

# Proč Wi-Fi nefunguje a jak to opravit – to nejlepší ze site survey



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31.3.2026

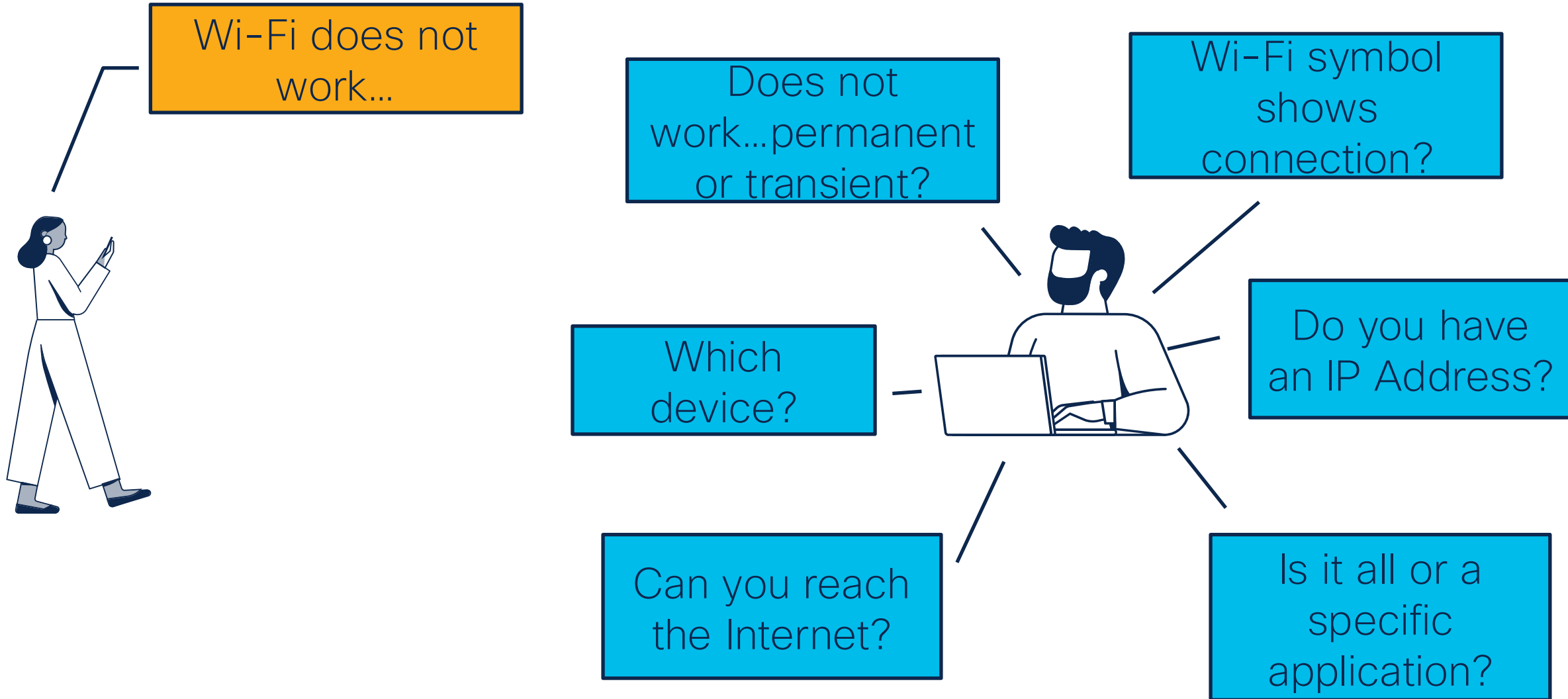


# Unable to connect to the Internet

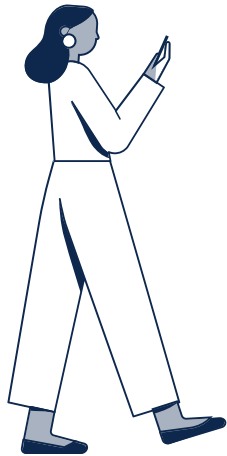
Google Chrome can't display the webpage because your computer isn't connected to Internet.

Reload

# The typical user ticket if a Wi-Fi device is involved...



The typical user



Wi-Fi  
w



ved...

Wi-Fi symbol shows connection?

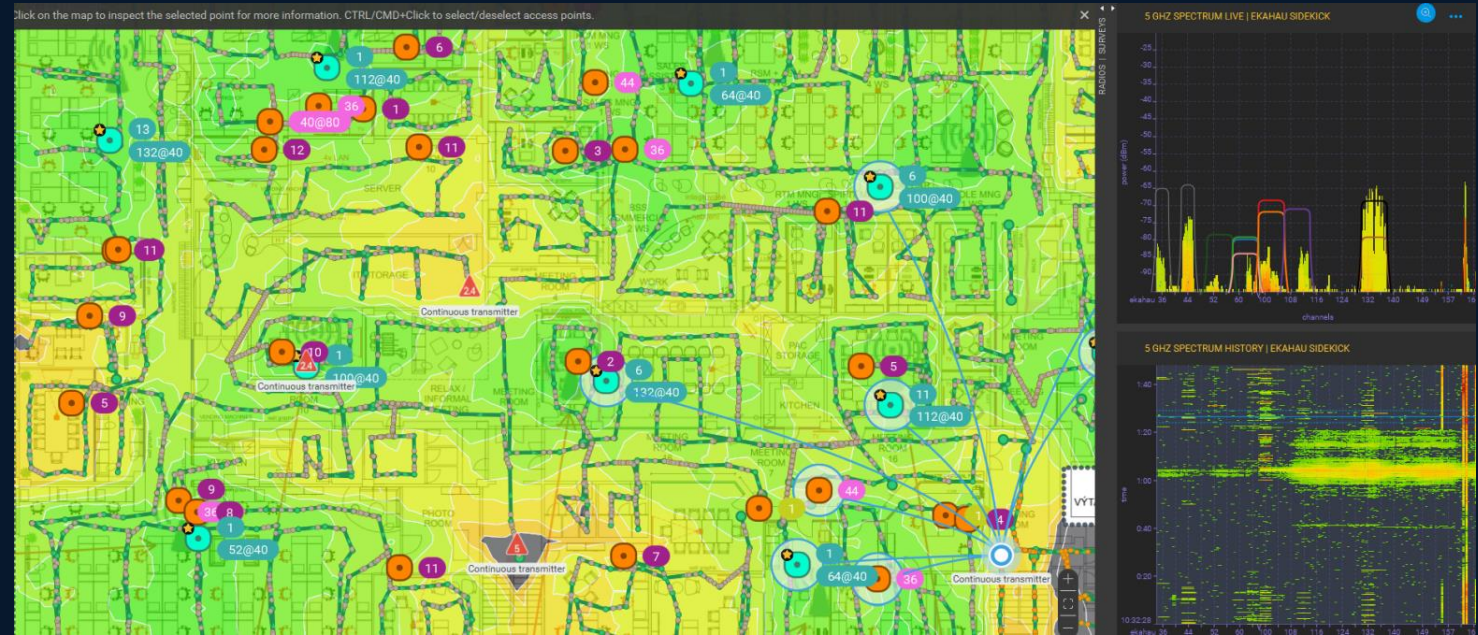
Do you have an IP Address?

Is it all or a specific application?

# Agenda



# Design & Site Survey



**„Wi-Fi nefunguje... ale signál  
máme dobrý.“**

Slyšeli jste to už někdy?

# Coverage $\neq$ Performance

# Typické problémy Wi-Fi sítí – Channel Interference



- ✗ 40 MHz kanály
- ✗ Všesměrové ant.

Řešením je:

- ✓ 20MHz kanály
- ✓ Směrové ant.

## Co and Adjacent Channel Interference at 5 GHz: 6

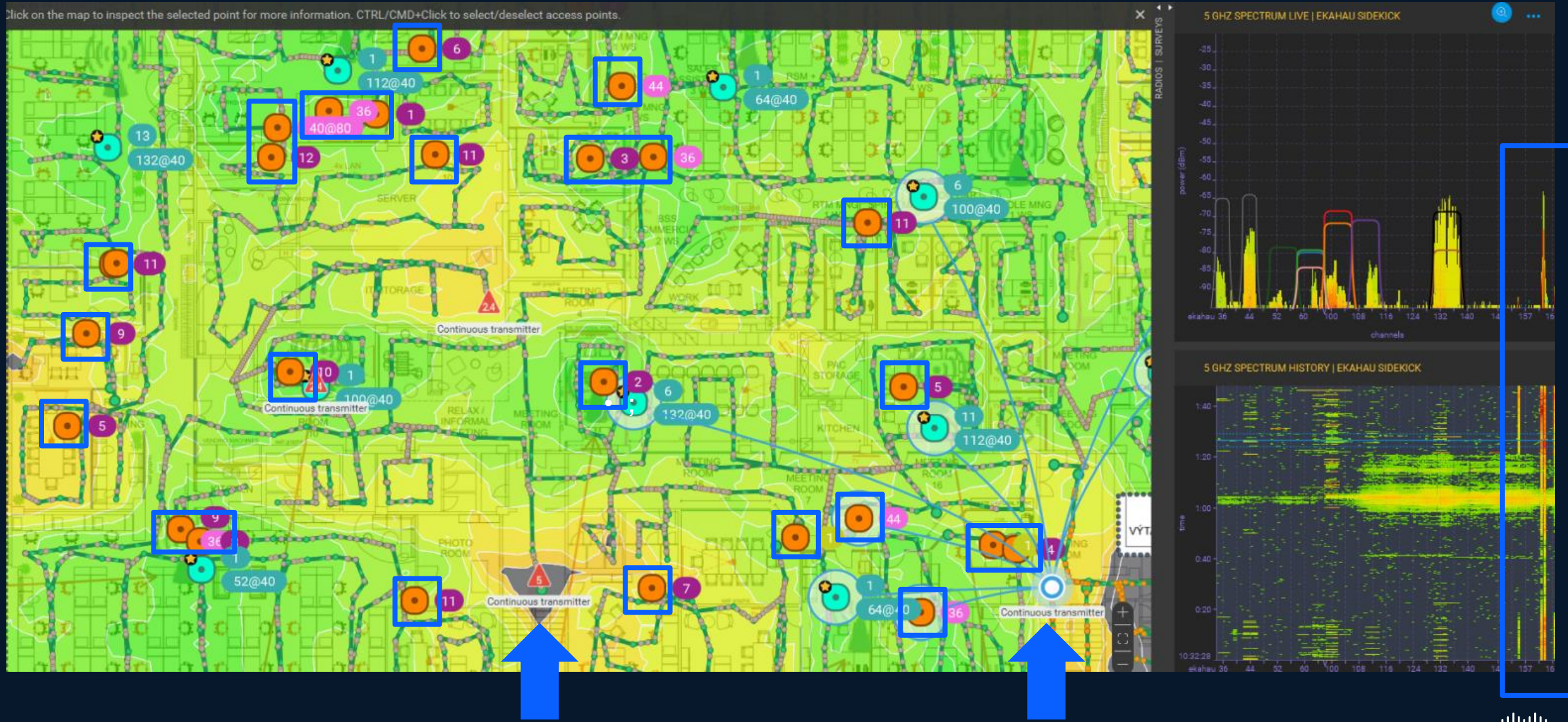
Client channel: 100 104

**Requirement not met.**

**Requirement for Ekahau Best Practices: 1**

NAME(MAC)	CHANNEL	RSSI (dBm)	FLOOR
Measured AP-94:40(68:7d:b4:...	100 104	-47	
Measured AP-2e:a0(68:7d:b4:...	100 104	-63	
Measured AP-16:80(48:91:d5:...	100 104	-63	
Measured AP-9a:81(88:9c:ad:...	100 104	-71	
Measured AP-d5:40(68:7d:b4:...	100 104	-83	
...			

# Typické problémy Wi-Fi sítí – Cizí rušení, cizí AP



# Typické problémy Wi-Fi sítí – umístění a antény



Nesnažit se pokrýt celou halu jedním AP s omni ant.

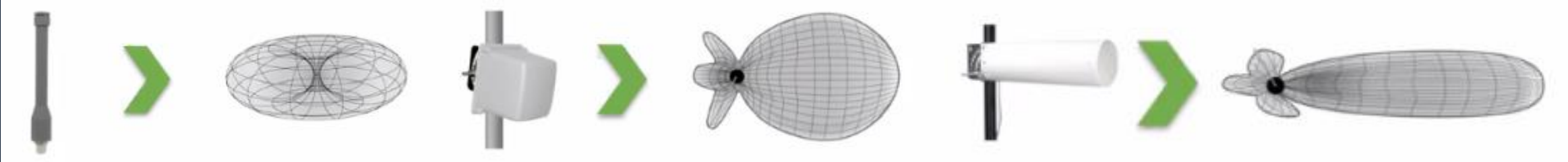


Pro venkovní pokrytí použít outdoor AP



Umístit pod překážky, ne nad ně

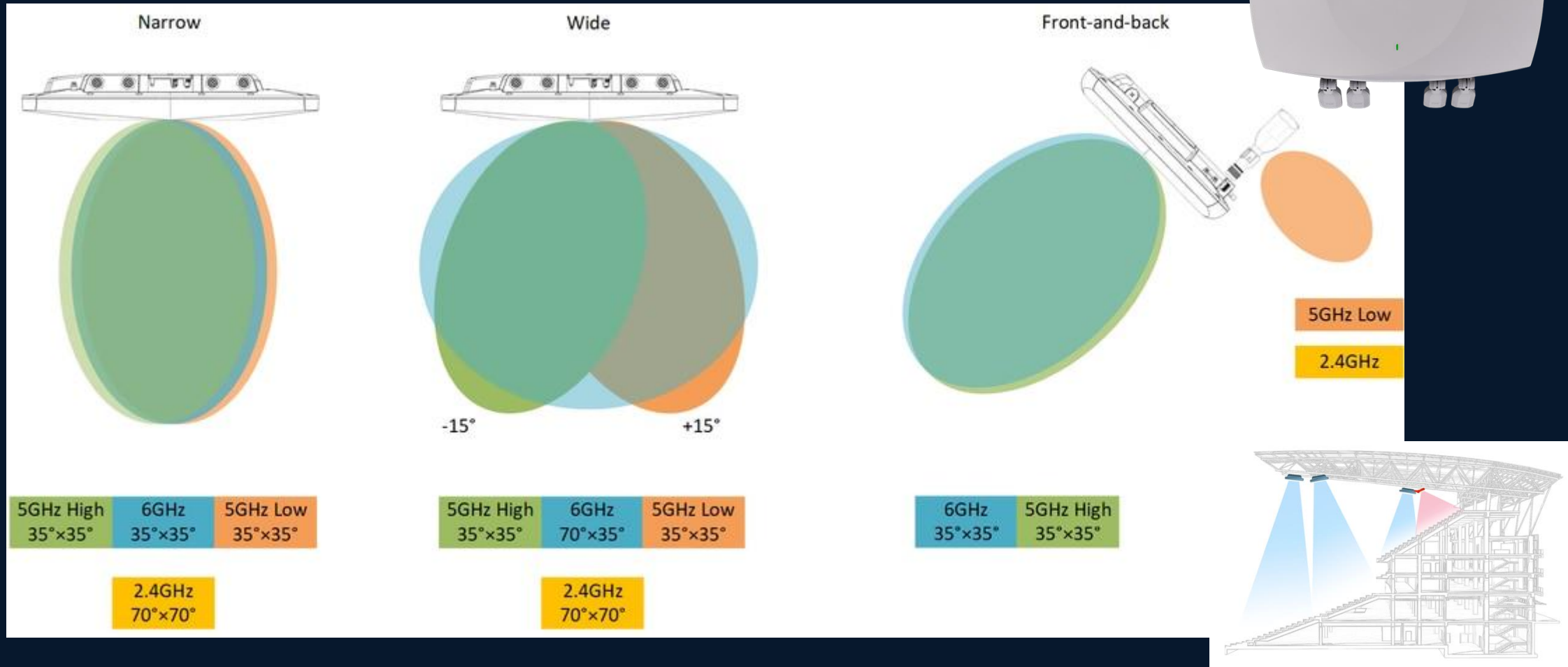
# Antény



# CW9176D1 (Directional) vs CW9176I (Omni)



# CW9179F - přepínatelné konfigurace antén (indoor/outdoor)



# Jak to odhalit a napravit

Site survey

# Site Survey - on-site vs prediktivní



# Hardware pro site survey (Ekahau)

## Prediktivní (design):

✓ Ekahau software/licence  
(Connect subs. - Cloud, Online App, Mobile Apps, Desktop App.)

## On-Síte Site Survey:

- + Ekahau Sidekick2 (2.4, 5, 6GHz)
- + iPad Pro (GPS/Lidar)





## Pro měření AP on a stick:

- + AP v site-survey modu
- + Teleskopický stativ na kolečkach 1,5-7m
- + Baterii 24V-7.8Ah
- + PoE injektor 90W







# Ekahau Analyzer

VALIDATE 📶 MERAKI-LAB >

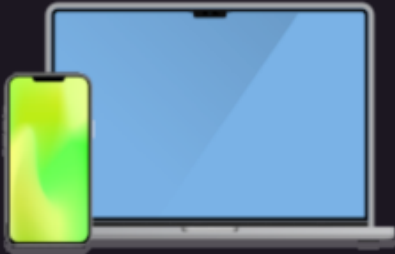
-  Coverage -44 dBm | 2 APs >
-  Channel CH 5 | 1 APs >
-  Connectivity 17 ms >
-  Interference 2 detected >

ANALYZE

-  Spectrum >
-  Packet Capture >
-  Speedtest >
-  Client Analysis >

# Ekahau Analyzer

← Client Analysis



! This device may be experiencing some potential issues.

Client-to-Sidekick	
Distance	Further
Signal strength	-89 dBm

Network

Channel	52	i
Channel width	80MHz	i
Encryption	WPA2 (PSK)	i
Management frame protection	Disabled	i
Minimum basic rate	6 Mbps	i
Primary coverage	-54 dBm	i
Secondary coverage	-84 dBm	i
SSID	VMW-LAB	i

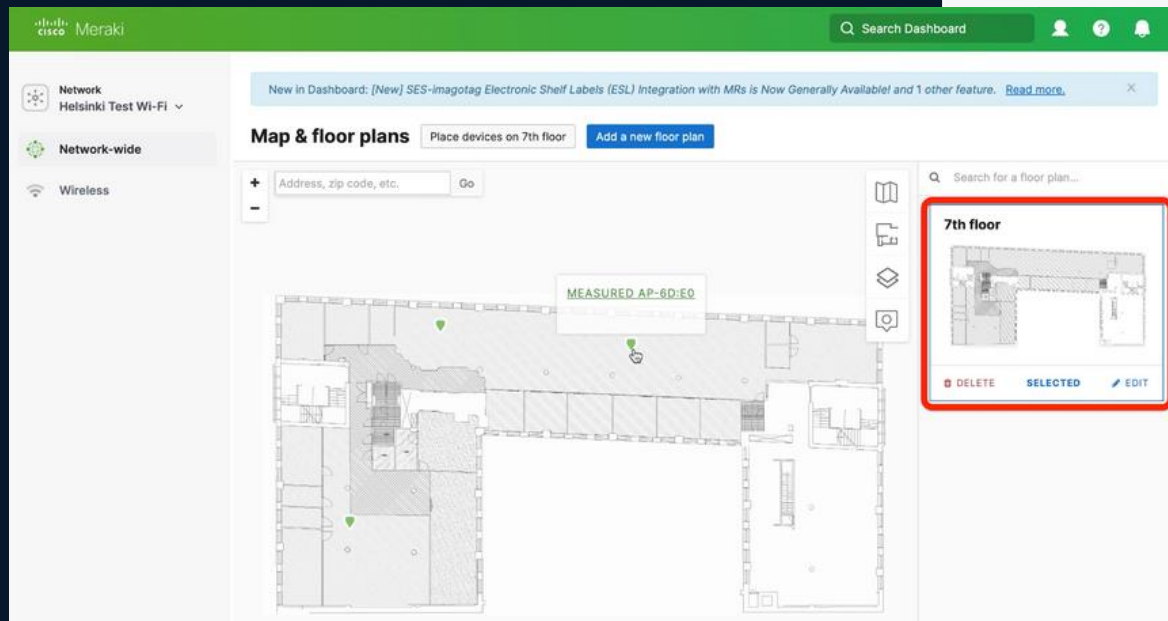
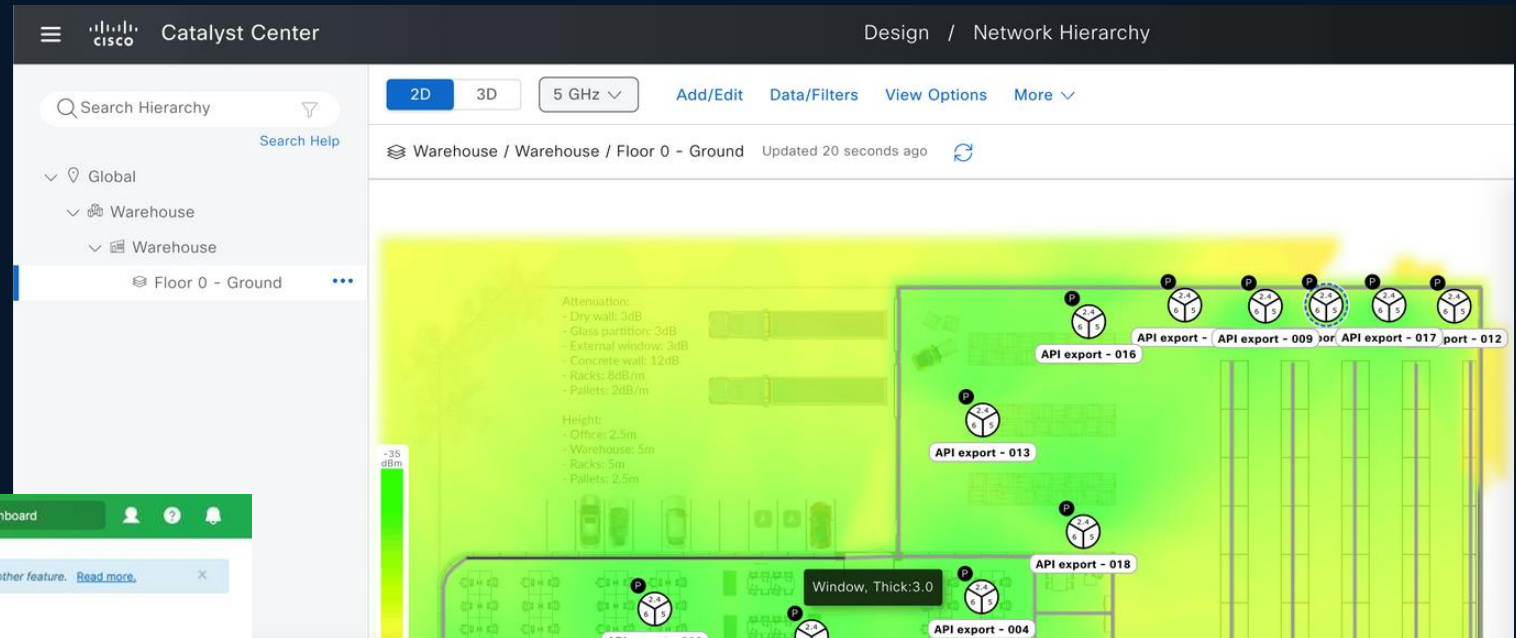
# Ekahau AI Pro Online

Ukázka prediktivní site survey (design)

# Integrace Ekahau – Cisco

## Ekahau → Cisco Catalyst Center

- import Ekahau projektu (.esx)
- přenos map a umístění AP
- mapování návrh vs reálná síť
- využití při deploymentu a troubleshooting



## Ekahau → Meraki Dashboard

- import floor planu
- automatické umístění AP na mapě
- mapování zařízení
- pomocí Ekahau Cloud integrace a napojení na Meraki Dashboard API

# Na co si dát pozor při návrhu

- volba správných modelů AP a ant. pro daný prostředí
- správná hustota a umístění AP
- neřešit jen coverage, ale kapacitu
- minimalizace co-channel interference
- zohlednění klientských zařízení (2×2 vs 4×4)



# Na co si dát pozor při site survey

- broadcast SSID prip. Aironet extension pro viditelnost AP hostname

## AP on a stick:

- správná volba modelu AP (ant.) vs umístění
- nastavit transmit power (max.14dBm/25mW)
- reálné prostředí (lidé, provoz, překážky)
- kontrola overlapu (sec. sig.)



# AI-powered tools for great wireless.



Fast, simple design and analysis for Wi-Fi, Private 5G and wireless IoT networks.



## Network Design & Analysis

with Hamina Planner

Browser-based network planning & live analysis tool with real-time heatmaps, powerful signal prediction, and automated AI building modeling.

- Design Wi-Fi, IoT, and Private 4G/5G networks
- Visualize, analyze and troubleshoot running networks
- Plan for switching, PoE and cabling
- Create rich, interactive reports

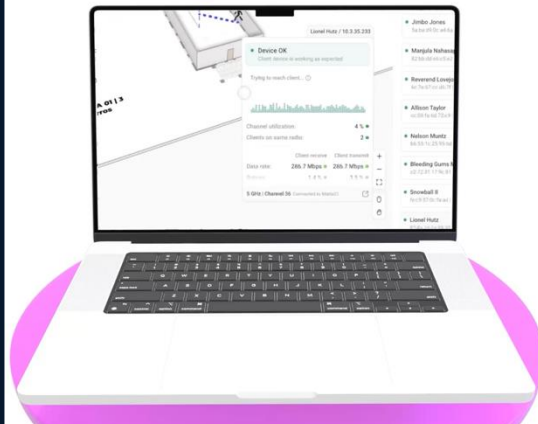
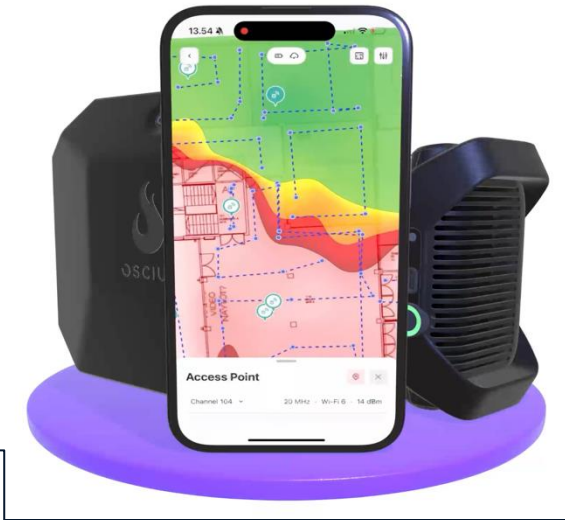
## Wi-Fi 7 Site Surveys

with Hamina Onsite

Perform on-site Wi-Fi survey measurements, troubleshooting, and spectrum analysis.

- Validation site surveys for 2.4 / 5 / 6 GHz Wi-Fi
- Remediate in Planner after site survey
- "AP on a stick" pre-deployment validation
- Add notes, generate reports
- Troubleshoot Wi-Fi on-site

[Learn more](#)



## Live Troubleshooting

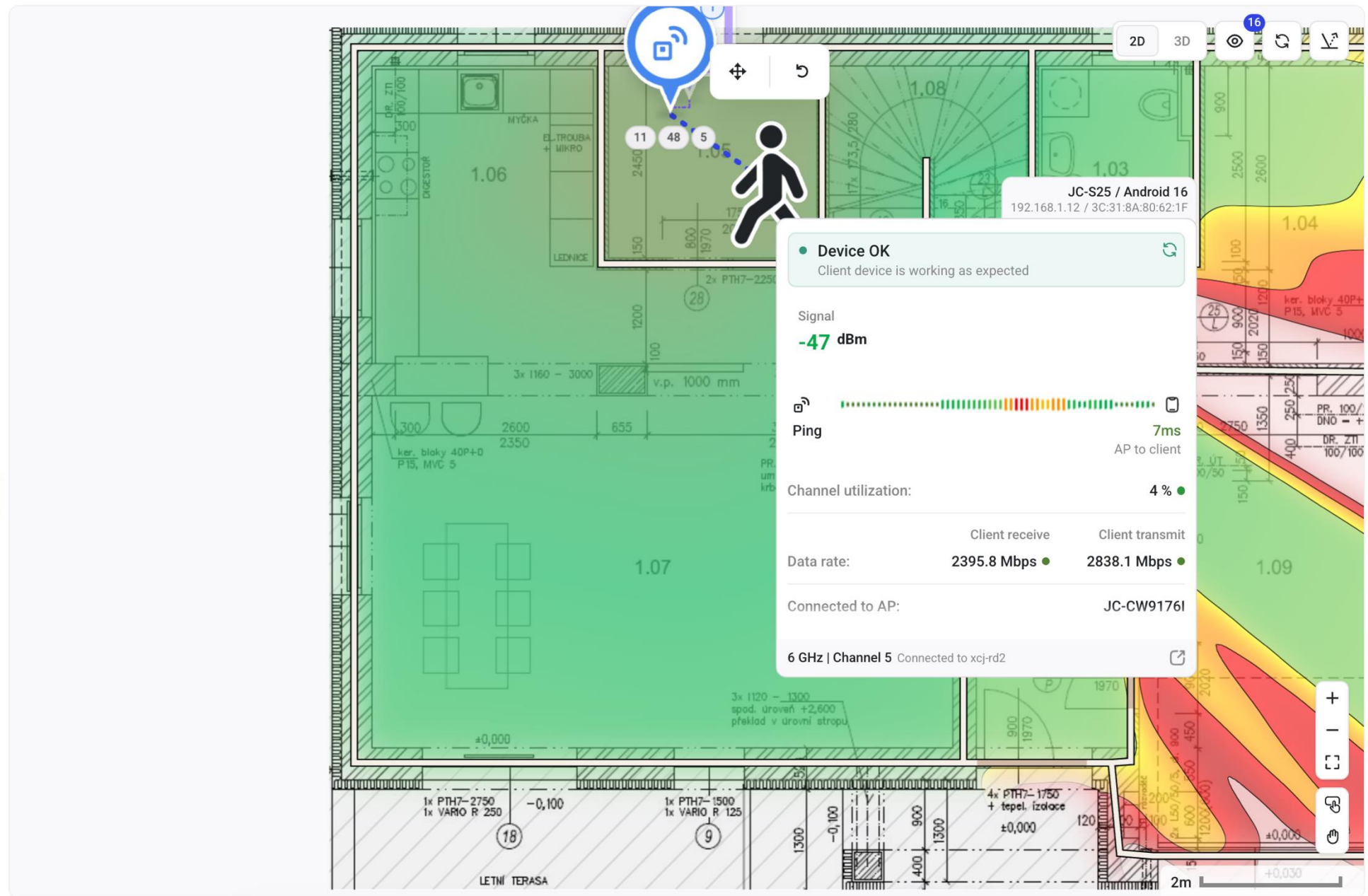
with Hamina Live (part of Planner Plus)

Real-time network analysis and live network testing that provides continuous 3D visibility into wireless network performance and user experience.

- Live heatmaps & 3D network analysis
- Live client & AP testing and troubleshooting
- For junior engineers & CWNE experts alike
- Supports modern enterprise Wi-Fi (capabilities vary). Internet experience testing with Orb.

[Watch video](#)





### View clients

Client search:

### Client list (7)

- azrouter**  
94:B5:55:A4:4D:6C | 172.16.1.11 | Espressif
- JC-Mac**  
84:2F:57:44:E8:2E | 192.168.1.10 | Apple
- Netatmo**  
70:EE:50:3F:4D:16 | 192.168.1.21 | Netatmo
- JC-S25**  
3C:31:8A:80:62:1F | 192.168.1.12 | Samsung
- Martina-NB-Lenovo**  
3C:21:9C:81:A8:49 | 192.168.1.137 | Lenovo
- nrgkick2**  
E0:E2:E6:78:32:28 | 172.16.1.14 | Espressif
- Tab-A8-Bara**  
0A:33:B5:4A:77:2C | 192.168.1.192 | Samsung

# Site Survey Webinars

- Ekahau: <https://www.ekahau.com/resources/webinars/>
- Hamina: <https://webinars.hamina.com/>

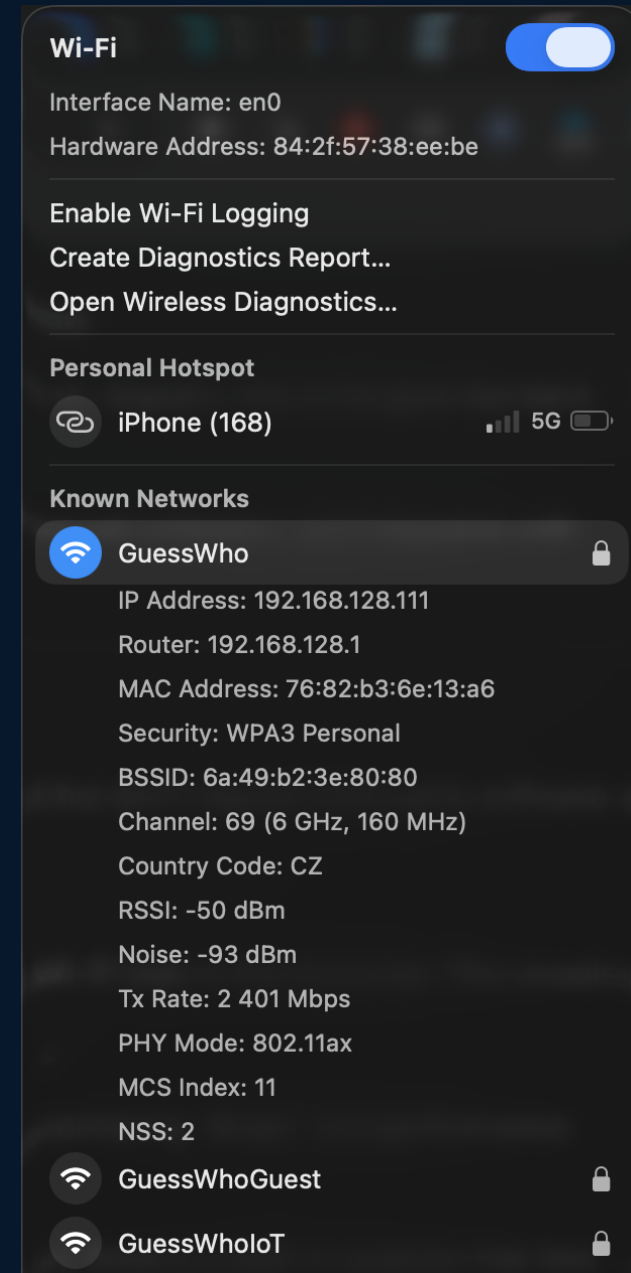
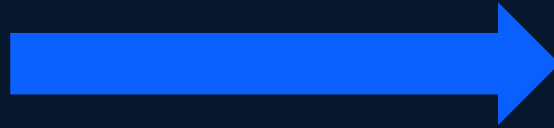
# Wi-Fi Tooling



# Wi-Fi OS-based Tools - OSX

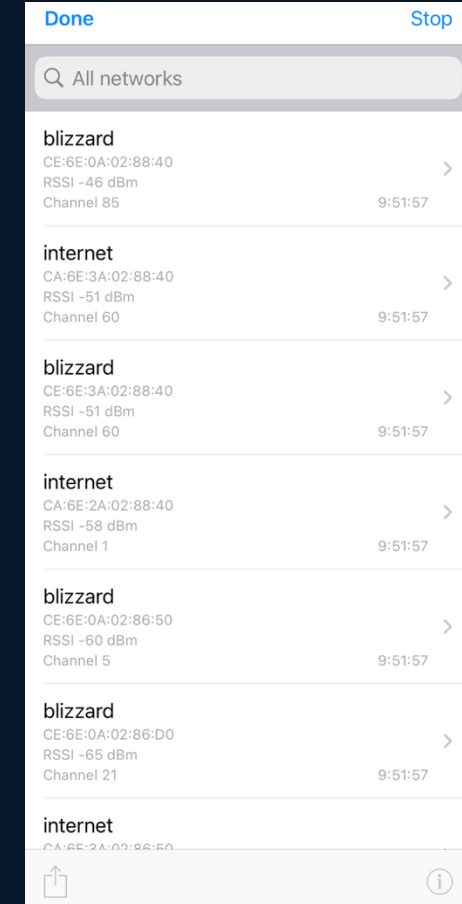
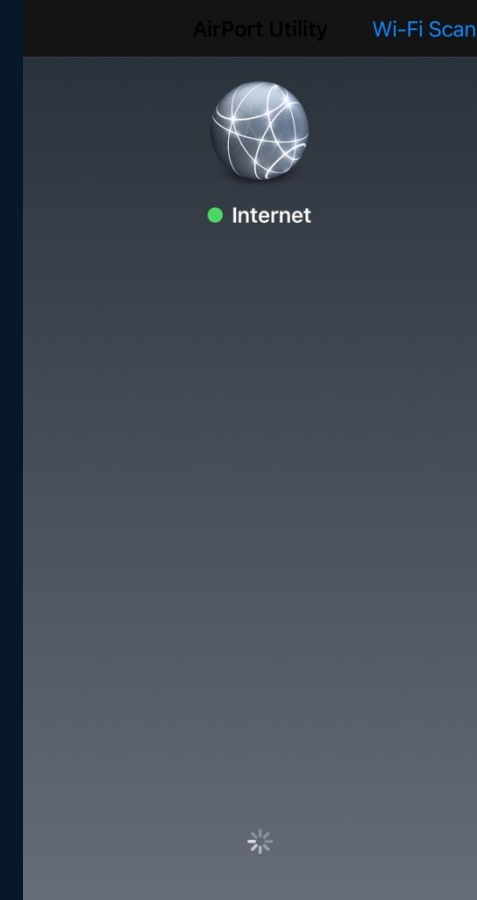
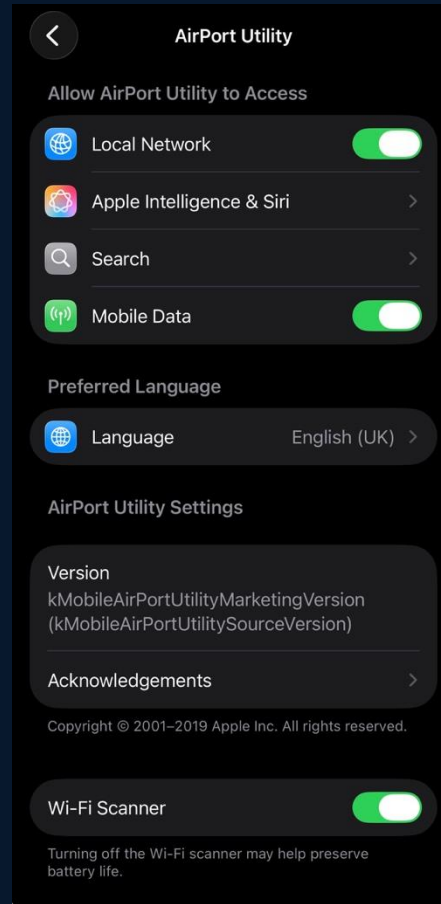


“Option” button + Wi-Fi icon



# Wi-Fi OS-based Tools – iOS – AirPort Utility

Download & Install  
AirPort

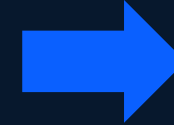
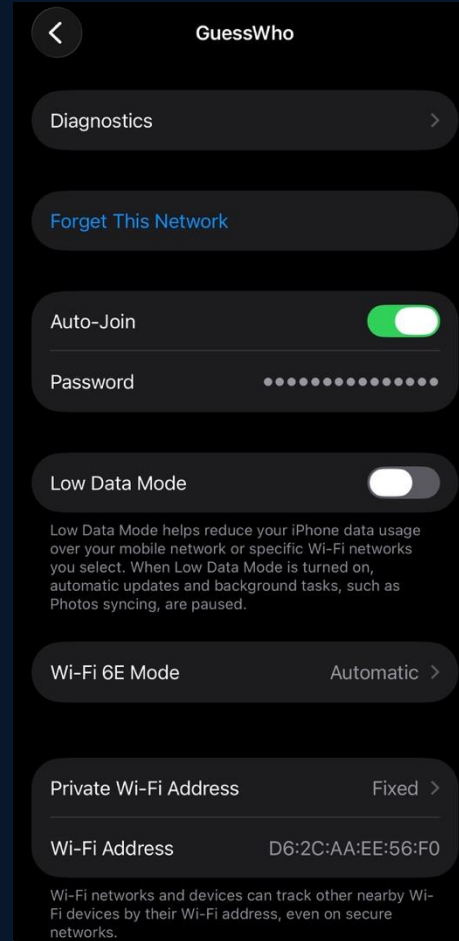


Settings > AirPort Utility and toggle "Wi-Fi Scanner" to ON

# Wi-Fi OS-based Tools – iOS – Shortcut



“My Wi-Fi” – Shortcut



Install Diagnostics profile – Shortcut

# Wi-Fi OS-based Tools - Windows

```
netsh wlan show wlanreport  
netsh wlan show all
```

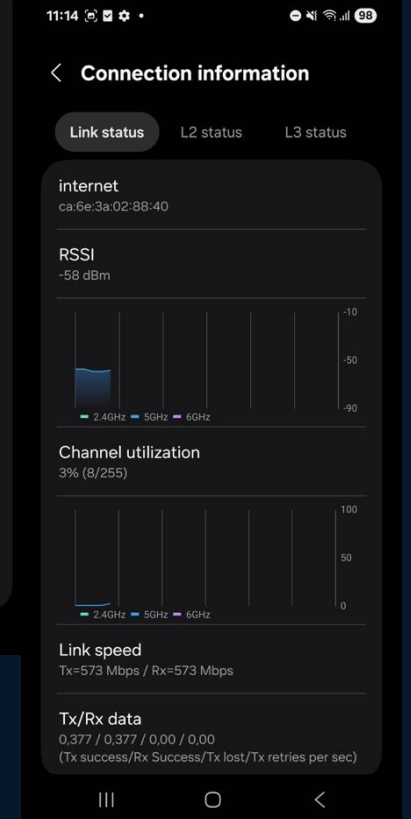
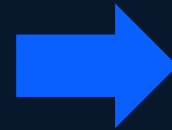
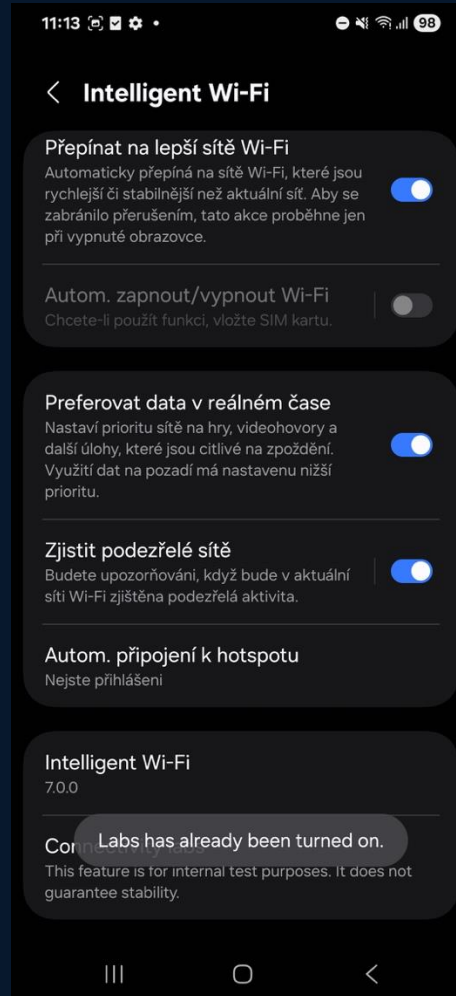
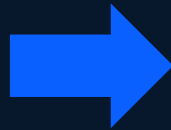
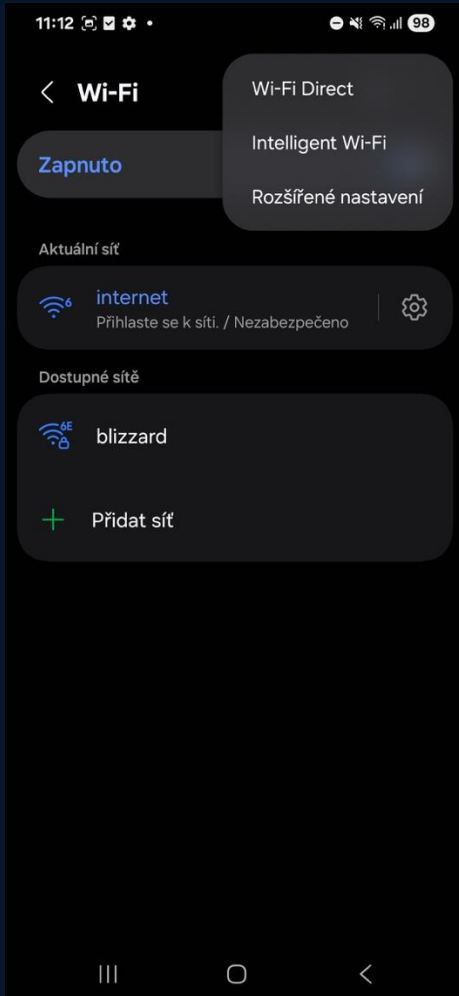
## Output for 'netsh wlan show all'

```
Name : Wi-Fi  
Description : Intel(R) Wi-Fi 6 AX201 160MHz  
GUID : f0def893-5603-42ee-985b-7f53ca82ad3b  
Physical address : f0:57:a6:88:9c:d0  
Interface type : Primary  
State : connected  
SSID : blizzard  
AP BSSID : ce:6e:3a:02:88:40  
Band : 5 GHz  
Channel : 60  
Connected Akm-cipher : [ akm = 00-0f-ac:03, cipher = 00-0f-ac:04 ]  
Network type : Infrastructure  
Radio type : 802.11ac  
Authentication : WPA2-Enterprise (FT-Roamed)  
Cipher : CCMP  
Connection mode : Auto Connect  
Receive rate (Mbps) : 400  
Transmit rate (Mbps) : 400  
Signal : 89%  
Rssi : -51  
Profile : blizzard  
QoS MSCS Configured : 0  
QoS Map Configured : 0  
QoS Map Allowed by Policy : 0
```

## Disconnect Reason: The network is disconnected by the driver.

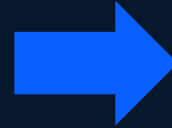
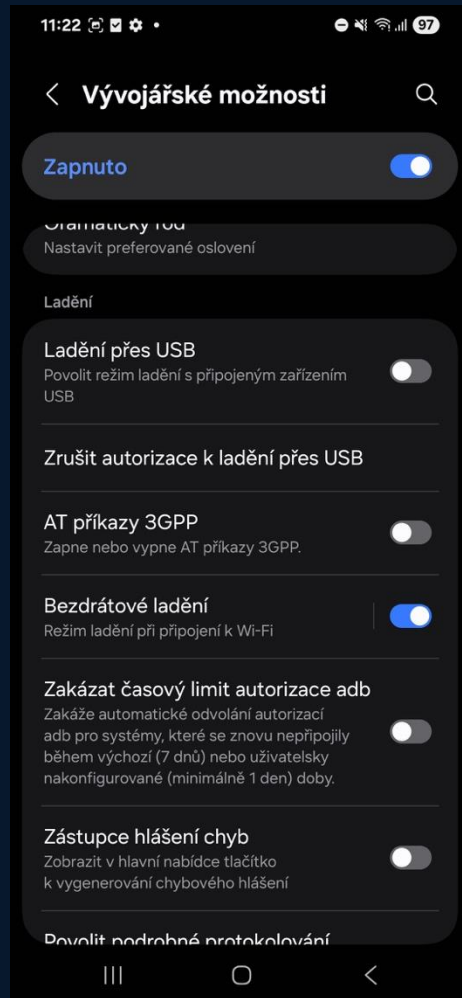
EventId	Time	Message
8000	2026-03-27T14:17:52	[+]WLAN AutoConfig service started a connection to a wireless network.
11000	2026-03-27T14:17:52	[+]Wireless network association started.
11001	2026-03-27T14:17:53	[+]Wireless network association succeeded.
11010	2026-03-27T14:17:53	[+]Wireless security started.
11005	2026-03-27T14:17:53	[+]Wireless security succeeded.
8001	2026-03-27T14:17:53	[+]WLAN AutoConfig service has successfully connected to a wireless network.
4042	2026-03-27T14:17:58	[+]Capability change on {f0def893-5603-42ee-985b-7f53ca82ad3b} (0x4700800000000000 Family: ...
11004	2026-03-27T14:23:40	[+]Wireless security stopped.
4042	2026-03-28T09:10:07	[+]Capability change on {f0def893-5603-42ee-985b-7f53ca82ad3b} (0x4700800000000000 Family: ...
11010	2026-03-28T09:10:07	[+]Wireless security started.
11005	2026-03-28T09:10:07	[+]Wireless security succeeded.

# Wi-Fi OS-based Tools - Android



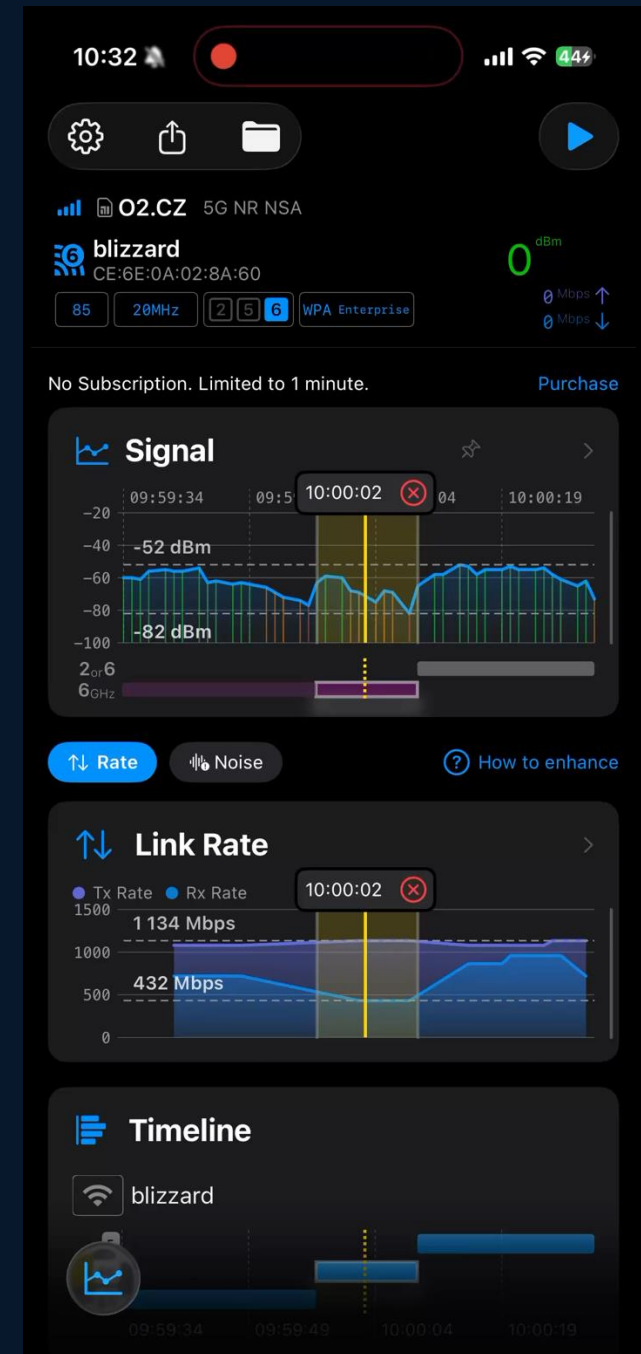
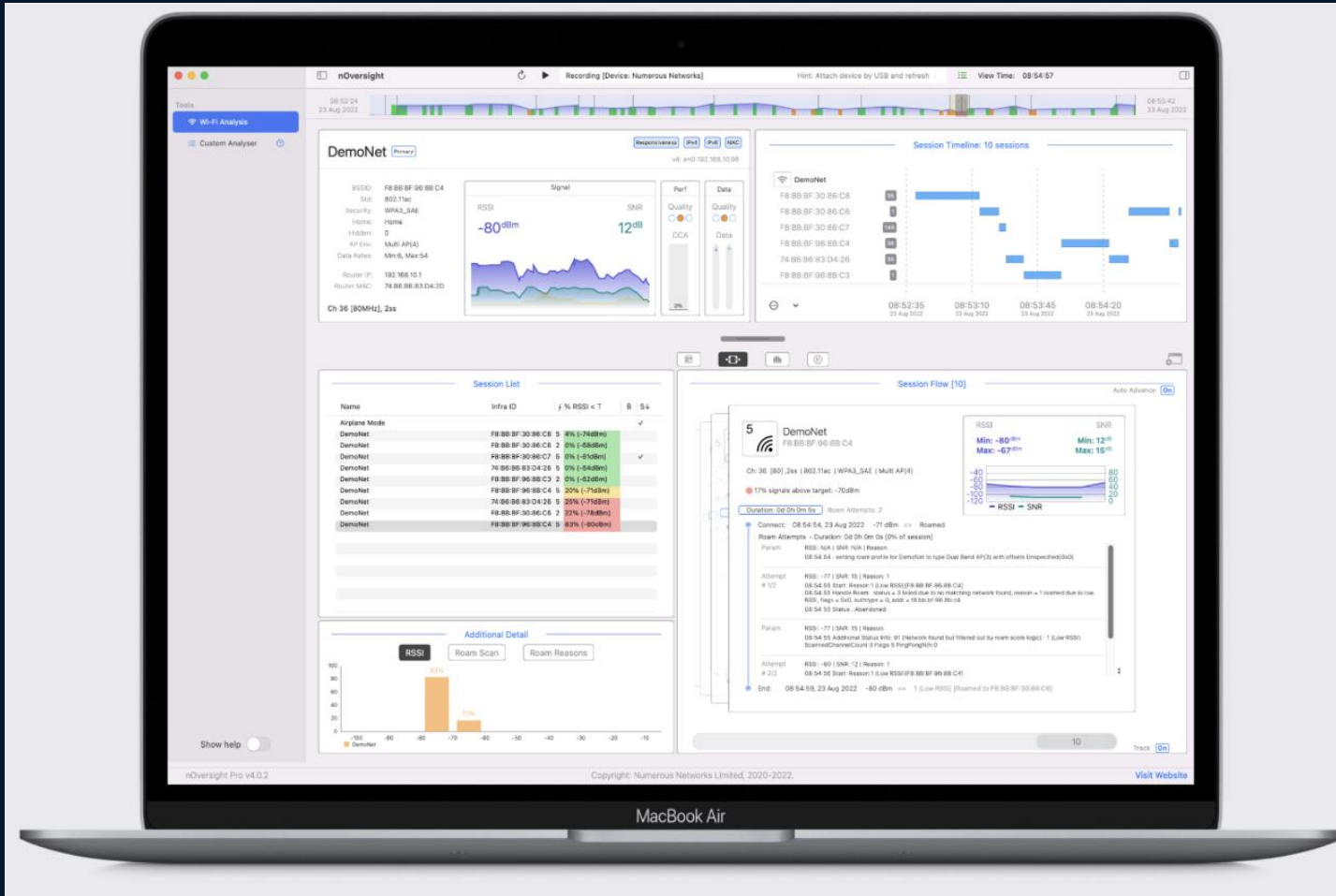
Tap "Intelligent Wi-Fi build number" 7 times

# Wi-Fi OS-based Tools – Android II



Settings -> Developer Tools

# Wi-Fi Community Tools - nOversight



# Wi-Fi Community Tools - Analyti

The screenshot displays the 'Connection Tra...' app interface. At the top, the status bar shows the time 8:19, signal strength, and battery level at 89%. The app title is 'Connection Tra...' with a pause button and a PDF icon. The main content area shows details for a Wi-Fi connection:

- WIFI internet** (5GHz, U-NII-1, CH36, 40MHz, AX2402)
- MAC address: `ca:6e:3a:02:62:20`
- Signal strength: **-76 dBm**
- device IPs: [ 10.169.44.13, fe80::804:12ff:febf:6305 ]
- gateway IP: `10.169.44.1`
- internet by: `AS109 CISCO SYSTEMS, INC./NL`
- public IP: `173.38.220.53`
- dns servers: [ 208.67.220.220, 208.67.222.222 ]

Below the details is a control bar with 'NOW', '30 SEC...', and 'EVENTS' options. A 'Signal Strength' graph shows a blue line fluctuating between -70 dBm and -80 dBm. A list of MAC addresses is visible at the bottom of the graph area:

- WIFI/internet/ca:6e:2a:02:81:10
- WIFI/internet/ca:6e:3a:02:81:10
- WIFI/internet/ca:6e:2a:02:85:c0
- WIFI/internet/ca:6e:2a:02:86:d0
- WIFI/internet/ca:6e:3a:02:85:c0
- WIFI/internet/ca:6e:2a:02:88:a0
- WIFI/internet/ca:6e:2a:02:8a:90

The bottom navigation bar includes icons for Connection, Speed, Networks, Channels, and Devices. The bottom-most bar shows standard Android navigation icons.



## Wi-Fi Analysis. Anywhere. Anytime



M4

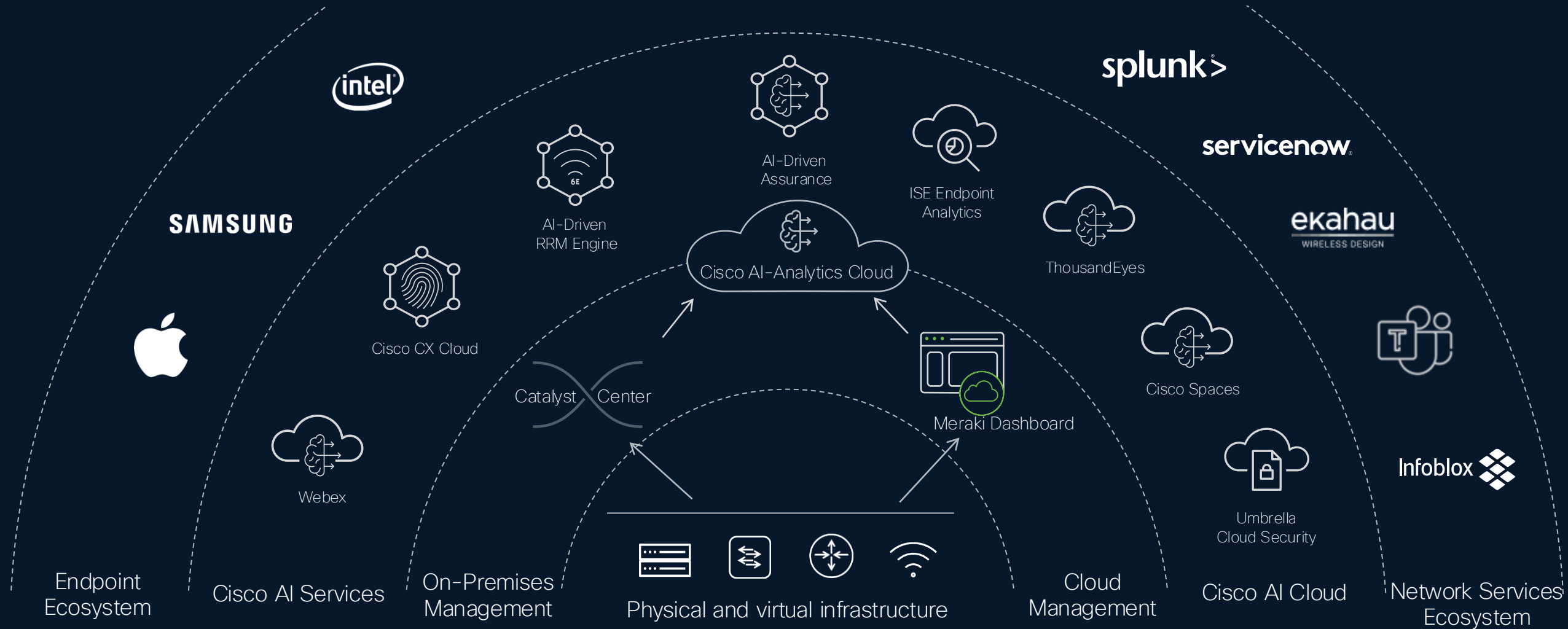


Go



R4

# AI Ops everywhere



# Always-on Anomaly Capture

## Discover and root cause issues

1 Enable Anomaly Capture



2 Anomaly Event Packet Capture

Cisco DNA Center Assurance - Dashboards - Health - User 360

Intelligent Capture: Grace.S

1:42p

Nov 15 1:45p 1:50p 1:55p 2:00p 2:05p 2:10p 2:15p 2:20p

Onboarding Events

Time	Duration
2:36:17 pm	< 1 ms
2:36:12 pm	< 1 ms
2:31:12 pm	< 1 ms
2:26:12 pm	< 1 ms
2:21:12 pm	< 1 ms
2:21:12 pm	< 1 ms
2:21:12 pm	< 1 ms
2:16:12 pm	< 1 ms
2:11:12 pm	< 1 ms
2:06:12 pm	< 1 ms
2:01:12 pm	< 1 ms
1:56:12 pm	< 1 ms

KeyExchange

Nov 15, 2020, 2:21:12.741 pm

4 way Key Timeout

3 Anomaly Type

4 Auto Packet Analyzer

Apply a display filter ... <31>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	Cisco_63:13:88	Cisco_9e:b1:c7	802.11	56	Authentication, SN=1695, FN=0, Flags=.....
2	0.003972	Cisco_9e:b1:c7	Cisco_63:13:88	802.11	56	Authentication, SN=0, FN=0, Flags=.....
3	0.004563	Cisco_63:13:88	Cisco_9e:b1:c7	802.11	161	Association Request, SN=1696, FN=0, Flags=.....
4	0.011495	Cisco_9e:b1:c7	Cisco_63:13:88	802.11	194	Association Response, SN=1, FN=0, Flags=.....
5	0.012977	Cisco_9e:b1:c7	Cisco_63:13:88	EAPOL	159	Key (Message 1 of 4)
6	1.185183	Cisco_9e:b1:c7	Cisco_63:13:88	EAPOL	159	Key (Message 1 of 4)
7	2.096783	Cisco_9e:b1:c7	Cisco_63:13:88	EAPOL	159	Key (Message 1 of 4)
8	3.088943	Cisco_9e:b1:c7	Cisco_63:13:88	802.11	52	Deauthentication, SN=2, FN=0, Flags=.....

Frame 15: 52 bytes on wire (416 bits), 52 bytes captured (416 bits)

Radiotap Header v0, Length 26

802.11 radio information

IEEE 802.11 Deauthentication, Flags: .....

IEEE 802.11 Wireless Management

Fixed parameters (2 bytes)

Reason code: 4-Way Handshake timeout (0x000f)

Validate Issue

Download Packets

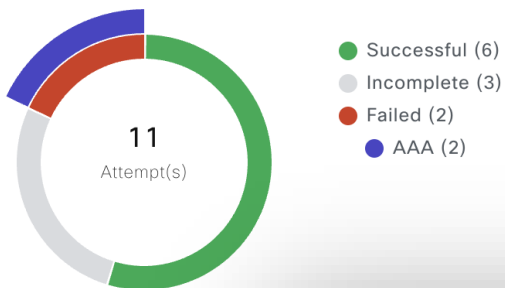
Event Legend:  
Red = Anomaly event  
Green = Healthy event



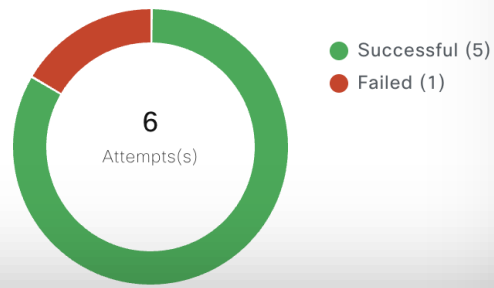
Onboarding failed during Authentication (1 out of 1), due to 'Auth Key Exchange Timeout' (1)

Roaming failed during Authentication (4 out of 4), mostly due to 'Auth Key Exchange Timeout' (3)

Onboarding



Roaming



View Details

● Attempts of this Client ● Attempts of all clients in location: -- ● AP Associations of

Event Viewer

Current Data Selected:

Impact Analysis

Correlation

Go to Global Event Viewer

Export Full Screen

Search Table

Event	Time	Details
INTRA-Roaming (6)	3:13:12.217 PM - 3:17:22.217 PM	AP:CW9178I-L
INTRA-Roaming (6)	10:18:12.217 AM - 10:22:22.217 AM	AP:CW9178I-L
Association Start	7:15:42.217 PM	Client Associati
Run	10:22:22.217 AM	
KeyExchange	10:21:32.217 AM	
Authentication Done	10:20:42.217 AM	Dot1x Full Auth
Authentication Start	10:19:52.217 AM	

Association Start

Mar 15, 2026 7:15:42 PM

Detailed Information

Status:

● Success

Details:

AP_MAC	00:3A:7D:87:C3:80
WLC_NAME	WLC-9800
SSID	@CorpSSID
SLOT	1
FREQUENCY	5.0

Client / Client 360

Device Info Connectivity RF iOS Analytics User Defined Network

Neighbor APs (5) [Export](#)

Search Table

BSSID	AP Name	Channel	RSSI (dBm)	Loc
e4:38:7e:46:55:f5	CW9166I-LDN1-05	6	-46.0	
e4:38:7e:46:44:e4	CW9178I-LDN1-04	44.0	-44.0	
e4:38:7e:46:33:d3	CW9178I-LDN1-03	153	-22.0	
e4:38:7e:46:22:c2	CW9176I-LDN1-02	48.0	-47.0	

5 Record(s) Show Records: 10 < 1 >

Client Disassociation Details (30) [Export](#)

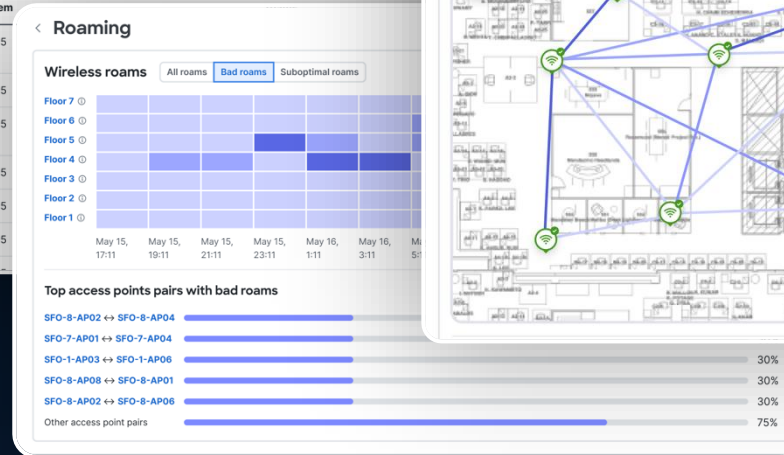
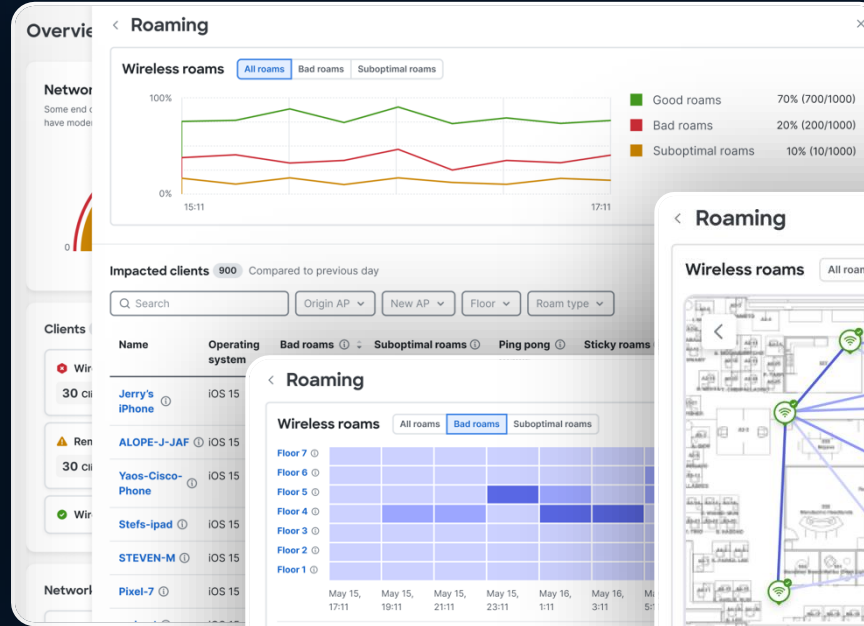
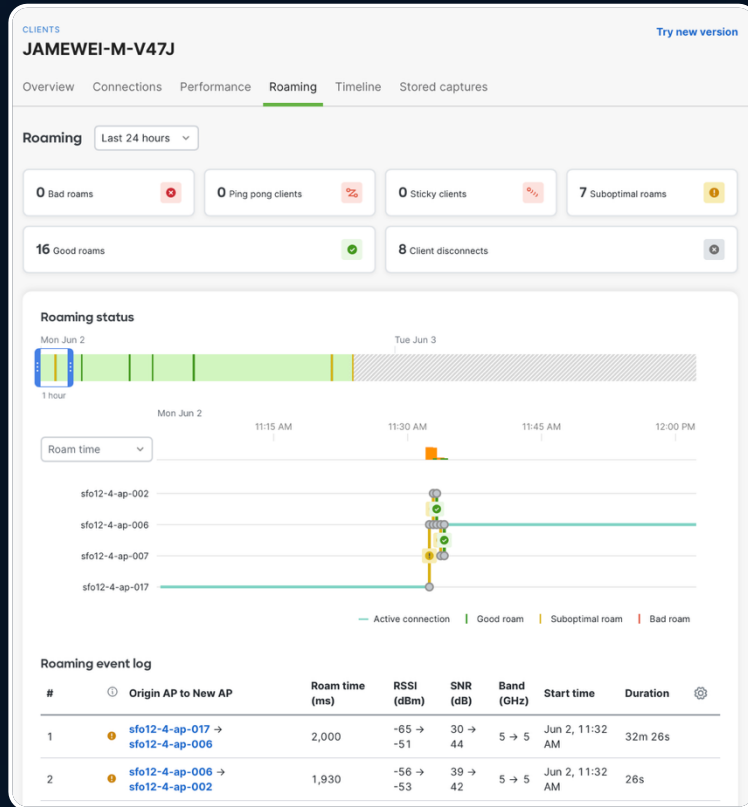
Search Table

Time	Disassociation Reason	Disassociated AP
Mar 15, 2026 9:56 PM	User triggered disassociation	C9120AXI-LDN1-:
Mar 15, 2026 9:51 PM	Device idle	C9120AXI-LDN1-:
Mar 15, 2026 9:46 PM	Device idle	C9120AXI-LDN1-:
Mar 15, 2026 9:41 PM	User triggered disassociation	C9120AXI-LDN1-:

30 Record(s) Show Records: 10 < 1 2 3 >

# Roaming Analytics

Tools for per-device and network-wide troubleshooting



[https://documentation.meraki.com/Wireless/Operate\\_and\\_Maintain/User\\_Guides/Monitoring\\_and\\_Reporting/Client\\_Roaming\\_Analytics](https://documentation.meraki.com/Wireless/Operate_and_Maintain/User_Guides/Monitoring_and_Reporting/Client_Roaming_Analytics)

# On-demand Spectrum Analysis

1 Start Spectrum Analysis

Toggle Radio Band View

2.4 GHz

5 GHz

Stop Spectrum Analysis

Default Persistent FFT View

Configurable Realtime FFT View

Channel By Amplitude

Channel by Time

Interference Severity

Per Channel Duty Cycle (%)

The screenshot displays a Spectrum Analysis interface with the following components:

- Radio Mode:** Local, **Channel:** 1
- Radio Band Selection:** A dropdown menu showing 2.4 GHz and 5 GHz.
- Stop Spectrum Analysis:** A button in the top right corner.
- Default Persistent FFT View:** A view showing Amplitude (dBm) vs. Time for multiple channels (Ch 1 to Ch 11).
- Configurable Realtime FFT View:** A view showing Amplitude (dBm) vs. Time for multiple channels (Ch 1 to Ch 11) with a Realtime FFT toggle.
- Channel By Amplitude:** A view showing Amplitude (dBm) vs. Time for multiple channels (Ch 1 to Ch 11).
- Channel by Time:** A view showing Time vs. Amplitude (dBm) for multiple channels (Ch 1 to Ch 11).
- Interference Severity:** A bar chart showing Severity vs. Duty Cycle (%) for multiple channels (Ch 1 to Ch 11).

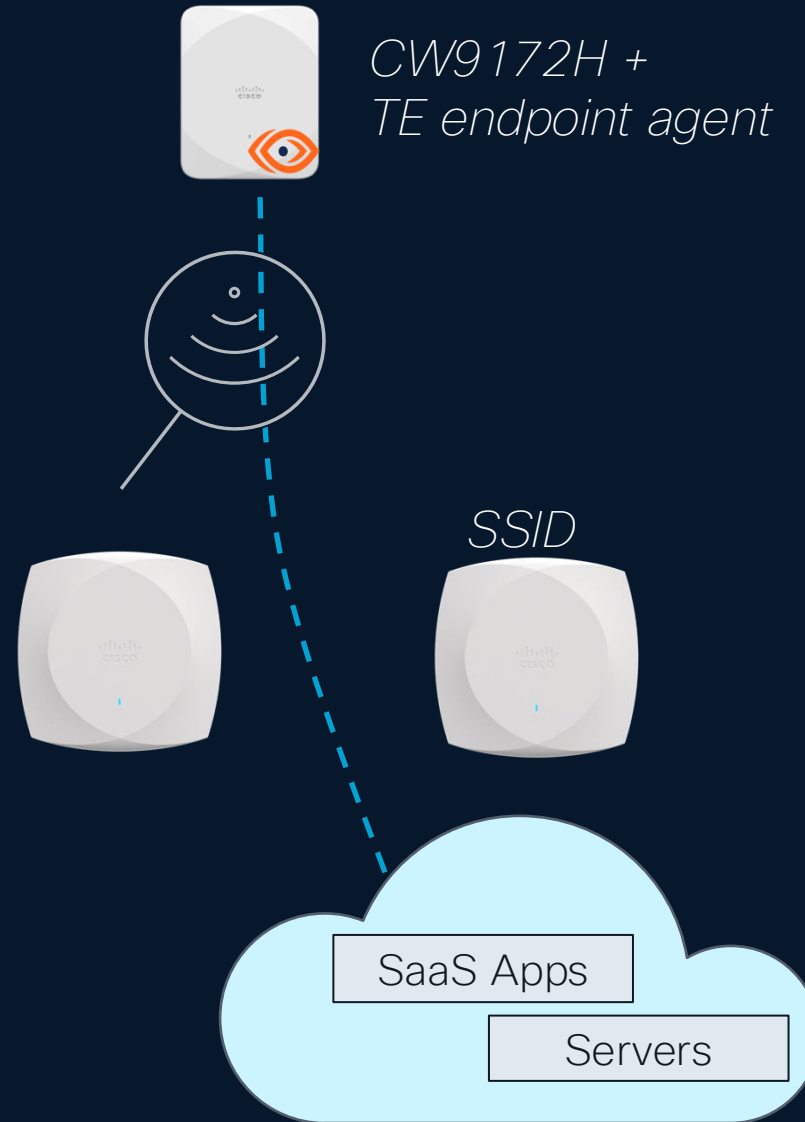
Navigation: [Open Menu] > Assurance > Health > Network > [Select AP] > Intelligent Capture > Spectrum Analysis

# Cisco Wireless Active Testing (WAT) powered by Thousandeyes

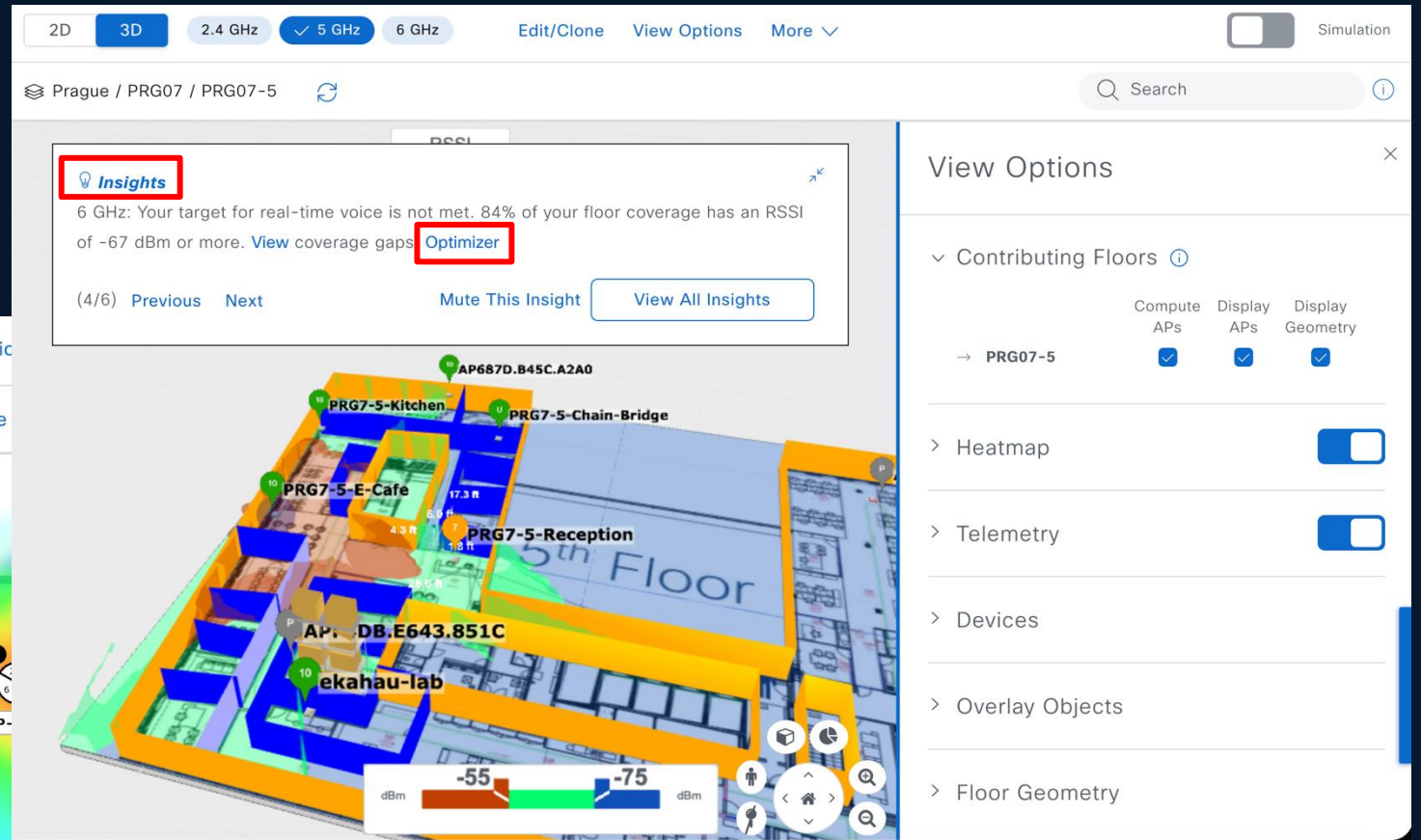
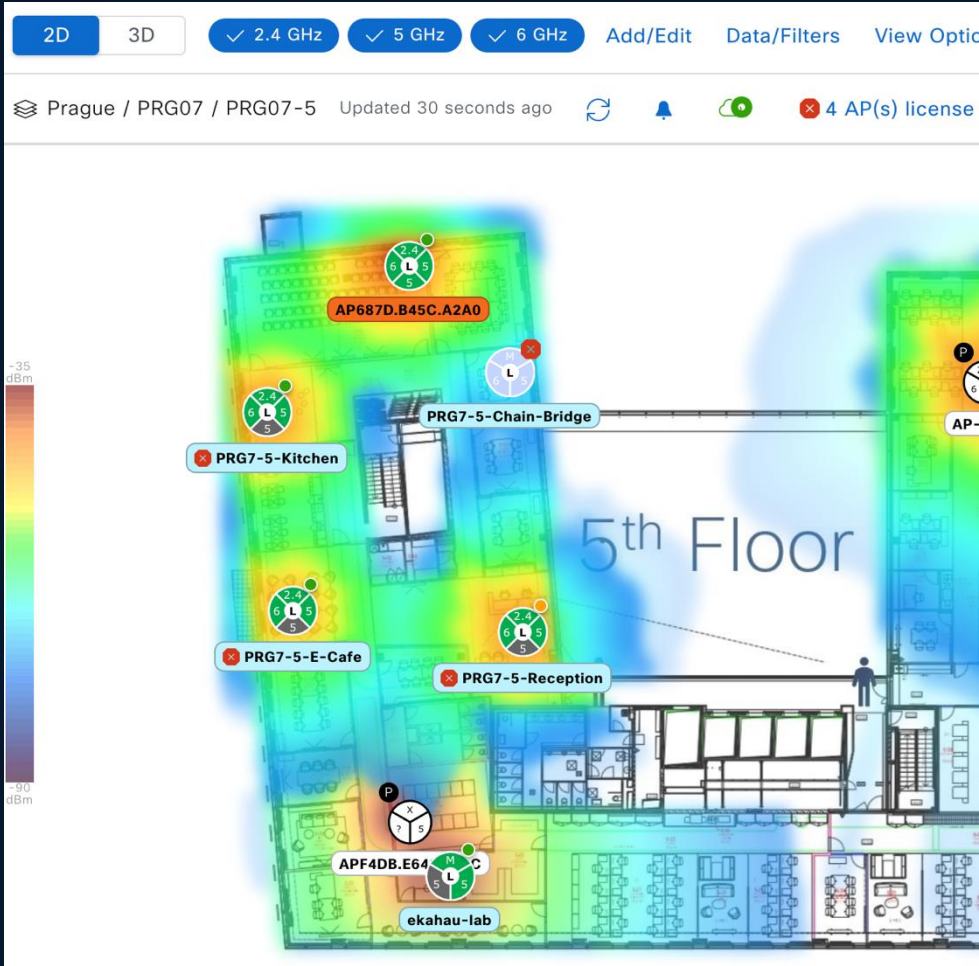
Dedicated AP as a Client

High Priority Location

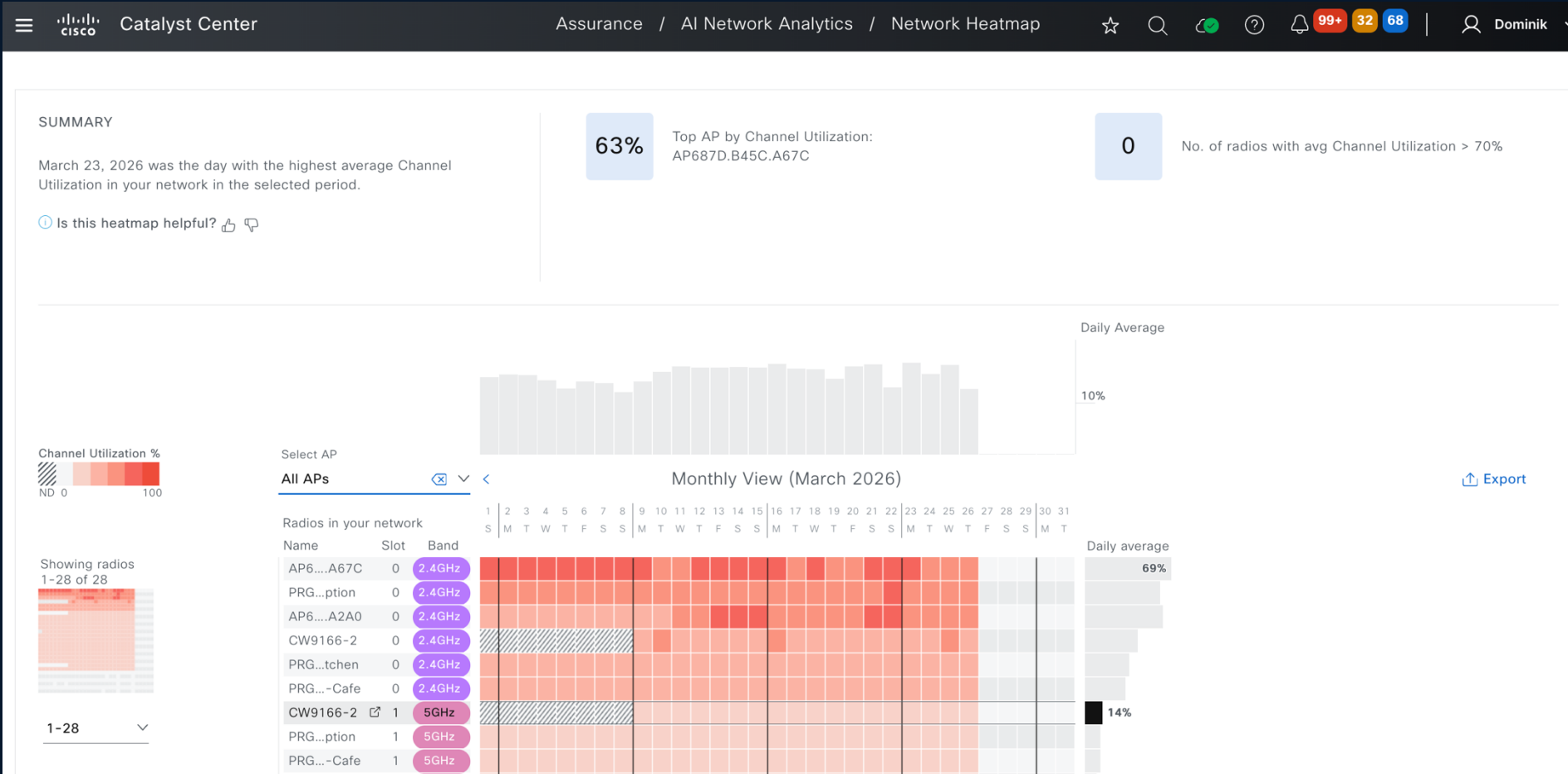
End-to-End Tests



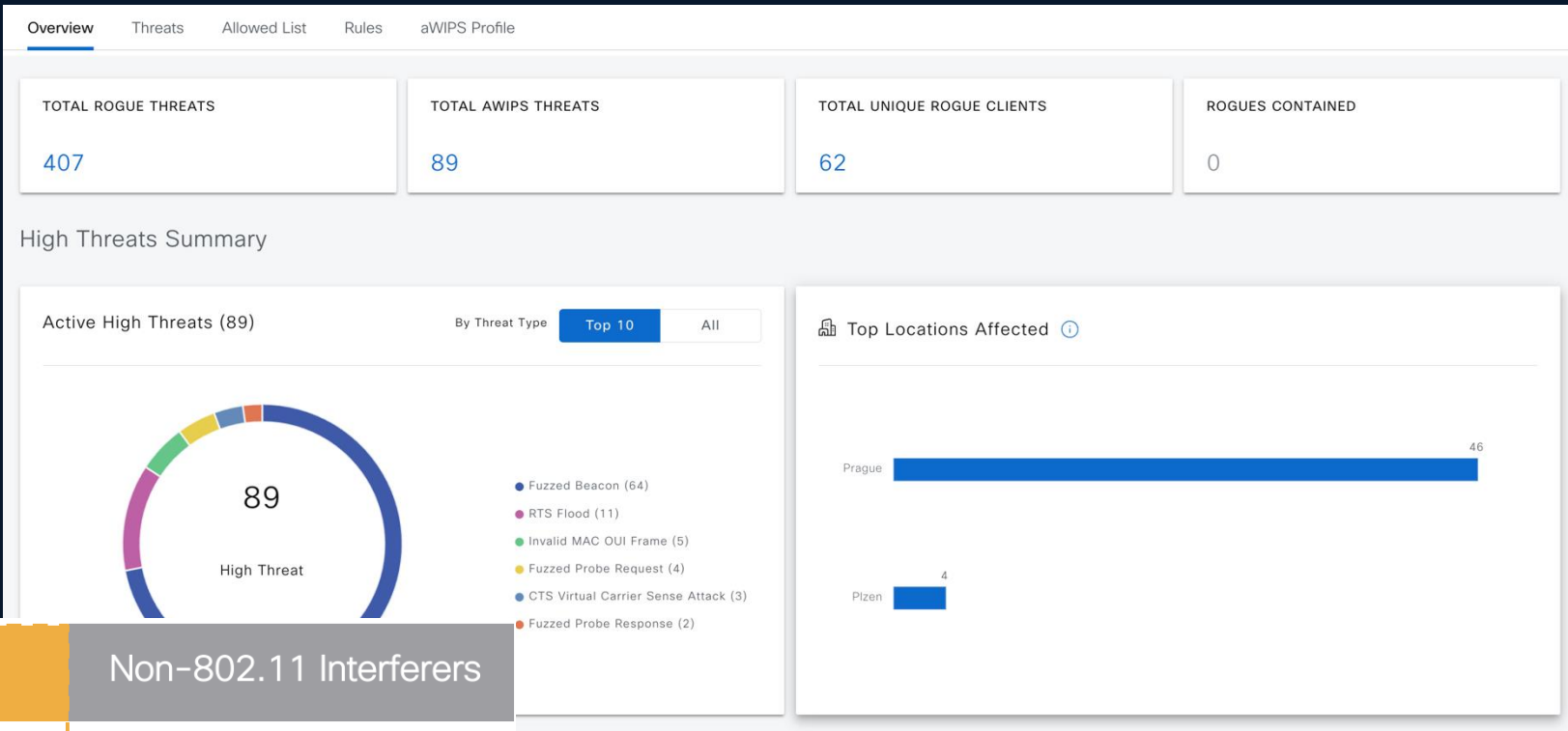
# 2D & 3D Wireless Maps



# Heatmaps



# Rogues & aWIPS



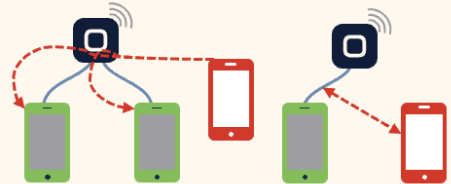
## Over-the-Air Attacks

Rogue Access Points | Honeypot or Evil Twin | AP MAC Spoofing



✓ **Rogue Management**  
Basic Wireless Security

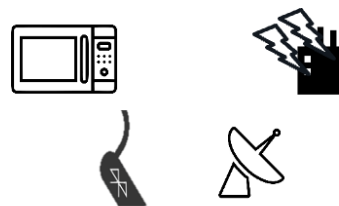
Denial of Service | Reconnaissance | Cracking Tools



✓ **WIPS**  
Advanced Wireless Security

## Non-802.11 Interferers

Microwave | Bluetooth Radar | RF Jammers

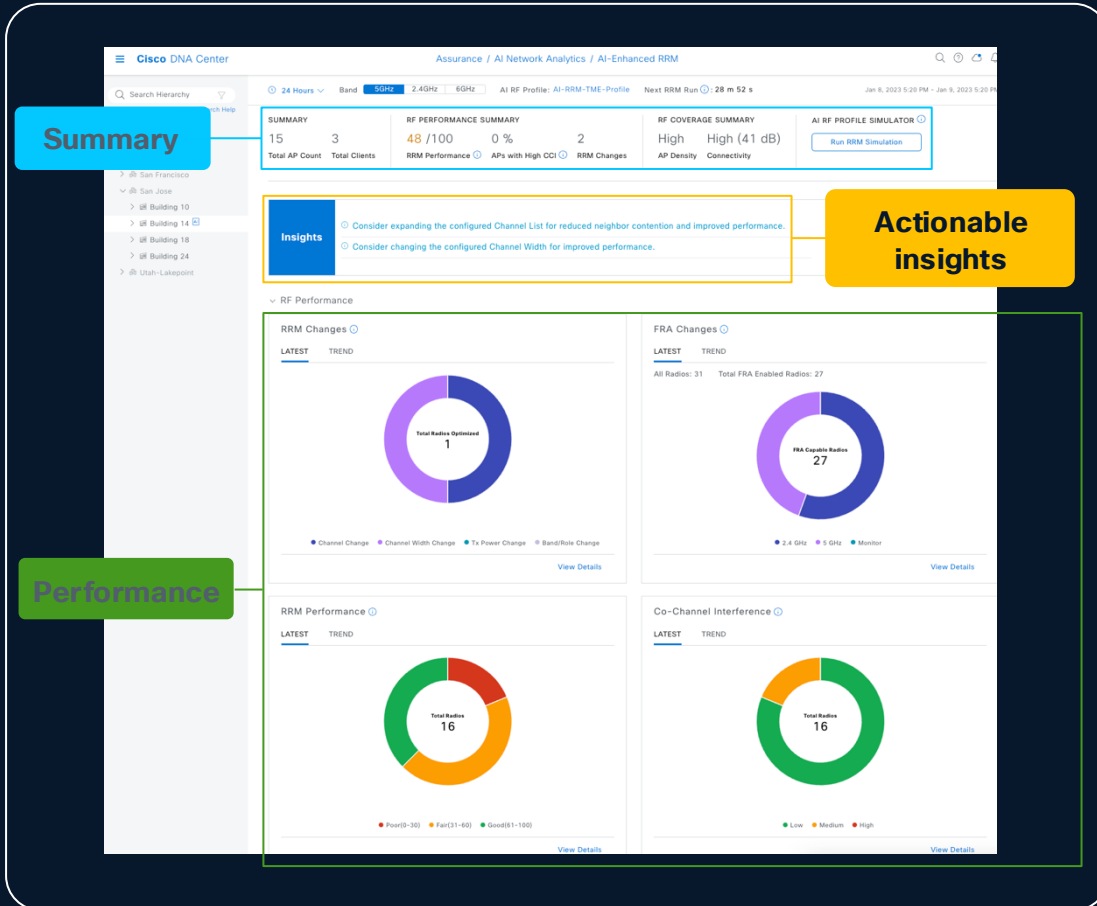


✓ **Cisco CleanAir**  
Visibility of non-WiFi interferers

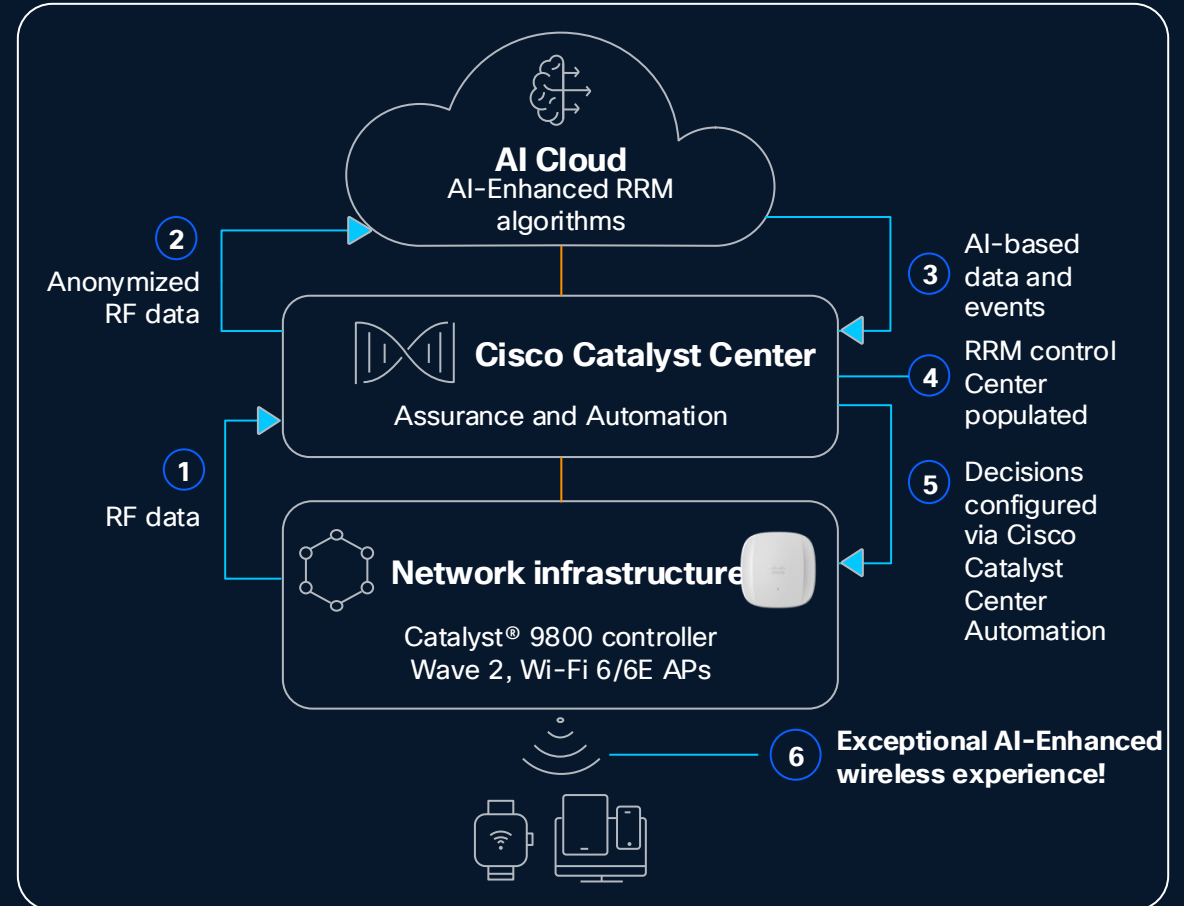
# What is AI-Enhanced RRM?

On-Prem AI-Driven RRM solution

Deep RF visibility & advanced control



Proactive optimizations for all deployment sizes



# Wireless Troubleshooting Automation

Configuration Debug

▶ Wireless Config Analyzer Express

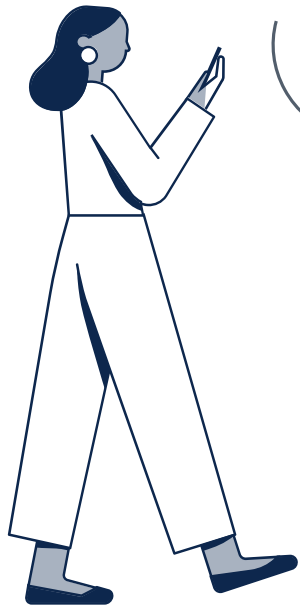


Wireless Reports

▶ Wireless Detector

RA Trace

▶ Wireless Debug Analyzer



OTA Capture

▶ WiFi HAWK

9800 Guest Shell/EEM scripts



# Shrnutí

- Site survey a nástroje pro práci s Wi-Fi pomáhají předcházet složitým situacím
- Doporučený postup:
  - Prediktivní analýza RF před realizací
  - Výpočet kapacity z pohledu počtu/hustoty klientů a typu provozu
  - Site survey
  - Post-deployment validace – site survey and nástroje pro testování)
  - Proaktivní monitoring pomocí AIOps pro wireless only

