at AP location B.

Issues (4)

Onboarding

Wireless client took a long time to connect (SSID: LA-Corporate2, AP: LA2-AP3802-23, Band: 2.4 GHz) - Excessive time for Authentication due to AAA server or Network delays

Total occurrences: 9

Application

Network Latency for Application 'netflix' is Above the Threshold Value of 387ms.

Total occurrences: 16

Application

Network Latency for Application 'disney-web-portal' is Above the Threshold Value of 262ms.

Total occurrences: 11

Onboarding

Wireless client took a long time to connect (SSID: LA-Corporate2, AP: LA2-AP3802-23, Band: 2.4 GHz, Site: Global/USA/SM/Level1) - Excessive time due to RF issues

Total occurrences: 4

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Detailed insights of the issue

Wireless client took a lon
delays
Total occurrences: 9

Application
Network Latency for App
Total occurrences: 16

Application
Network Latency for App
Total occurrences: 11

Onboarding
Wireless client took a lon
Total occurrences: 4

Onboarding

Status: Open

Description

This client is taking longer than expected time to connect to 'LA-Corporate2' SSID due to excessive authentication time.

- Onboarding took 36.4 seconds (expected time should be less than 10.0 seconds).
- Association took less than a second (expected time should be less than 2.0 seconds)
- Authentication and Key Exchange took 30.8 seconds (expected time should be less than 3.0 seconds)
- IP Addressing took 0 seconds (expected time should be less than 5.0 seconds)

Onboarding Transaction Log

Find

Event	Reason	Date / Duration
Failure	4 Way Key Timeout	5.55 sec
Success		30.85 sec

Event	Reason
Auth Start	PMK Cache Expired
Auth Done	dot1x Full Auth
L2Key Done	4 Way Key Timeout
Send Deauth	

Failure due to - 4 way handshake key timeout

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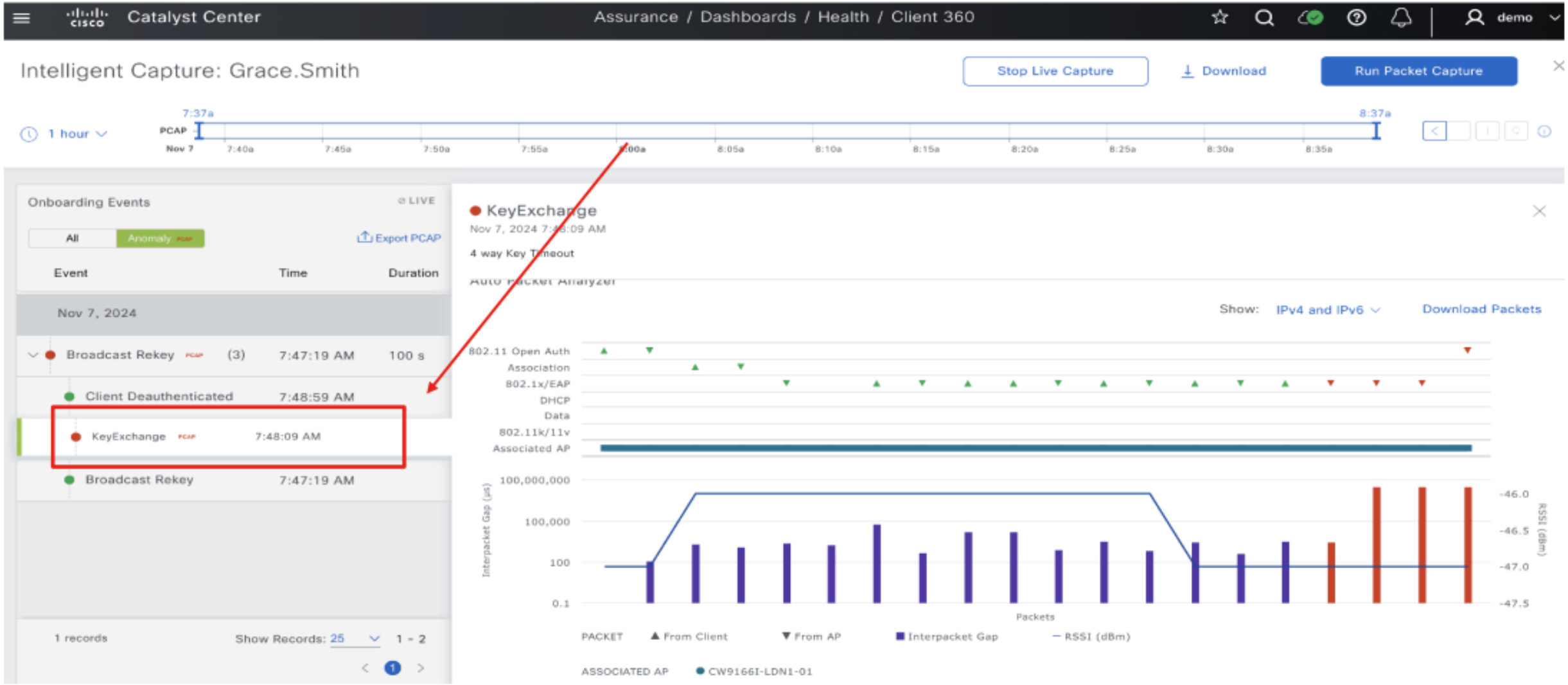
ICAP (Intelligent Capture) in Catalyst Center – Client 360



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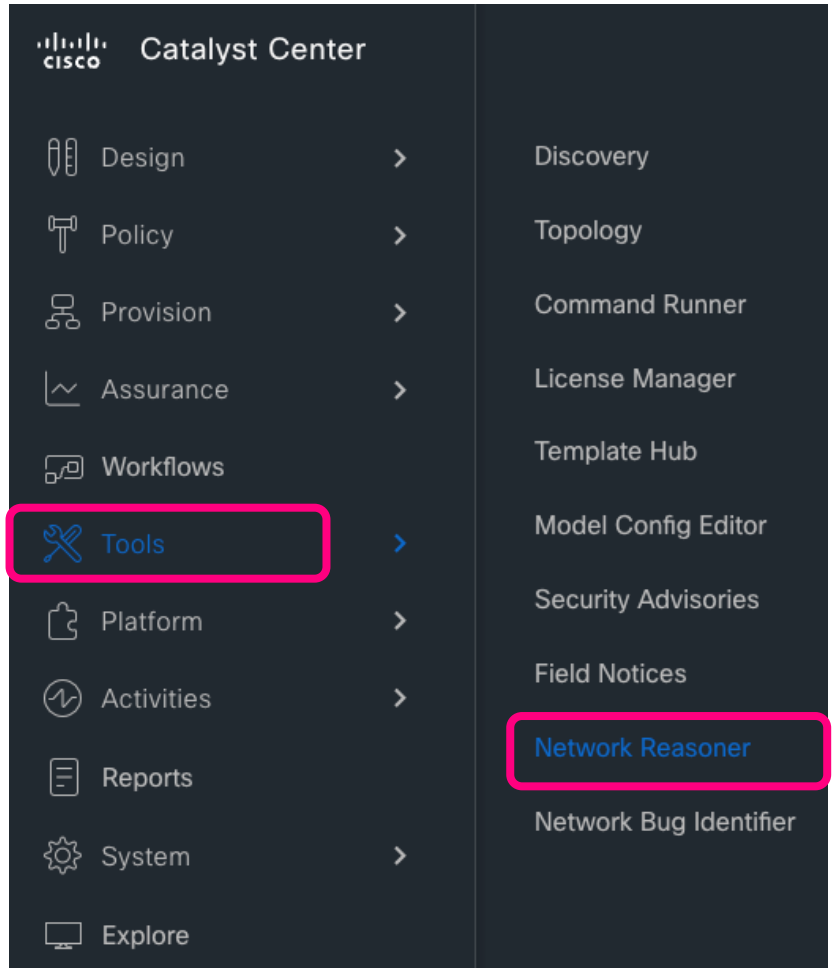
Network Reasoner



1

Wireless AP Data Collection

Collect show output, logs, and PCAP for an Access Point (AP) on its associated Catalyst 9800 WLC and via SSH to the AP for up to 30 minutes

Network Performance Impact: Medium

CX

2

Wireless Client Data Collection

Collect show output, logs, and PCAP for a Wireless Client on 1-2 Catalyst 9800 WLCs and up to 5 APs via SSH for up to 30 minutes

Network Performance Impact: Medium

CX

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Running Machine Reasoning – AP Data Collection

Reasoner Inputs

Troubleshoot Duration (5-30 minutes)*
5

Two AP MAC address (A,B)*
a49b.cd5a.b160,a49b.cd47.f474

PCAP Interface
GigabitEthernet0

AP IP address*
10.107.79.18

AP Name*
9120AP

Run Machine Reasoning

Download the bundle

Reasoning Activity | Conclusions (1)

Download the command outputs file here: cmd_output_9f7962c3-c54a-4a76-9642-05ddf0ca23ae.tar.gz

View Relevant Activities

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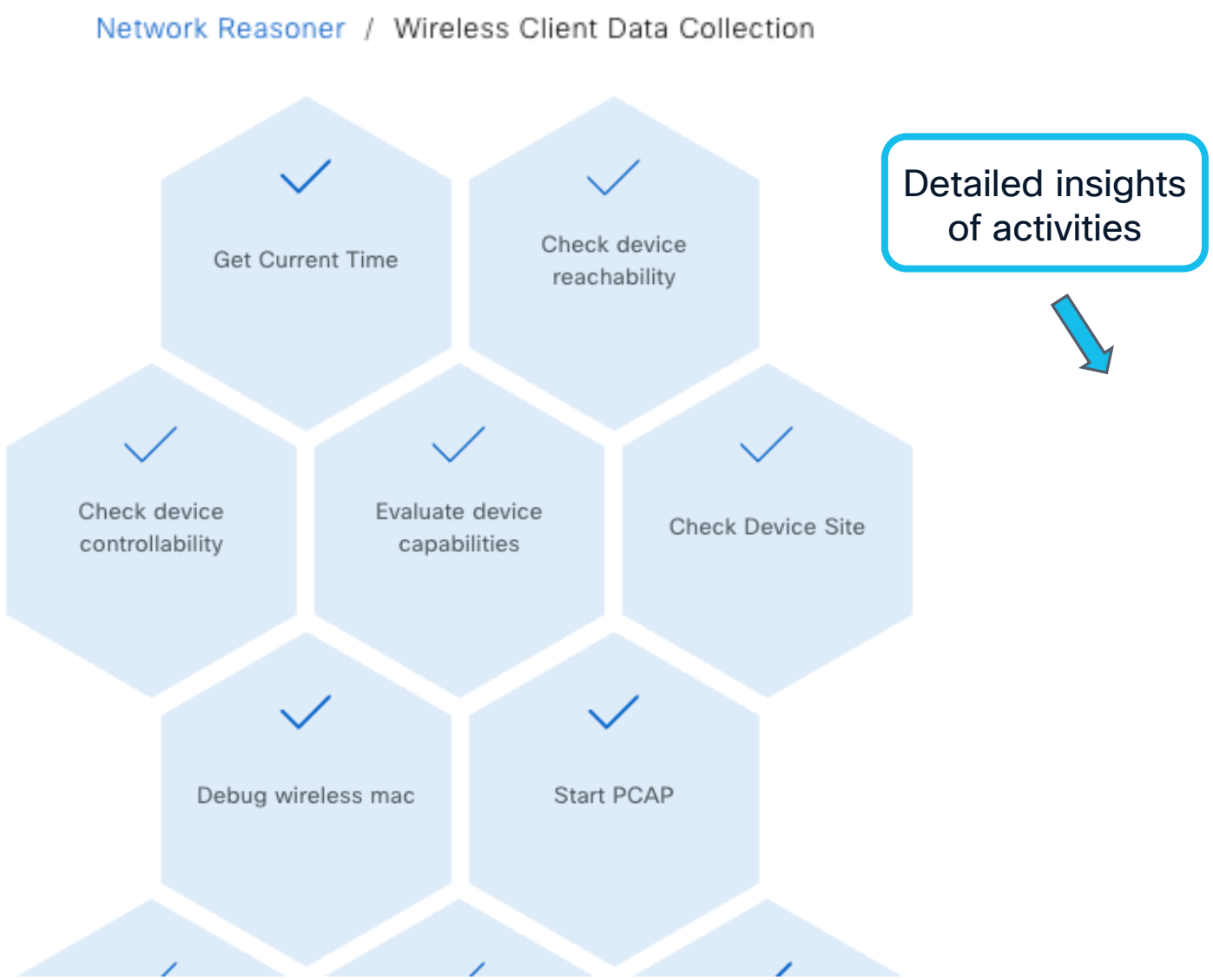
Network Reasoner Activity - Client



Detailed insights of activities

Relevant Activity Details Hide Details

Check if the device f45a3cc3-d96c-46d1-a33d-7ecc147e6fe9 is provisioned or assigned to a site.

Sep 13, 2025 11:32:38 PM

Debug wireless mac

Sep 13, 2025 11:32:44 PM

Get Current Time

Sep 13, 2025 11:32:44 PM

Starting Client PCAP session mre_client_pcap_1757786564883 with filter ec63.d7fc.f729 on interface GigabitEthernet0

Sep 13, 2025 11:32:45 PM

Get file store URL on Catalyst Center for wireless data collection upload on WLC with IP address 10.127.84.21 for filename: c9800-40-SJC.cisco.com-ec63.d7fc.f729-1757786555655.txt

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Meraki Dashboard for Catalyst Devices

- Cloud management – Catalyst devices
- Assurance and Packet Captures

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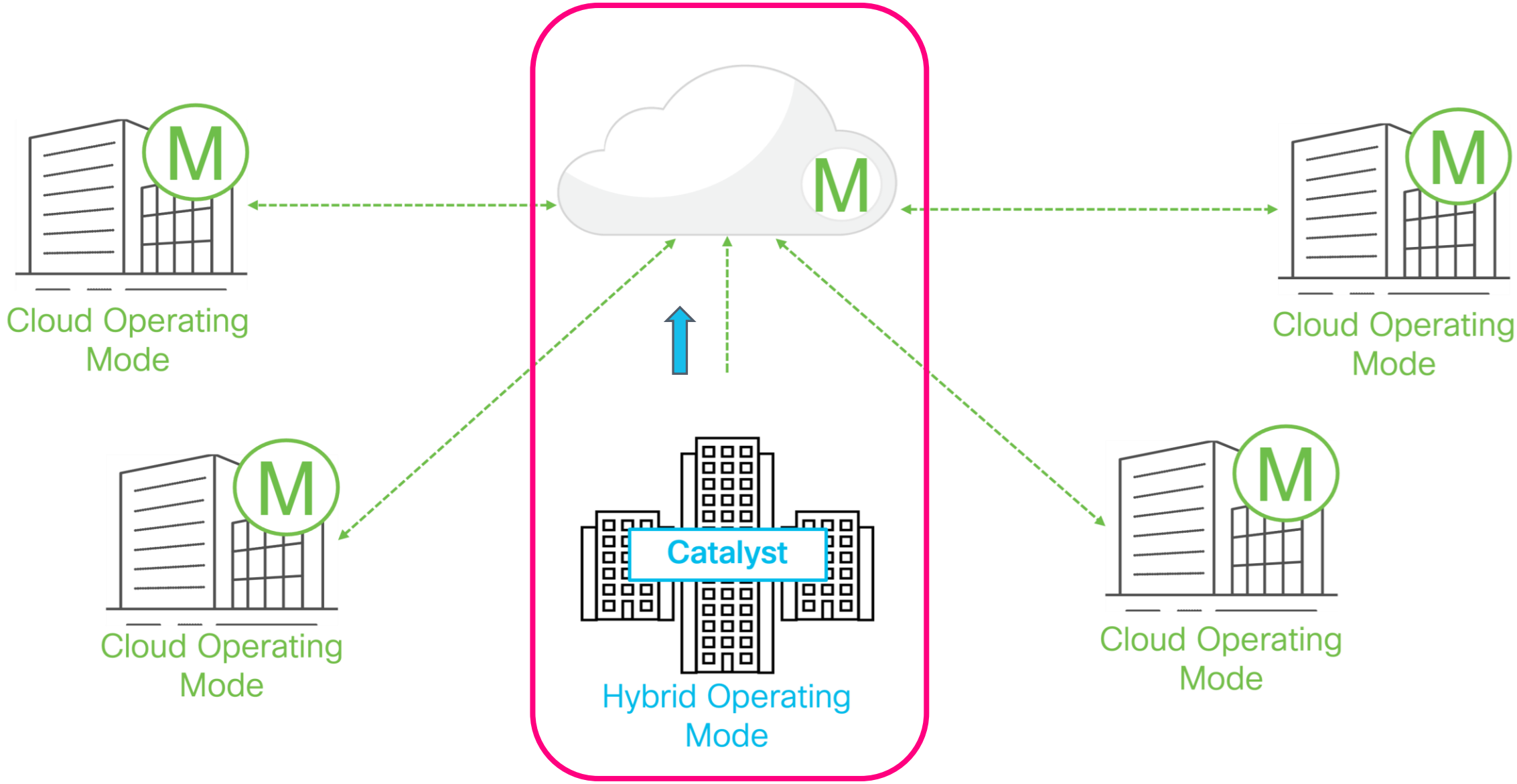
Unified Architecture



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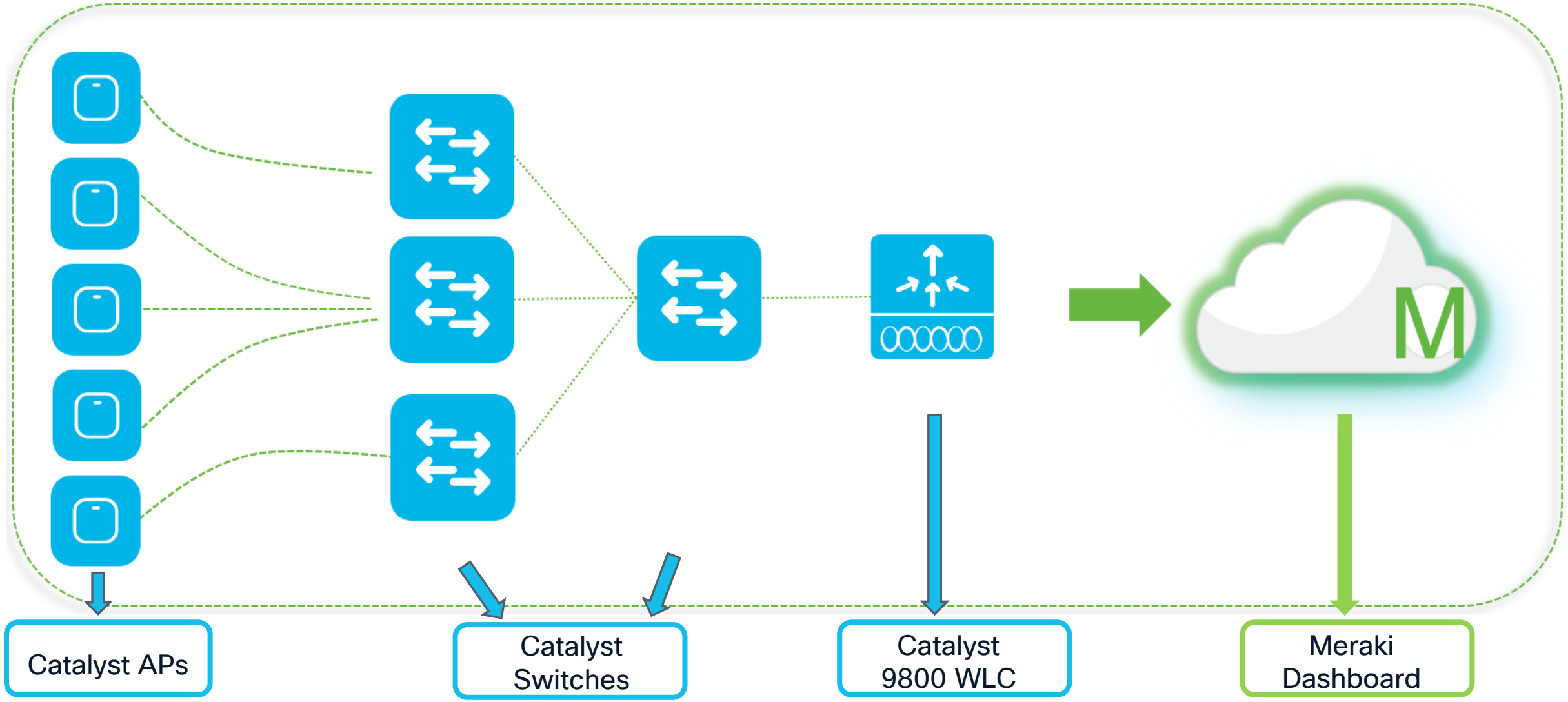
Hybrid Operating Mode



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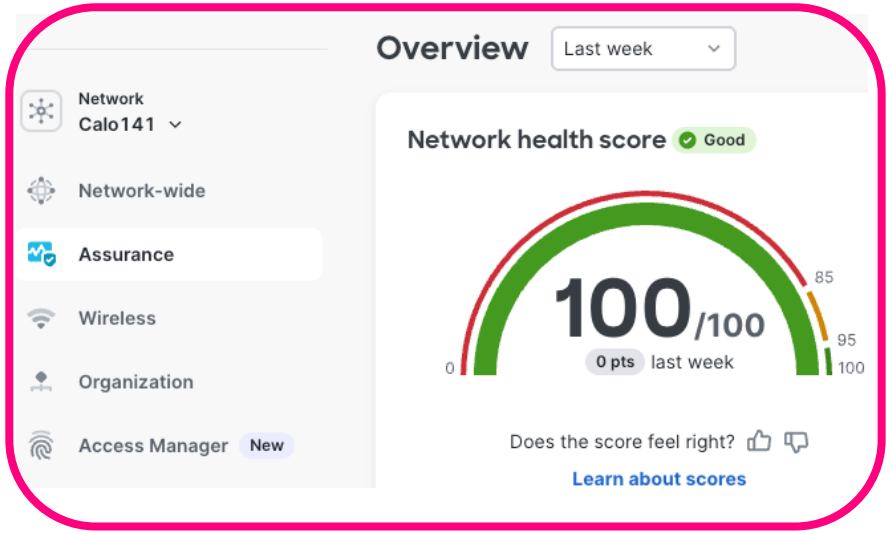
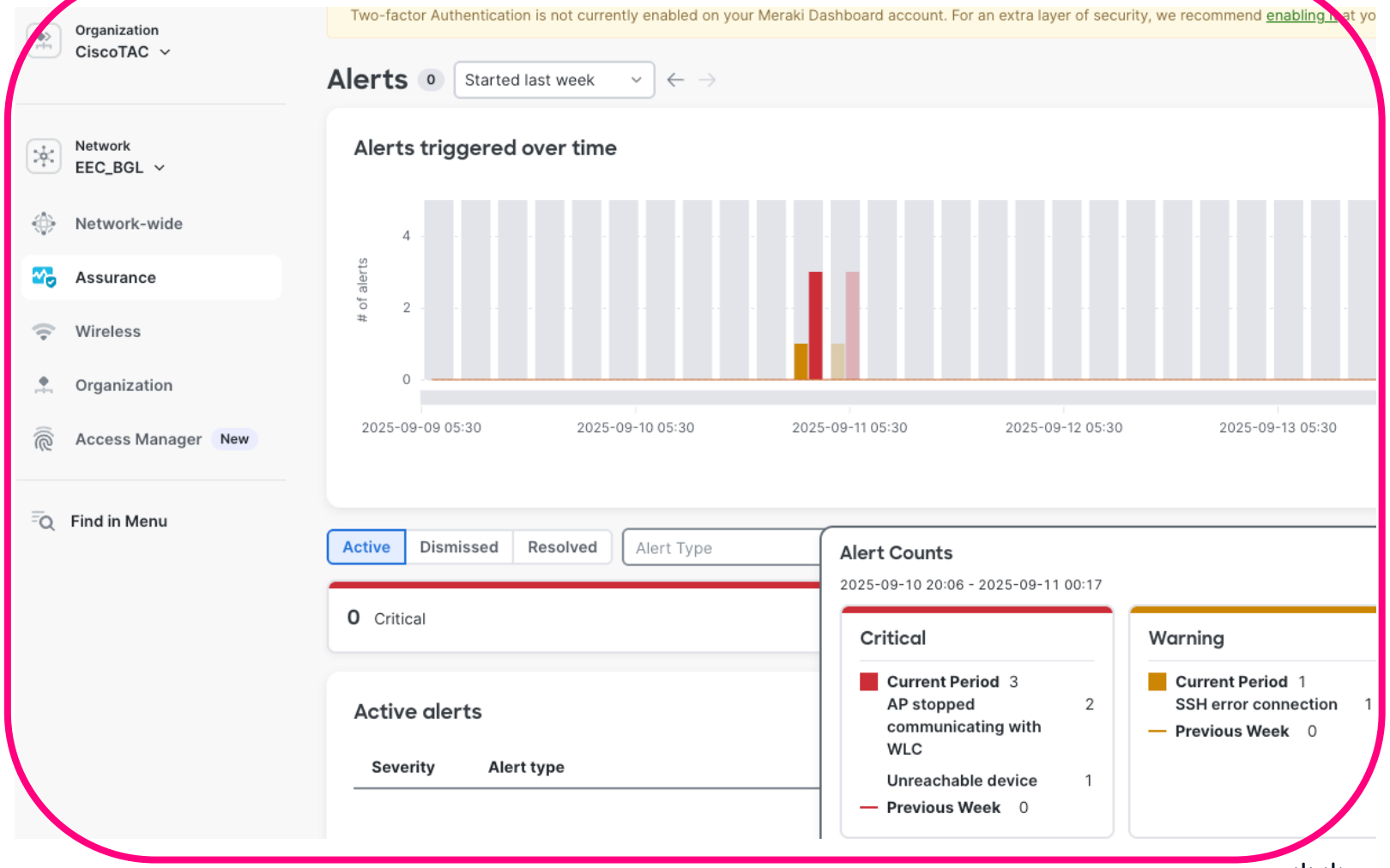
Assurance in Meraki Dashboard

Alerts : AP stopped communicating with WLC



Network health score on 100



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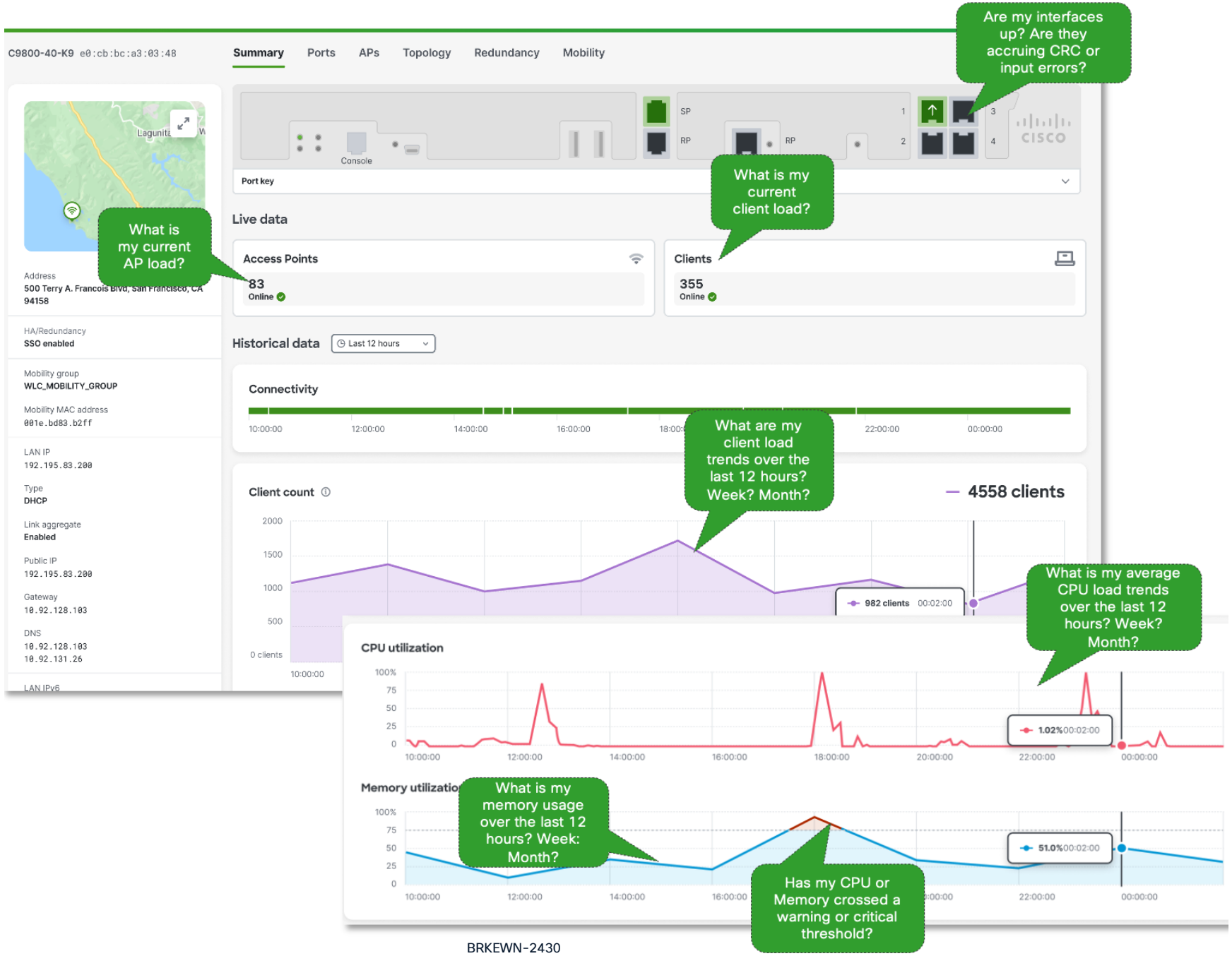
WLC KPIs



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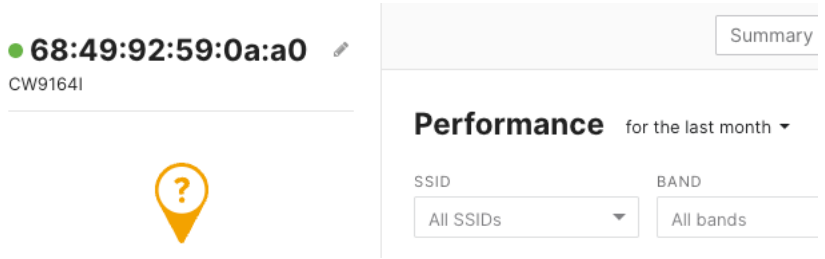
KPIs Per AP



AP CW9164I Performance

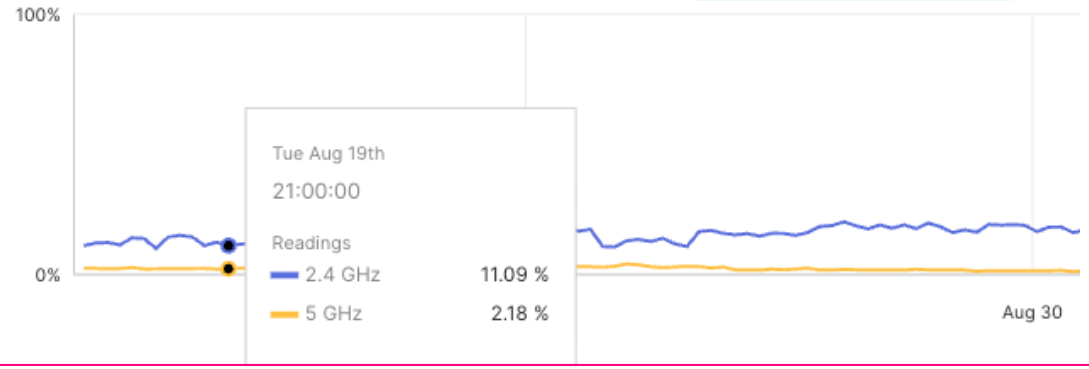
Clients

Number of clients on this AP on 21st Aug

Channel utilization

802.11 and interference

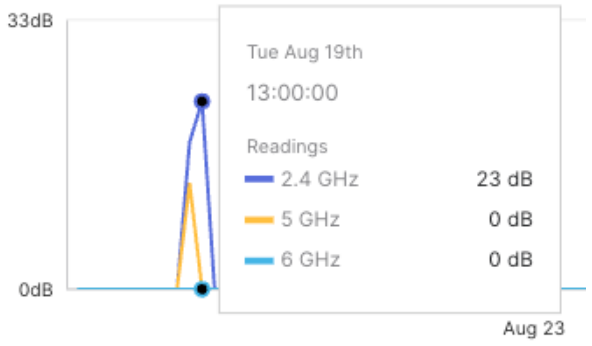
Channel util on both radios



Avg signal quality and latency in ms for all 3 radios

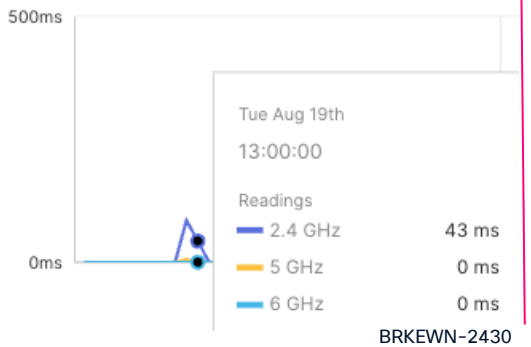
Average signal quality

in SNR



Average wireless latency

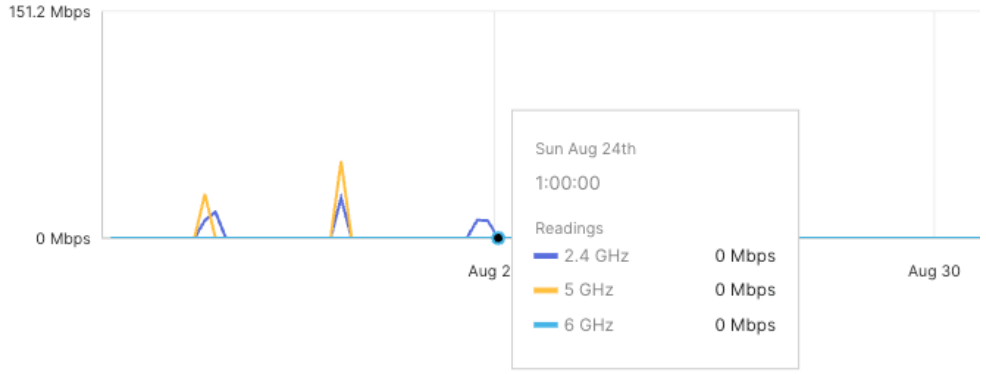
All traffic | Slowest Clients



Data rates

All traffic

Data rates per radio in Mbps



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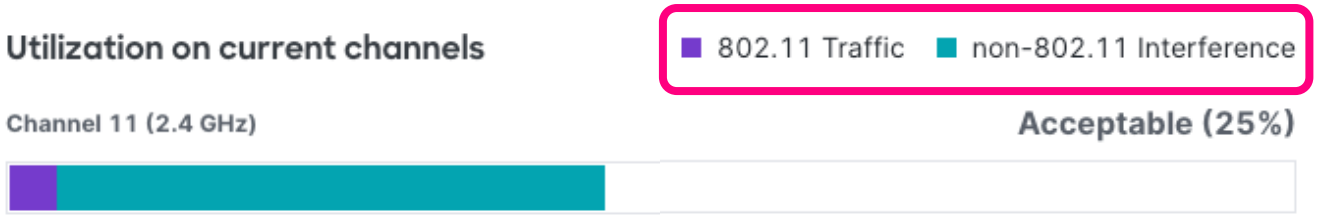
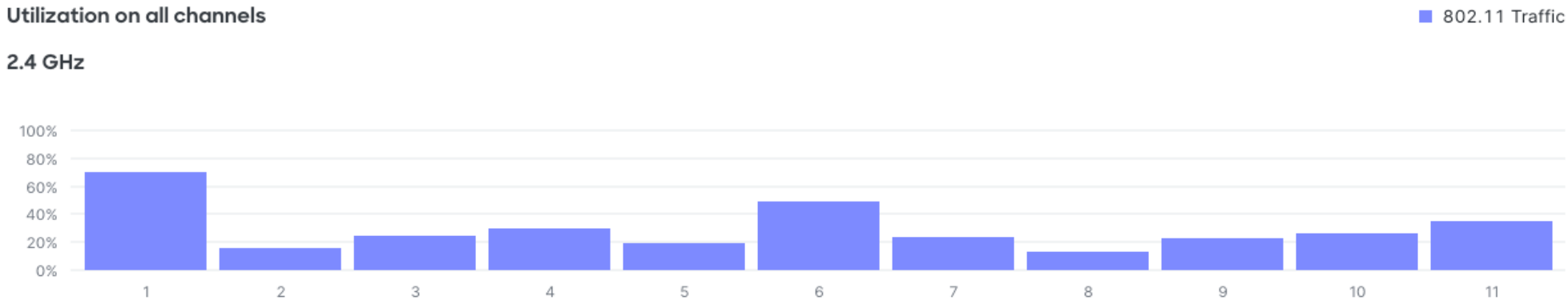
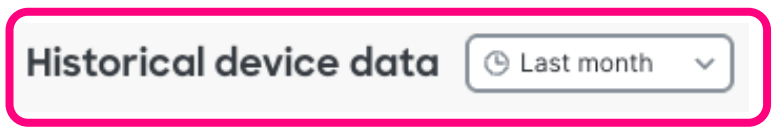
KPIs Per AP



802.11 Utilization across 2.4GHz





Historical clients 2 clients 40 KB

Description	Usage	IP Address	MAC Address
Samsung Galaxy S21	22 KB	192.168.1.16	62:ff:4e:16:30:12
Unknown Device	18 KB	—	06:fe:43:f4:12:10

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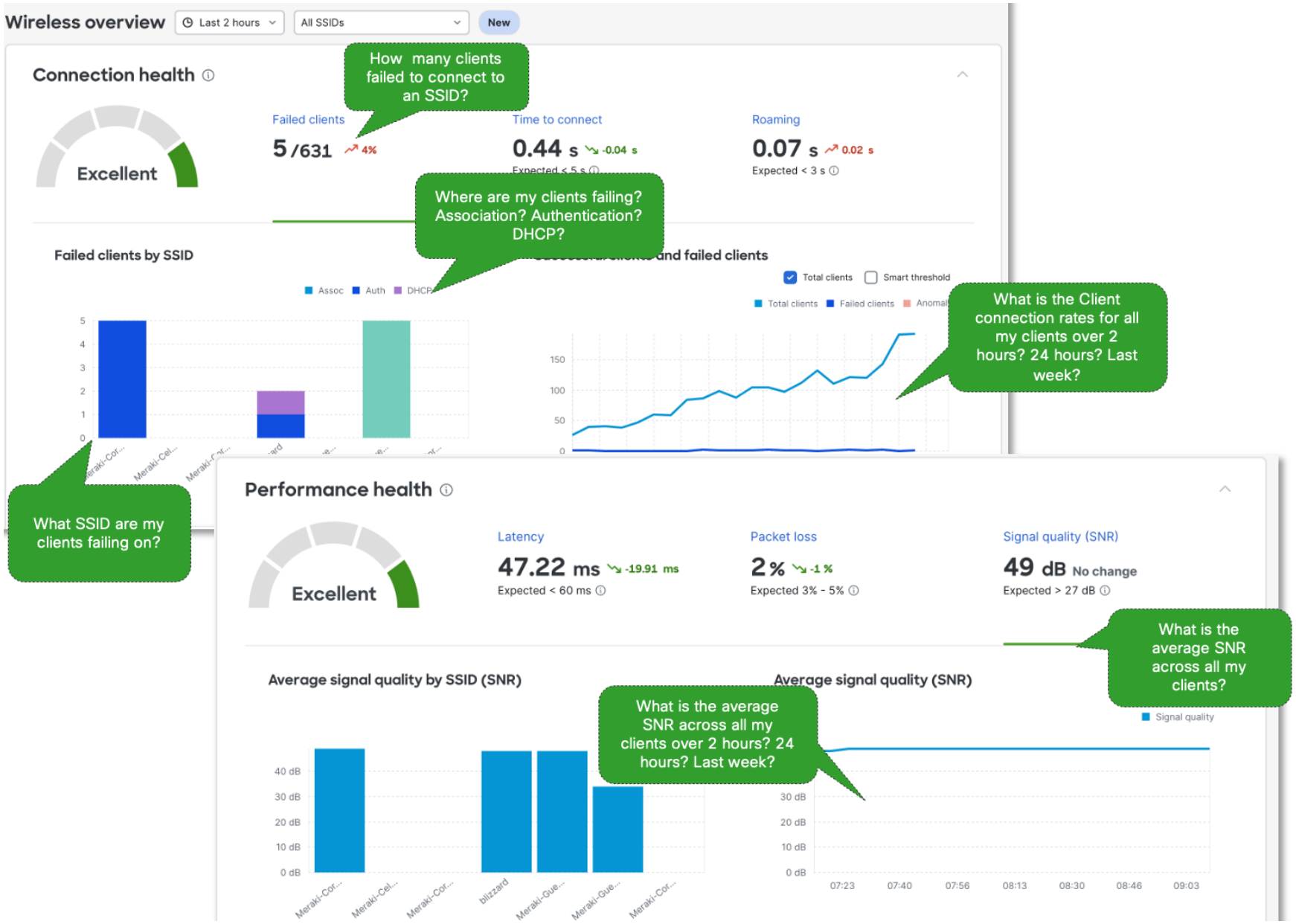
Client KPIs



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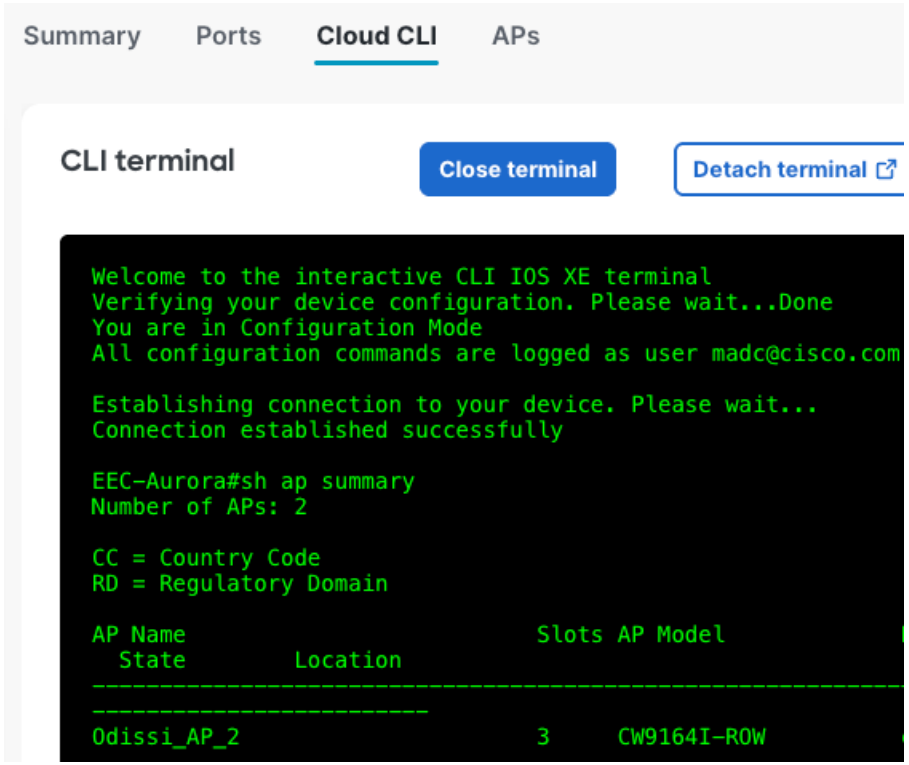
New Cloud CLI



Automated show commands

Select command

Show CDP Details

Select port

TenGigabitEthernet0/0/0

Outputs CDP neighbor details on an interface

Run

Show CDP Details for Port num TenGigabitEthernet0/0/0

```
EEC-Aurora#  show cdp neighbors TenGigabitEthernet 0/0/0 detail


-------------------------
Device ID: Fusion-C9300-1.ciscolab.com
```

Session History

Start time (UTC)	Complete time (UTC)	User	Session type	Session log
Aug 12, 2025 12:15:46	Aug 12, 2025 12:15:50	MerakiSupport_leOA7d	Configuration	Download
Aug 12, 2025 12:15:34	Aug 12, 2025 12:16:17	MerakiSupport_leOA7d	Configuration	Download
Aug 12, 2025 11:55:08	Aug 12, 2025 11:58:55	MerakiSupport_leOA7d	Configuration	Download

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Option D – Advanced Scripts

Flexible Options to Self-Serve & Accelerate Case Resolution

Proactive Engagement
- Log Advisor
- Vulnerability Checker
- Talk to cisco.com

DignosticTools
- AP, WLC Debugs
- Wireless Config Analyzer Express
- Debug Analyzer
- WiFi Hawk-Over the air

Advanced Scripts
- EEMs
- Guest Shell
- WLAN Poller

Case Open

Case Closure

A

In-Product Assistance
- WalkMe
- Cisco Support Assistant Extension

B

C

Monitoring Dashboards
- Catalyst Center
- Meraki Dashboard

D

E

Cloud Like Tool
- RADKit

1. Prevent TAC case | **2. Gather and Analyze Data** | **3. KPI Monitoring, Workarounds, TAC Handoff**

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Option D : Advanced Scripts (KPI Monitoring/Workaround)

Scenario : KPI monitoring, Apply workarounds, Bulk data collection

EEMs

- Match condition and recover from tricky issues or prevent outages.
- Example : HA SSO failure recovery or AP radio shutdown

Guest Shell Scripts

- Host guest shell scripts for scheduled activities
- Example : KPI monitoring, rollover packet captures

WLAN Poller

- Bulk data collection or push workaround to APs and WLCs
- Ex : Flash corruption recovery, AP migration

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EEM - Embedded Event Manager

- Available in switches/routers and now in 9800 WLCs, they are trigger-based TCL(Tool Command Language) scripts.
  - Match a trigger and take an action accordingly. Ex : Apply workarounds automatically
  - Automate data-collection
  - Combine outputs or create commands.

- Documentation:

General Information

IOS-XE EEM

Best Practices

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EEM Script : Example 1

Issue :

- WLC stuck in Standby recovery due to the ports going into **Remote fault**.
- **Reboot** of controller is **needed to recover** the device from remote fault/ recovery mode.

Challenge :

Manual intervention needed to identify the issue and reboot the WLC

EEM Solution :

EEM script to match remote fault and execute reload of WLC to recover without human intervention.

```
event manager applet AutoReload
event syslog pattern "Interface TenGigabitEthernet0/0/1, link down due to remote fault"
action 100 syslog msg "Reloading to recover from port in Remote fault"
action 101 reload
```

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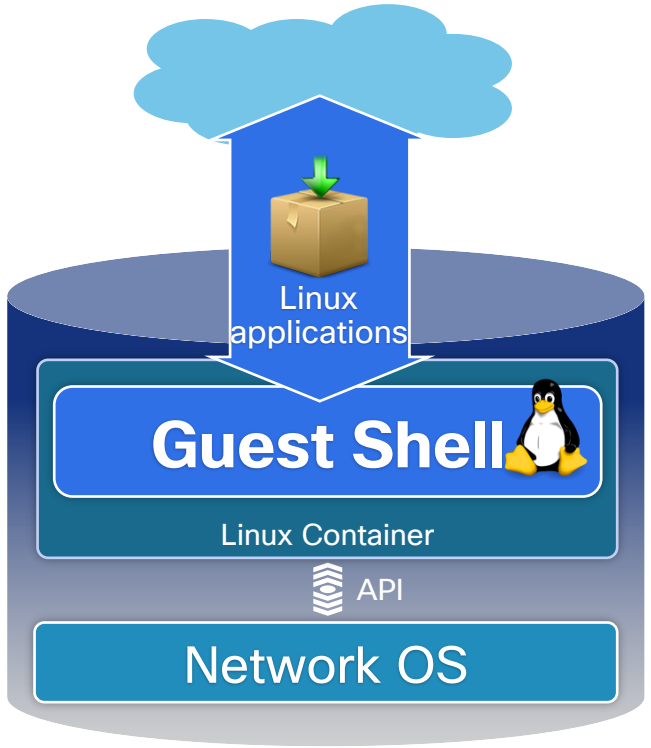
Guestshell

- Virtualized Linux-based environment, designed to run Python scripts for automated control and management.
- Python 3.6 supported from 17.1 onwards and is default after 17.3.1.
- Supported on 9800-40, 9800-80 or 9800-L running 16.12 or later (Not supported on 9800-CL or EWC APs)
- Enable guestshell in config.
- Copy python scripts in the /bootflash/guest-share folder

Guestshell Sample Scripts for following use cases:

- Efficient Client Troubleshooting
- Automated Archive request and export
- Continuous Embedded Packet Capture
- KPI Collector



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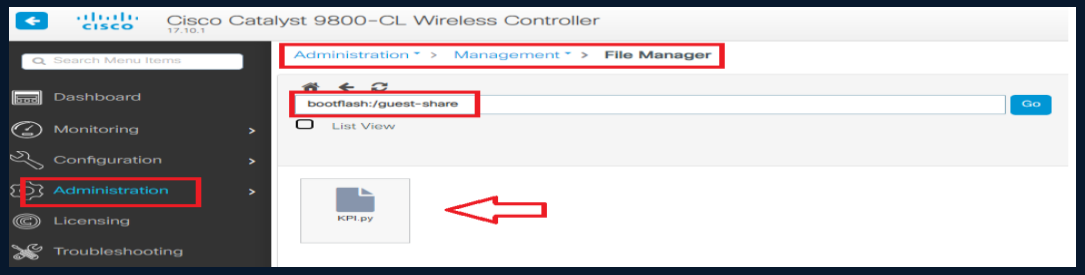
How to setup Guestshell – KPI Collector

Reference & Script

Enable Guestshell

```
conf t
iox
     app-hosting appid guestshell
     app-vnic management guest-interface 0
     end
wr
```

Copy Script to 9800



Execute script

```
Gladius1#guestshell run python3 /bootflash//guest-share/KPI.py
Starting datacollection
Exported files WLC-Sep-10-2025.txt to destination
tftp://192.168.0.45/wlc/
```

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KPI Script

Actions done:

- Run a set of commands.
- Store info in a file.
- Can collect logs several times using for loop.

```
[guestshell@guestshell guest-share]$ cat KPI.py
import cli
import time
from datetime import datetime
#Configure tftp server and directory
dst="tftp://192.168.0.45/wlc/"

#List of commands
cmd_list=[
"sh ver | i uptime|Installation mode|Cisco IOS Software",
"sh redundancy | i ptime|Location|Current Software state",
"sh processes cpu platform sorted | i wncd",
"sh platform resources",
"show process memory platform sorted",

.....
"show wireless mobility sum",
"sh nmsp status"
]
```

Add the needed commands

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Combine Guestshell & EEM – Continuous PCAP Ex

- Combine EEM with Guestshell using EEM trigger-based scripts
- Create Scripts to automate data-collection
- Run script periodically or On-Demand

Script to capture continuous PCAP from WLC

```
event manager applet Continuous_packet_capture
event timer watchdog name timer time 120
action 0.5 cli command "enable"
action 1.0 cli command "guestshell run python3 /bootflash//guest-
share/Continuous_packet_capture.py"
```

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WLAN Poller

- Gather bulk data from AP/WLC

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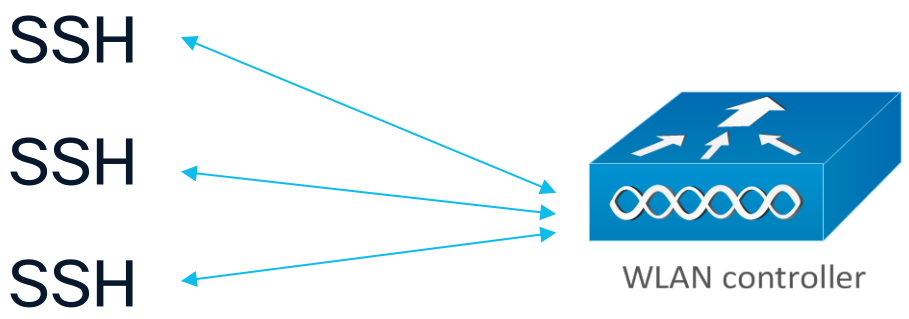
WLAN Poller – For AP Side Data Collection

- **Bulk data** collection from controllers and APs, **execute commands** on **regular intervals.** Ex : IOS AP Flash health check and recovery, AP Image download & AP Reload options

- Task automation against Controller/APs

- Python bundle: No install required

- Aggregate AP crashfiles (taken from WLC), radio events and coredumps (taken from APs) to a common TFTP repository



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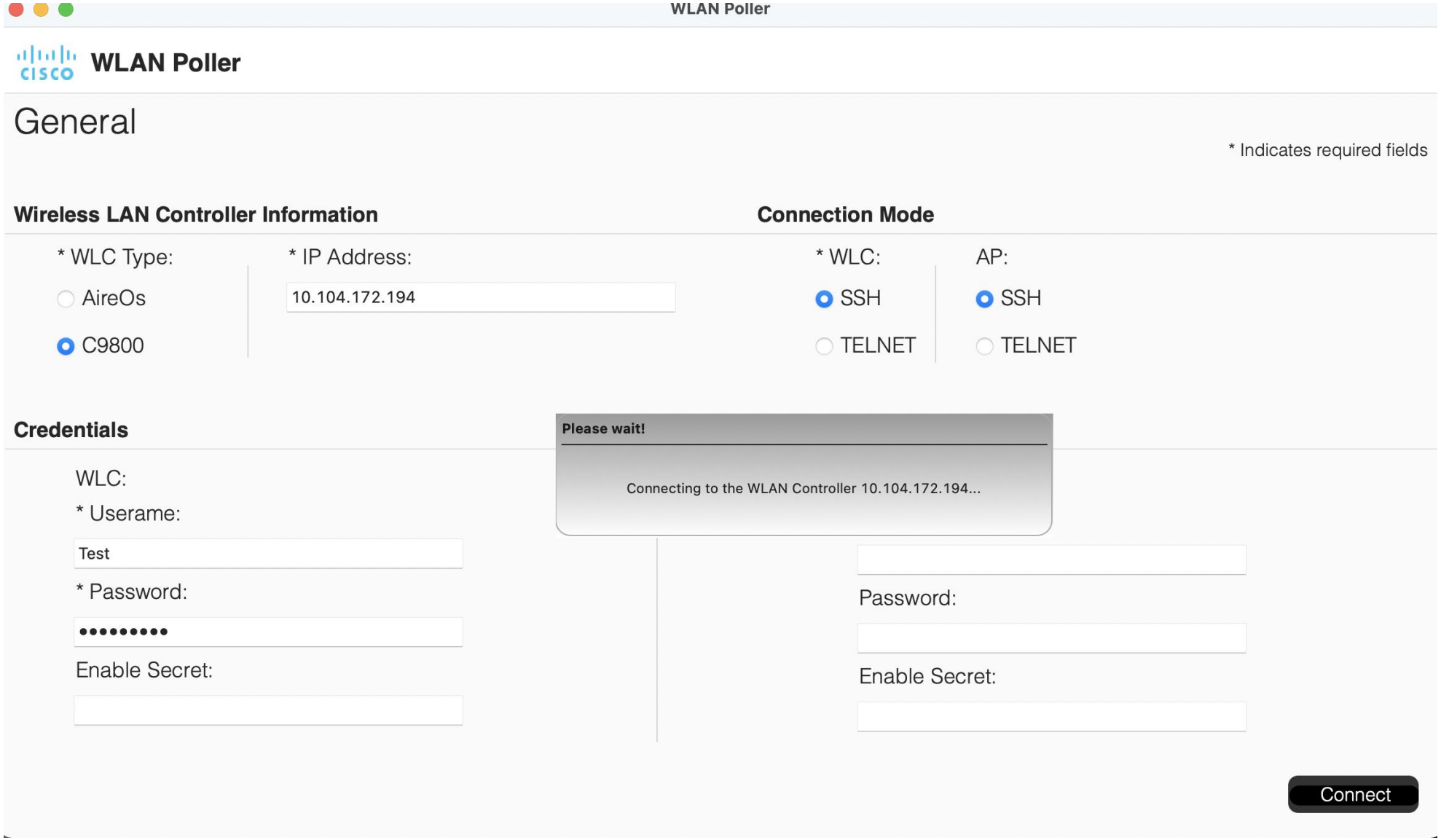
WLAN Poller GUI



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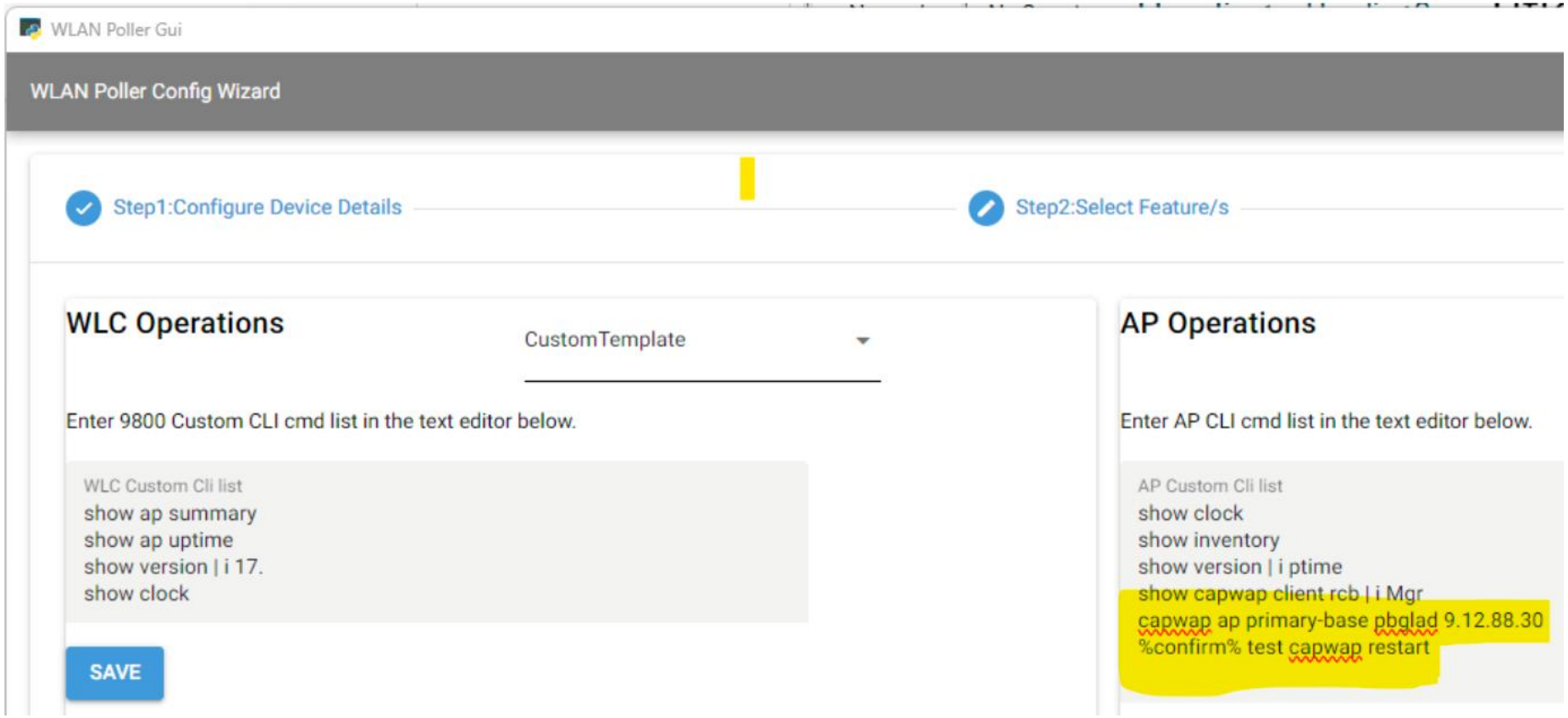
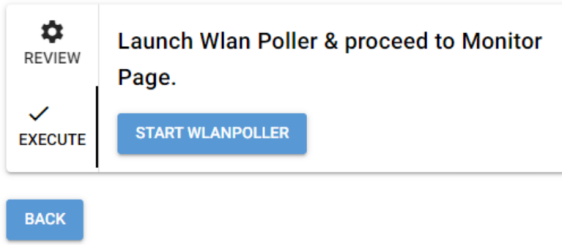
WLAN Poller – GUI (Command List)





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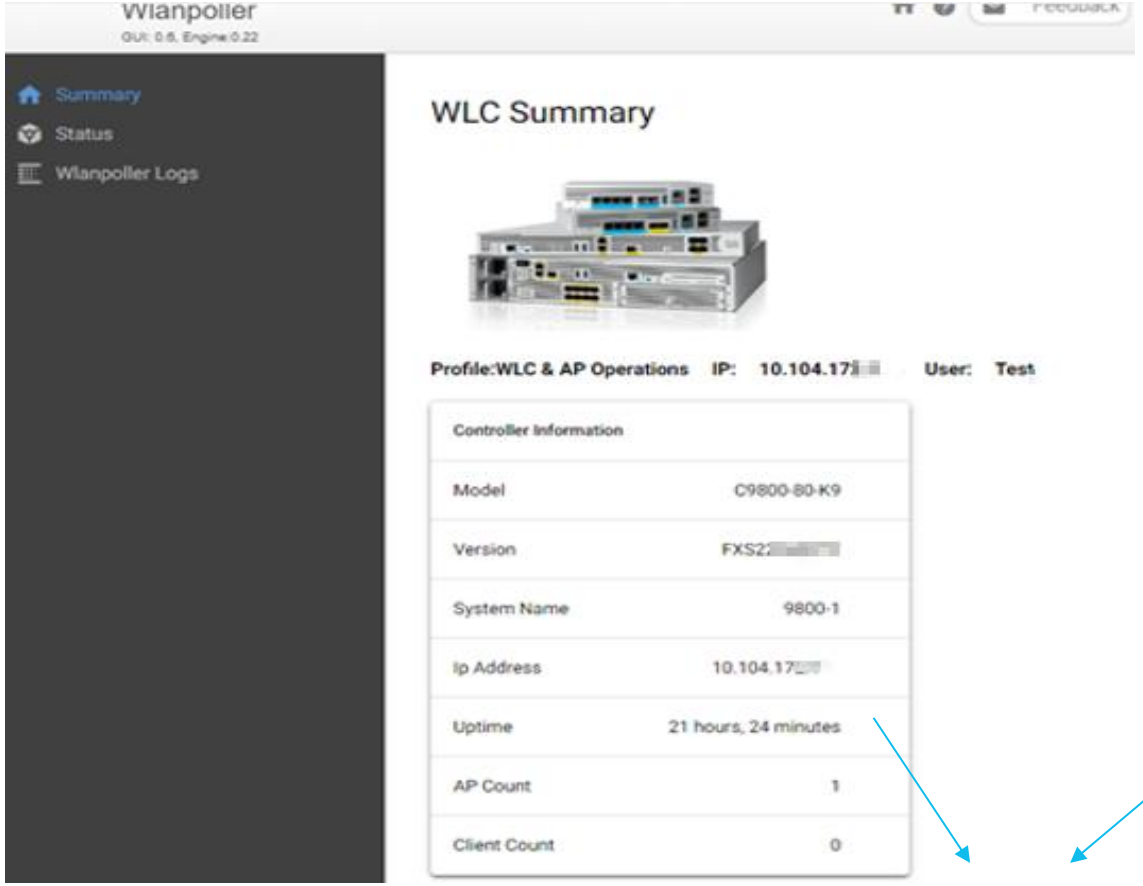
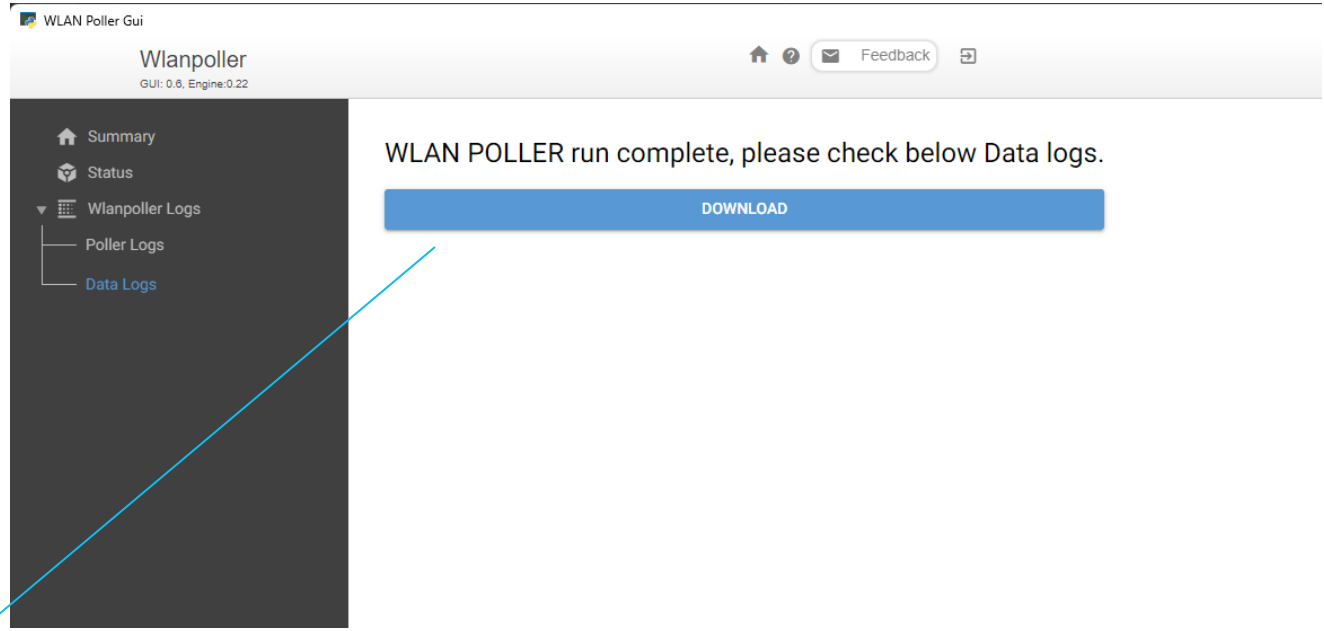
Check Summary and Download





- Check summary & status
- Download logs

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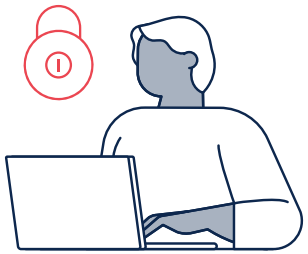
E - RADKit

Current troubleshooting method

Resources, frustration level, time to resolution

Case open → Progress → Done

Original



Email

- Initial response
- Engineer information
- Request for issue description and basic information collection

Email

- Issue description
- Basic Information collection and send

Email, Phone & Webex

- TAC – Request for additional information collection & analysis iteration
- Customer – Iterative collection and send of additional information
- Customer – Environment setup for real-time remote troubleshooting
- Increase in lead time in the event of customer and partner support delays

Issue clear

Numerous iteration of Capture-Analyze cycles and burdens on Customers

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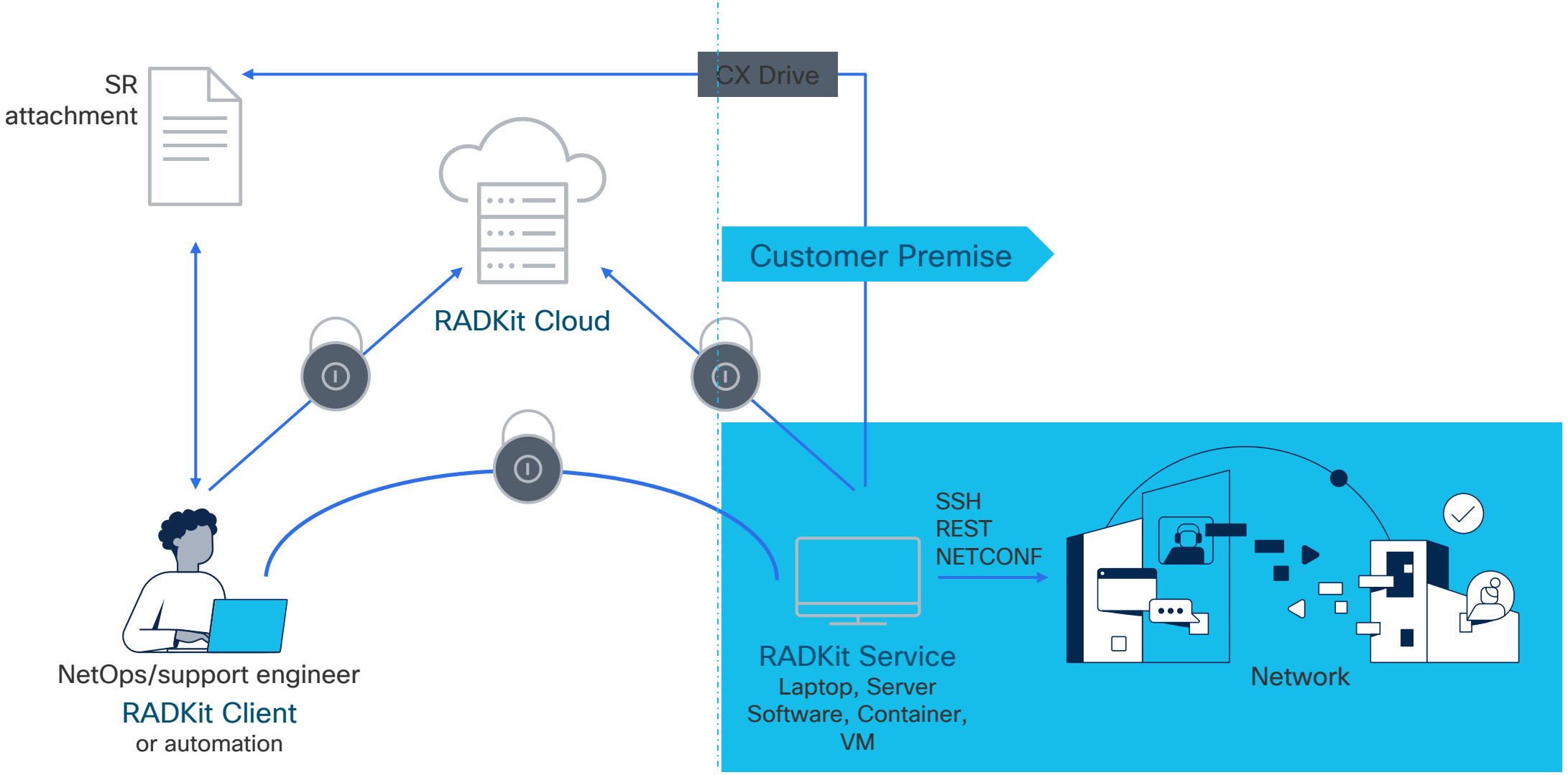
RADKit accelerates case resolution

More info at radkit.cisco.com



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RADKit Security & Capabilities

More at radkit.cisco.com - FAQ section

- RADKit is CSDL compliant, meets all stringent security, and data privacy criterias
- All data is encrypted at rest and in-transit. End to end encryption. Remote procedure call (RPC) over TLS1.3
- RADKit does not store any user data in the cloud. All data remains the customer property.
- Only customer authorized users can connect
- Capabilities :
  - Exec data collection
  - Interactive CLI troubleshooting
  - GUI Live troubleshooting
  - SR file attachment

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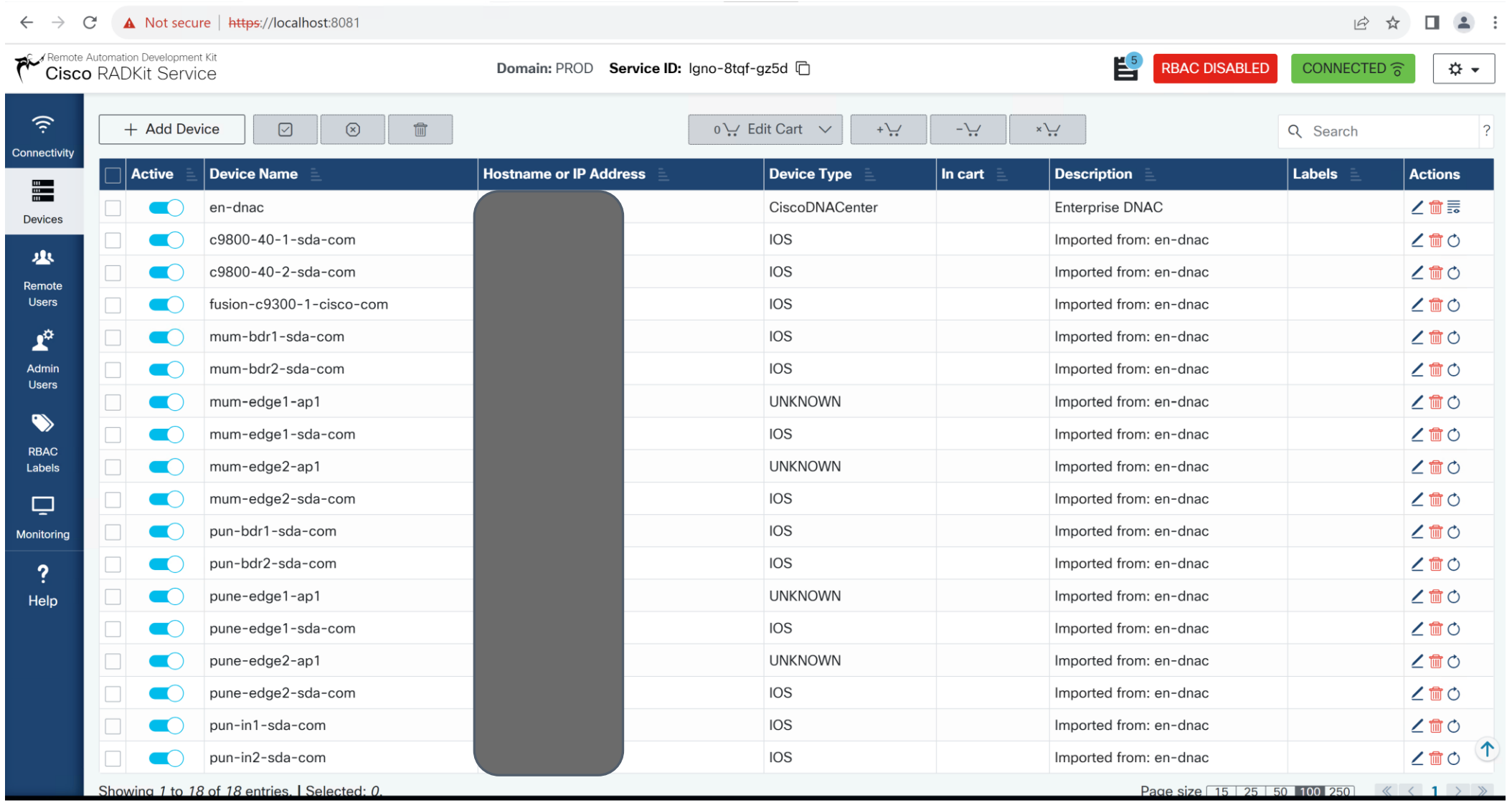
Customer View : RADKit Service Inventory

All Devices



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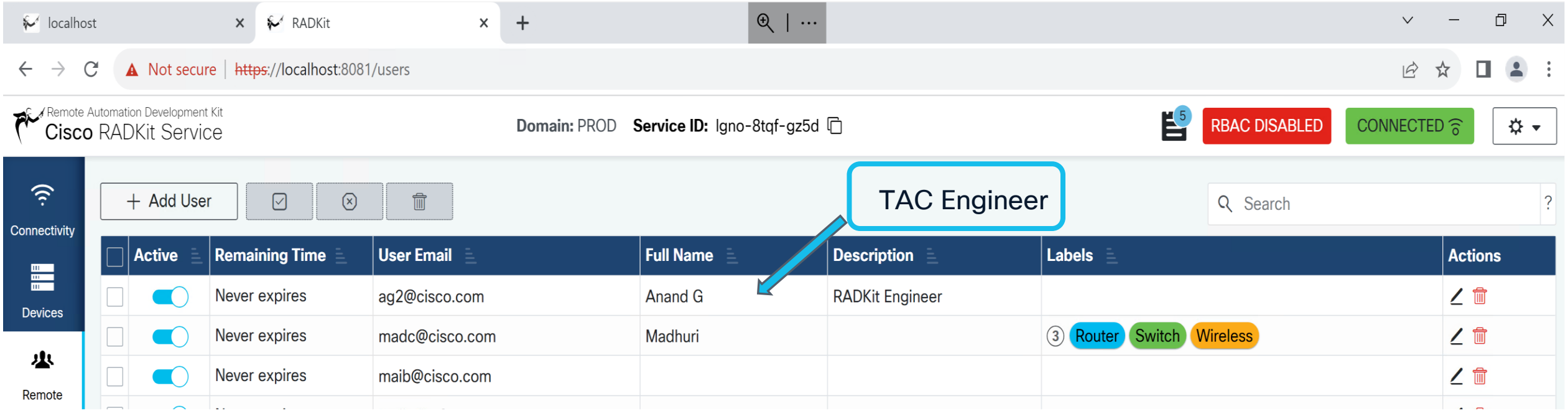
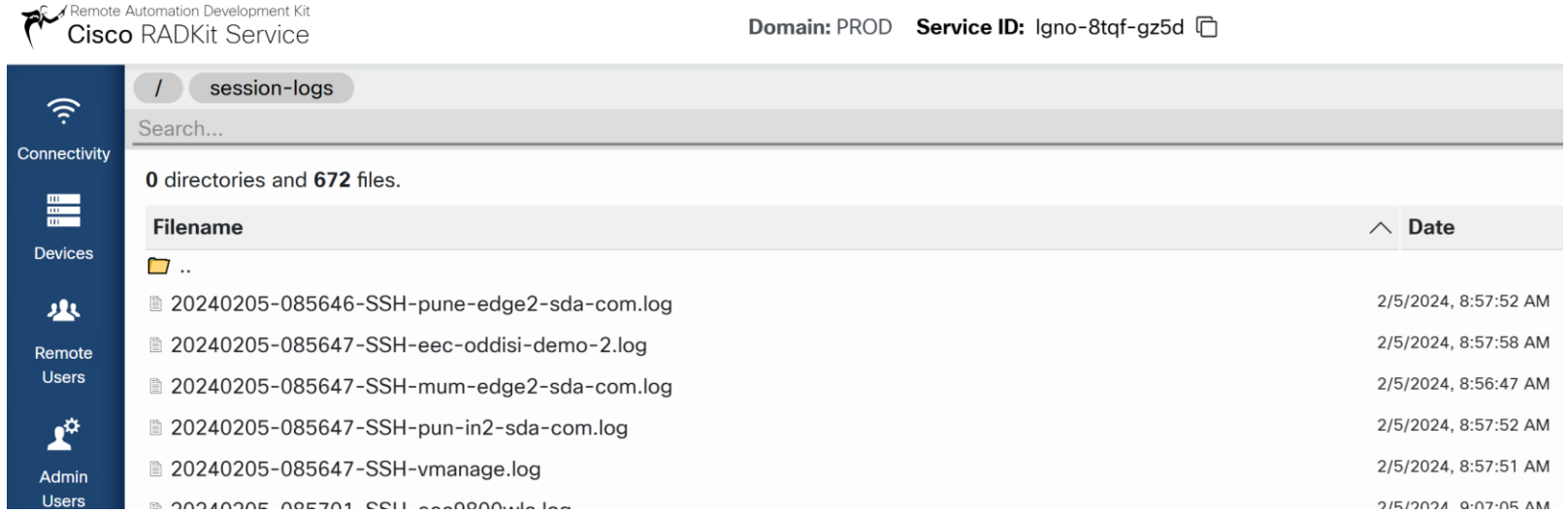
RADKit Users & Session Logs



Sessions logs in RADKit Serivce



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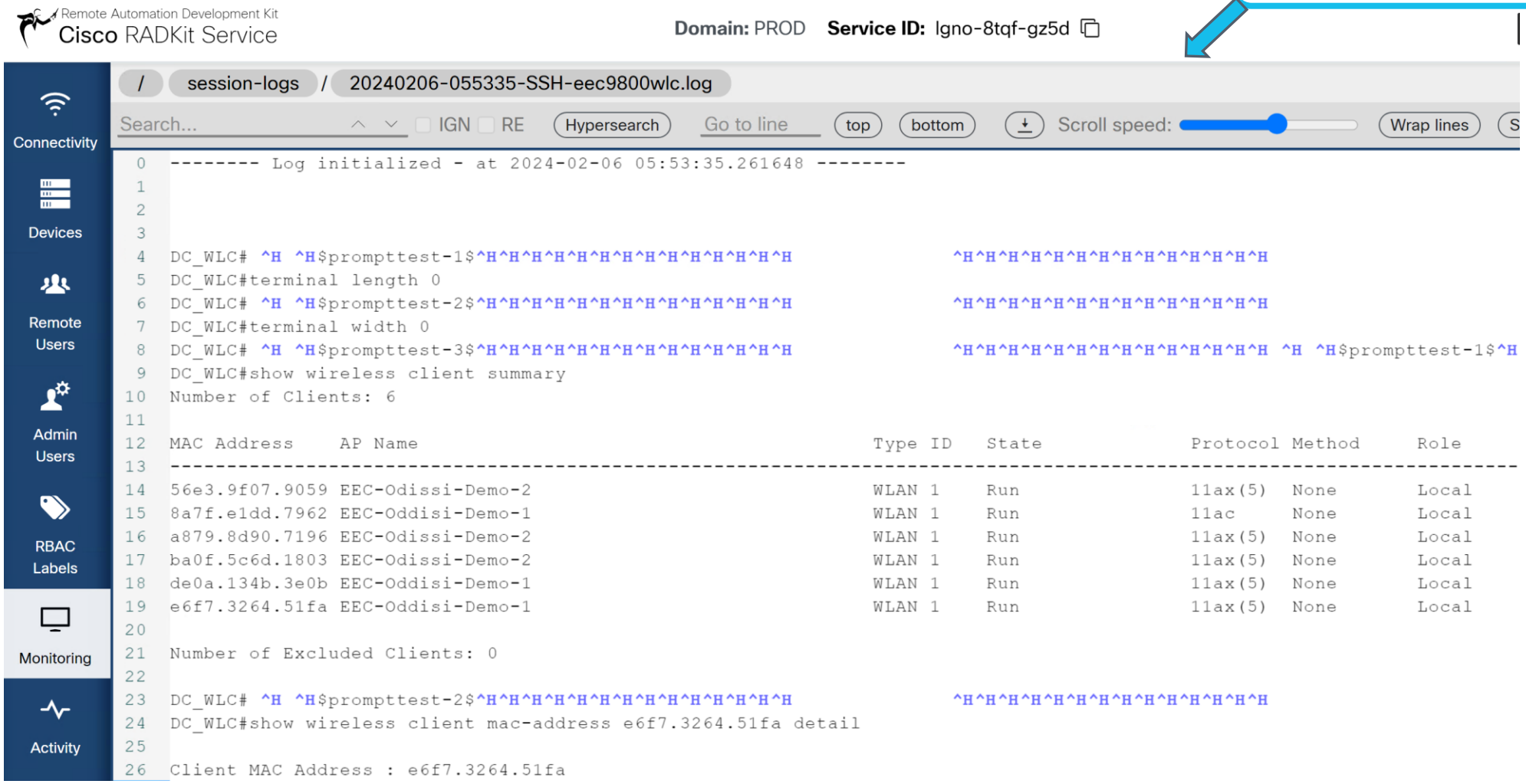
RADKit Session Logs

Session logs accessed by TAC can we viewed



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TAC View : Inventory and Device Login

RADKit Network Console

```
[madc@lgno-8tqf-gz5d] 696976857> show inventory
<radkit_client.sync.device.DeviceDict object at 0x23b1d4ad1f0>
```

name	host	device_type	Terminal	Netconf	SNMP	Swagger	HTTP	description	failed
c9800-40-1-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
c9800-40-2-sda-com		IOS_XE	True	False	False	False	True	Imported from: en-dnac	False
eec-oddisi-demo-2		IOS_XE	True	False	False	False	False		False
eec9800wlc		IOS_XE	True	False	False	False	True		False
en-dnac		CISCO_DNA_CENTER	False	False	False	False	True	Enterprise DNAC	False
fusion-c9300-1-cisco-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
mum-bdr1-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
mum-bdr2-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
mum-edge1-ap1		GENERIC	True	False	False	False	False	Imported from: en-dnac	False
mum-edge1-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
mum-edge2-ap1		GENERIC	True	False	False	False	False	Imported from: en-dnac	False
mum-edge2-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
pun-bdr1-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
pun-bdr2-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
pun-in1-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
pun-in2-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
pune-edge1-ap1		GENERIC	True	False	False	False	False	Imported from: en-dnac	False
pune-edge1-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
pune-edge2-ap1		GENERIC	True	False	False	False	False	Imported from: en-dnac	False
pune-edge2-sda-com		IOS_XE	True	False	False	False	False	Imported from: en-dnac	False
vmanage		VMANAGE	True	False	False	False	True		False

```
Untouched inventory from service lgno-8tqf-gz5d.
[madc@lgno-8tqf-gz5d] 696976857>
[madc@lgno-8tqf-gz5d] 696976857>
[madc@lgno-8tqf-gz5d] 696976857>
[madc@lgno-8tqf-gz5d] 696976857> interactive c9800-40-2-sda-com

  Attaching to c9800-40-2-sda-com ...
    Type: ~. to detach.
          ~? for other shortcuts.
  When using nested SSH sessions, add an extra ~ per level of nesting.

Warning: all sessions are logged. Never type passwords or other secrets, except at an echo-less password prompt.


C9800-40-2#
C9800-40-2#
C9800-40-2#
C9800-40-2#sh version
Cisco IOS XE Software, Version 17.09.03
Cisco IOS Software [Cupertino], C9800 Software (C9800_IOSXE-K9), Version 17.9.3, RELEASE SOFTWARE (fc6)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2023 by Cisco Systems, Inc.
Compiled Tue 14-Mar-23 18:14 by mcpre
```

Login to device

Execute commands

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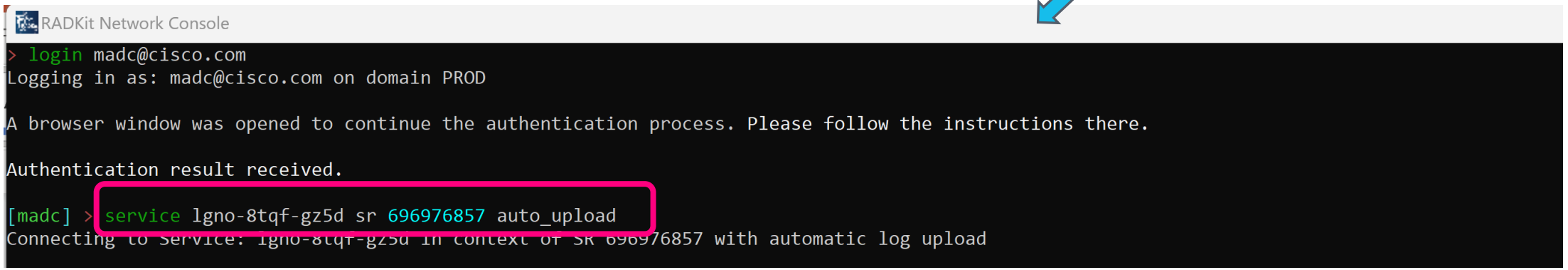
RADKit Console – Upload to SR

Auto uploads session logs to SR



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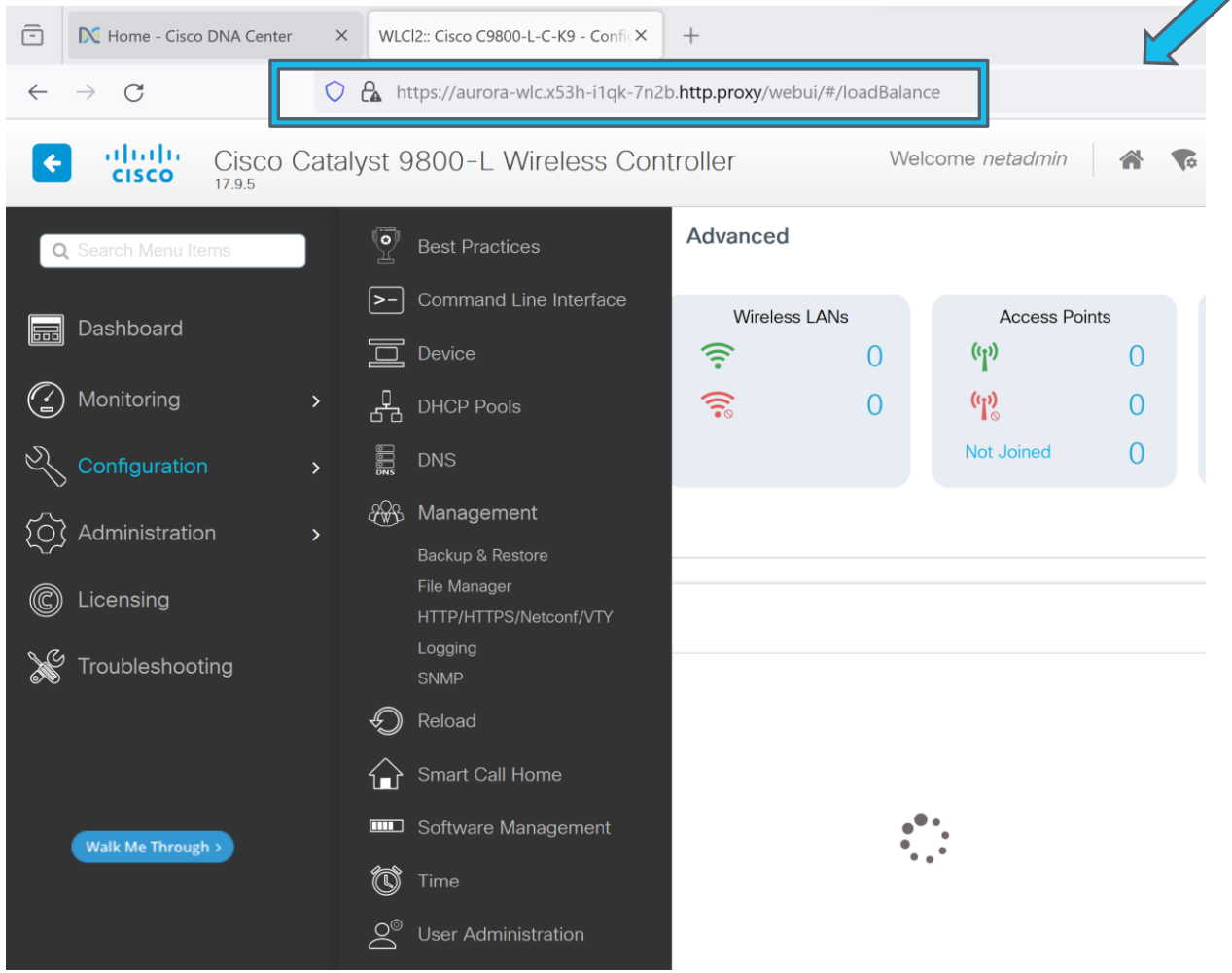
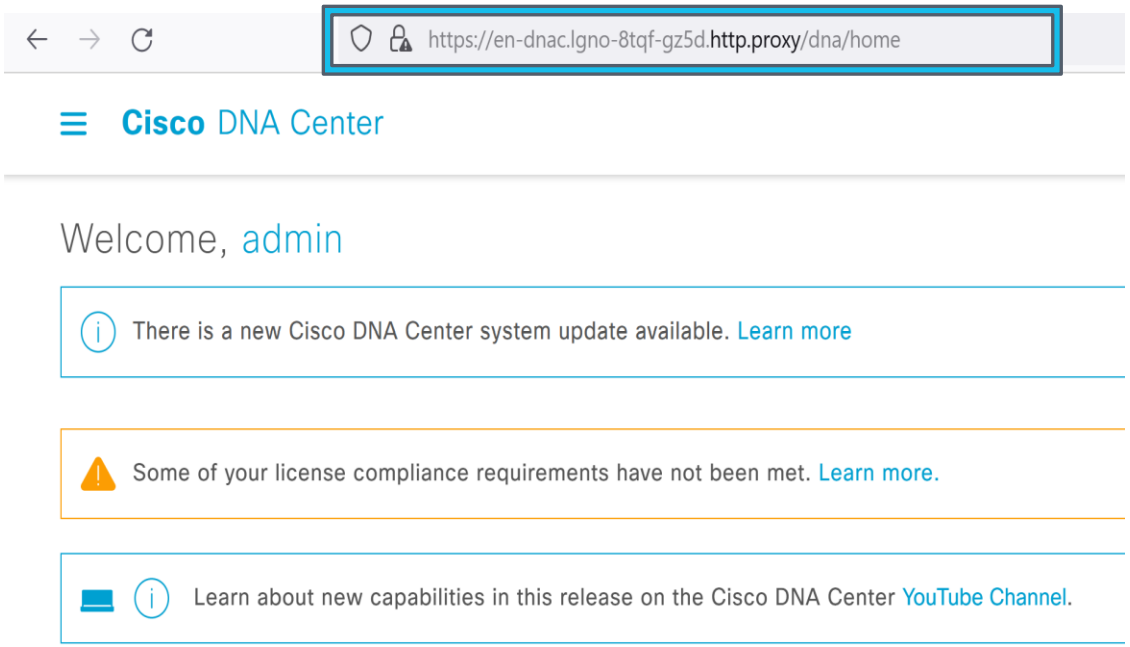
Passwordless GUI Login

Proxy in the URL





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Benefits of RADKit

On call time : No or minimal on call/webex time

Data Collection Ownership: Ownership of data collection with TAC

File Upload : File uploaded to TAC case automatically via Radkit without delay

Reduced Email Exchange : No back and forth emails for additional data collection

Faster Resolution : Reduces meeting conflicts delay and Timezone challenges between TAC & Customers

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RADKit Success Story – A Sample

Problem

- A bug triggered during specific condition of channel and power changes together triggered via RRM on 9166 APs would have N/A as country code(Regulatory Domain), resulting in CAPWAP resets impacting random 100s of APs out of ~1800 APs.

Challenge

- Identify the impacted AP radios out of 1800 APs.
- Recover the AP radio by manually entering the devshell/present challenge of each AP, remove the config/wireless file, and reboot the AP.

How did RADKit help

- Identification Script : To run “show controllers dot11radio 0 | in country”, match for regex ‘NA’ and write the AP names to a text file.
- Recovery Script : To login to every AP that is in affected.txt file, get into devshell prompt, present challenge, perform recovery by re-building config file

This saved 100+ hours together for TAC and customer

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Flexible Options to Self-Serve & Accelerate Case Resolution

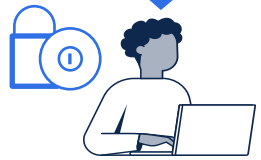
Proactive Engagement
- Log Advisor
- Vulnerability Checker
- Talk to cisco.com

DignosticTools
- AP, WLC Debugs
- Wireless Config Analyzer Express
- Debug Analyzer
- WiFi Hawk-Over the air

Advanced Scripts
- EEMs
- Guest Shell
- WLAN Poller

Case Open

Case Closure



A

In-Product Assistance
- WalkMe
- Cisco Support Assistant Extension

B

C

Monitoring Dashboards
- Catalyst Center
- Meraki Dashboard

D

E

Cloud Like Tool
- RADKit

1. Prevent TAC case | **2. Gather and Analyze Data** | **3. KPI Monitoring, Workarounds, TAC Handoff**

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Cisco AI Assistant for Support

How to escalate a technical support case

If you have opened a service request and are not satisfied with the progress, use the following procedure to escalate and connect directly to a resolution owner

- Escalate using Cisco AI Assistant for Support at https://supportassistant.cisco.com/escalate, via Webex App, on Support Case Manager or Virtual Spaces
  - Enter case number
  - Provide escalation reason
  - Choose “Escalate to TAC Manager”
  - Provide phone number for S1/S2 case or email address for S3/4 case

Severity Definitions

Severity 1
Critical impact on business operations. Cisco hardware, software, or as-a-service product is down.

Severity 2
Substantial impact on business operations. Cisco hardware, software, or as-a-service product is degraded.

Severity 3
Minimal impact on business operations. Cisco hardware, software or as a service product is partially degraded.

Severity 4
No impact on business operations. Features, implementation, or configuration assistance.

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Complete your session evaluations

Complete a minimum of 4 session surveys and the Overall Event Survey to claim a CiscoLive T-Shirt.

Earn 800 points per survey completed and compete on the Cisco Live Challenge leaderboard.

Level up and earn exclusive prizes!

Complete your surveys in the Cisco Live Events app.

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Thank You

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