

Troubleshooting Common Wi-Fi Problems

Tom Resman - NetScout

It just has to work!



IT Professional Wi-Fi Trek 2016



AirCheck Sparks a Debate at the Presidential Debates

-Using AirCheck to shut down hotspots at the debates and sell \$200 WiFi access 😊



Kenneth P. Vogel @kenvogel · Sep 26

Technicians patrolling #debatenight press file using this device to detect & shut down hotspots, so they can sell \$200 wifi accounts instead



1.5K



1.1K



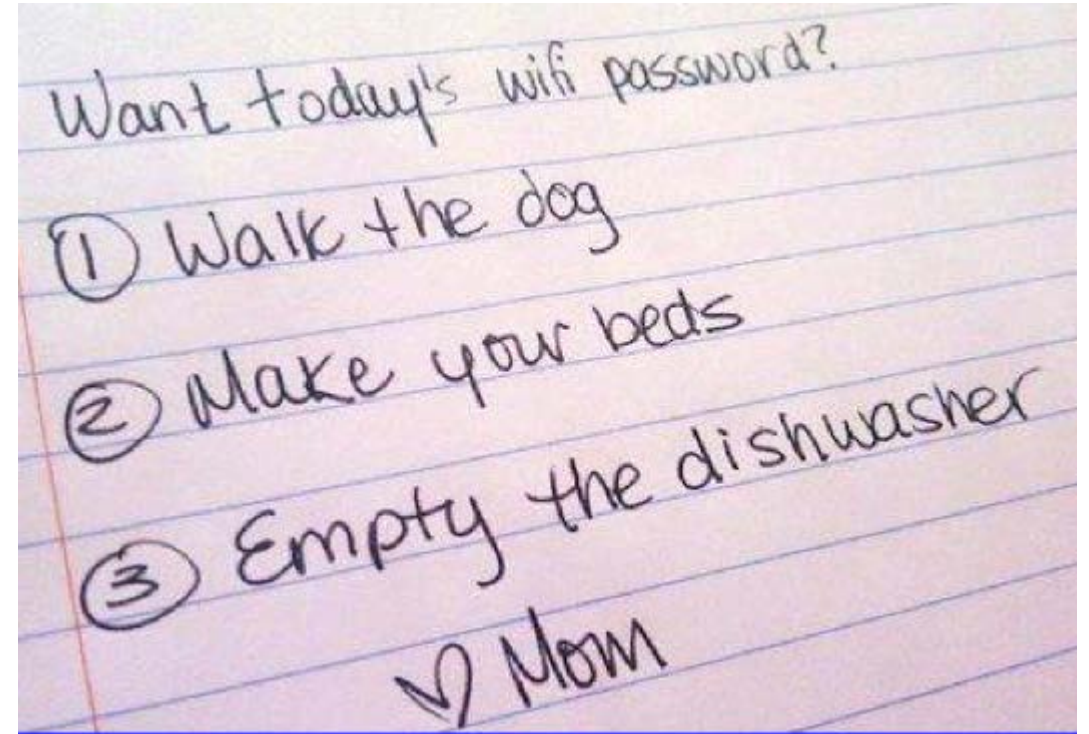
Troubleshooting Common WiFi Problems – Simple and Fast!



IT Professional Wi-Fi Trek 2016

What Wi-Fi Complaints Do You Typically Get?

- The Wi-Fi is too slow
- I keep getting disconnected
- I can't roam
- I can't connect to the wireless network



What are the Causes Behind These Complaints?

- Misconfiguration
 - Access Points
 - Clients
- Coverage
- Capacity
- Co-Channel Interference
 - Your networks
 - Neighbor networks
 - Rogues
- Non Wi-Fi Interference
 - Persistent sources
 - Transient sources
- Security breaches and attacks



Finding Root Cause is Complex

- Complaints

Slow

Can't Connect

Get Disconnected

Can't Roam

- Causes

- Excessive Retries on channel
- Client connected at slow rate
- AP cell too big
- AP cell too small
- AP misconfigured
- Too many APs on channel
- Too many users on channel
- Interferers are present
- Too many SSIDs broadcasting
- Neighbor AP on same channel
- Too many users on same AP
- User's client misconfigured
- Legacy 802.11b clients present
- No secondary AP coverage



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- Channel traffic congestion
- Channel device congestion
- Poor SNR



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- Channel traffic congestion
- Channel device congestion
- Poor SNR
- Client mis-configured
- AP mis-configured
- ...



Key points

- Wi-Fi is location-dependent. Need portable tools to troubleshoot.
- Wi-Fi uses a time-shared medium... the channel.
- Signal Strength is important, but Signal/Noise Ratio is more-so.
- Critical KPIs include channel airtime utilization, SNR, retry rates.
- Client visibility is priceless.
- Every wireless network uses a wired network. Check for services.
- The right tools for the job makes all the difference.



- **So let's look at each complaint and how it can be addressed...**



“The Wi-Fi is too slow”



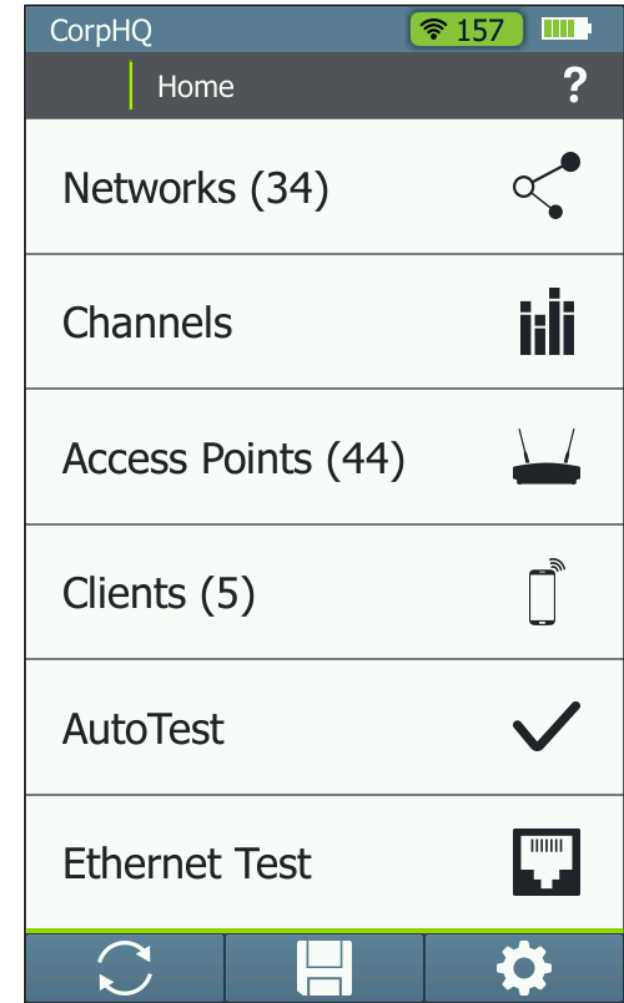
What To Check For

- How many APs on the channel?
- Airtime utilization of the channel for Wi-Fi devices
 - Are there legacy clients present?
- Airtime utilization of the channel for non Wi-Fi devices
 - Are there any non Wi-Fi interferers on that channel?
- What AP is the customer connected to, and what rates are supported?



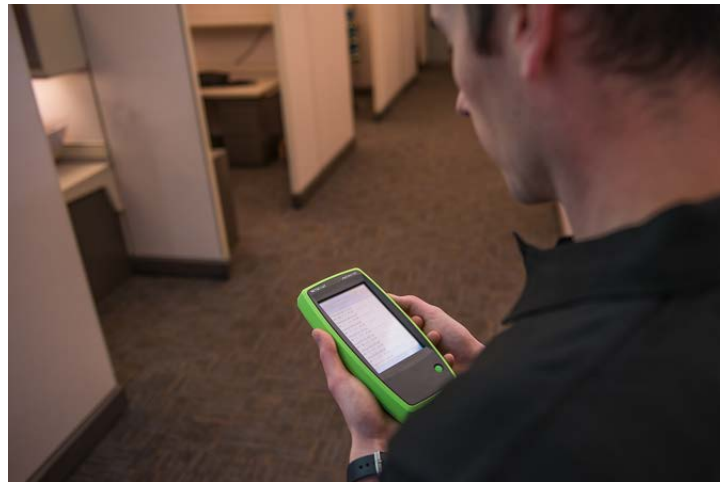
What Dave the IT Tech Did (v1)

- Grabbed his AirCheck Wi-Fi Tester and went to the location of the user.



What Dave the IT Tech Did

- Found the user's connection on his AirCheck Wi-Fi Tester, and identified its channel.

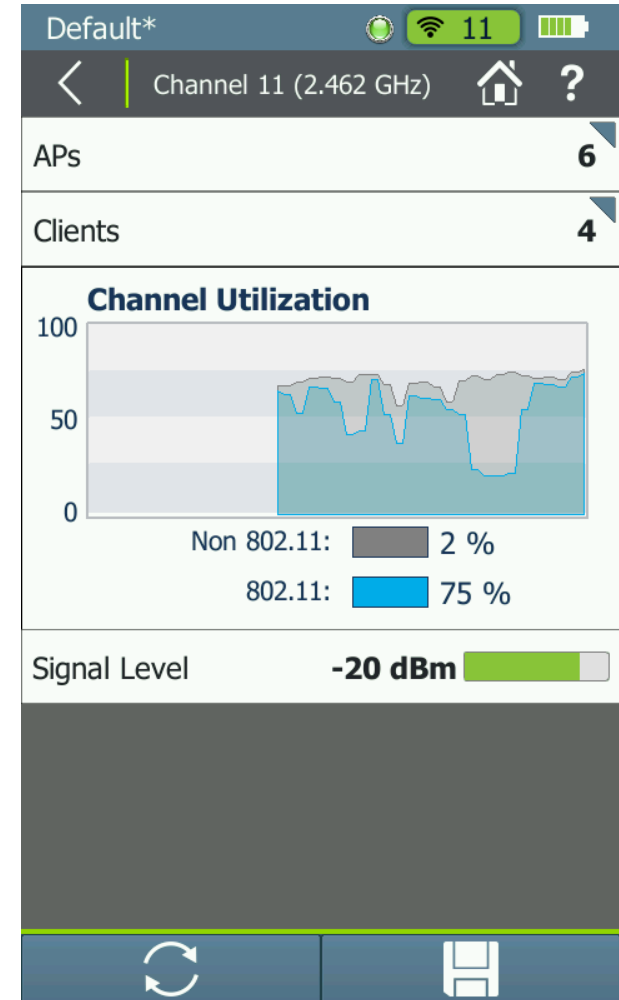


Default*	
<	Apple:05:9f:d6
Signal Strength	
Signal Level	-24 dBm
SSID	Flapjack-2
AP Name	AsusTk:66:eb:08
AP BSSID	AsusTk:66:eb:08
Security	WPA2
802.11 Type	
Band	2.4 GHz
Channel	11
Last Seen	0 seconds ago
Locate	



What Dave the IT Tech Did

- Checked the channel and found too many APs on it.
- Corresponding 802.11 utilization was high.



What Dave the IT Tech Did

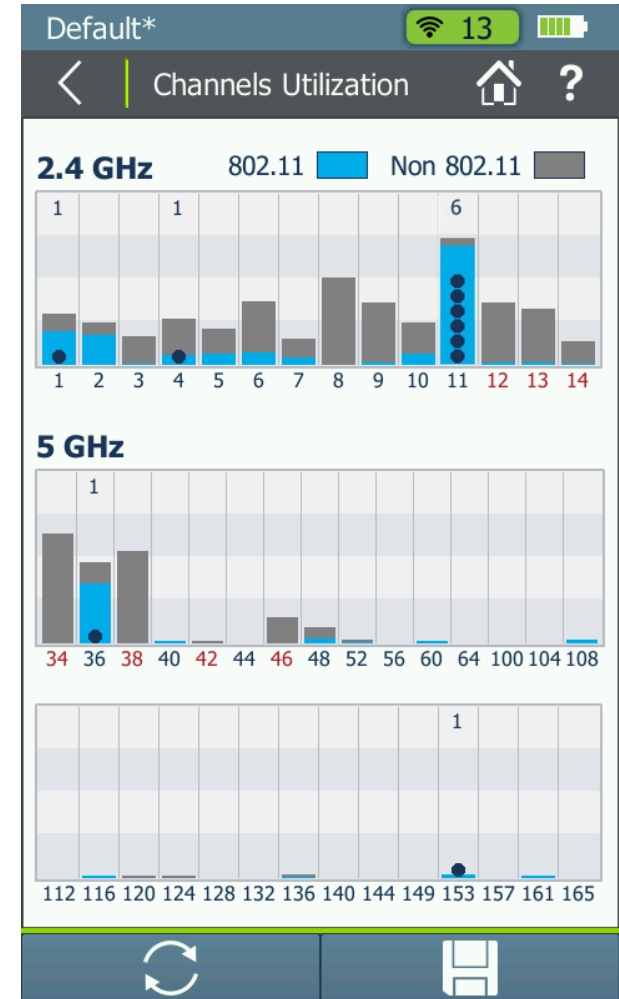
- Drilled to the APs on the channel and saw many neighbor network APs.

AP Name	Signal Strength	SNR	Channel
AsusTk:66:eb:08	-13	68 dB	11
Cisco1130-1Nort	-40	41 dB	11
Studio2020AP	-50	31 dB	11
Arris:53:b6:b7	-62	19 dB	11
lap-cos-us-3	-63	18 dB	11
lap-cos-us-9	-70	11 dB	11
Cisco:84:aa:f0	-74	7 dB	11
Cisco1130-2Sout			



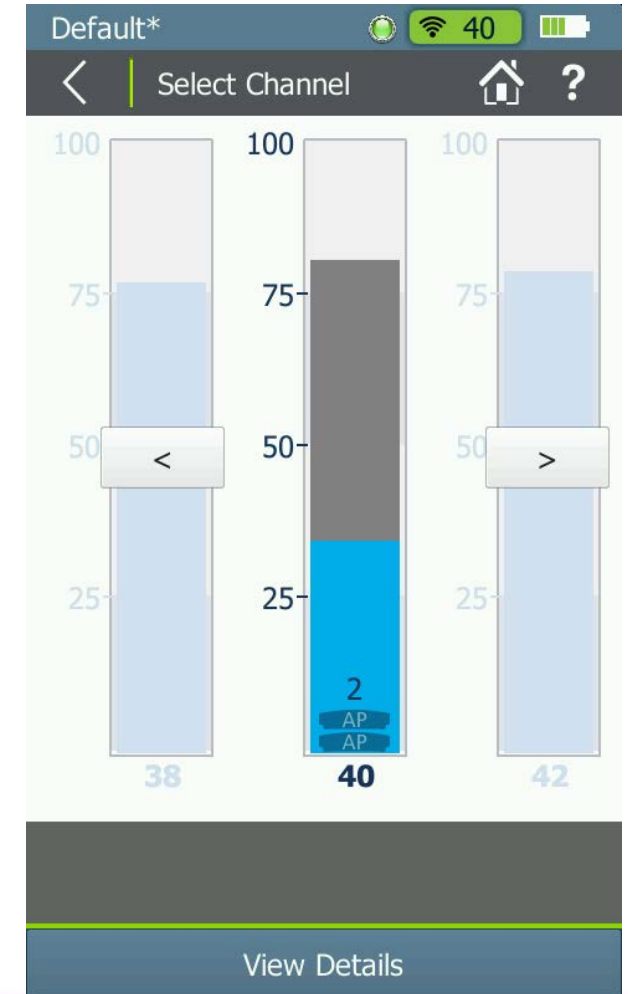
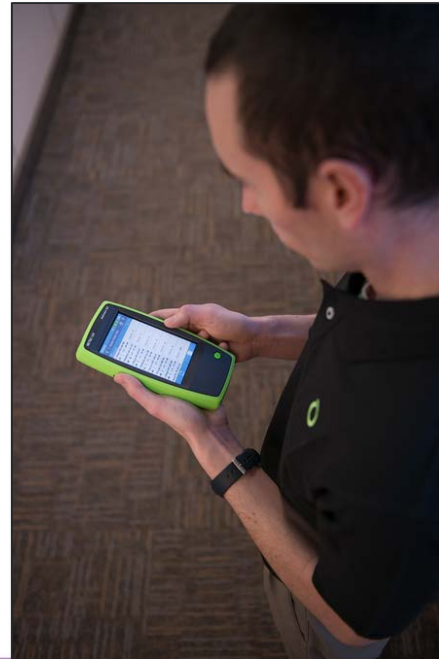
What Dave the IT Tech Did

- Viewed other channels and found one much less used.
- Moved the AP to that channel.



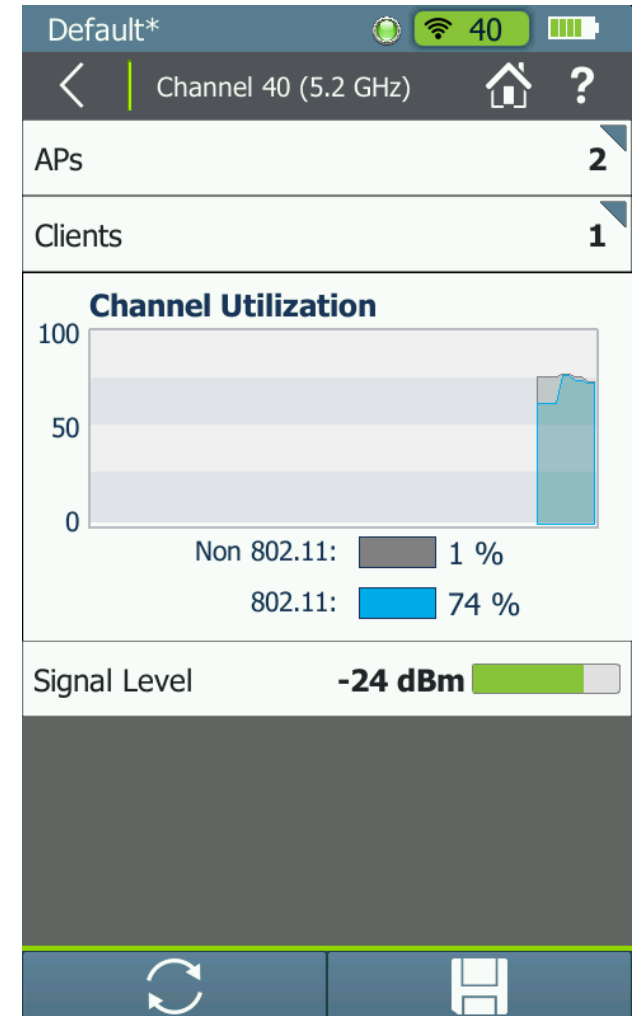
What Dave the IT Tech Did (v2)

- Checked the channel that the client was on.
- Found 2 APs on the channel; didn't seem too bad



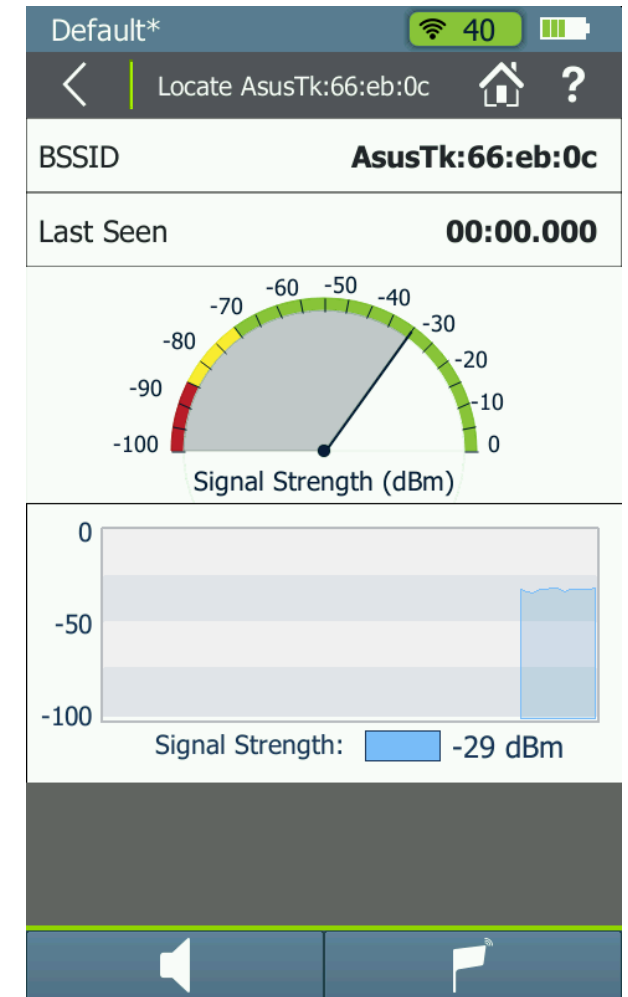
What Dave the IT Tech Did (v2)

- Checked channel utilization and saw it was very high



What Dave the IT Tech Did (v2)

- Checked the APs on the channel and found one was not familiar.
- He located it.



What Dave the IT Tech Did (v2)

- Found a rogue AP that was transmitting large files. One AP and client caused over-utilization of the channel.
- Removing the AP killed two problems with one swipe - Score!



Network is Slow!



“I keep getting disconnected”



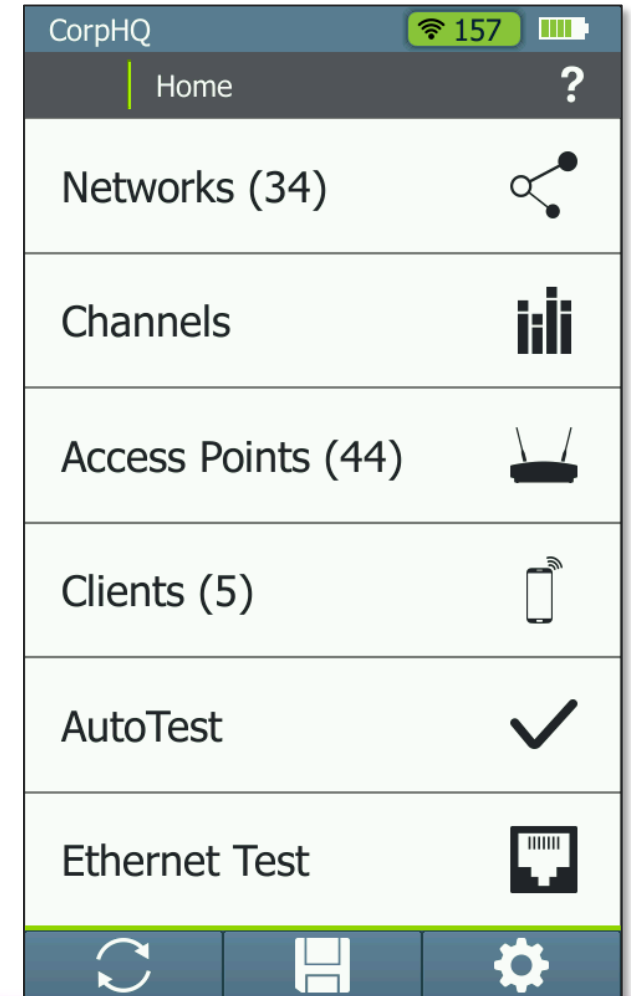
What To Check For

- Are there interference sources present?
 - Signal levels and duty cycles
- Weak SNR at client location
- Is the client device configured properly?



What Dave the IT Tech Did

- Grabbed his AirCheck Wi-Fi Tester and went to the location of the user



What Dave the IT Tech Did

- Found the AP that the user connects to, and identified its channel

A screenshot of a mobile device showing Wi-Fi details for 'lap-cos-us-flk-'. The details include:

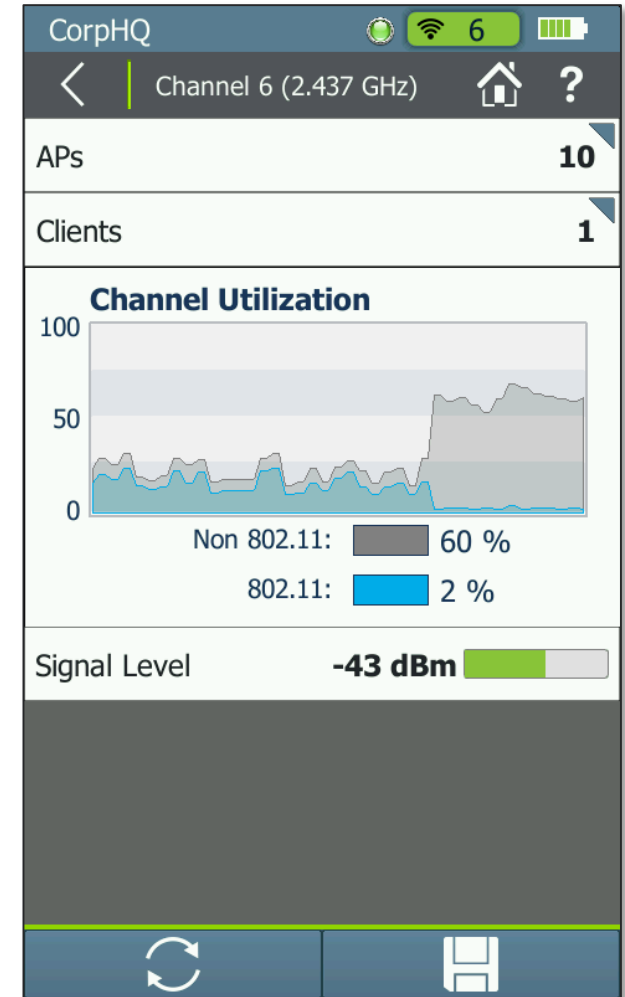
Signal Strength	
Signal Level	-65 dBm
Noise Level	-82 dBm
SNR	17 dB
SSID	NSVisitor
BSSID	Cisco:8e:cc:21
Security	WPA2
802.11 Types	g n
Clients	0
Band	2.4 GHz
Channels	6

At the bottom, there are three buttons: 'Locate', 'Connect', and a save icon. A green arrow points from the 'Channels' row to the 'Locate' button.



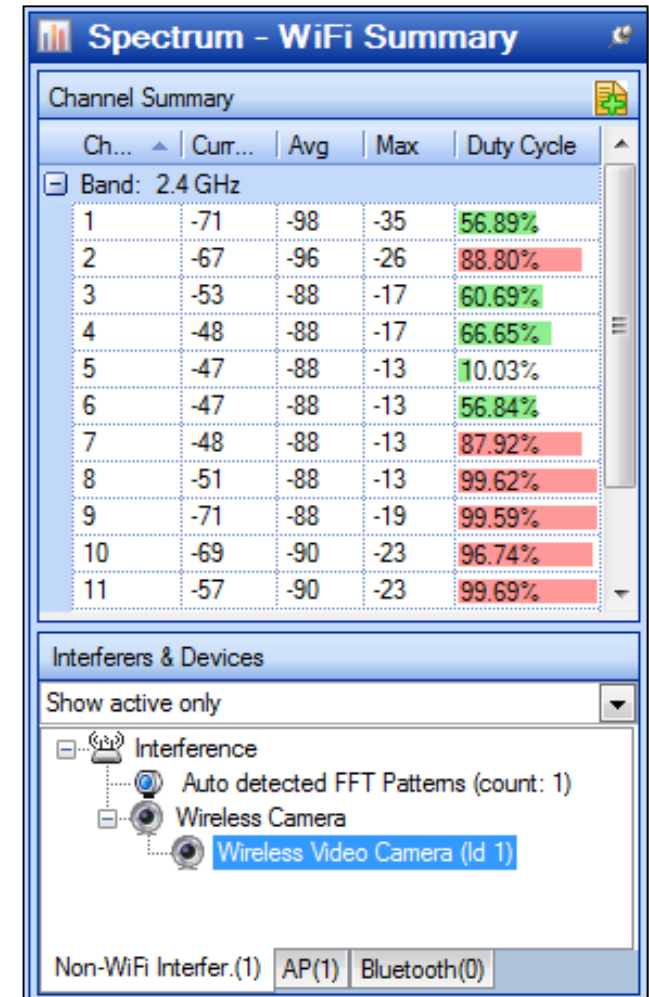
What Dave the IT Tech did

- Saw non-802.11 Wi-Fi channel utilization was high. Immediately knew there was a interferer issue and notified Ed the engineer



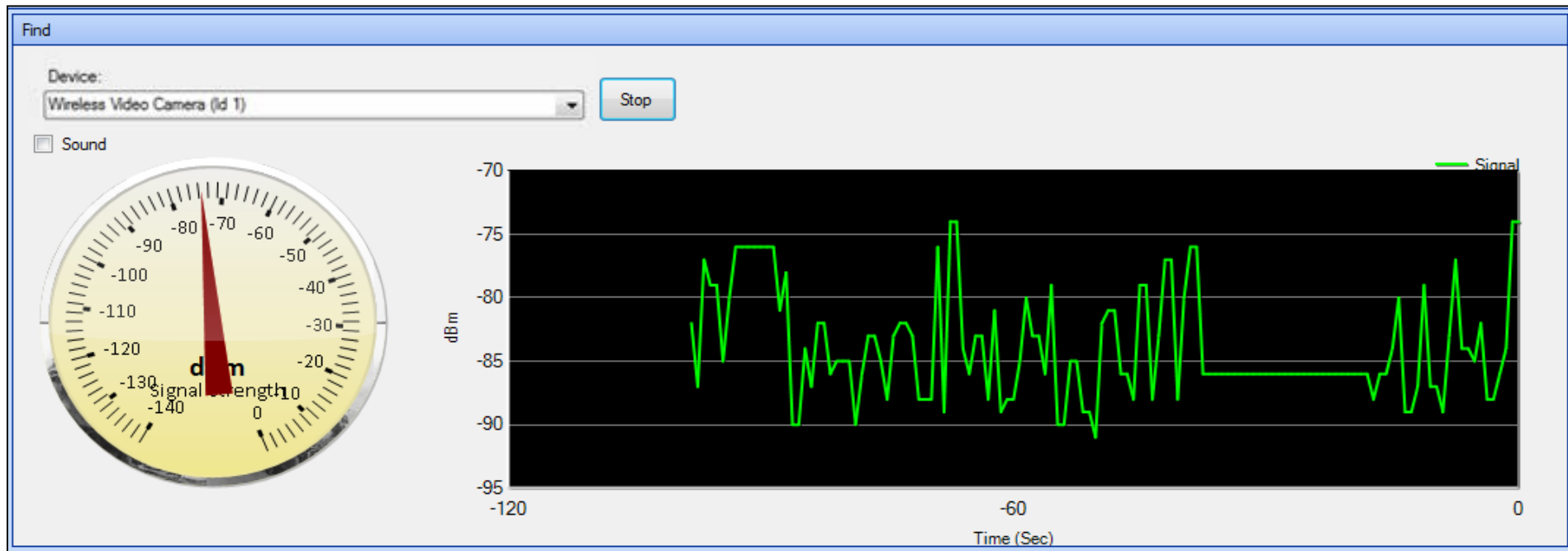
What Ed the engineer did

- Grabbed his AirMagnet[®] Spectrum XT[™] and identified the interference source
 - Only periodic transmissions
 - But duty cycle = 99% and across all 2.4GHz band



What Ed the engineer did

- Located the interference source



What Ed the engineer did

- Depending on the interference source:
 - Removed it
 - For unauthorized or unnecessary devices
 - Changed the Wi-Fi channels around it
 - For embedded devices like microwaves and security cameras
 - Move the AP or increase power to increase SNR
 - For low power devices like sensors



“I can't roam”



What To Check For

- Secondary AP coverage
- AP cell sizes too big, Tx power too high
- Client overload on an AP
- AP misconfiguration



What Dave the IT Tech Did

- Grabbed his AirCheck Wi-Fi Tester and successfully connected to the network

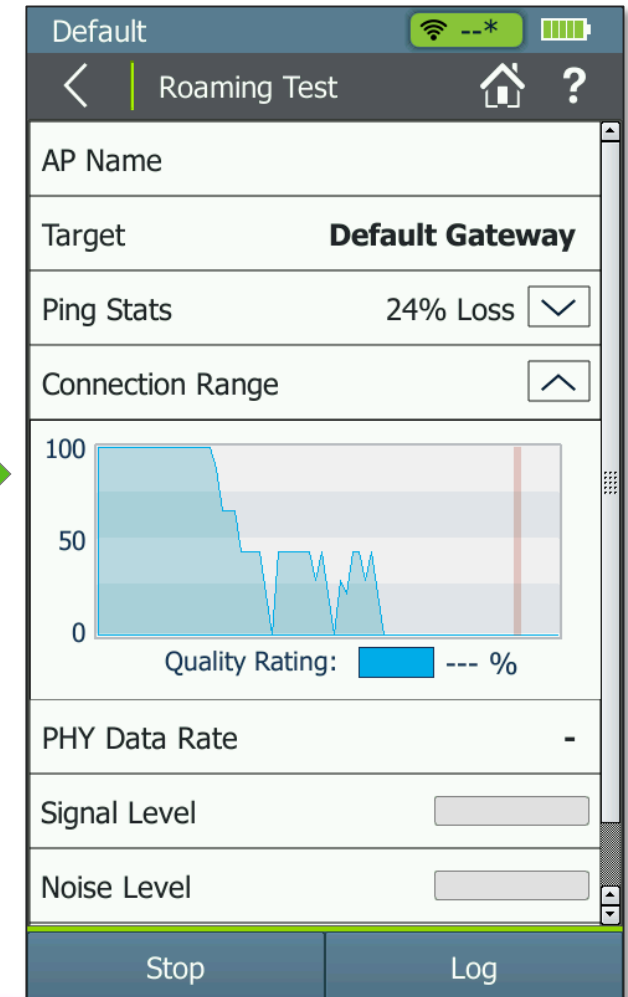
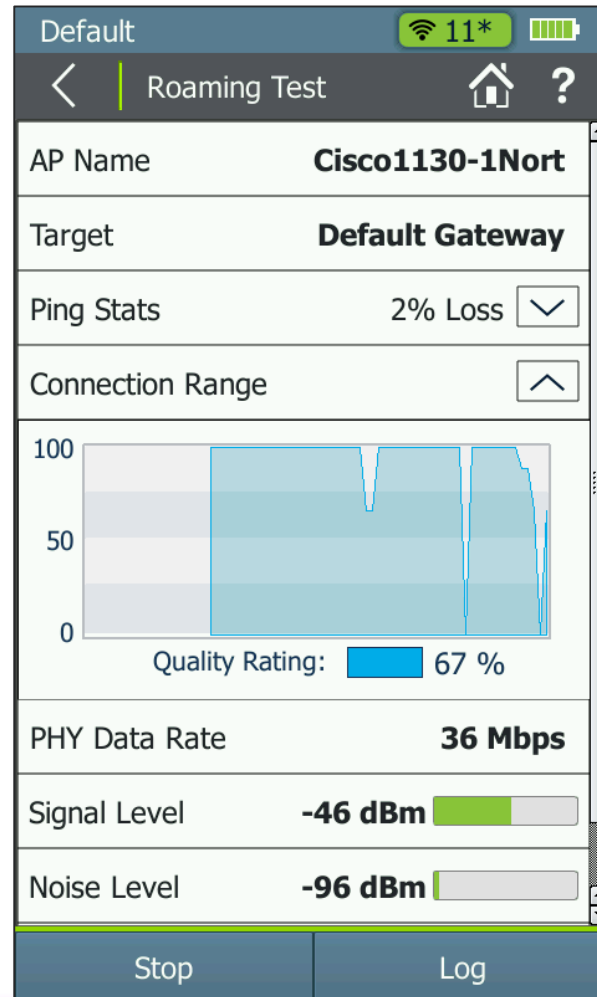


Default		11*	🔋
Connect to Cisco4400			
SSID	Cisco4400		
BSSID	00:17:0f:e7:9b:00		
Link Uptime	0:00:30		
Connection Established			
IP Address	10.250.9.247		
Gateway Found	10.250.8.1		
DHCP Server Found	10.250.8.2		
DNS 1 Found	10.250.1.221		
DNS 2 Found	129.196.196.25		
Target Found	www.google.com		
Link-Live Upload Successful			
Roaming Test	Log	📁	



What Dave the IT Tech Did

- Performed a roaming test. Roaming failed



What Dave the IT Tech Did

- AirCheck Wi-Fi Tester indicated the network had mixed security types. This is a misconfiguration of an access point



Network Name	Signal Strength	Security	Router	Devices	SNR
Battle Mountain Crestron	-56	Lock	Router	1	32 dB
Chamber 5g	-64	Keyhole	Router	1	26 dB
Cisco4400	-34	Keyhole	Router	5	50 dB
Cisco4400_WPA2only	-34	Lock	Router	5	50 dB
clh	-68	Lock	Router	1	18 dB
DIRECT-38-HP ENVY 7640 series	-47	Lock	Router	1	38 dB
DIRECT-PC-VIZIOTV	-79	Lock	Router	1	13 dB
EA6500 TAC 24G					



What Dave the IT Tech Did

- Immediately went to the list of APs on the network. Saw the AP he needed to roam to was set for the wrong security type



What Dave the IT Tech Did

- Fixed the AP security configuration issue, and roaming was restored



Can't Roam?

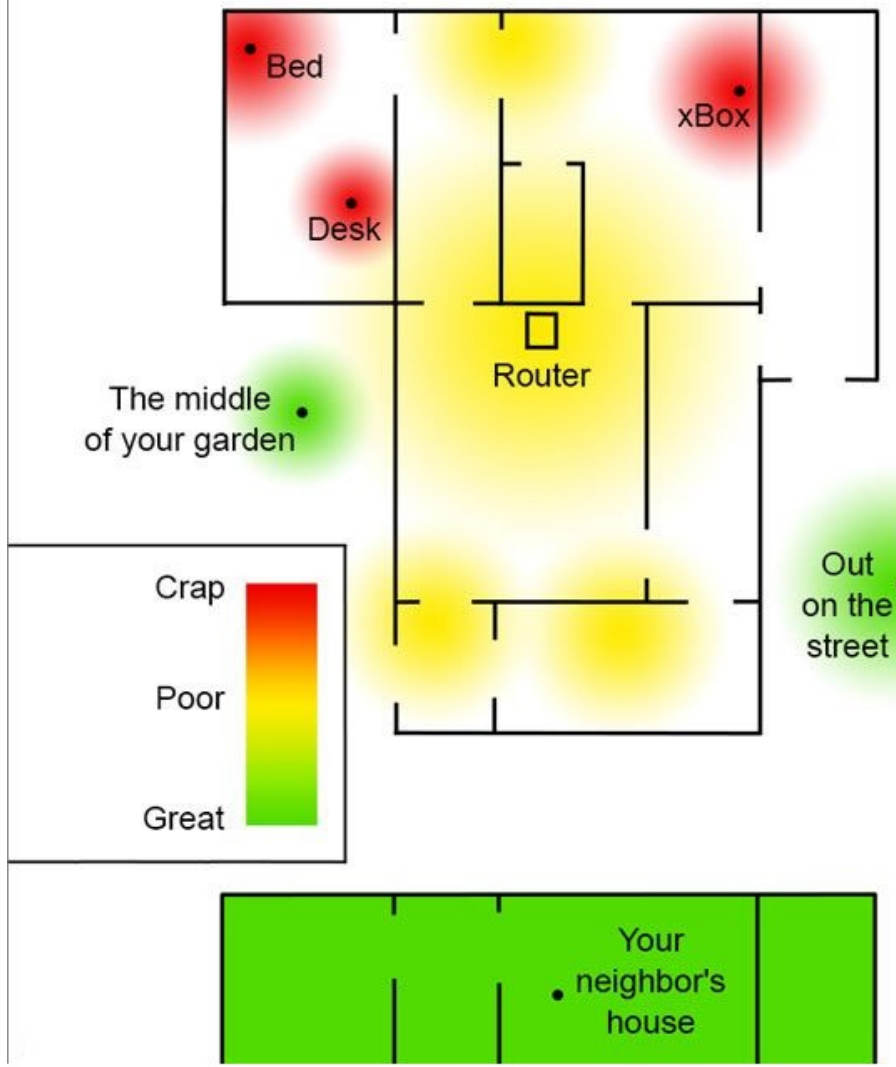


“I can't connect”

- “I can't connect”



Your wireless internet signal strength



What To Check For

- Network availability
- Proper signal coverage, and SNR
- Proper access point configuration
- Proper client configuration
- Channel utilization and interference
- Network services availability: DHCP, DNS, gateway route
- Security incidents



What Dave the IT Tech Did (v1)

- Grabbed his AirCheck Wi-Fi Tester and tried to connect to the network.

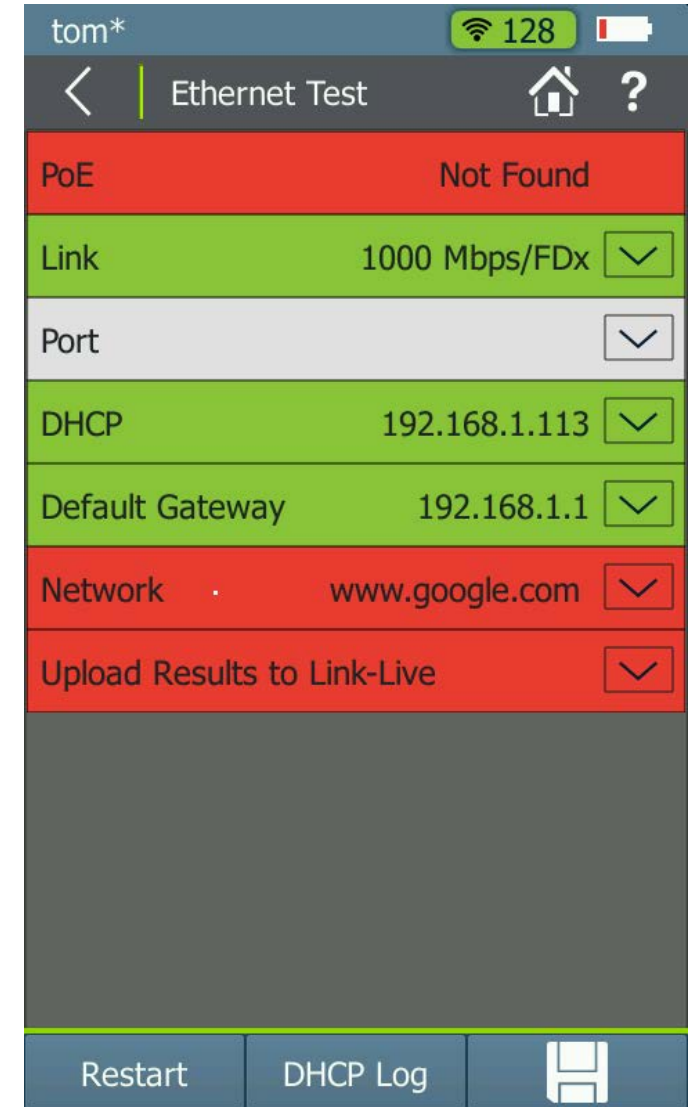


tom*	
SSID	Flapjack-2
BSSID	AsusTk:66:eb:08
Link Uptime	0:00:32
Connection Established	<input type="checkbox"/>
IP Address	192.168.1.16 <input type="checkbox"/>
DHCP Server Found	192.168.1.1 <input type="checkbox"/>
Gateway Found	192.168.1.1 <input type="checkbox"/>
DNS 1 Found	192.168.1.1 <input type="checkbox"/>
Find DNS 2	<input type="checkbox"/>
Target Not Found	www.google.c... <input type="checkbox"/>
Link-Live Upload Failed	<input type="checkbox"/>
Roaming Test	Log



What Dave the IT Tech Did (v1)

- Checked the Ethernet connection at the AP and saw that he could not get out to the internet.
- Found that it was a misconfigured firewall.



Simple and Fast WiFi Troubleshooting



THANK YOU



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