

WiFi Explorer Pro 3

"The Definitive User Guide"

Nigel Bowden & Adrian Granados

Published by Bowden Networks Ltd (UK)

Contents

CHAPTER 1 - WIFI EXPLORER PRO 3 PRODUCT OVERVIEW	3
CHAPTER 2 - WLAN SCANNING THEORY	6
CHAPTER 3 - LOCAL DATA ACQUISITION	16
CHAPTER 4 - DATA ACQUISITION USING SENSORS	18
CHAPTER 5 - DATA IMPORT FROM EXTERNAL SYSTEMS.....	35
CHAPTER 6 - SPECTRUM ANALYSIS DATA.....	45
CHAPTER 7 - BLUETOOTH & ZIGBEE DATA.....	57
CHAPTER 8 - WIFI EXPLORER PRO 3 UI TOUR	63
CHAPTER 9 - WIFI EXPLORER PRO 3 SETTINGS.....	91
CHAPTER 10 - DATA VISUALIZATION: FILTER EXPRESSIONS & DISPLAY FILTERS	103
CHAPTER 11 - DATA VISUALIZATION: COLUMNS & PROFILES.....	112
CHAPTER 12 - DATA VISUALIZATION: SCAN RESULTS ORGANIZATION, COLORING RULES, DATA ENHANCEMENTS & HIDDEN GEMS	117
CHAPTER 13 - INSPECTORS.....	131
CHAPTER 14 - TROUBLESHOOTING WORKFLOW	137
CHAPTER 15 - DATA EXPORT & REPORTING	151
CHAPTER 16 - RF ENVIRONMENT AUDITING	154
CHAPTER 17 - RASPBERRY PI SENSOR	155

Chapter 1 - WiFi Explorer Pro 3 Product Overview

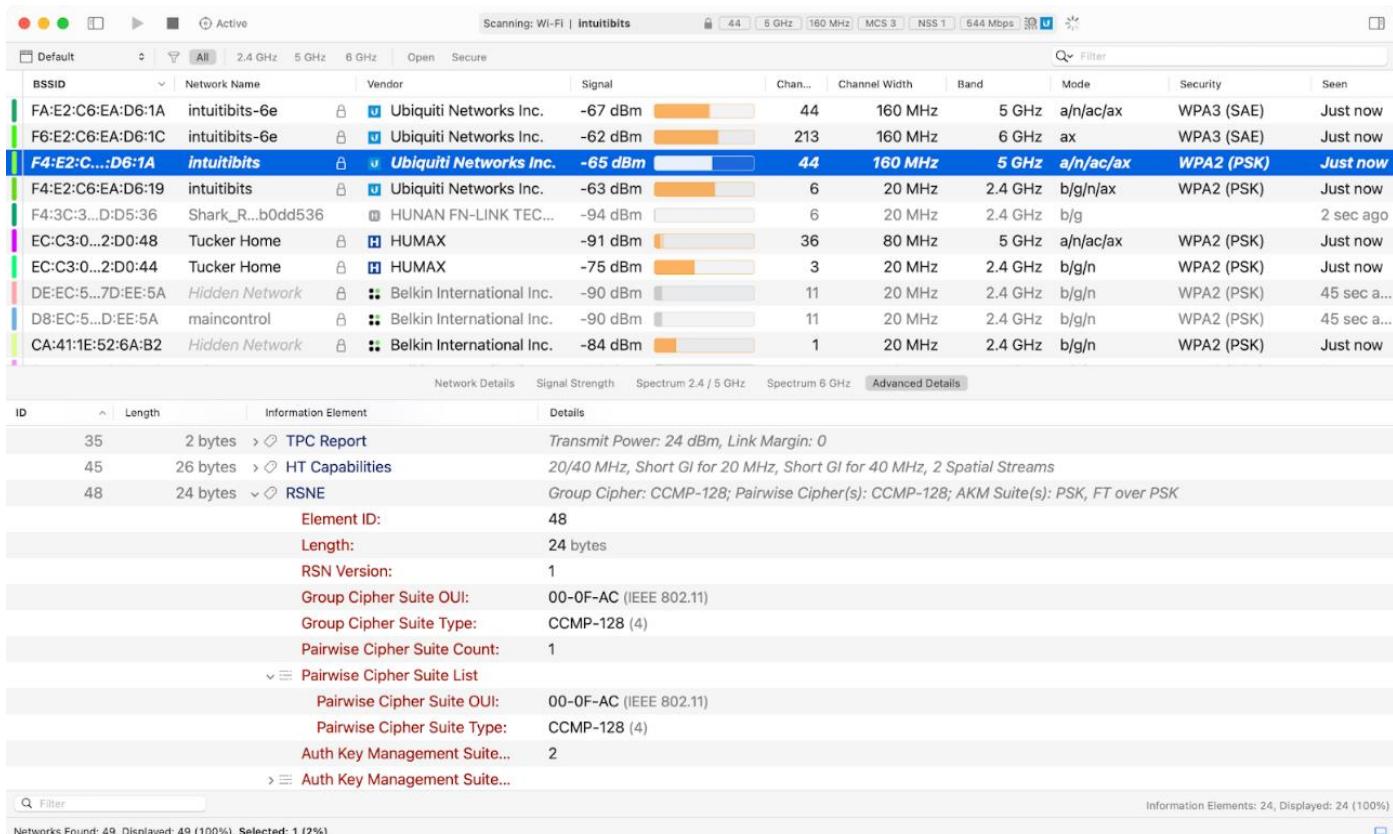


Figure 1-1 - WiFi Explorer Pro 3 User Interface

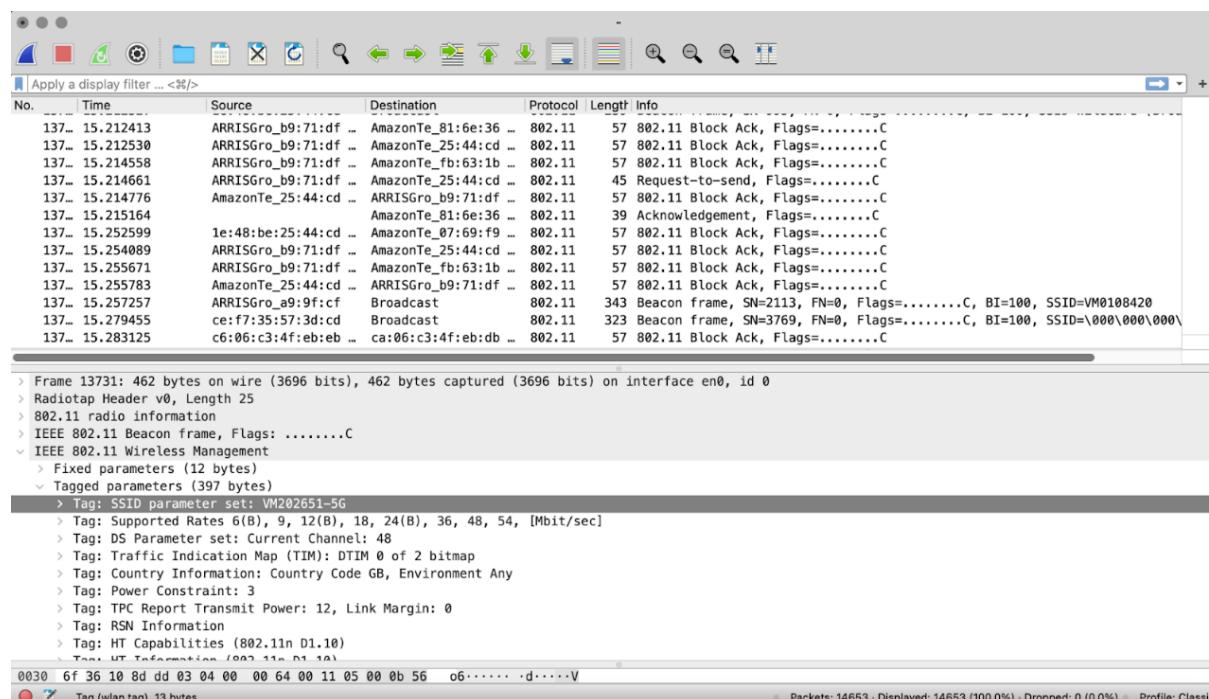


Figure 1-2 - Wireshark User Interface

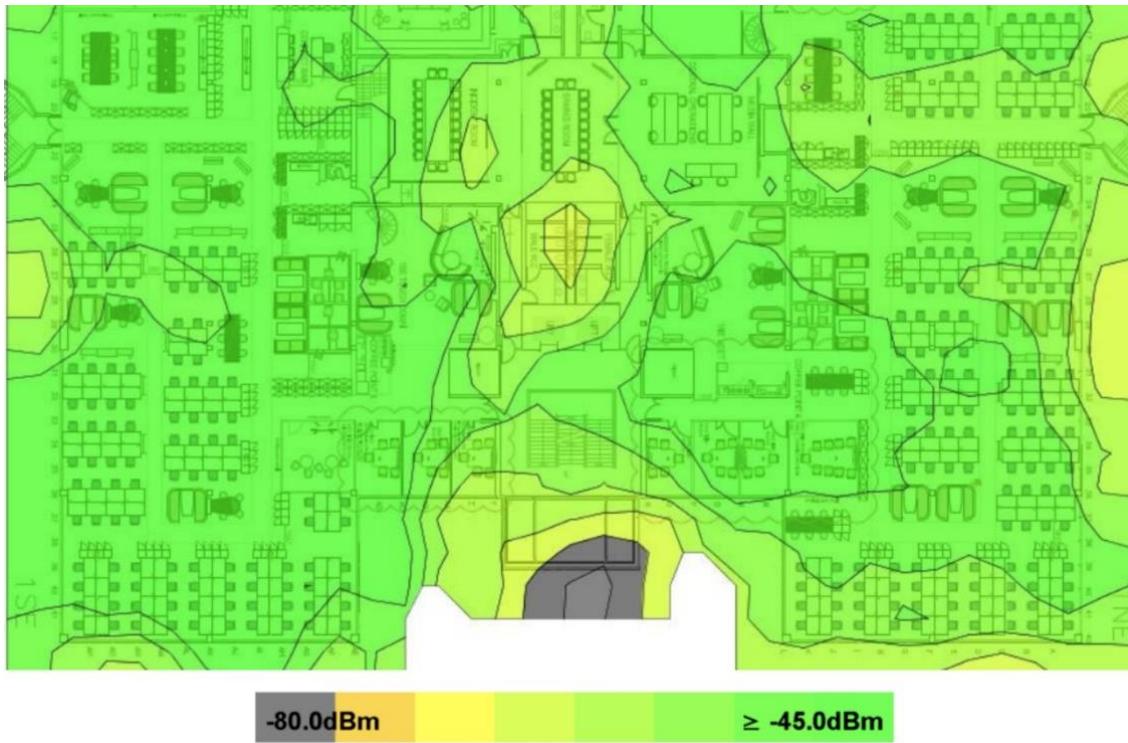


Figure 1-3 - Sample heatmap from a survey tool showing the projected signal levels of a new WLAN

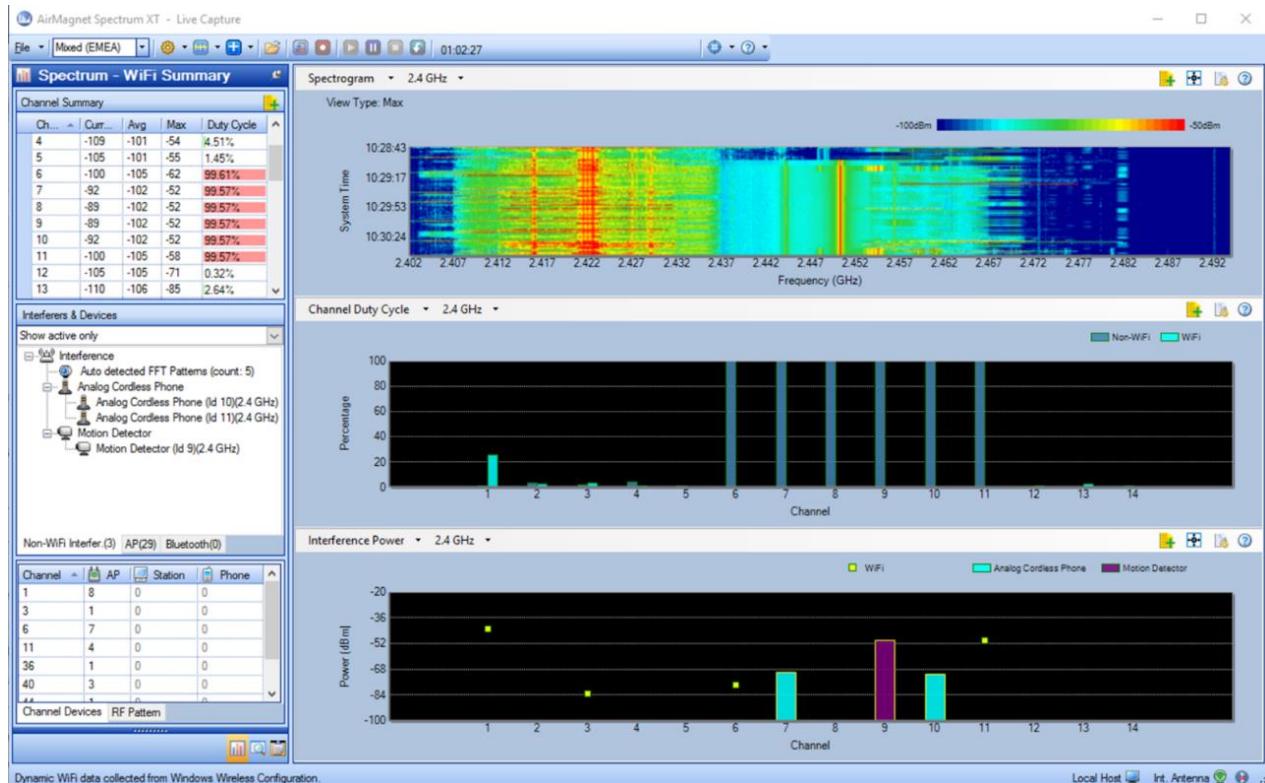


Figure 1-4 - Spectrum Analyzer screenshot

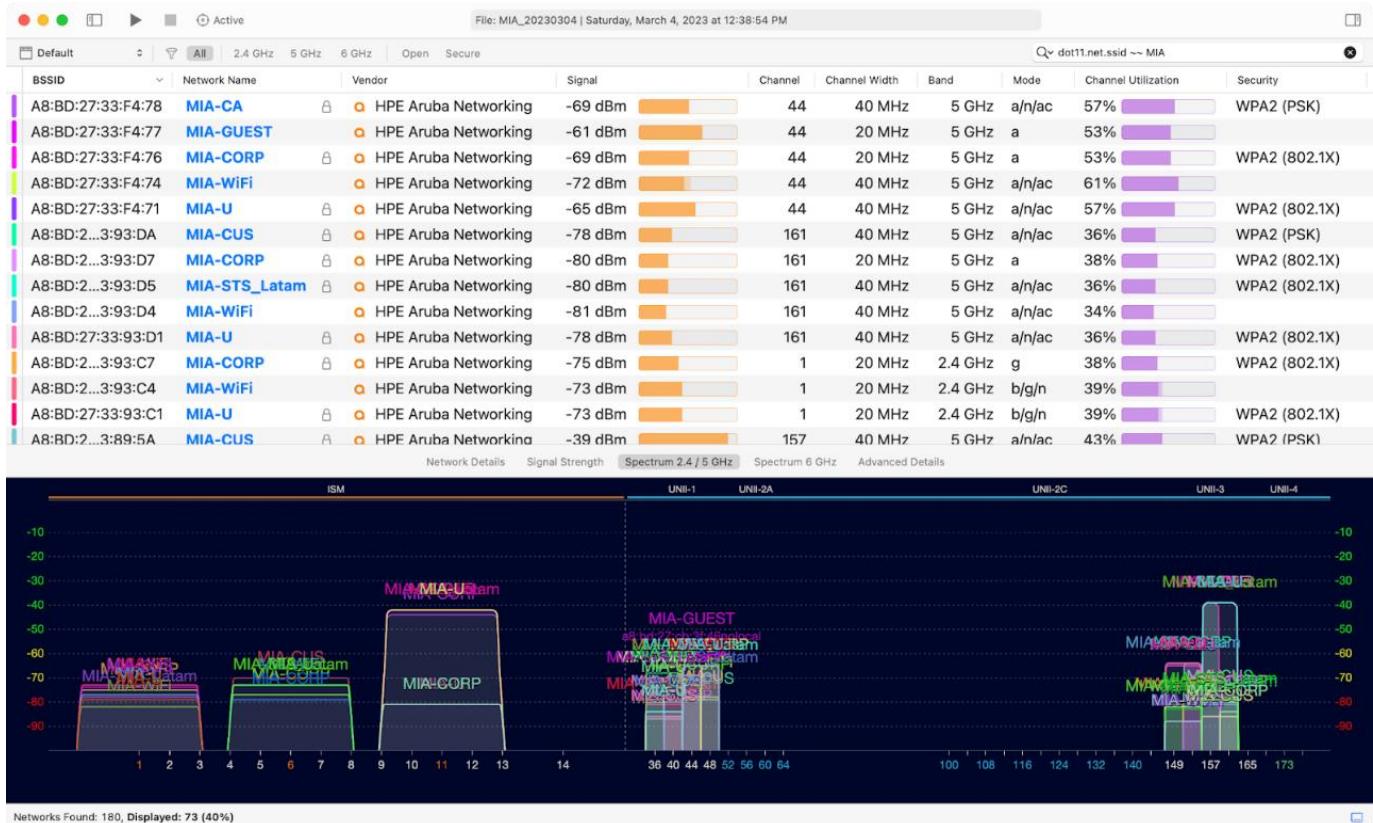


Figure 1-5 - Screenshot of WiFi Explorer Pro 3 (the premiere Wi-Fi scanner!)

Chapter 2 - WLAN Scanning Theory

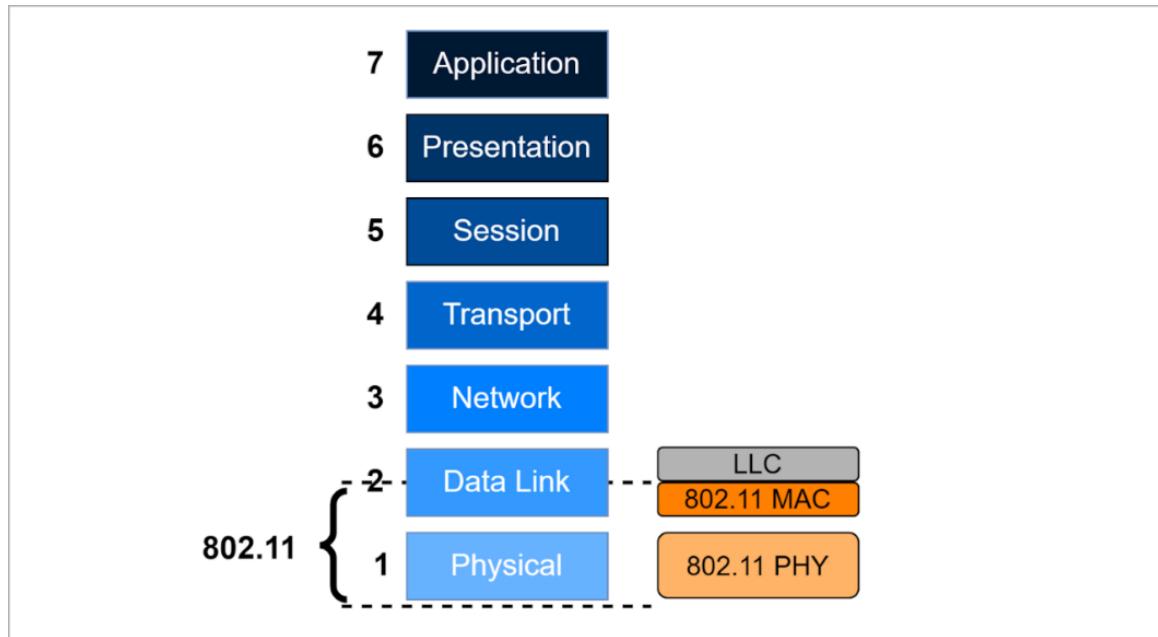


Figure 2-1 - OSI 7 layer model with 802.11 layer mapping

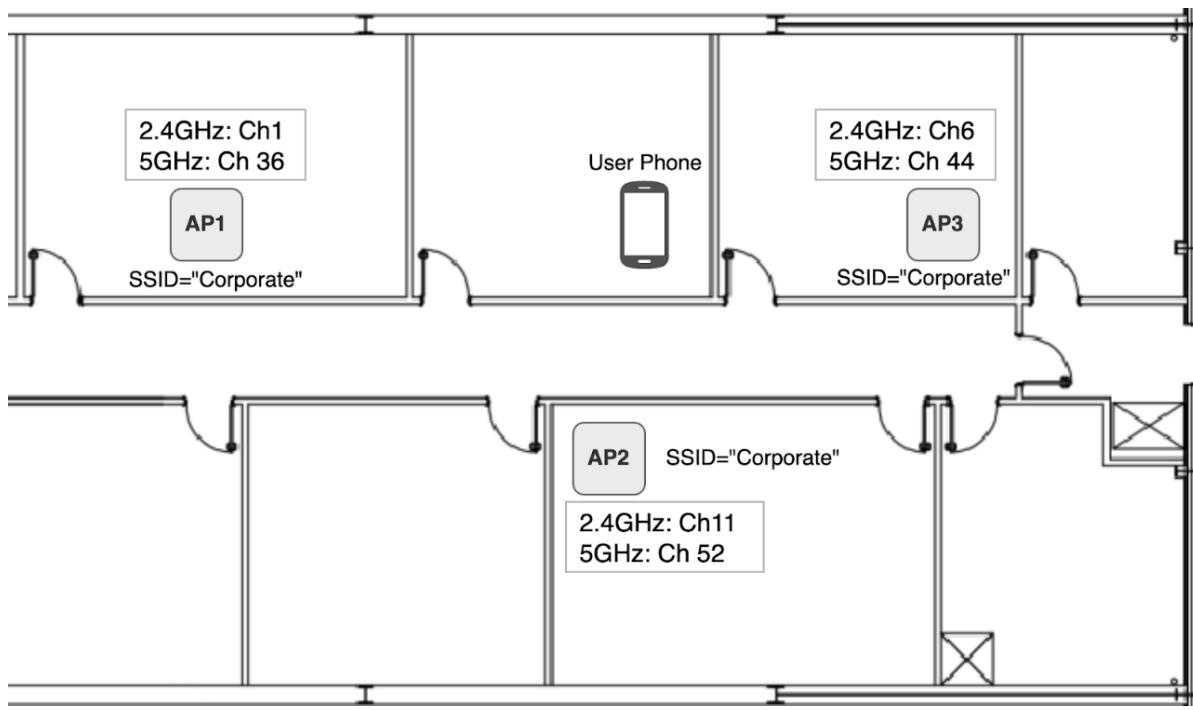


Figure 2-2 - AP channel allocations

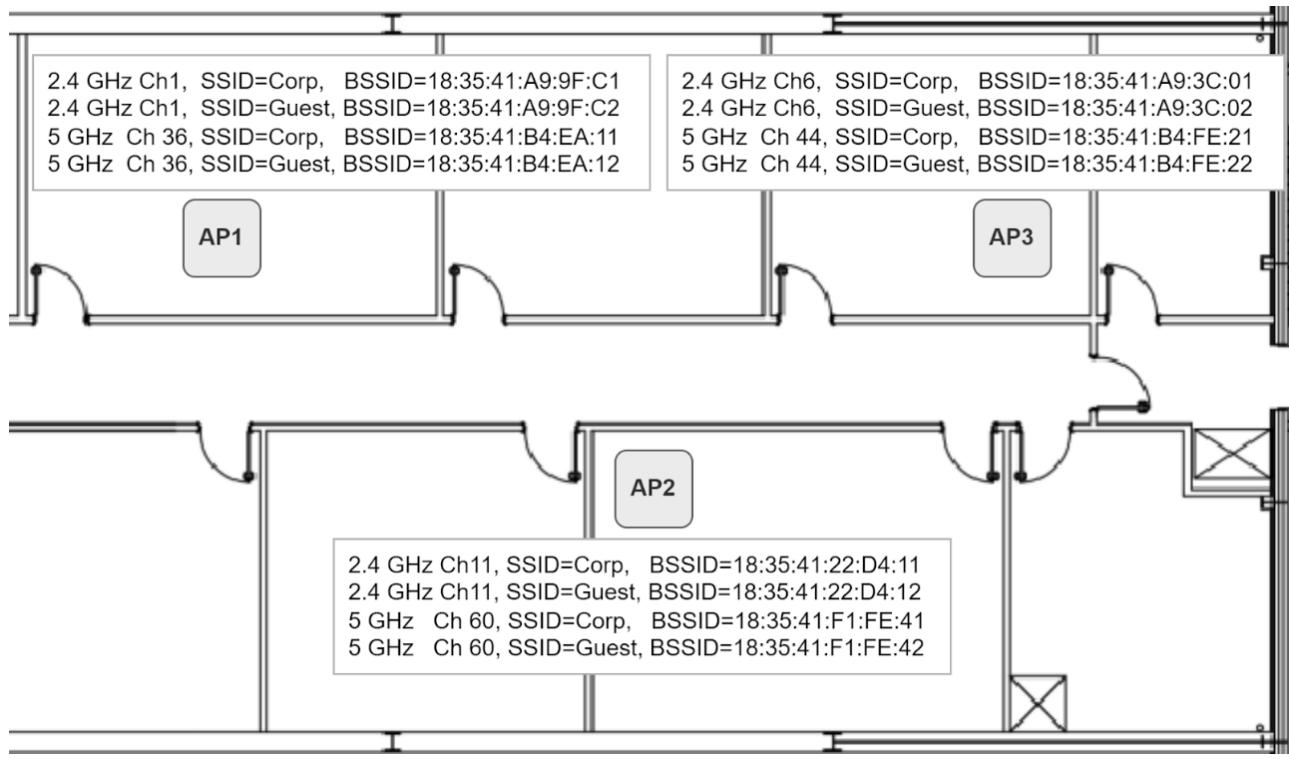


Figure 2-3 - BSSIDs for two SSIDs across the 2.4 GHz and 5 GHz radios

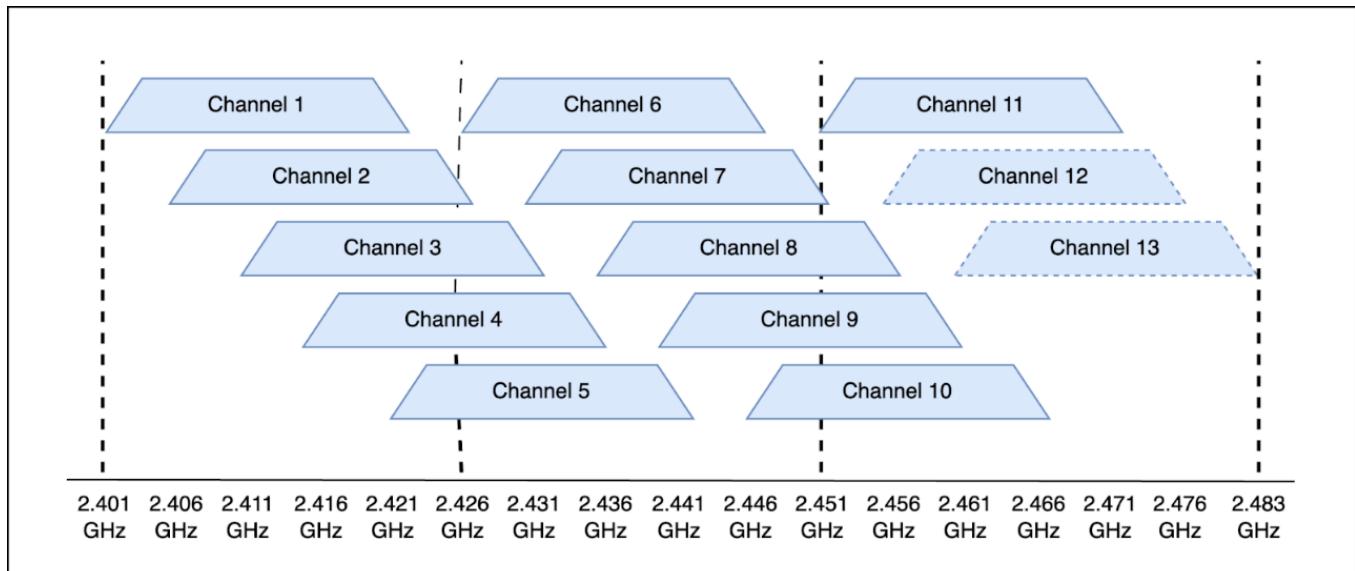


Figure 2-4 - 2.4 GHz band

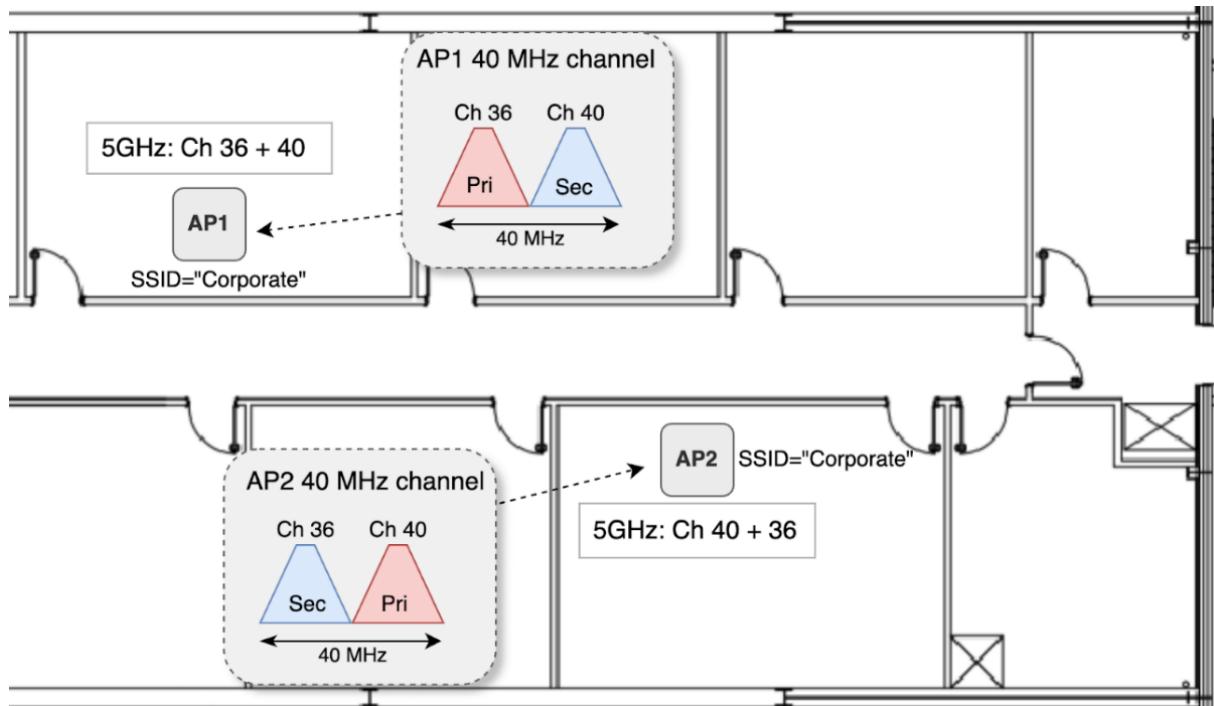


Figure 2-5 - OBSS when using bonded channels

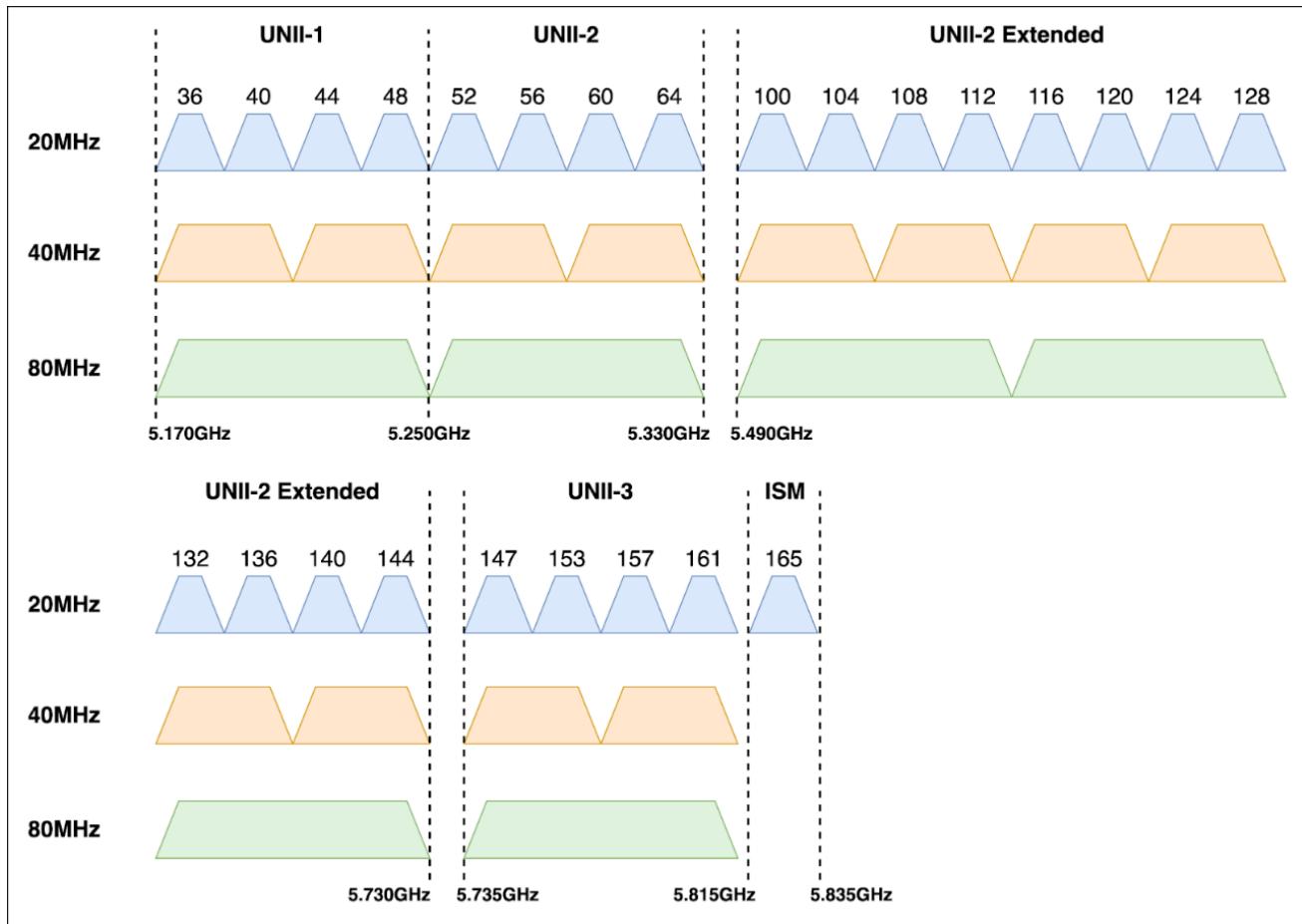


Figure 2-6 - 5 GHz Band

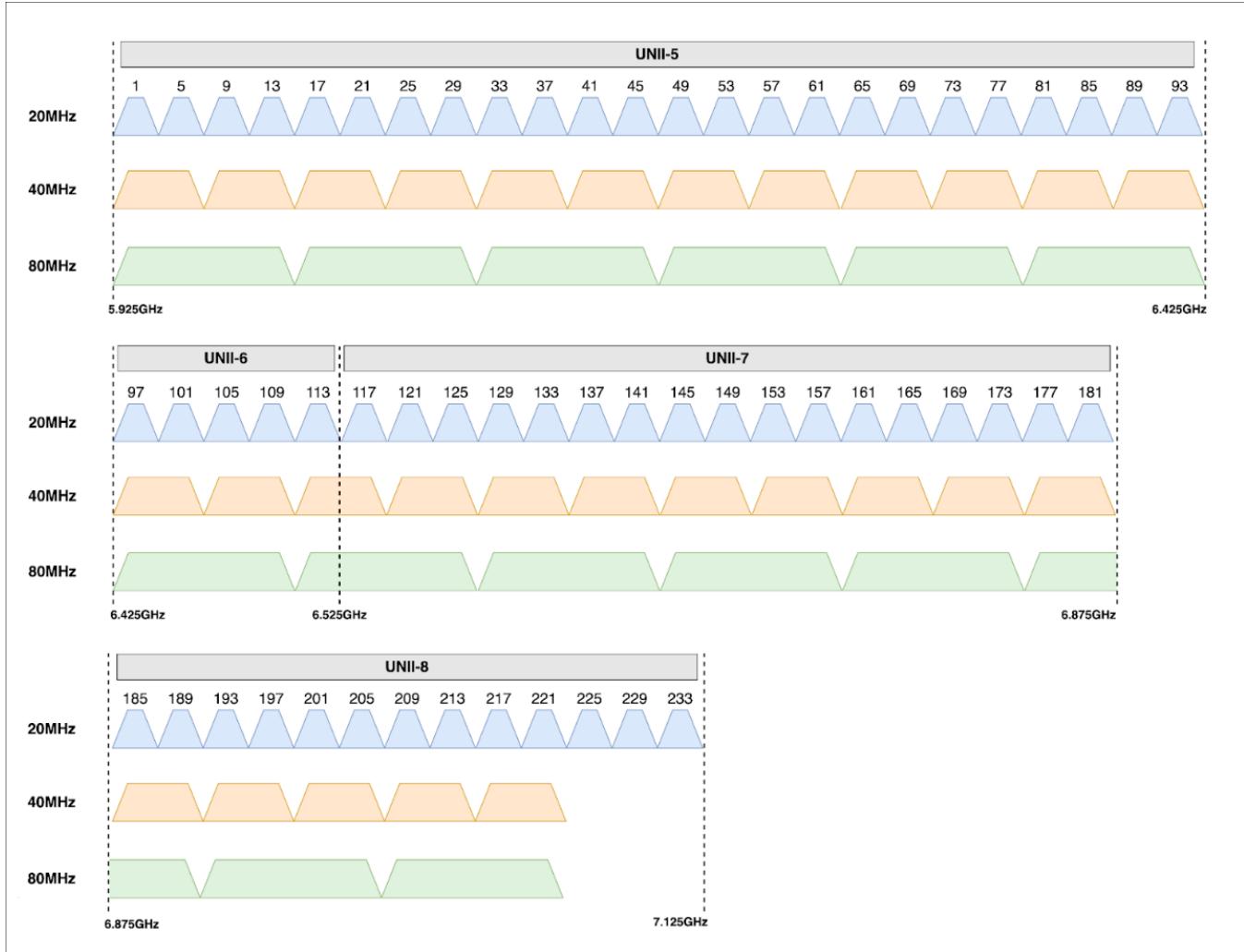


Figure 2-7 - 6 GHz band

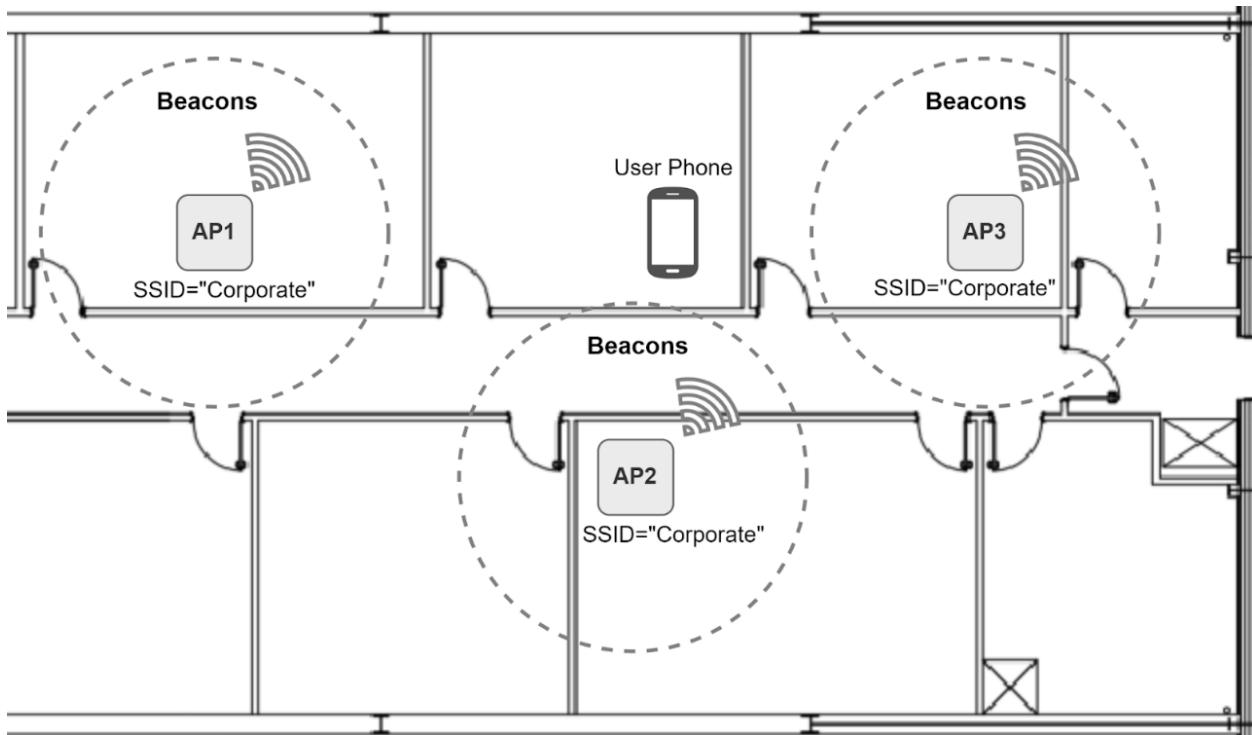


Figure 2-8 - APs broadcasting beacon frames

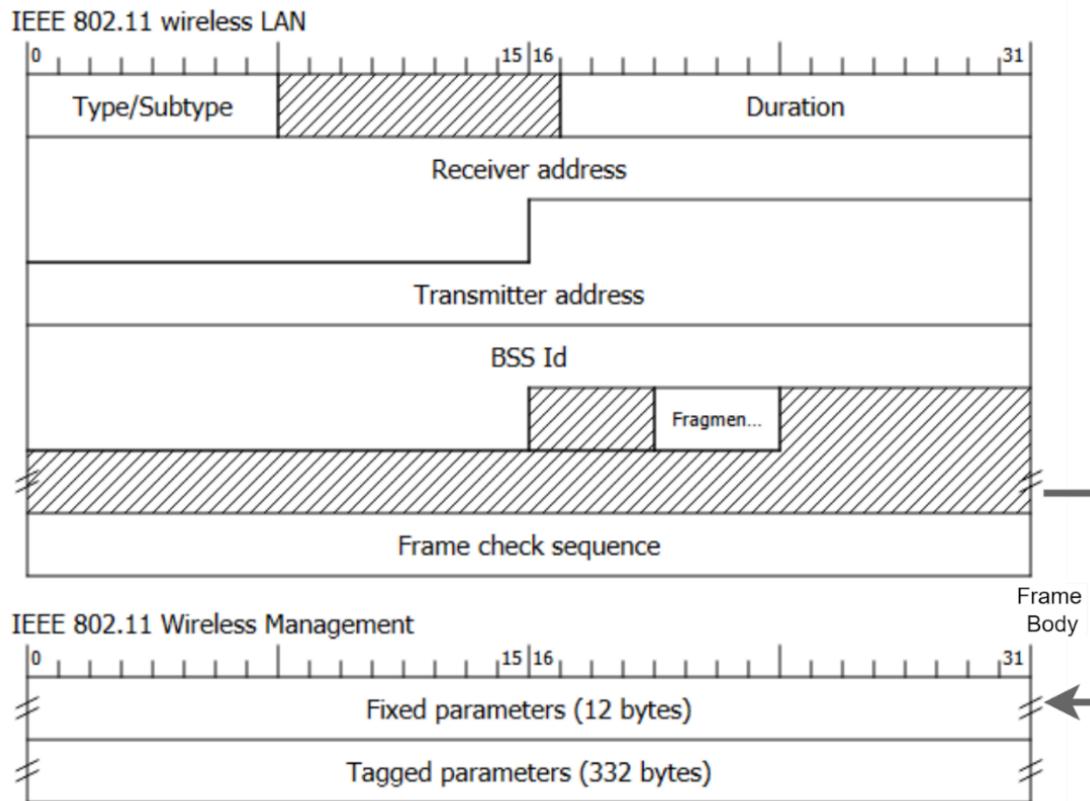


Figure 2-9 - Beacon frame format

```

> Frame 71: 369 bytes on wire (2952 bits), 369 bytes captured (2952 bits) on interface en0, id 0
> Radiotap Header v0, Length 25
> 802.11 radio information
> IEEE 802.11 Beacon frame, Flags: .....
< IEEE 802.11 Wireless Management
  < Fixed parameters (12 bytes)
    Timestamp: 1962171187688
    Beacon Interval: 0.102400 [Seconds]
    > Capabilities Information: 0x0111
  < Tagged parameters (304 bytes)
    > Tag: SSID parameter set: "Zyxel_444D_5G"
    > Tag: Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
    > Tag: Traffic Indication Map (TIM): DTIM 0 of 1 bitmap
    > Tag: Country Information: Country Code E0, Environment All
    > Tag: Power Constraint: 0
    > Tag: TPC Report Transmit Power: 19, Link Margin: 0
    > Tag: RSN Information
    > Tag: QBSS Load Element 802.11e CCA Version
    > Tag: HT Capabilities (802.11n D1.10)
    > Tag: HT Information (802.11n D1.10)
    > Tag: Extended Capabilities (8 octets)
    > Tag: VHT Capabilities
    > Tag: VHT Operation
    > Tag: Tx Power Envelope
    > Tag: Vendor Specific: Microsoft Corp.: WPS
    > Tag: Vendor Specific: Broadcom
    > Tag: Vendor Specific: Microsoft Corp.: WMM/WME: Parameter Element

```

Figure 2-10 - Beacon frame tag summary

< Tag: SSID parameter set: "Zyxel_444D_5G"

Tag Number: SSID parameter set (0)

Tag length: 13

SSID: "Zyxel_444D_5G"

Figure 2-11 - SSID element

< Tag: QBSS Load Element 802.11e CCA Version

Tag Number: QBSS Load Element (11)

Tag length: 5

QBSS Version: 2

Station Count: 7

Channel Utilization: 41 (16%)

Available Admission Capacity: 0 (0 us/s)

Figure 2-12 - BSS load element

```

▼ Tag: RSN Information
  Tag Number: RSN Information (48)
  Tag length: 26
  RSN Version: 1
  > Group Cipher Suite: 00:0f:ac (Ieee 802.11) AES (CCM)
    Pairwise Cipher Suite Count: 1
  > Pairwise Cipher Suite List 00:0f:ac (Ieee 802.11) AES (CCM)
    Auth Key Management (AKM) Suite Count: 1
  > Auth Key Management (AKM) List 00:0f:ac (Ieee 802.11) PSK
  > RSN Capabilities: 0x008c
    PMKID Count: 0
    PMKID List

```

Figure 2-13 - RSN information

```

> Frame 1600: 147 bytes on wire (1176 bits), 147 bytes captured (1176 bits) on interface en0, id 0
> Radiotap Header v0, Length 25
> 802.11 radio information
> IEEE 802.11 Probe Request, Flags: .......C
▼ IEEE 802.11 Wireless Management
  ▼ Tagged parameters (94 bytes)
    > Tag: SSID parameter set: Wildcard SSID
    > Tag: Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
    > Tag: HT Capabilities (802.11n D1.10)
    > Tag: Extended Capabilities (8 octets)
    > Tag: VHT Capabilities
    > Ext Tag: HE Capabilities

```

Figure 2-14 - Null probe request

```

> Frame 118: 204 bytes on wire (1632 bits), 204 bytes captured (1632 bits) on interface en0, id 0
> Radiotap Header v0, Length 25
> 802.11 radio information
> IEEE 802.11 Probe Request, Flags: .......C
▼ IEEE 802.11 Wireless Management
  ▼ Tagged parameters (151 bytes)
    > Tag: SSID parameter set: "Zyxel_444D_5G"
    > Tag: Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
    > Tag: HT Capabilities (802.11n D1.10)
    > Tag: Extended Capabilities (11 octets)
    > Tag: VHT Capabilities
    > Ext Tag: HE Capabilities
    > Tag: Vendor Specific: Apple, Inc.
    > Tag: Vendor Specific: Epigram, Inc.
    > Tag: Vendor Specific: Microsoft Corp.: Unknown 8
    > Tag: Vendor Specific: Broadcom

```

Figure 2-15 - Directed probe request

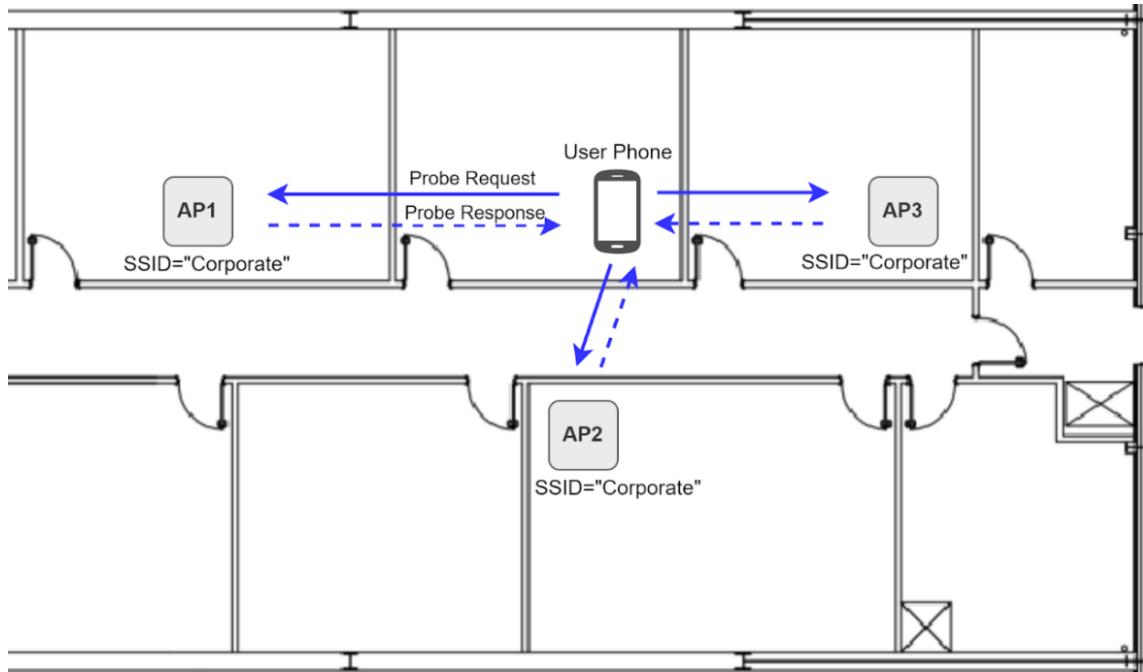


Figure 2-16 - Probe request and probe responses

```

> Frame 119: 462 bytes on wire (3696 bits), 462 bytes captured (3696 bits) on interface en0, id 0
> Radiotap Header v0, Length 25
> 802.11 radio information
> IEEE 802.11 Probe Response, Flags: .......C
< IEEE 802.11 Wireless Management
  > Fixed parameters (12 bytes)
  < Tagged parameters (397 bytes)
    > Tag: SSID parameter set: "Zyxel_444D_5G"
    > Tag: Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
    > Tag: Country Information: Country Code E0, Environment All
    > Tag: Power Constraint: 0
    > Tag: TPC Report Transmit Power: 19, Link Margin: 0
    > Tag: RSN Information
    > Tag: QBSS Load Element 802.11e CCA Version
    > Tag: HT Capabilities (802.11n D1.10)
    > Tag: HT Information (802.11n D1.10)
    > Tag: Extended Capabilities (8 octets)
    > Tag: VHT Capabilities
    > Tag: VHT Operation
    > Tag: Tx Power Envelope
    > Tag: Vendor Specific: Microsoft Corp.: WPS
    > Tag: Vendor Specific: Broadcom
    > Tag: Vendor Specific: Microsoft Corp.: WMM/WME: Parameter Element
  
```

Figure 2-17 - Probe response

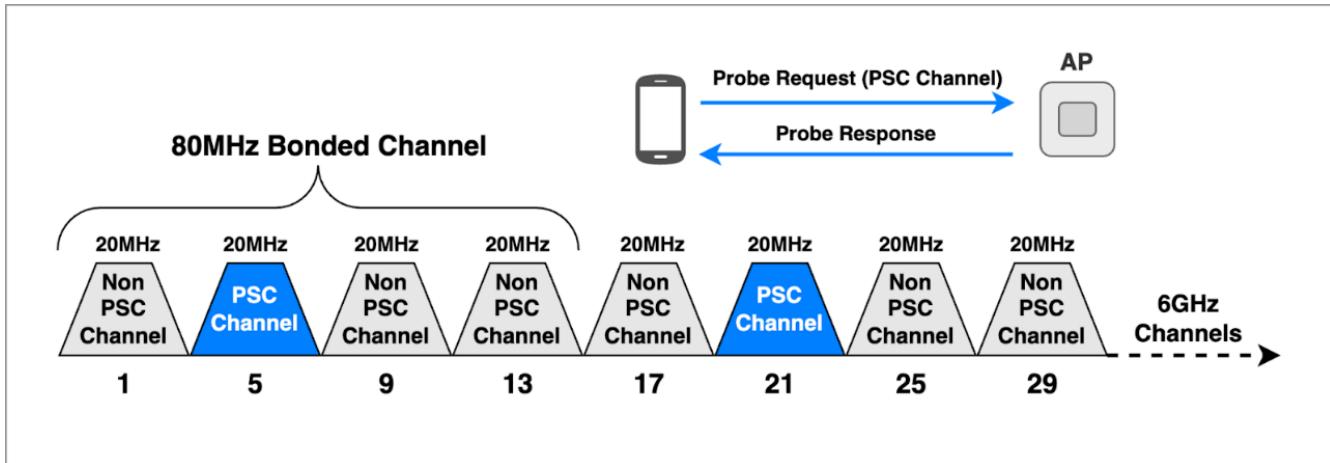


Figure 2-18 - PSC channel probes

Default		All	2.4 GHz	5 GHz	Open	Secure	>	Filter
	BSSID	Network Name	Vendor	Signal	Channel	Streams	SNR	
94:18:65:B6:DC:48	BNL	Netgear Inc.	-37 dBm	48	4	59 dB		
94:18:65:B6:DC:25	VM202651-2G	Netgear Inc.	-51 dBm	1	2	32 dB		
52:0D:10:D1:A9:01	Virgin Media	ARRIS Group Inc.	-57 dBm	6	2	39 dB		
D4:20:B0:8A:31:61	VM202651-2G	Mist Systems Inc.	-62 dBm	11	4	34 dB		

Network Details		Signal Strength	Spectrum 2.4 / 5 GHz	Advanced Details
ID	Length	Information Element	Details	
192	5 bytes	> VHT Operation	Channel Width: 20 MHz or 40 MHz, Channel Center Freq...	
195	5 bytes	> Transmit Power Envelope	Local EIRP	
201	30 bytes	> Reduced Neighbor Report	Channel: 37 (80 MHz), BSSID 0: 94:18:65:B6:DC:62, Short...	
		Element ID:	201	
		Length:	30 bytes	
		< Neighbor AP Information:	Channel 37 Operating Class 133 (80 MHz)	
		> TBTT Information Header:	0x0d10	
		Operating Class:	133 80 MHz	
		Channel Number:	37	
		< TBTT 0		
		Neighbor AP TBTT Offset:	Unknown 0xff	
		BSSID:	94:18:65:B6:DC:62 (Netgear Inc.)	
		Short SSID:	0xFA150FFC	
		> BSS Parameters:	0x4c	
		20 MHz PSD:	11.0 dBm/MHz	
		> TBTT 1		

Figure 2-19 - Reduced Neighbor Report data

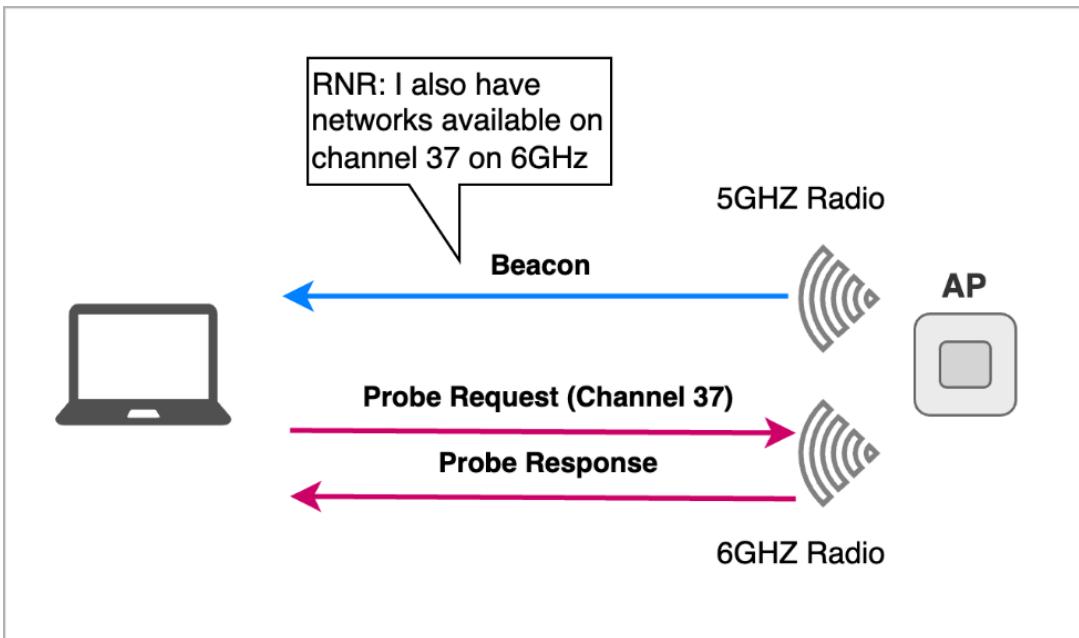


Figure 2-20 - RNR operation

Chapter 3 - Local Data Acquisition

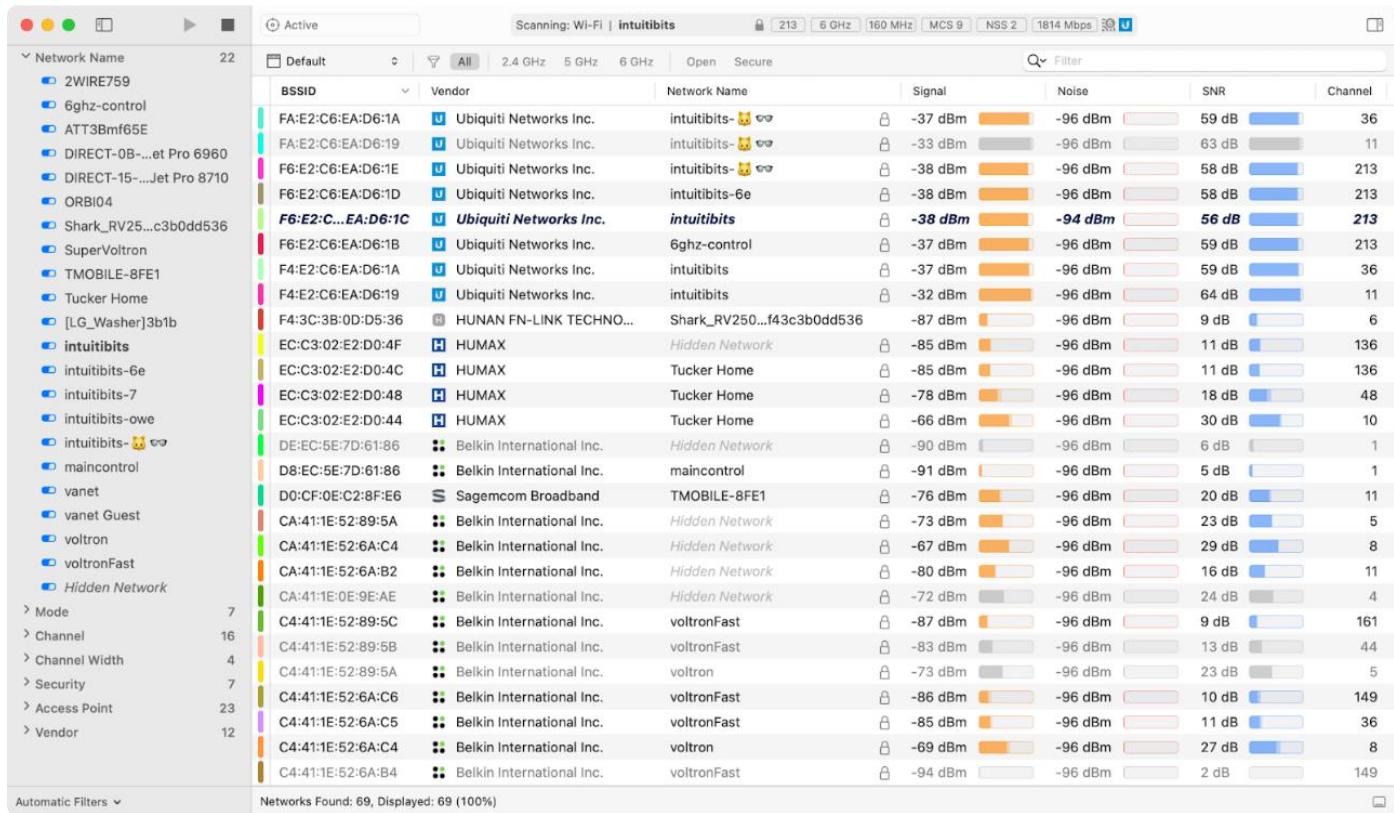


Figure 3-1 - WFE Pro 3 showing signal, noise & SNR data

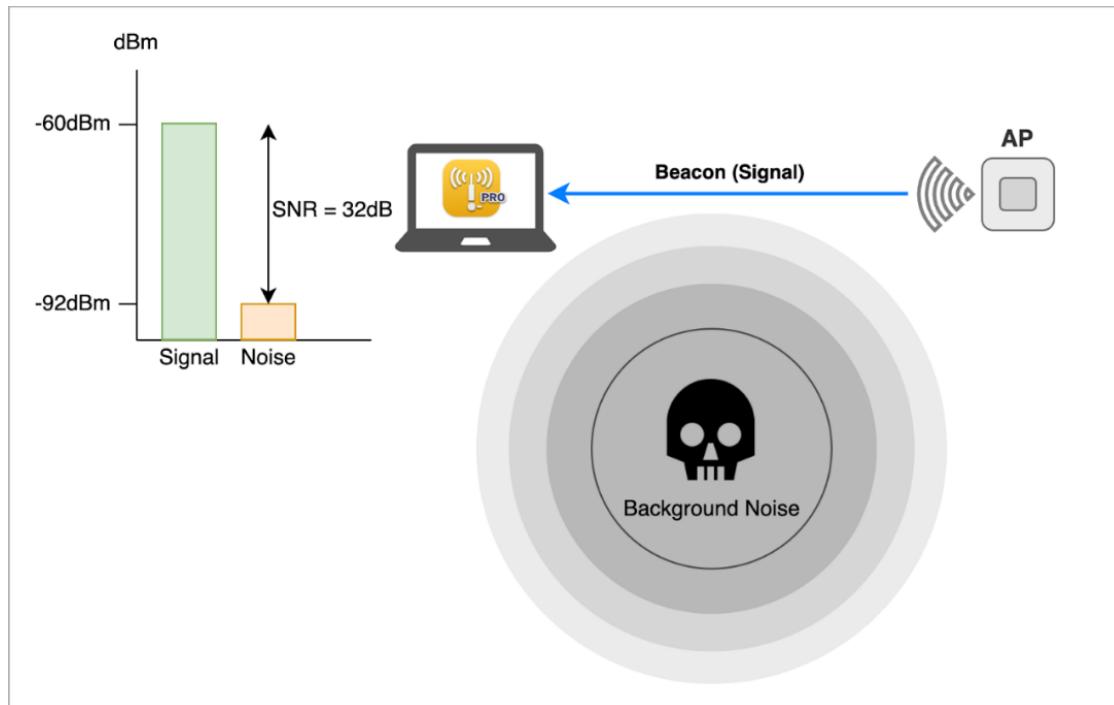


Figure 3-2 - SNR calculation

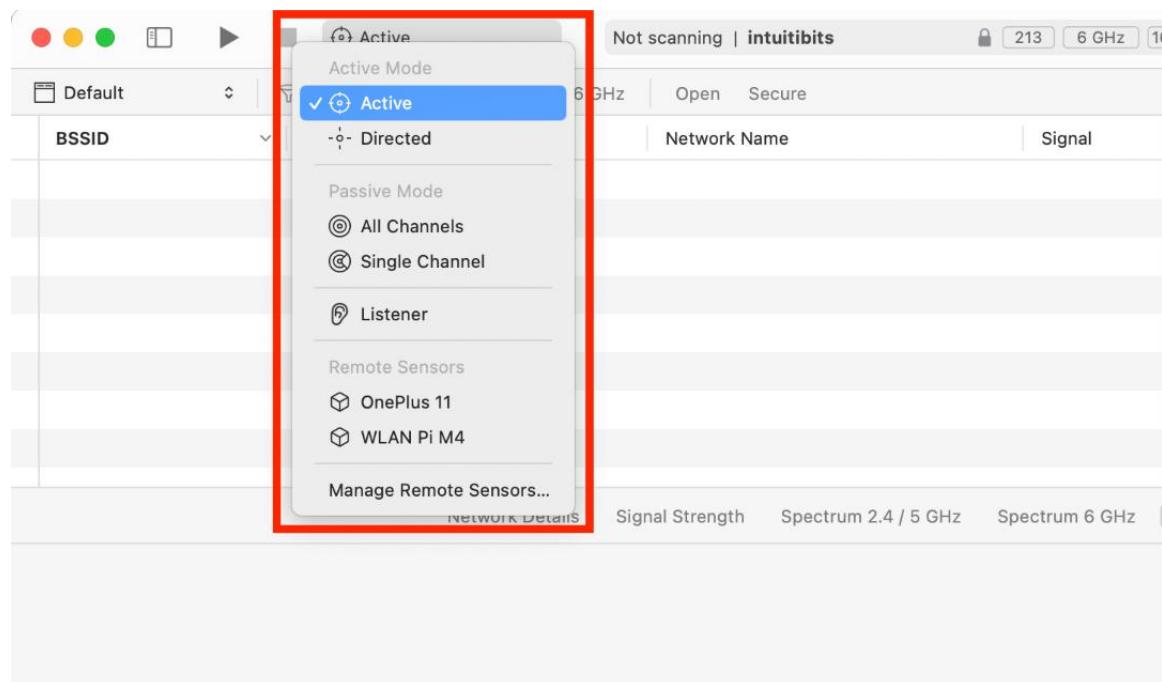


Figure 3-3 - WFE Pro 3 scanning options

Chapter 4 - Data Acquisition Using Sensors

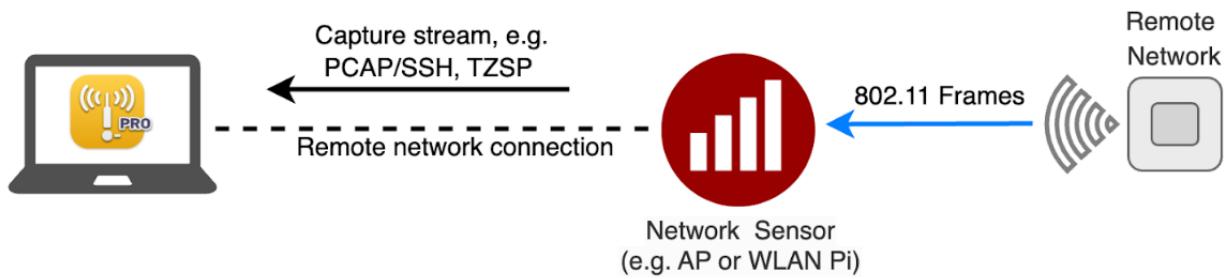


Figure 4-1 - Remote sensor operation

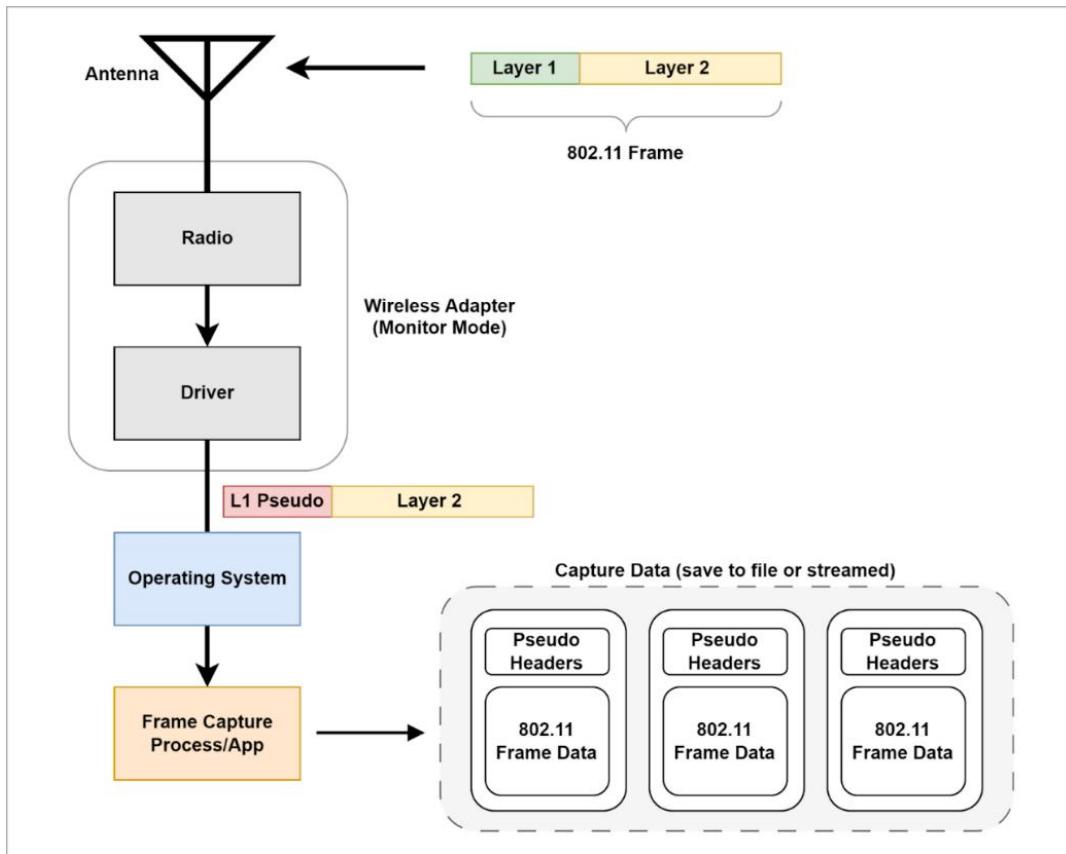


Figure 4-2 - Pseudo-header injection

```

▶ Frame 1: 277 bytes on wire (2216 bits), 277 bytes captured (2216 bits)
▼ Radiotap Header v0, Length 25
  Header revision: 0
  Header pad: 0
  Header length: 25
▶ Present flags
  MAC timestamp: 310768875
▼ Flags: 0x12
  .... ...0 = CFP: False
  .... ..1. = Preamble: Short
  .... .0.. = WEP: False
  .... 0... = Fragmentation: False
  ...1 .... = FCS at end: True
  ..0. .... = Data Pad: False
  .0.. .... = Bad FCS: False
  0.... .... = Short GI: False
  Data Rate: 6.0 Mb/s
  Channel frequency: 5805 [A 161]
▼ Channel type: 802.11a (0x0140), Orthogonal Frequency-Division Multiplexing (OFDM), 5 GHz spectrum
  .... .... ...0 .... = Turbo: False
  .... .... ..0. .... = Complementary Code Keying (CCK): False
  .... .... .1... .... = Orthogonal Frequency-Division Multiplexing (OFDM): True
  .... .... 0.... .... = 2 GHz spectrum: False
  .... .... 1.... .... = 5 GHz spectrum: True
  .... ...0. .... .... = Passive: False
  .... .0. .... .... = Dynamic CCK-OFDM: False
  .... 0.... .... .... = Gaussian Frequency Shift Keying (GFSK): False
  ...0 .... .... .... = GSM (900MHz): False
  ..0. .... .... .... = Static Turbo: False
  .0.... .... .... = Half Rate Channel (10MHz Channel Width): False
  0.... .... .... = Quarter Rate Channel (5MHz Channel Width): False
  SSI Signal: -58 dBm
  SSI Noise: -92 dBm
  Antenna: 1
▶ IEEE 802.11 Beacon frame, Flags: .....
▶ IEEE 802.11 wireless LAN management frame

```

Figure 4-3 - Radiotap pseudo-header data example

```

▶ Frame 11: 209 bytes on wire (1672 bits), 209 bytes captured (1672 bits)
▼ PPI version 0, 32 bytes
  Version: 0
▼ Flags: 0x00
  .... ...0 = Alignment: Not aligned
  0000 000. = Reserved: 0x00
  Header length: 32
  DLT: 105
▼ 802.11-Common
  Field type: 802.11-Common (2)
  Field length: 20
  TSFT: 184674142
  ▶ Flags: 0x0001
    Rate: 866.5 Mbps
    Channel frequency: 5805 [A 161]
  ▶ Channel type: 802.11a (0x0140)
    FHSS hopset: 0x00
    FHSS pattern: 0x00
    dBm antenna signal: -50
    dBm antenna noise: -92
  ▶ IEEE 802.11 QoS Data, Flags: .....F.C
  ▶ Logical-Link Control

```

Figure 4-4 - PPI pseudo-header data example

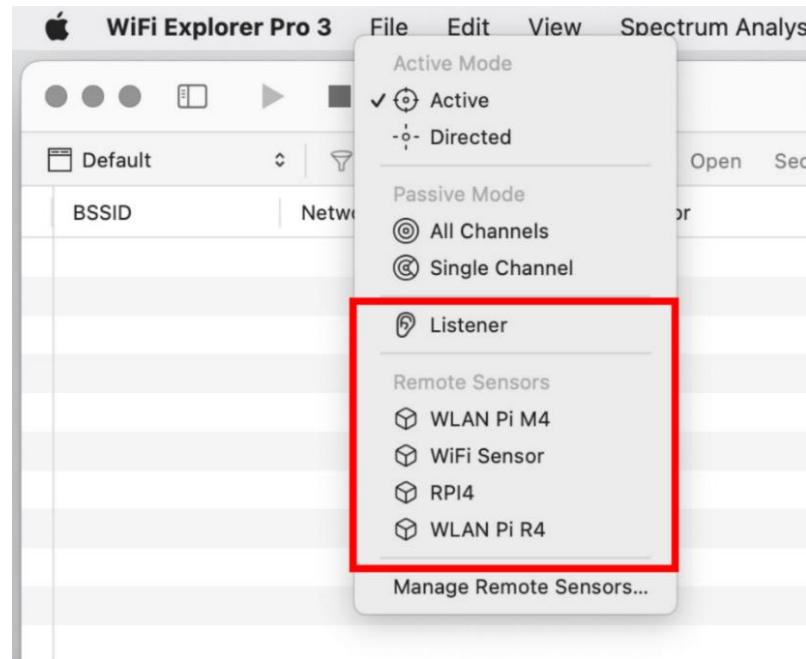


Figure 4-5 - Network sensor options

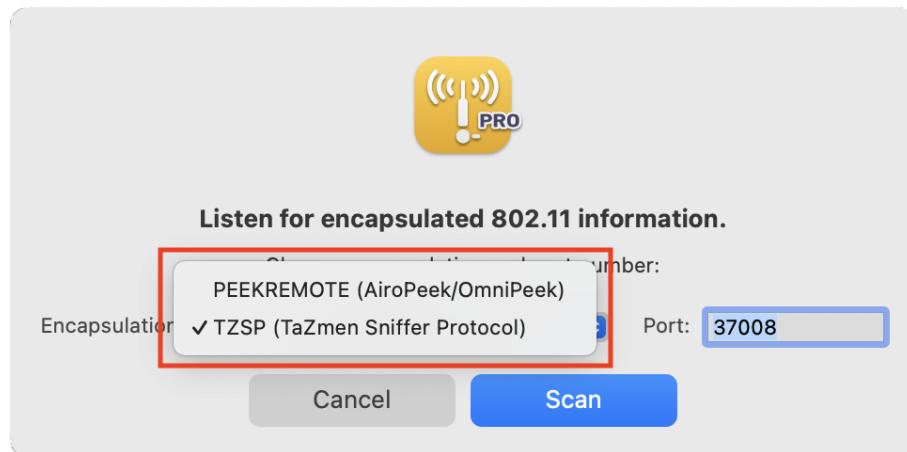


Figure 4-6 - Listener mode options available in WFE Pro 3

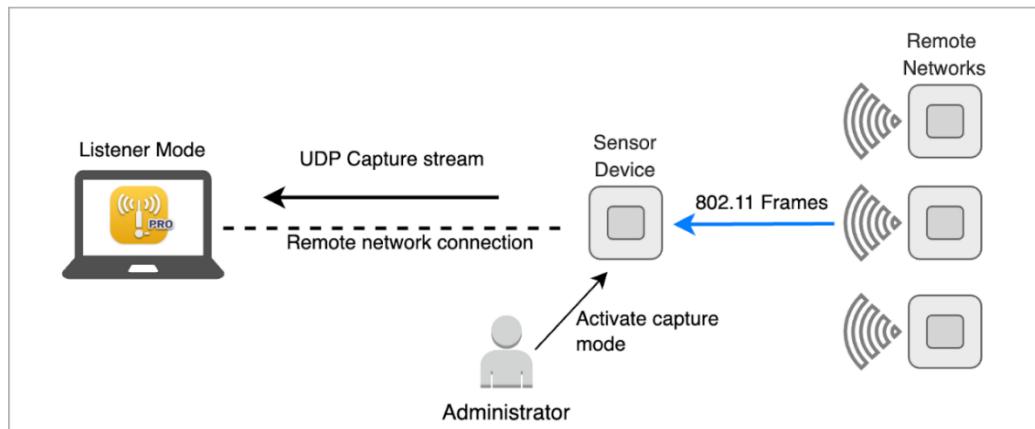


Figure 4-7 - Listener mode operation

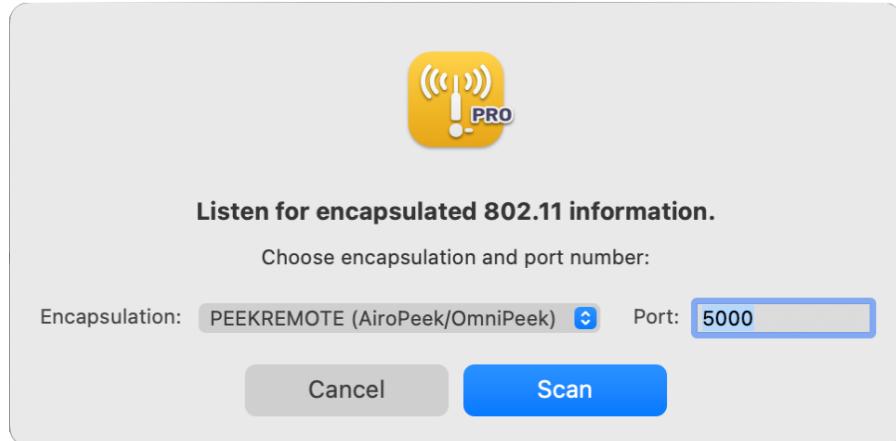


Figure 4-8 - Listener mode: PEEKREMOTE

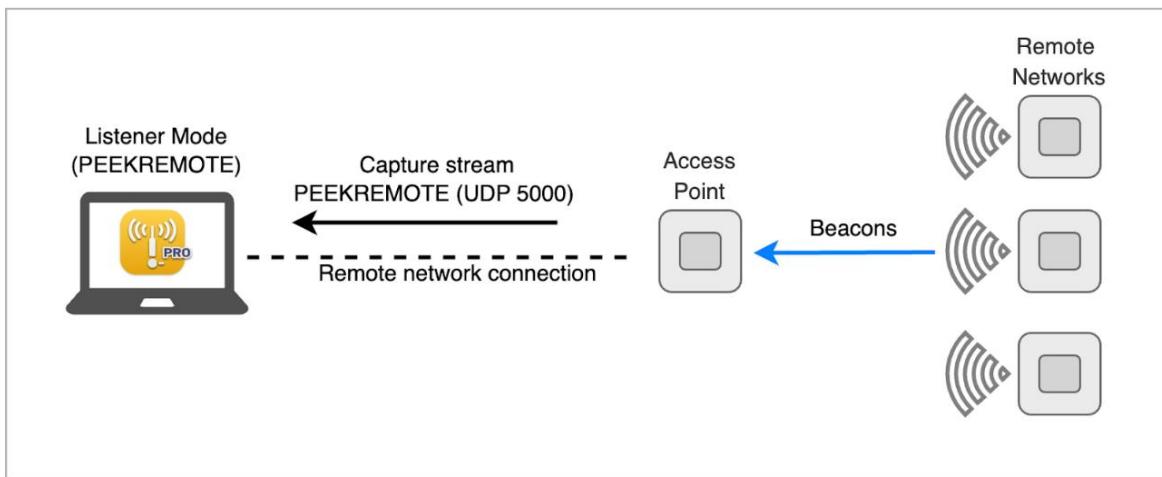


Figure 4-9 - PEEKREMOTE capture stream from an access point

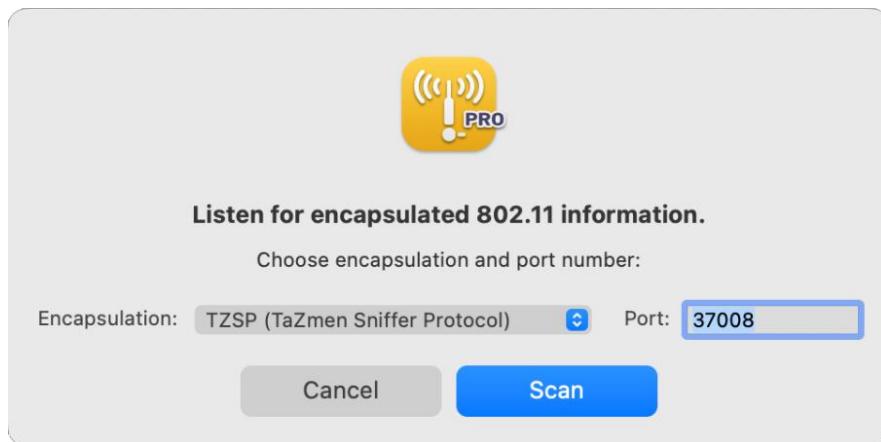


Figure 4-10 - Listener mode: TZSP

WiFi Explorer Pro 3: The Definitive User Guide

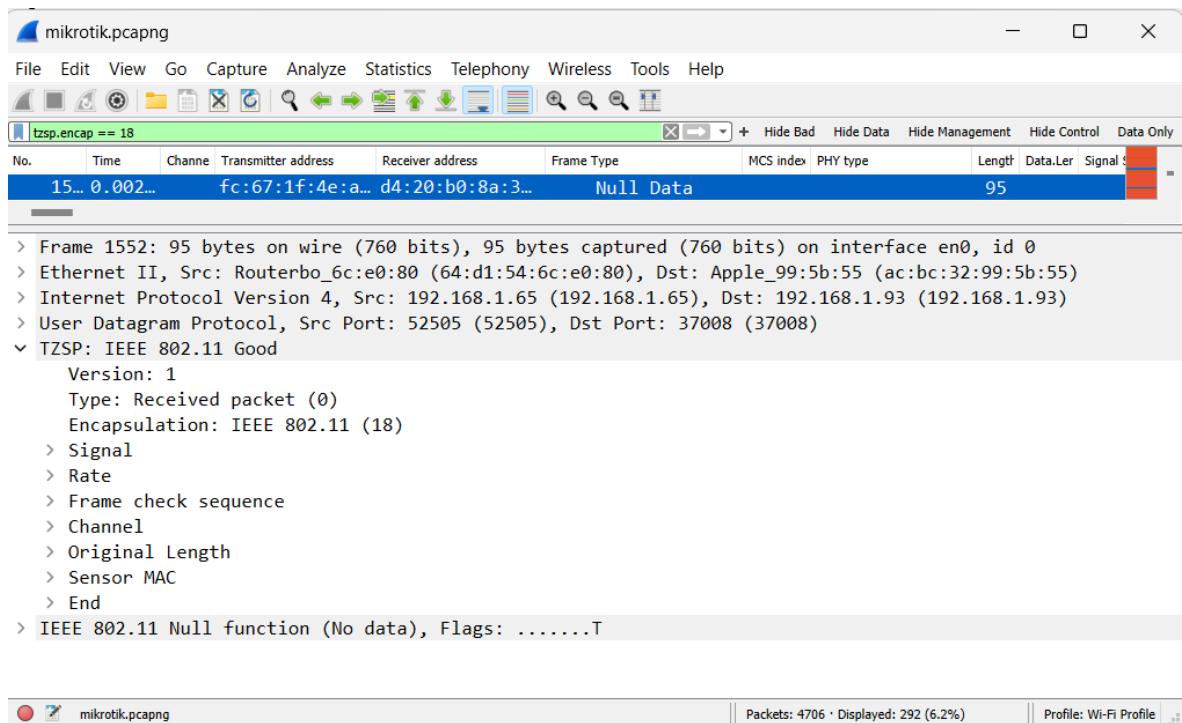


Figure 4-11 - TZSP header data example

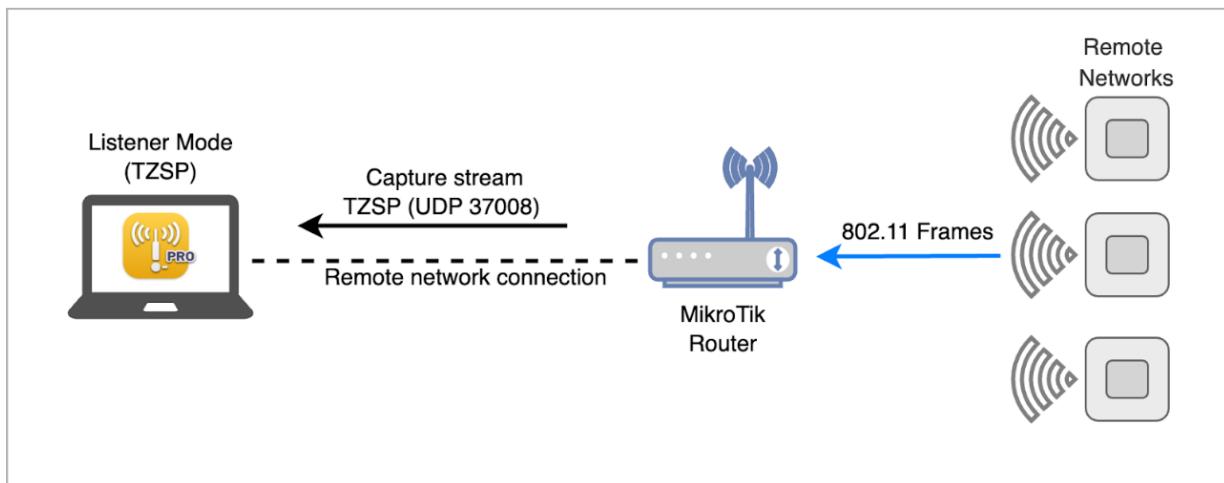
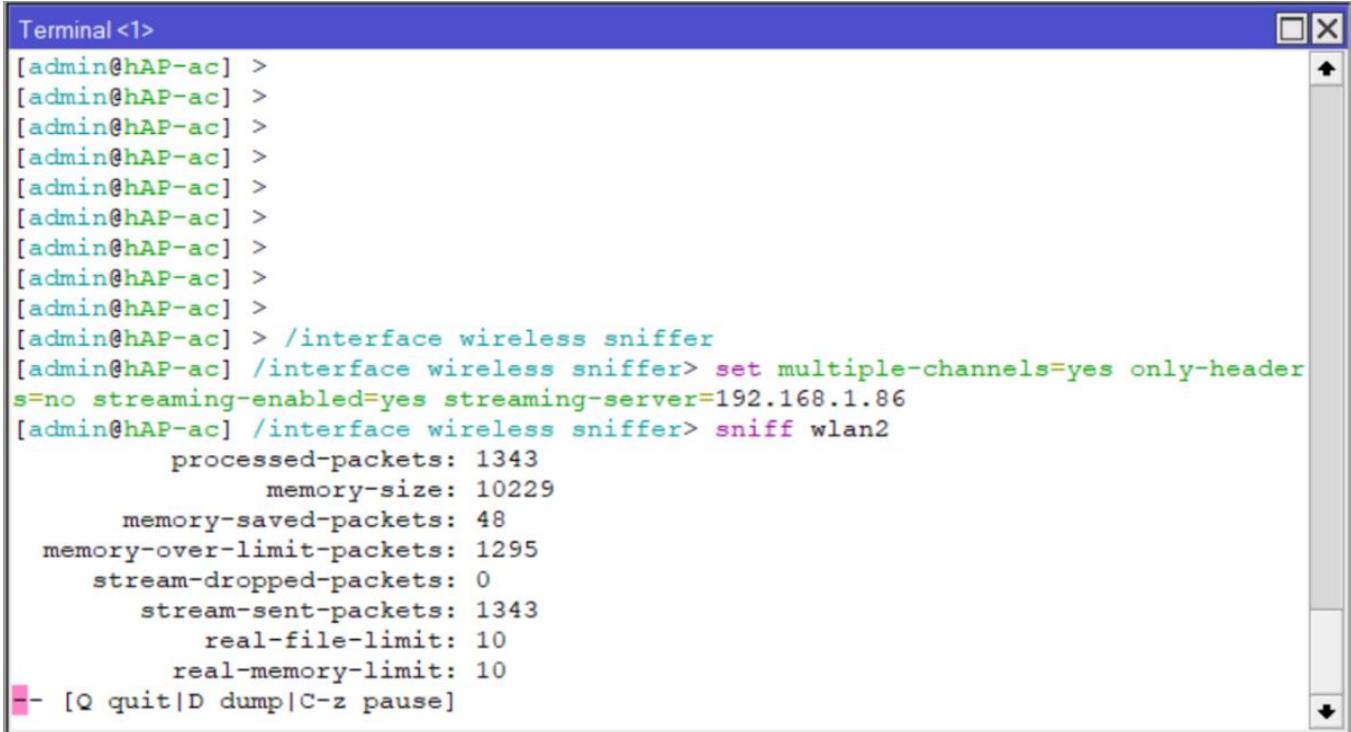


Figure 4-12 - TZSP capture stream from MikroTik device



```

Terminal <1>
[admin@hAP-ac] >
[admin@hAP-ac] > /interface wireless sniffer
[admin@hAP-ac] /interface wireless sniffer> set multiple-channels=yes only-header
s=no streaming-enabled=yes streaming-server=192.168.1.86
[admin@hAP-ac] /interface wireless sniffer> sniff wlan2
    processed-packets: 1343
        memory-size: 10229
        memory-saved-packets: 48
    memory-over-limit-packets: 1295
        stream-dropped-packets: 0
        stream-sent-packets: 1343
            real-file-limit: 10
            real-memory-limit: 10
-- [Q quit|D dump|C-z pause]

```

Figure 4-13 - Mikrotik device capture

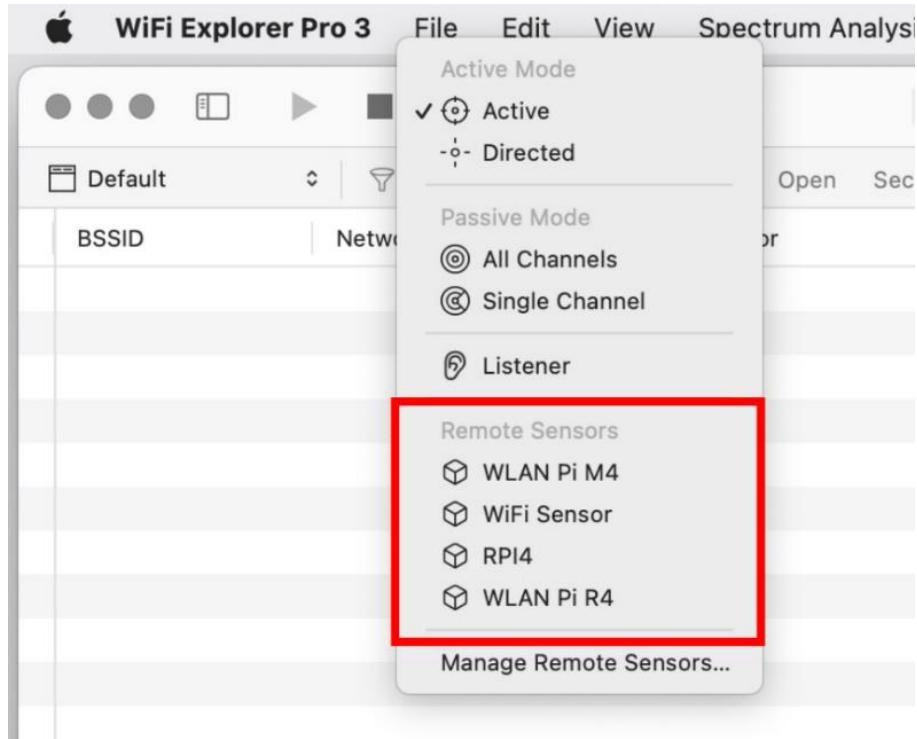


Figure 4-14 - Remote sensors selection and management options

WiFi Explorer Pro 3: The Definitive User Guide

The screenshot shows the 'Sensors' tab of the WiFi Explorer Pro 3 application. At the top, there are tabs for General, Profiles, Annotations, Filters, Coloring Rules, Sensors (which is selected and highlighted in blue), Spectrum Analysis, and Advanced. Below the tabs is a table with the following columns: Name, Address, Interface, Mode, and Port. The table contains four rows of data:

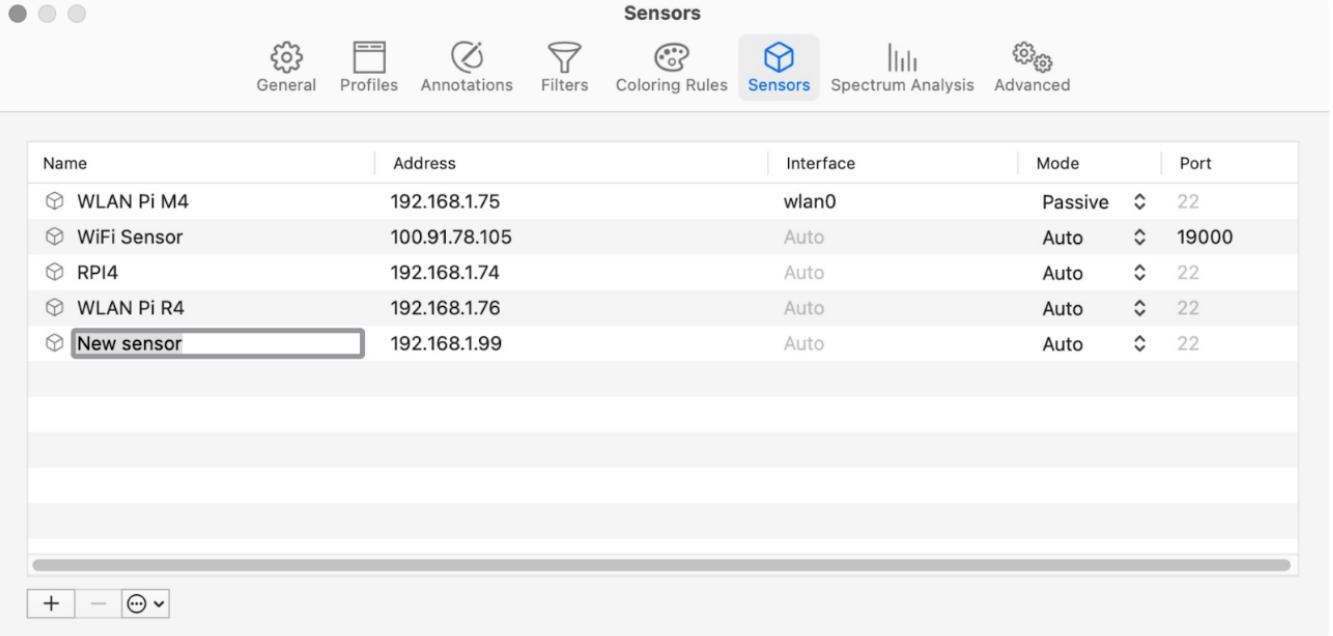
Name	Address	Interface	Mode	Port
WLAN Pi M4	192.168.1.75	wlan0	Passive	22
WiFi Sensor	100.91.78.105	Auto	Auto	19000
RPI4	192.168.1.74	Auto	Auto	22
WLAN Pi R4	192.168.1.76	Auto	Auto	22

At the bottom left of the main window are three buttons: a plus sign (+), a minus sign (-), and a circular arrow icon.

Figure 4-15 - Remote sensor management

The screenshot shows the 'Sensors' tab of WiFi Explorer Pro 3 with a modal dialog box overlaid. The dialog has a yellow icon with a WiFi signal and the word 'PRO'. It contains the text 'Enter the address of the remote sensor:' followed by a text input field. Below the input field are two buttons: 'Cancel' and 'Add'. In the bottom left corner of the main window, there is a red callout pointing to a red-bordered '+' button with the text 'Add Sensor' next to it.

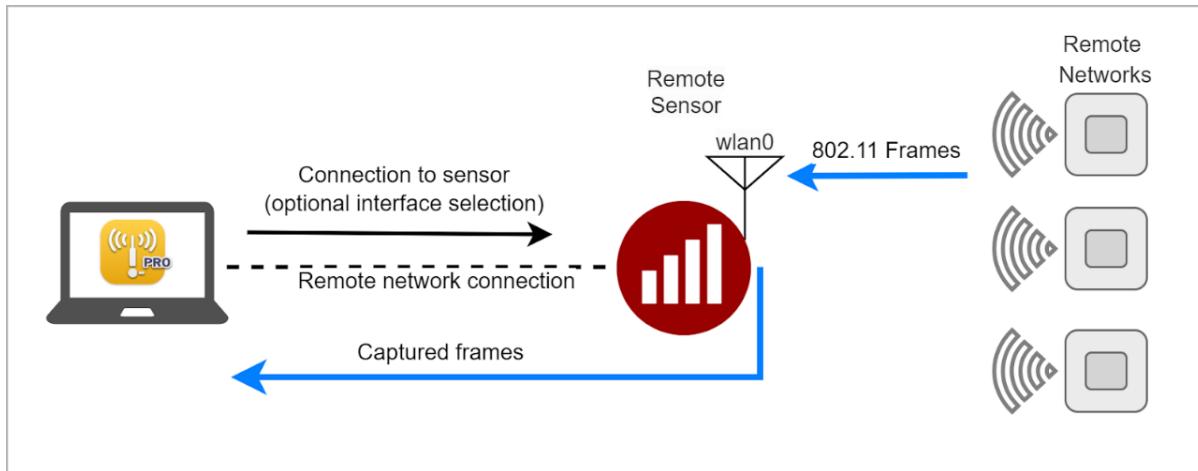
Figure 4-16 - Adding a new sensor



The screenshot shows the NetworkMiner application interface. The title bar says "Sensors". Below it is a toolbar with icons for General, Profiles, Annotations, Filters, Coloring Rules, Sensors (which is selected and highlighted in blue), Spectrum Analysis, and Advanced. The main area is a table with columns: Name, Address, Interface, Mode, and Port. There are five rows of data:

Name	Address	Interface	Mode	Port
WLAN Pi M4	192.168.1.75	wlan0	Passive	22
WiFi Sensor	100.91.78.105	Auto	Auto	19000
RPI4	192.168.1.74	Auto	Auto	22
WLAN Pi R4	192.168.1.76	Auto	Auto	22
New sensor	192.168.1.99	Auto	Auto	22

At the bottom left are buttons for adding (+), removing (-), and filtering (magnifying glass).

Figure 4-17 - A new sensor with initial attribute values**Figure 4-18 - Remote sensor operation**

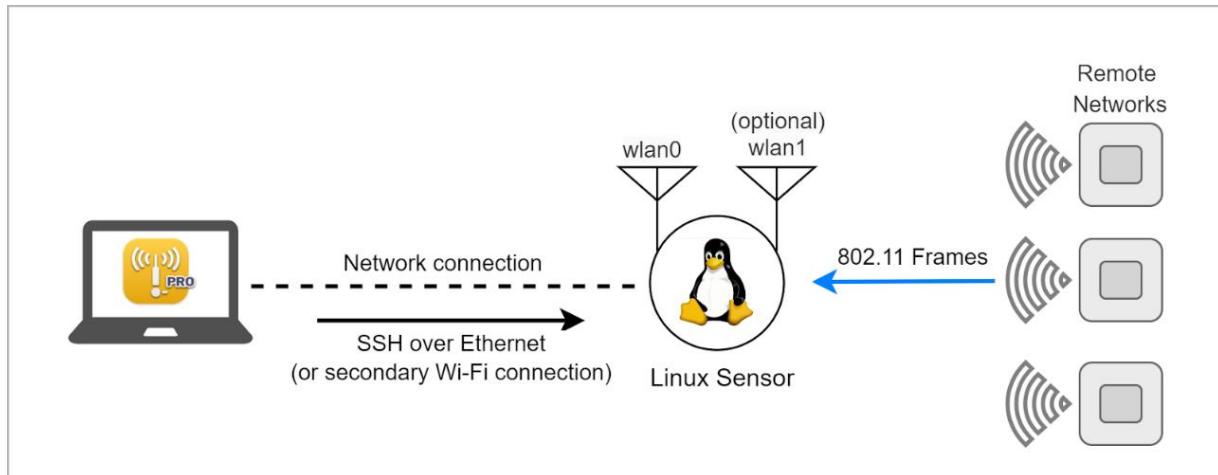


Figure 4-19 - Linux sensor overview



Figure 4-20 - WLAN Pi Pro, M4 and R4



Figure 4-21 - WLAN Pi NEO2

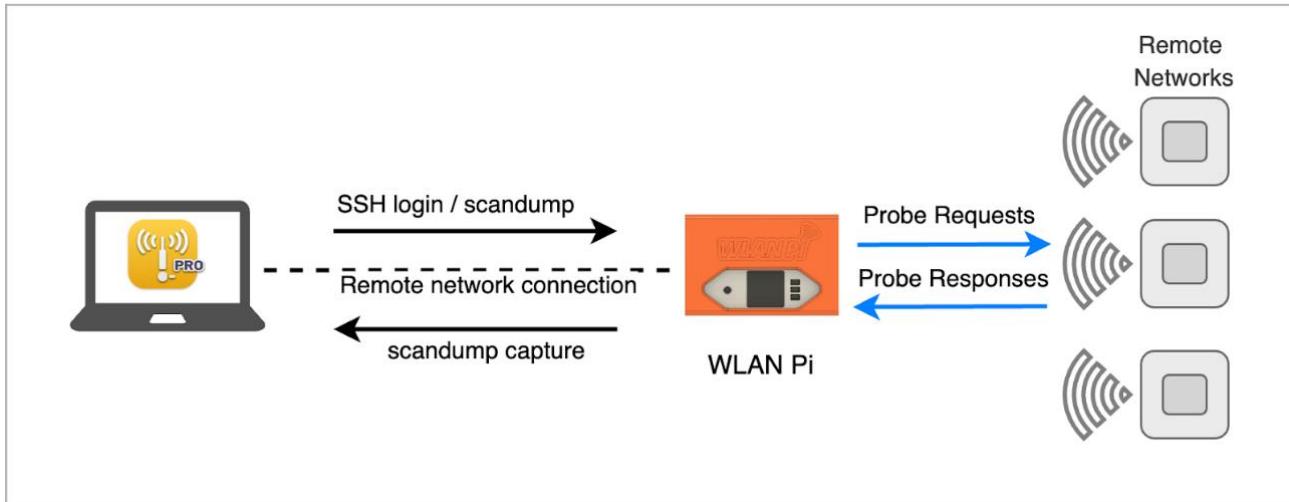


Figure 4-22 - WLAN Pi as a remote sensor using active scanning

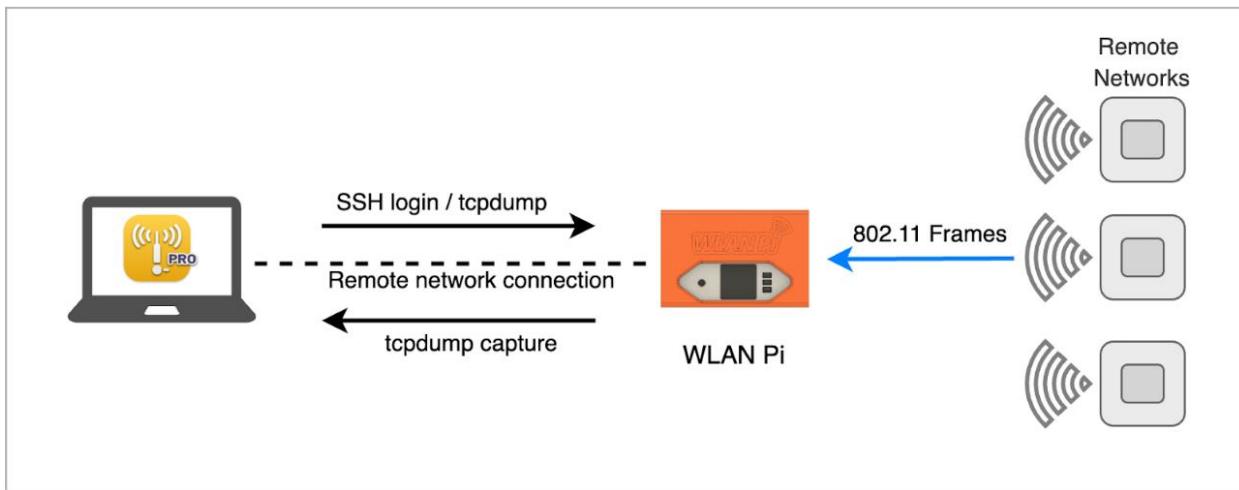


Figure 4-23 - WLAN Pi as a remote sensor using passive scanning

A screenshot of the WiFi Explorer Pro 3 software interface, specifically the "Sensors" tab. The window title bar says "Sensors". Below the title bar are several icons: General, Profiles, Annotations, Filters, Coloring Rules, Sensors (which is highlighted in blue), Spectrum Analysis, and Advanced. The main area is a table listing four sensors:

Name	Address	Interface	Mode	Port
WLAN Pi M4	192.168.1.75	wlan0	Passive	22
WiFi Sensor	100.91.78.105	Auto	Auto	19000
RPI4	192.168.1.74	Auto	Auto	22
WLAN Pi R4	192.168.1.76	Auto	Auto	22

At the bottom left of the table are buttons for adding (+), removing (-), and filtering (refresh icon).

Figure 4-24 - Sensor management panel showing WLAN Pi sensors

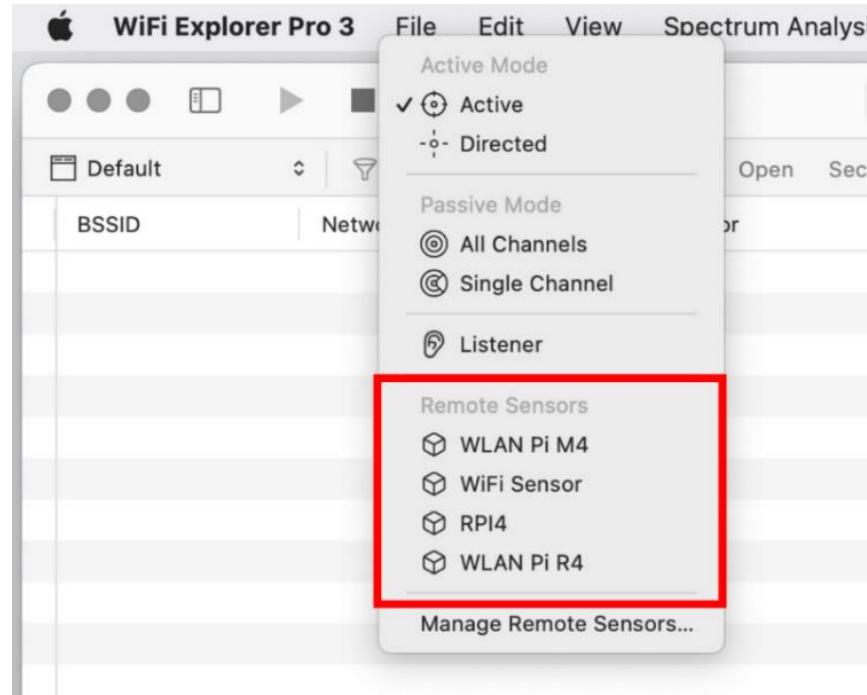


Figure 4-25 - WFE Pro 3 scan mode selector showing WLAN Pi sensors

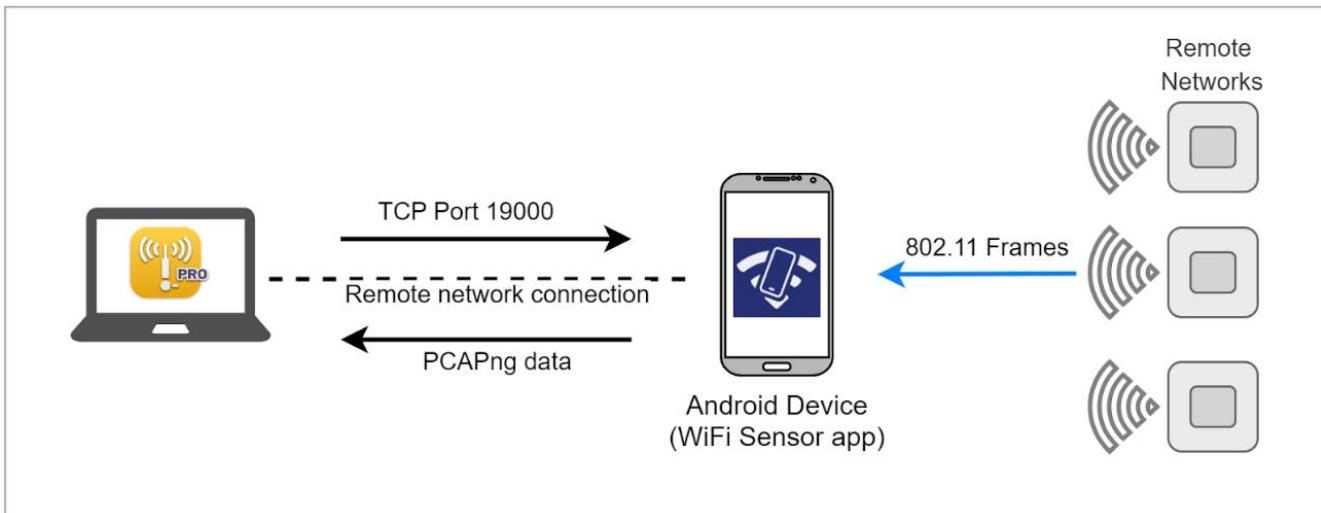


Figure 4-26 - WiFi Sensor app as a remote sensor

WiFi Explorer Pro 3: The Definitive User Guide

The screenshot shows the 'Sensors' tab of the WiFi Explorer Pro 3 application. The interface includes a top navigation bar with icons for General, Profiles, Annotations, Filters, Coloring Rules, Sensors (selected), Spectrum Analysis, and Advanced. Below this is a table listing network devices:

Name	Address	Interface	Mode	Port
RPi3b	192.168.1.41	wlan1	Active	22
Neo3	192.168.1.65	Auto	Auto	22
WLAN Pi M4	192.168.1.32	Auto	Auto	22
WiFi Sensor	192.168.1.53	Auto	Auto	19000

At the bottom left are standard window control buttons (+, -, and close).

Figure 4-27 - WiFi Sensor Android device added to WFE Pro 3 sensor list

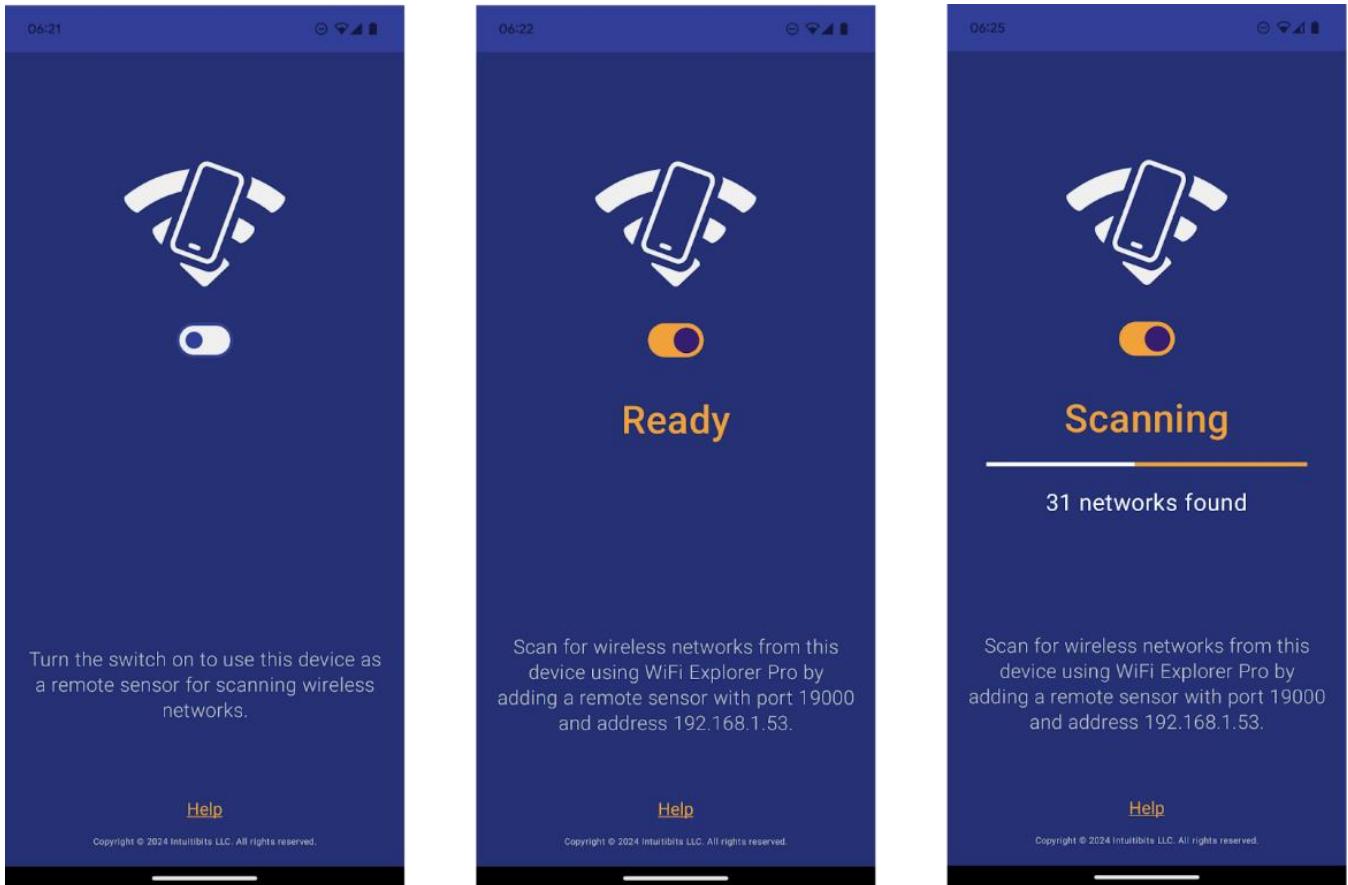


Figure 4-28 - WiFi Sensor app operation

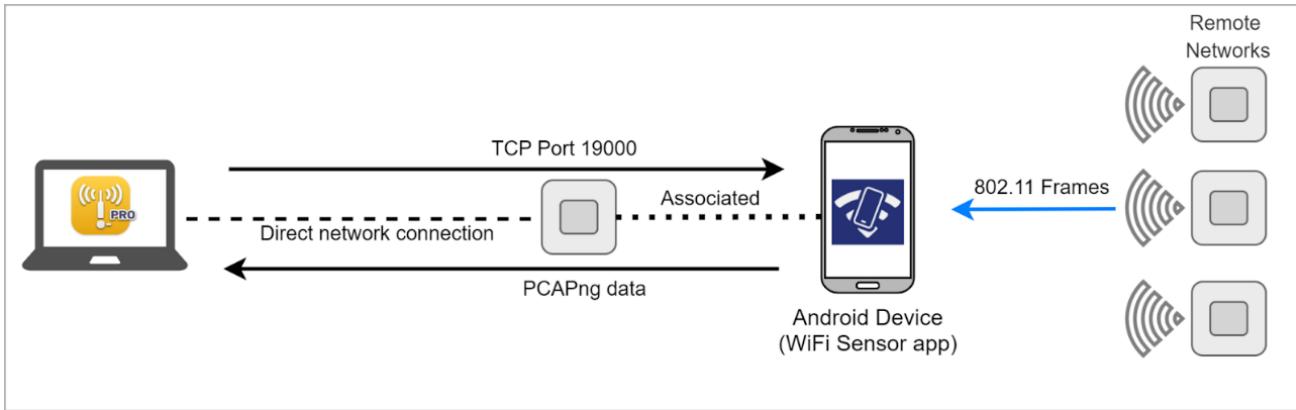


Figure 4-29 - WiFi Sensor direct connectivity

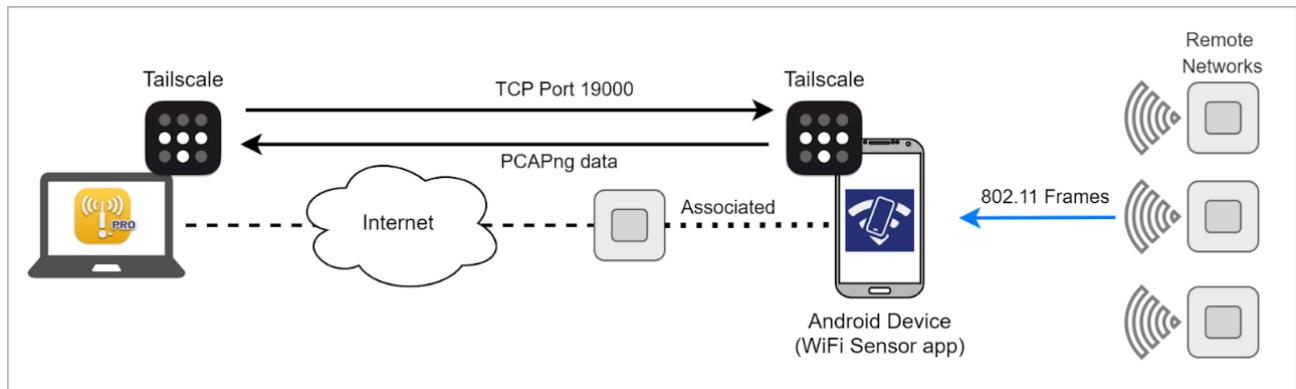


Figure 4-30 - WiFi Sensor VPN connectivity (local Wi-Fi connection)

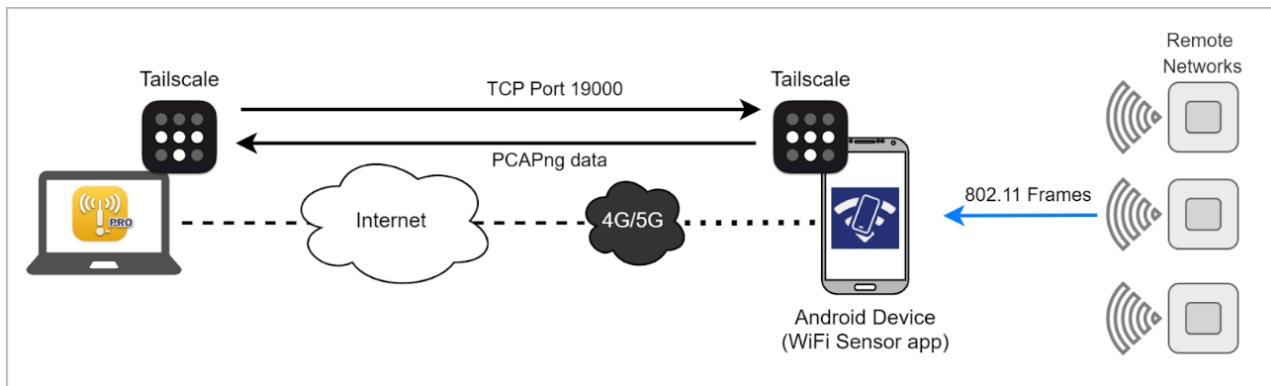


Figure 4-31 - WiFi Sensor VPN connectivity (cellular connection)

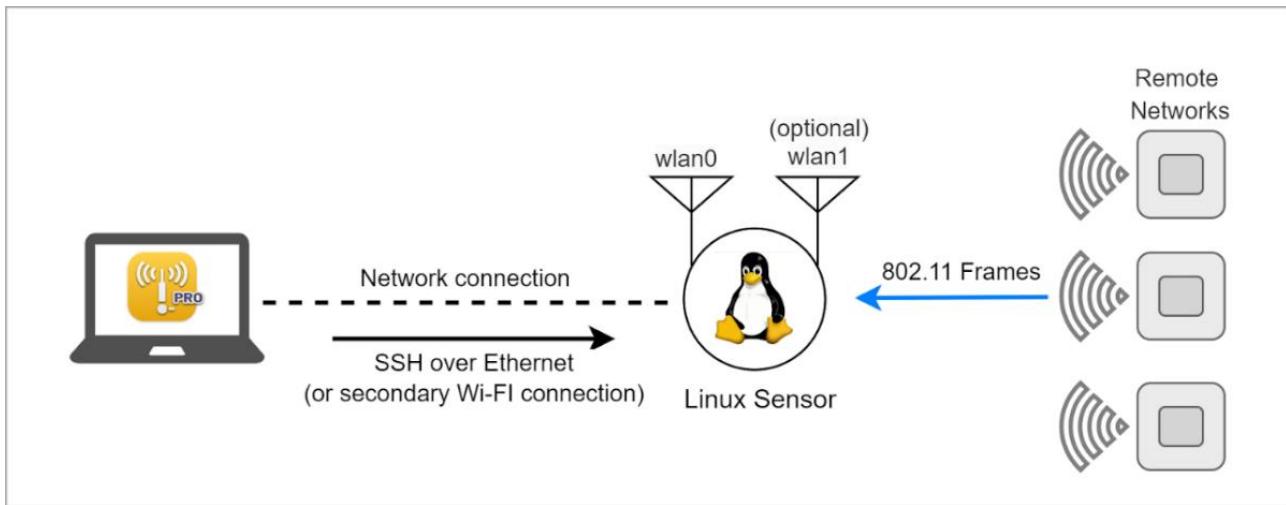


Figure 4-32 - Linux sensor overview

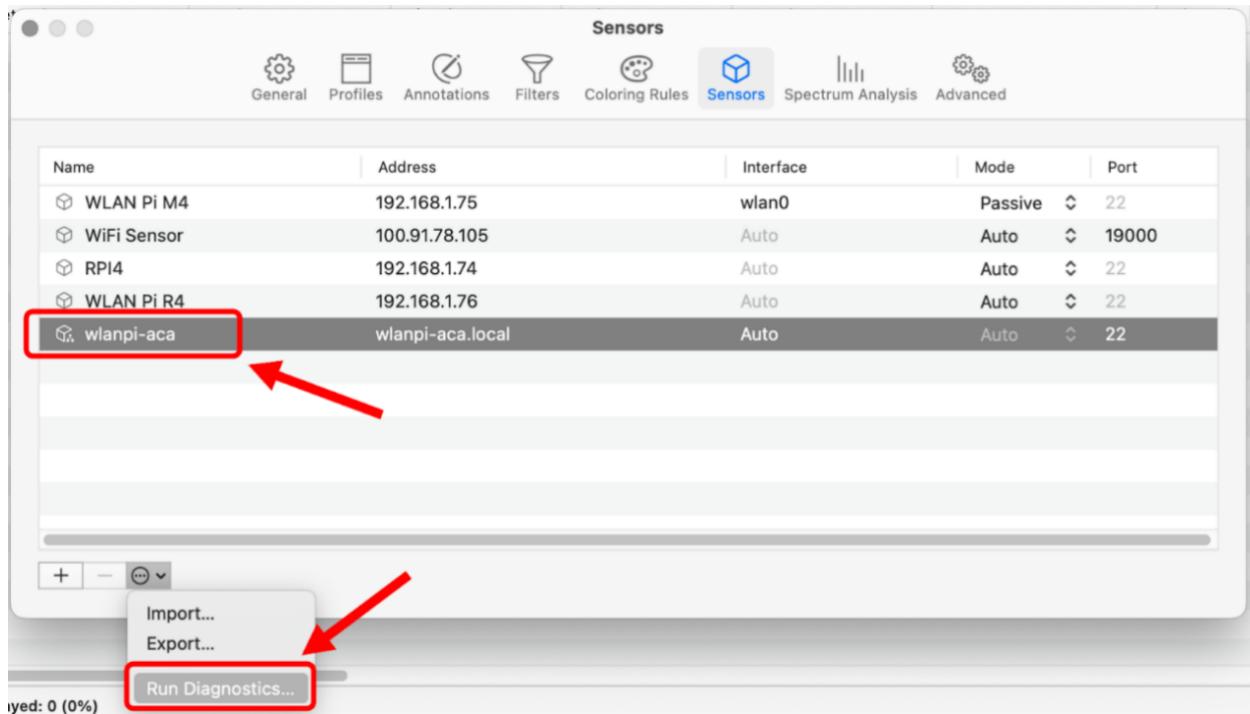


Figure 4-33 - Remote sensor diagnostics

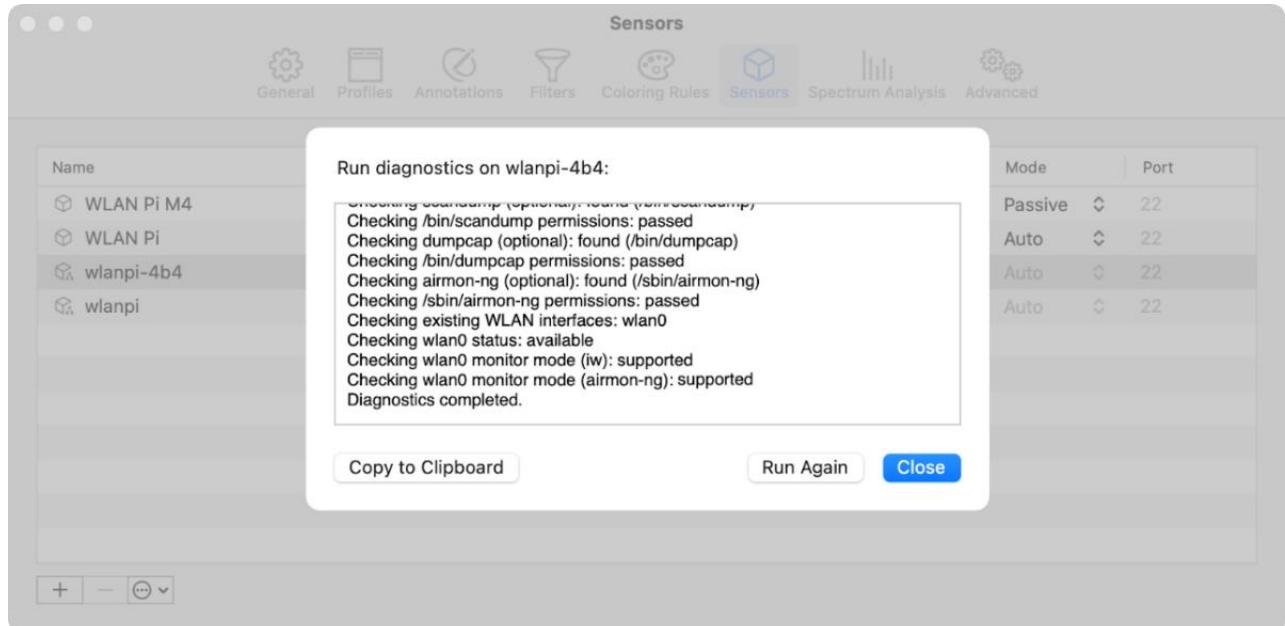


Figure 4-34 - Remote sensor diagnostics results

The screenshot shows the ZeroTier dashboard under the 'Members' section. It includes a search bar, display filters for 'Authorized', 'Not Authorized', and 'Bridges' status, and sorting options by 'Address' or 'Name'. The main table lists two members:

Auth?	Address	Name/Description	Managed IPs	Last Seen	Version	Physical IP
<input checked="" type="checkbox"/>	372a95ed42 da:bc:d5:a7:eb:c8	Pixel6 (WiFi Sensor) (description)	fd83:048a:0632:ff8b:db99:9337:2a95:ed42 10.147.17.217 + 10.147.17.x	1 MINUTE	1.14.0	82.132.247.159
<input checked="" type="checkbox"/>	d3bd326b7d da:58:42:00:6d:f7	MBP(WFE Pro 3) (description)	fd83:048a:0632:ff8b:db99:93d3:bd32:6b7d 10.147.17.181 + 10.147.17.x	37 MINUTES	1.12.2	81.98.195.90

At the bottom, there are sections for 'E-Mail Join Instructions' (with an input field for 'alice@example.com') and 'Manually Add Member' (with an input field for '# #####'). Buttons for 'Invite' and 'Add New Member' are also present. A link to 'Members Help' is at the bottom right.

Figure 4-35 - ZeroTier dashboard showing WFE Pro 3 and WiFi Sensor endpoints

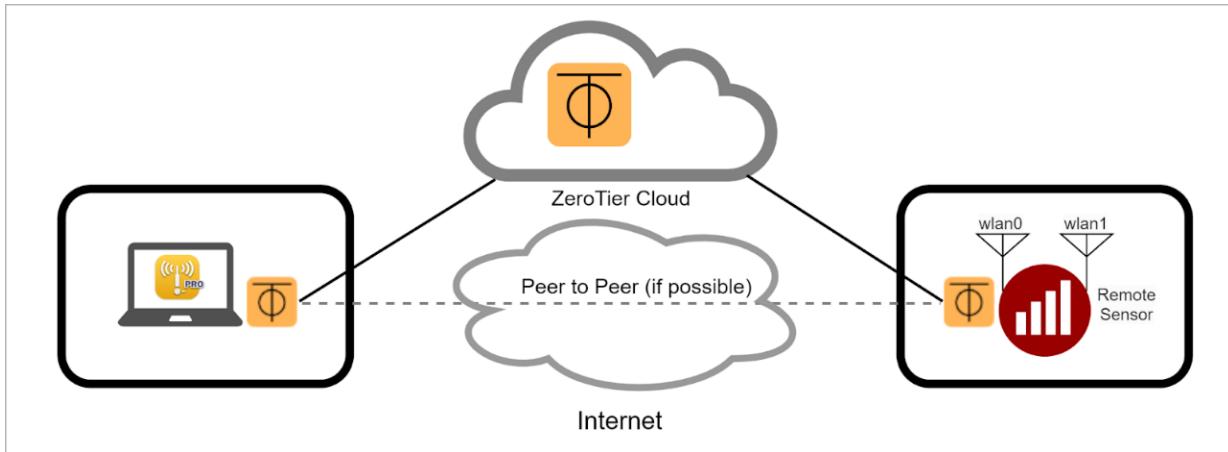


Figure 4-36 - ZeroTier Connectivity

MACHINE	ADDRESSES ⓘ	VERSION	LAST SEEN
mbp-wfe-pro-3 co.uk	100.117.201.76 ⓘ	1.70.0 macOS 12.7.5	Connected
pixel-6-wifi-sensor co.uk	100.91.78.105 ⓘ	1.70.0 Android 14	Connected

Figure 4-37 - Tailscale dashboard showing WFE Pro 3 and WiFi Sensor endpoints

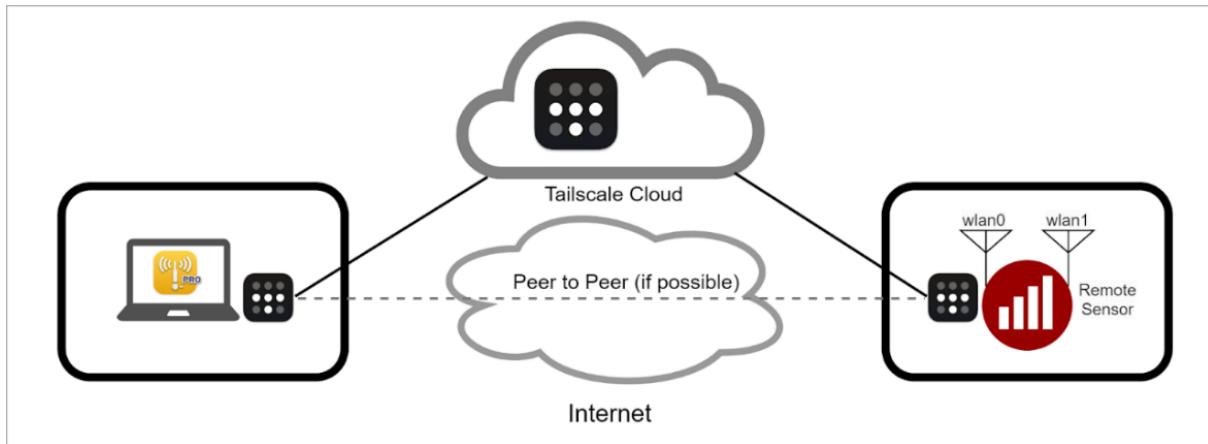


Figure 4-38 - Tailscale Connectivity

Chapter 5 - Data Import From External Systems

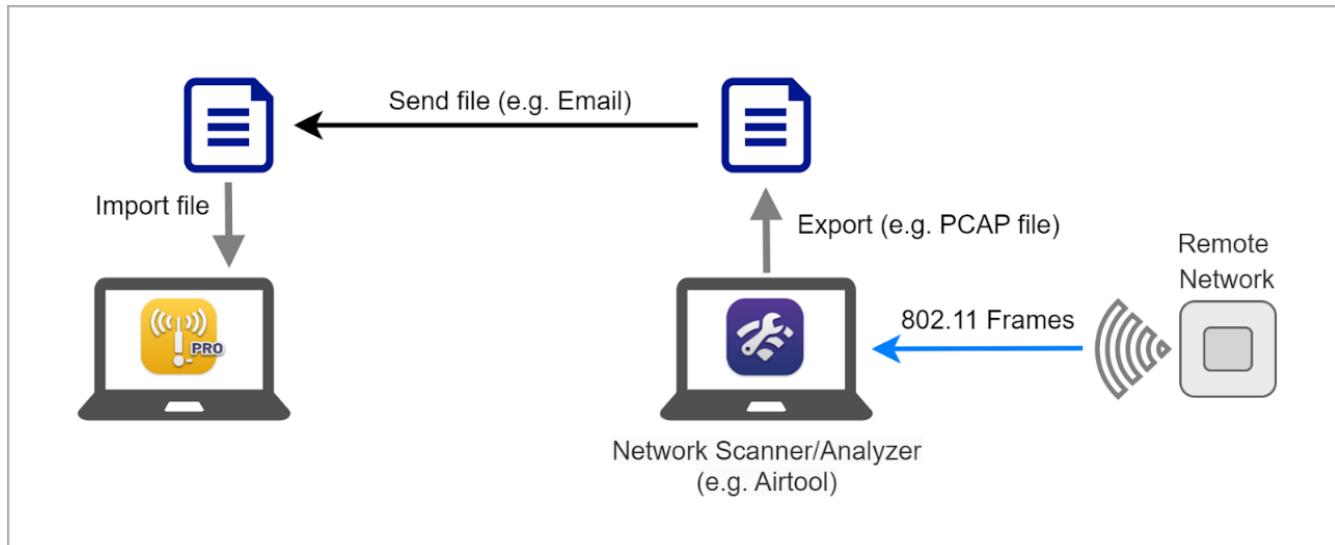


Figure 5-1 - Data import from frame capture application/utility

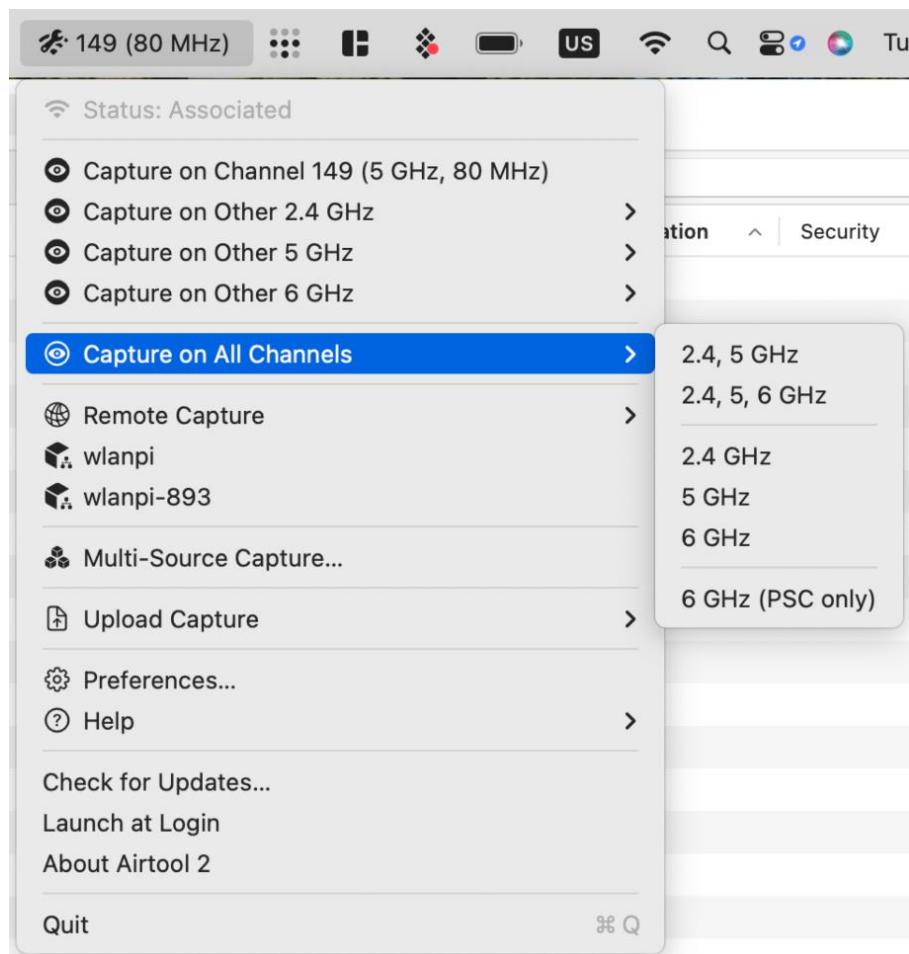


Figure 5-2 - Airtool 2 multi-channel scanning option

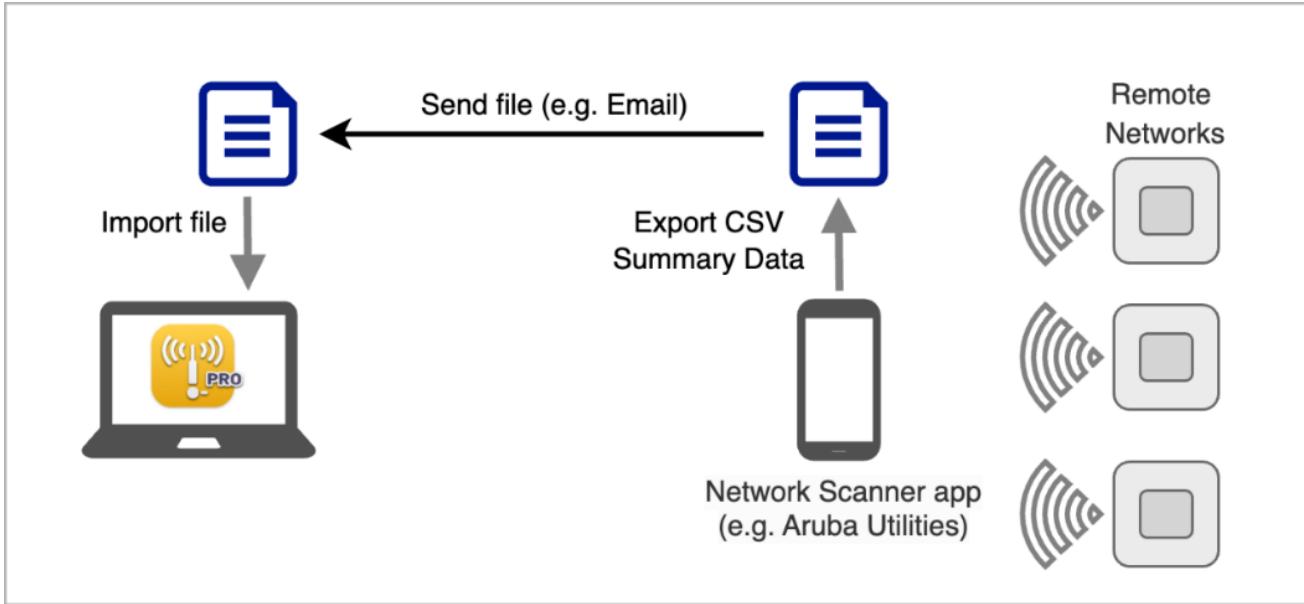


Figure 5-3 - Data import from a network scanner app

text-9810CF953F47-1.txt

SSID, BSS, RSSI, Channel, Time
"VM0108420", "C0:06:C3:4F:EA:C2", "-74", "12", "06:16:42"
"VM0108420", "C0:06:C3:4F:EA:C2", "-75", "12", "06:16:45"
"VM0108420", "C0:06:C3:4F:EA:C2", "-77", "12", "06:16:48"
"VM0108420", "C0:06:C3:4F:EA:C2", "-77", "12", "06:16:52"
"VM0108420", "C0:06:C3:4F:EA:C2", "-78", "12", "06:16:55"
"VM0108420", "C0:06:C3:4F:EA:C2", "-79", "12", "06:16:58"
"BT-GMA266", "78:DD:12:B5:0B:37", "-84", "1", "06:16:42"
"BT-GMA266", "78:DD:12:B5:0B:37", "-84", "1", "06:16:45"
"BT-GMA266", "78:DD:12:B5:0B:37", "-90", "1", "06:16:48"
"BT-GMA266", "78:DD:12:B5:0B:37", "-85", "1", "06:16:52"
"BT-GMA266", "78:DD:12:B5:0B:37", "-84", "1", "06:16:55"
"BT-GMA266", "78:DD:12:B5:0B:37", "-84", "1", "06:16:58"
"VM6643873", "18:35:D1:B9:71:DF", "-76", "44", "06:16:42"
"VM6643873", "18:35:D1:B9:71:DF", "-76", "44", "06:16:45"
"VM6643873", "18:35:D1:B9:71:DF", "-79", "44", "06:16:48"

Figure 5-4 - Exported CSV data sample

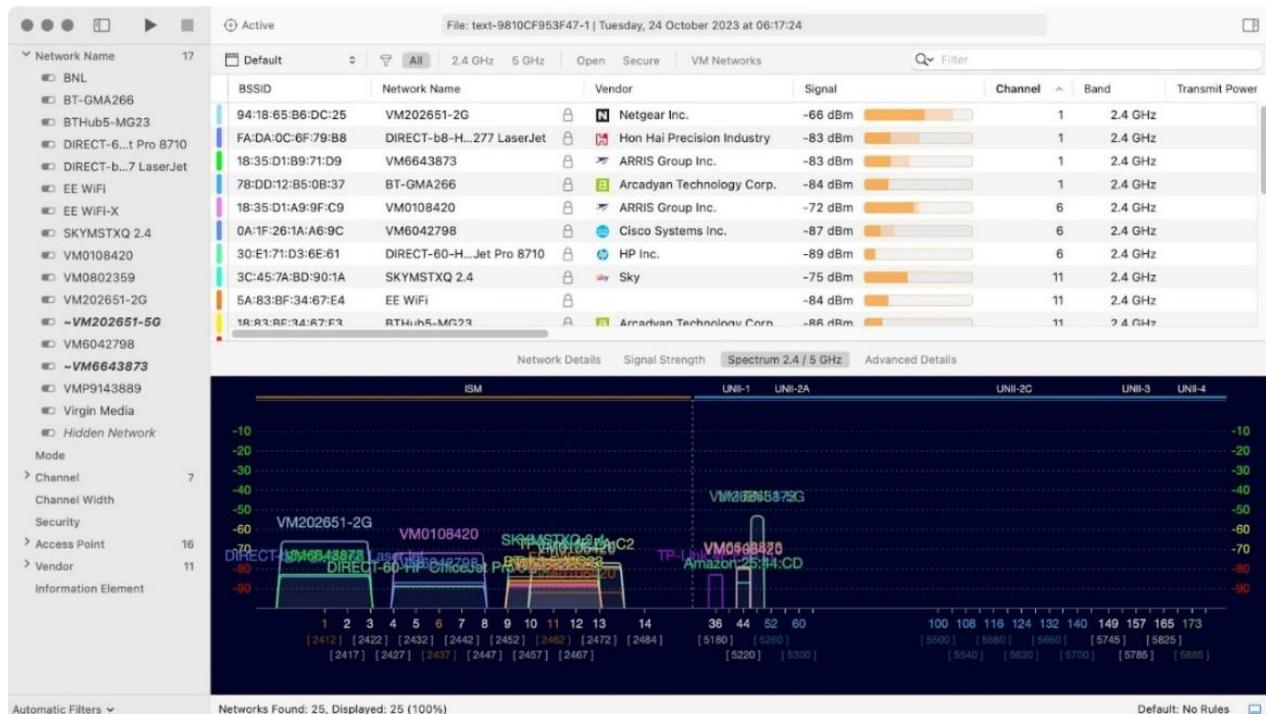


Figure 5-5 - WFE Pro 3 displaying imported CSV data (Airport Utility)

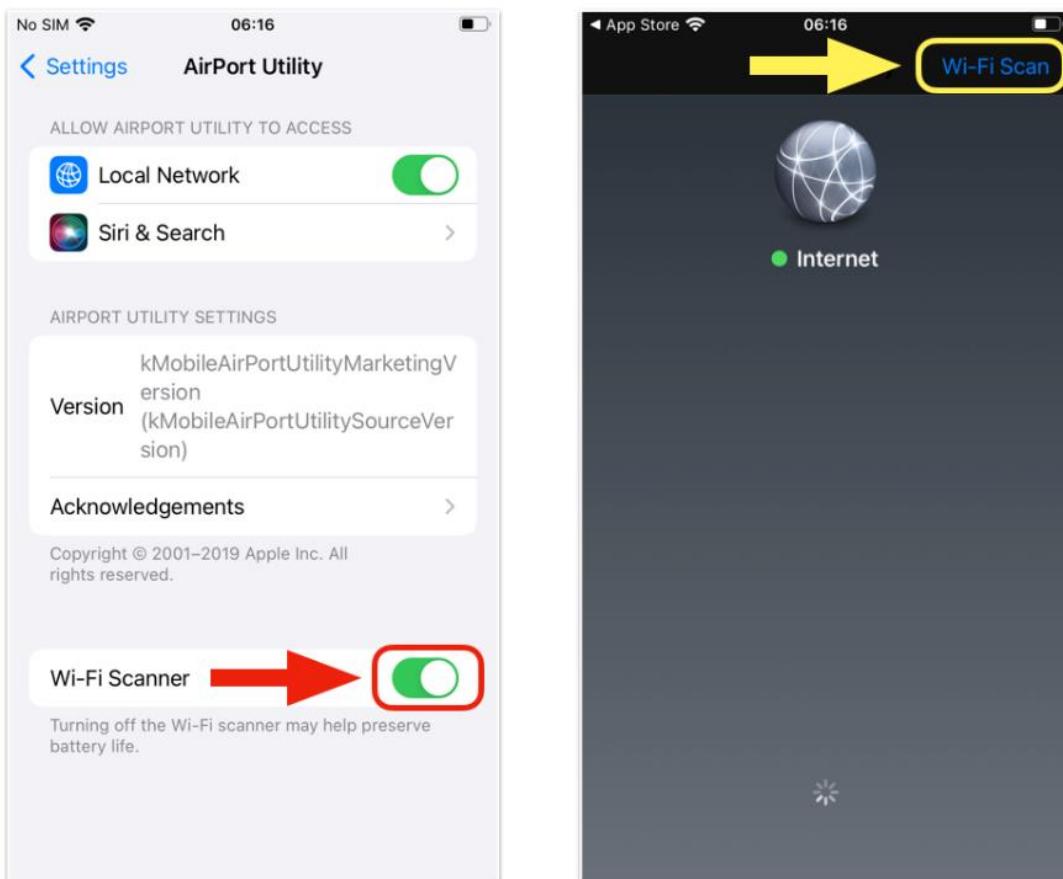


Figure 5-6 - Apple AirPort Utility setup #1

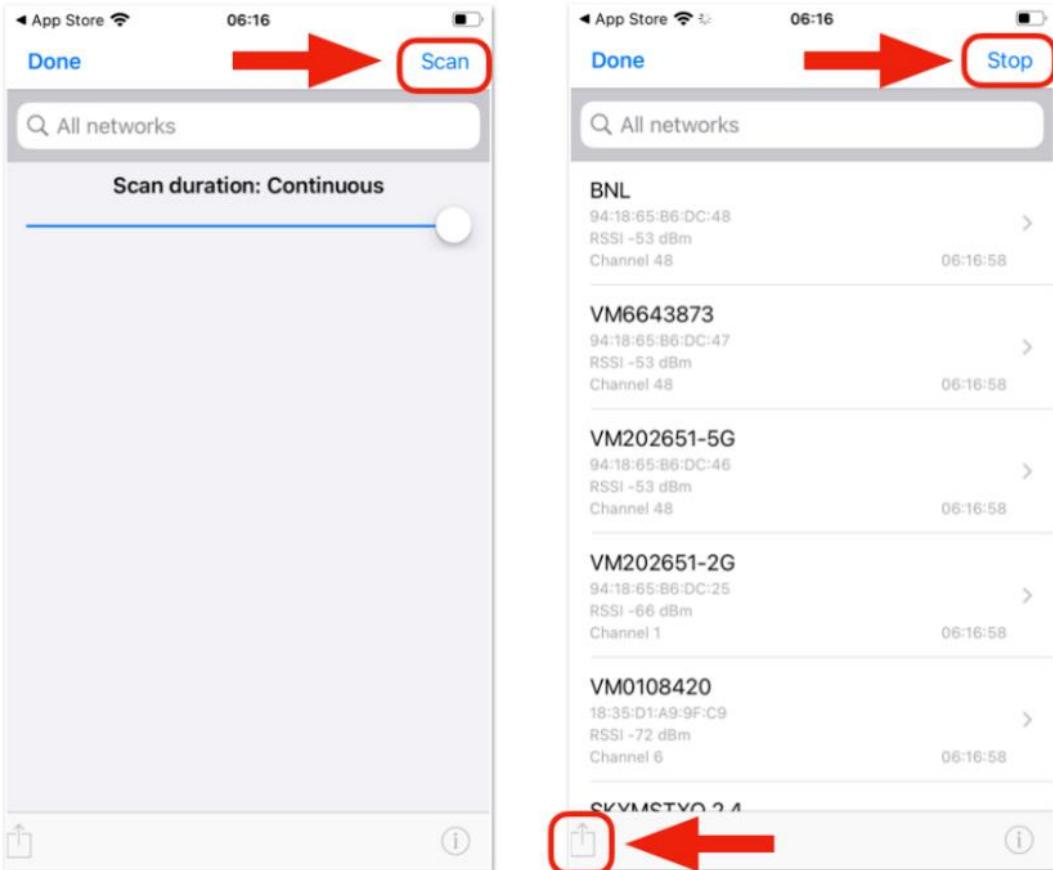


Figure 5-7 - Apple AirPort Utility setup #2

A screenshot of a Mac OS X text editor window titled 'text-48D3-8BAE-0A-0.txt'. The window displays a list of network scan results, each consisting of five fields separated by commas: SSID, BSS, RSSI, Channel, and Time. The results are identical to those shown in the screenshots above, listing various networks like BNL and VM202651-2G with their respective details.

```

SSID, BSS, RSSI, Channel, Time
"BNL_2G", "30:23:03:1B:42:DE", "-82", "4", "19:59:09"
"BNL_2G", "30:23:03:1B:42:DE", "-82", "4", "19:59:13"
"BNL_2G", "30:23:03:1B:42:DE", "-82", "4", "19:59:16"
"BNL_2G", "30:23:03:1B:42:DE", "-82", "4", "19:59:19"
"BNL_2G", "30:23:03:1B:42:DE", "-82", "4", "19:59:23"
"VM202651-2G", "36:23:03:1B:42:DF", "-83", "40", "19:59:09"
"VM202651-2G", "36:23:03:1B:42:DF", "-84", "40", "19:59:13"
"VM202651-2G", "36:23:03:1B:42:DF", "-87", "40", "19:59:16"
"VM202651-2G", "36:23:03:1B:42:DF", "-87", "40", "19:59:19"
"VM202651-2G", "36:23:03:1B:42:DF", "-84", "40", "19:59:23"
"VM202651-2G", "36:23:03:1B:42:DF", "-84", "40", "19:59:26"
"VM202651-2G", "36:23:03:1B:42:DF", "-84", "40", "19:59:29"
"VM202651-2G", "36:23:03:1B:42:DF", "-84", "40", "19:59:32"
"VM202651-2G", "36:23:03:1B:42:DF", "-86", "40", "19:59:36"
"VM202651-2G", "36:23:03:1B:42:DF", "-84", "40", "19:59:39"
"VM202651-2G", "36:23:03:1B:42:DF", "-84", "40", "19:59:45"
"BNL", "94:18:65:B6:DC:48", "-69", "48", "19:59:09"
"BNL", "94:18:65:B6:DC:48", "-69", "48", "19:59:13"
"BNL", "94:18:65:B6:DC:48", "-67", "48", "19:59:16"
"BNL", "94:18:65:B6:DC:48", "-65", "48", "19:59:19"
"BNL", "94:18:65:B6:DC:48", "-64", "48", "19:59:23"
"BNL", "94:18:65:B6:DC:48", "-63", "48", "19:59:26"
"BNL", "94:18:65:B6:DC:48", "-62", "48", "19:59:29"
"BNL", "94:18:65:B6:DC:48", "-63", "48", "19:59:32"
"BNL", "94:18:65:B6:DC:48", "-63", "48", "19:59:36"

```

Figure 5-8 - Raw CSV data from AirPort Utility

Airport Utility Active File: text-48D3-8BAE-0A-0 | Wednesday, 31 July 2024 at 20:00:24

Airport Utility All 2.4 GHz 5 GHz Open Secure Filter

BSSID	Network Name	Vendor	Channel	Band	Signal	Noise (Approx)	SNR (Approx)	Last Seen
94:18:65:B6:DC:48	BNL	Netgear Inc.	48	5 GHz	-62 dBm	-96 dBm	34 dB	2000/01/01 07:59:45 pm
1E:48:BE:25:44:CD	Hidden Network	Amazon Technolo...	44	5 GHz	-72 dBm	-96 dBm	24 dB	2000/01/01 07:59:45 pm
18:35:D1:A9:9F:C9	VM0108420	ARRIS Group Inc.	11	2.4 GHz	-73 dBm	-96 dBm	23 dB	2000/01/01 07:59:45 pm
18:35:D1:B9:71:D9	VM6643873	ARRIS Group Inc.	6	2.4 GHz	-75 dBm	-96 dBm	21 dB	2000/01/01 07:59:45 pm
FA:0A:0C:6F:79:B8	DIRECT-b...7 LaserJet	Hon Hai Precision...	6	2.4 GHz	-78 dBm	-96 dBm	18 dB	2000/01/01 07:59:45 pm
C6:06:C...4F:EA:C2	Hidden Network	TP-Link Technolo...	9	2.4 GHz	-79 dBm	-96 dBm	17 dB	2000/01/01 07:59:45 pm
02:68:EB:44:88:B8	DIRECT-B...t Pro 8020	HP Inc.	6	2.4 GHz	-80 dBm	-96 dBm	16 dB	2000/01/01 07:59:45 pm
18:35:D1:B9:71:DF	VM6643873	ARRIS Group Inc.	44	5 GHz	-80 dBm	-96 dBm	16 dB	2000/01/01 07:59:45 pm
C0:06:C...4F:EA:C2	VM0108420	TP-Link Technolo...	9	2.4 GHz	-80 dBm	-96 dBm	16 dB	2000/01/01 07:59:45 pm
36:23:03:1B:42:DE	VM202651-2G	Belkin Internation...	4	2.4 GHz	-81 dBm	-96 dBm	15 dB	2000/01/01 07:59:45 pm
30:23:03:1B:42:DE	BNL_2G	Belkin Internation...	4	2.4 GHz	-82 dBm	-96 dBm	14 dB	2000/01/01 07:59:23 pm
3A:23:03:1B:42:DE	Hidden Network	Belkin Internation...	4	2.4 GHz	-82 dBm	-96 dBm	14 dB	2000/01/01 07:59:45 pm
C0:06:C...4F:EB:DA	VM0108420	TP-Link Technolo...	9	2.4 GHz	-83 dBm	-96 dBm	13 dB	2000/01/01 07:59:45 pm
C6:06:C...4F:EB:DA	Hidden Network	TP-Link Technolo...	9	2.4 GHz	-83 dBm	-96 dBm	13 dB	2000/01/01 07:59:45 pm
18:83:BF:34:67:E3	BTHub5-MG23	Arcadyan Technol...	1	2.4 GHz	-84 dBm	-96 dBm	12 dB	2000/01/01 07:59:45 pm
30:23:03:1B:42:DF	VM202651-5G	Belkin Internation...	40	5 GHz	-84 dBm	-96 dBm	12 dB	2000/01/01 07:59:45 pm
36:23:03:1B:42:DF	VM202651-2G	Belkin Internation...	40	5 GHz	-84 dBm	-96 dBm	12 dB	2000/01/01 07:59:45 pm
5A:83:BF:34:67:E5	EE WiFi-X	ARRIS Group Inc.	1	2.4 GHz	-85 dBm	-96 dBm	11 dB	2000/01/01 07:59:45 pm
18:35:D1:A9:9F:CF	VM0108420	ARRIS Group Inc.	44	5 GHz	-86 dBm	-96 dBm	10 dB	2000/01/01 07:59:45 pm
5A:83:BF:34:67:E4	EE WiFi	ARRIS Group Inc.	1	2.4 GHz	-86 dBm	-96 dBm	10 dB	2000/01/01 07:59:45 pm
5C:62:8B:35:76:1C	VM3668793_EXT	TP-Link Technolo...	6	2.4 GHz	-88 dBm	-96 dBm	8 dB	2000/01/01 07:59:45 pm
C0:06:C...4F:EB:EA	VM0108420	TP-Link Technolo...	9	2.4 GHz	-88 dBm	-96 dBm	8 dB	2000/01/01 07:59:45 pm

Networks Found: 33, Displayed: 33 (100%)

Figure 5-9 - AirPort Utility data displayed in WFE Pro 3

WiFi Explorer Pro 3: The Definitive User Guide

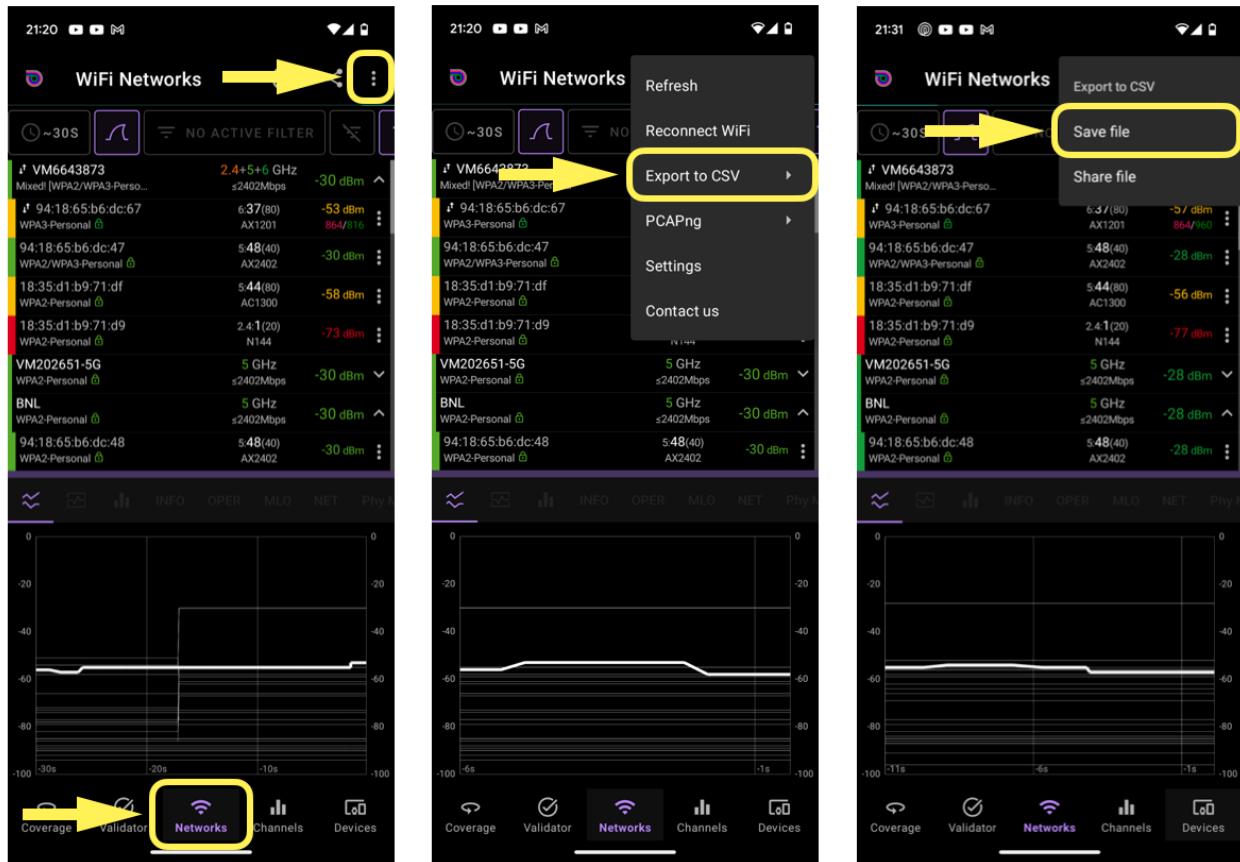


Figure 5-10 - Analiti CSV export process

Analiti CSV											Filter
BSSID	Network Name	Vendor	Band	Channel	Channel Width	Security	Signal	Noise (Approx)			
94:18:65:B6:DC:48	BNL	Netgear Inc.	5 GHz	48	40 MHz	WPA2/WPA3 (PSK/SAE)	-48 dBm	-96 dBm			
94:18:65:B6:DC:68	BNL	Netgear Inc.	6 GHz	37	80 MHz	WPA3 (SAE)	-56 dBm	-96 dBm			
94:18:65:B6:DC:62	WLANPI_Test_6GHz	Netgear Inc.	6 GHz	37	80 MHz	WPA3 (SAE)	-57 dBm	-96 dBm			
18:35:D1:A9:9F:C9	VM0108420	ARRIS Group Inc.	2.4 GHz	11	20 MHz	WPA2 (PSK)	-70 dBm	-96 dBm			
4E:17:44:F9:9C:FC	Hidden Network	Amazon Technolo...	5 GHz	44	20 MHz	WPA2 (PSK)	-74 dBm	-96 dBm			
36:23:03:1B:42:DE	VM202651-2G	Belkin Internation...	2.4 GHz	4	20 MHz	WPA2 (PSK)	-77 dBm	-96 dBm			
C0:06:C3:4F:EA:C3	VM0108420	TP-Link Technolo...	5 GHz	36	80 MHz	WPA2 (PSK)	-77 dBm	-96 dBm			
18:35:D1:B9:71:DF	VM6643873	ARRIS Group Inc.	5 GHz	44	80 MHz	WPA2 (PSK)	-78 dBm	-96 dBm			
30:23:03:1B:42:DE	BNL_2G	Belkin Internation...	2.4 GHz	4	20 MHz	WPA2 (PSK)	-78 dBm	-96 dBm			
3A:23:03:1B:42:DE	Hidden Network	Belkin Internation...	2.4 GHz	4	20 MHz	WPA2 (PSK)	-78 dBm	-96 dBm			
C0:06:C3:4F:EA:C2	VM0108420	TP-Link Technolo...	2.4 GHz	9	40 MHz	WPA2 (PSK)	-78 dBm	-96 dBm			
C6:06:C3:4F:EA:C3	Hidden Network	TP-Link Technolo...	5 GHz	36	80 MHz	WPA2 (PSK)	-78 dBm	-96 dBm			
FA:DA:0C:6F:79:B8	DIRECT-B...t LaserJet	Hon Hai Precision...	2.4 GHz	6	20 MHz	WPA2 (PSK)	-78 dBm	-96 dBm			
30:23:03:1B:42:DF	VM202651-5G	Belkin Internation...	5 GHz	40	80 MHz	WPA2 (PSK)	-79 dBm	-96 dBm			
36:23:03:1B:42:DF	VM202651-2G	Belkin Internation...	5 GHz	40	80 MHz	WPA2 (PSK)	-79 dBm	-96 dBm			
18:35:D1:A9:9F:CF	VM0108420	ARRIS Group Inc.	5 GHz	44	80 MHz	WPA2 (PSK)	-81 dBm	-96 dBm			
1E:48:BE:25:44:CD	Hidden Network	Amazon Technolo...	5 GHz	44	20 MHz	WPA2 (PSK)	-82 dBm	-96 dBm			
02:68:EB:44:88:B8	DIRECT-B...t Pro 8020	HP Inc.	2.4 GHz	6	20 MHz	WPA2 (PSK)	-83 dBm	-96 dBm			
0A:1F:26:1A:A6:9F	Hidden Network	Cisco Systems Inc.	2.4 GHz	6	20 MHz	WPA2 (PSK)	-84 dBm	-96 dBm			
0A:1F:26:1A:A6:9C	VM1953835	Cisco Systems Inc.	2.4 GHz	6	20 MHz	WPA2 (PSK)	-85 dBm	-96 dBm			
18:35:D1:B9:71:DF	VM6643873	ARRIS Group Inc.	2.4 GHz	6	20 MHz	WPA2 (PSK)	-85 dBm	-96 dBm			
C6:06:C3:4F:EB:DA	Hidden Network	TP-Link Technolo...	2.4 GHz	9	40 MHz	WPA2 (PSK)	-86 dBm	-96 dBm			

Figure 5-11 - Analiti data displayed in WFE Pro 3

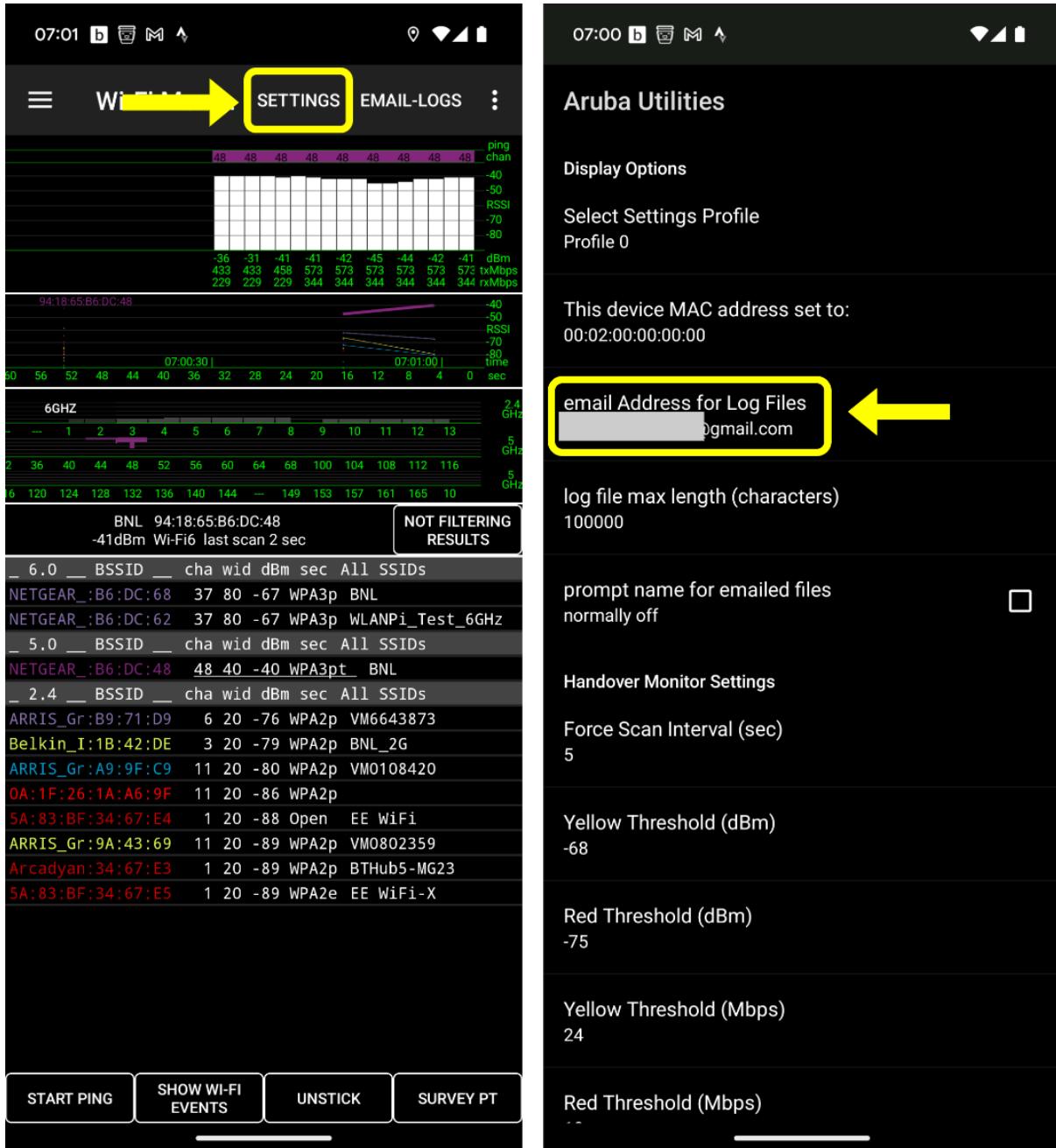


Figure 5-12 - Aruba Utilities network scan and export process #1

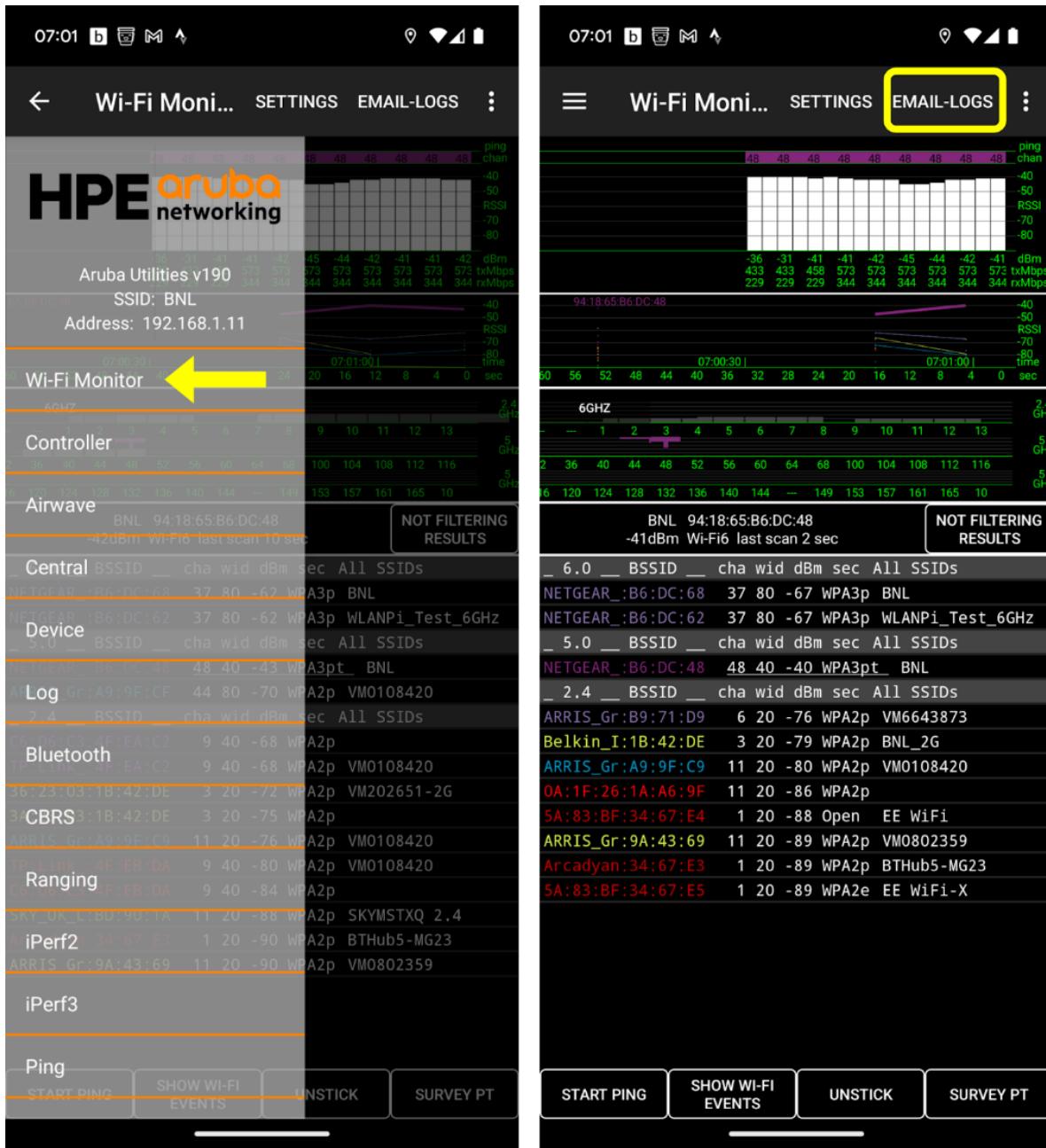


Figure 5-13 - Aruba Utilities network scan and export process #2

Aruba Utilities Active File: ArubaUtilitiesCsvScanFile_2024_0802_073237_ | Friday, 2 August 2024 at 07:33:39

BSSID	Network Name	Vendor	Band	Channel	Signal	Noise (Approx)	SNR (Approx)	Center Frequency
94:18:65:B6:DC:48	BNL	Netgear Inc.	5 GHz	48	-15 dBm	-96 dBm	81 dB	5240 MHz
18:35:D1:A9:9F:CF	VM0108420	ARRIS Group Inc.	5 GHz	44	-53 dBm	-96 dBm	43 dB	5220 MHz
C0:06:C3:4F:EA:C3	VM0108420	TP-Link Technolo...	5 GHz	36	-54 dBm	-96 dBm	42 dB	5180 MHz
C6:06:C3:4F:EA:C3	Hidden Network	TP-Link Technolo...	5 GHz	36	-54 dBm	-96 dBm	42 dB	5180 MHz
4E:17:44:F9:9C:FC	Hidden Network	Amazon Technolo...	5 GHz	44	-56 dBm	-96 dBm	40 dB	5220 MHz
94:18:65:B6:DC:62	WLANPi_Test_6GHz	Netgear Inc.	5 GHz	37	-56 dBm	-96 dBm	40 dB	5185 MHz
94:18:65:B6:DC:68	BNL	Netgear Inc.	5 GHz	37	-56 dBm	-96 dBm	40 dB	5185 MHz
1E:48:BE:25:44:CD	Hidden Network	Amazon Technolo...	5 GHz	44	-58 dBm	-96 dBm	38 dB	5220 MHz
30:23:03:1B:42:DF	VM202651-5G	Belkin Internation...	5 GHz	108	-58 dBm	-96 dBm	38 dB	5540 MHz
36:23:03:1B:42:DF	VM202651-2G	Belkin Internation...	5 GHz	108	-58 dBm	-96 dBm	38 dB	5540 MHz
18:35:D1:B9:71:DF	VM6643873	ARRIS Group Inc.	5 GHz	44	-59 dBm	-96 dBm	37 dB	5220 MHz
C0:06:C3:4F:EB:DB	VM0108420	TP-Link Technolo...	5 GHz	36	-62 dBm	-96 dBm	34 dB	5180 MHz
C0:06:C3:4F:EB:EB	VM0108420	TP-Link Technolo...	5 GHz	36	-62 dBm	-96 dBm	34 dB	5180 MHz
C6:06:C3:4F:EB:EB	Hidden Network	TP-Link Technolo...	5 GHz	36	-62 dBm	-96 dBm	34 dB	5180 MHz
C6:06:C3:4F:EB:DB	Hidden Network	TP-Link Technolo...	5 GHz	36	-63 dBm	-96 dBm	33 dB	5180 MHz
C0:06:C3:4F:EA:C2	VM0108420	TP-Link Technolo...	2.4 GHz	9	-73 dBm	-96 dBm	23 dB	2452 MHz
C6:06:C3:4F:EA:C2	Hidden Network	TP-Link Technolo...	2.4 GHz	9	-73 dBm	-96 dBm	23 dB	2452 MHz
FA:DA:0C:6F:79:88	DIRECT-b...7 LaserJet	Hon Hai Precision...	2.4 GHz	6	-76 dBm	-96 dBm	20 dB	2437 MHz
C0:06:C3:4F:EB:DA	VM0108420	TP-Link Technolo...	2.4 GHz	9	-78 dBm	-96 dBm	18 dB	2452 MHz
36:23:03:1B:42:DE	VM202651-2G	Belkin Internation...	2.4 GHz	3	-80 dBm	-96 dBm	16 dB	2422 MHz
18:35:D1:A9:9F:C9	VM0108420	ARRIS Group Inc.	2.4 GHz	11	-81 dBm	-96 dBm	15 dB	2462 MHz
30:23:03:1B:42:DE	BNL_2G	Belkin Internation...	2.4 GHz	3	-81 dBm	-96 dBm	15 dB	2422 MHz

Networks Found: 27, Displayed: 27 (100%)

Figure 5-14 - Aruba Utilities data displayed in WFE Pro 3

Chapter 6 - Spectrum Analysis Data

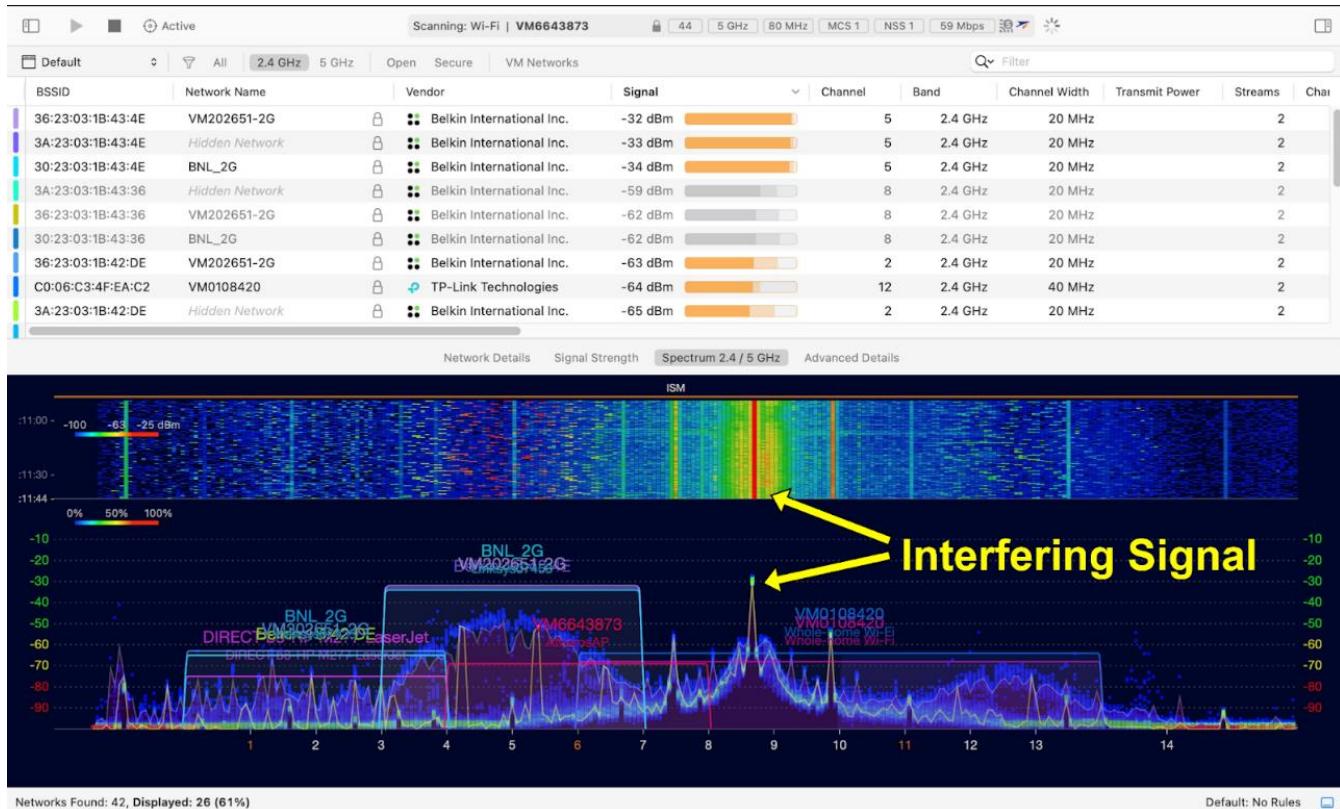


Figure 6-1 - 2.4 GHz Spectrum plot with interferer near channel 9



Figure 6-2 - MetaGeek Wi-Spy DBx & Wi-Spy 2.4x (v2) spectrum analysis dongles

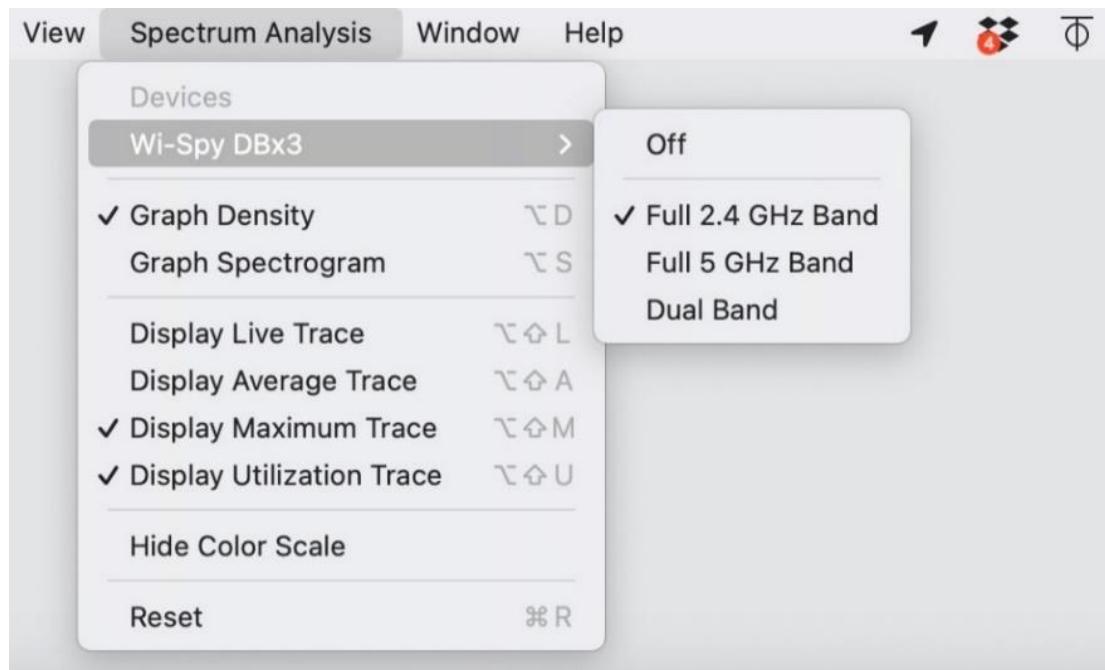


Figure 6-3 - MetaGeek DBx3 spectrum analysis controls

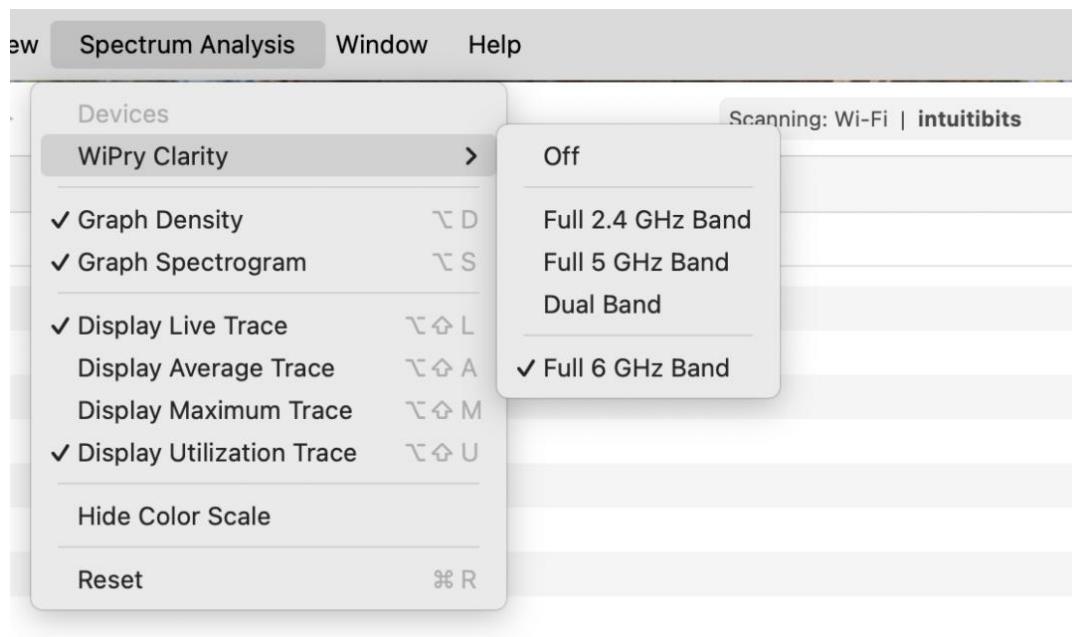


Figure 6-4 - Oscium Clarity spectrum snalysis controls



Figure 6-5 - Oscium WiPry 2500x & WiPry Clarity



Figure 6-6 - RF Explorer Wi-Fi Combo



Figure 6-7 - Ubertooth One

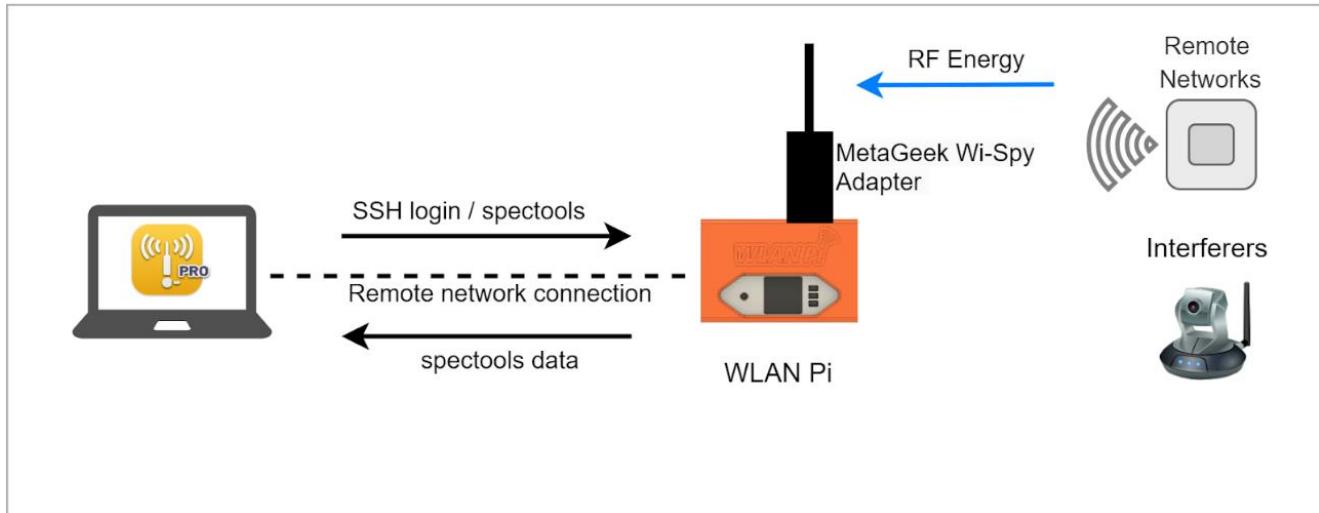


Figure 6-8 - WLAN Pi as a remote Spectrum Analysis probe

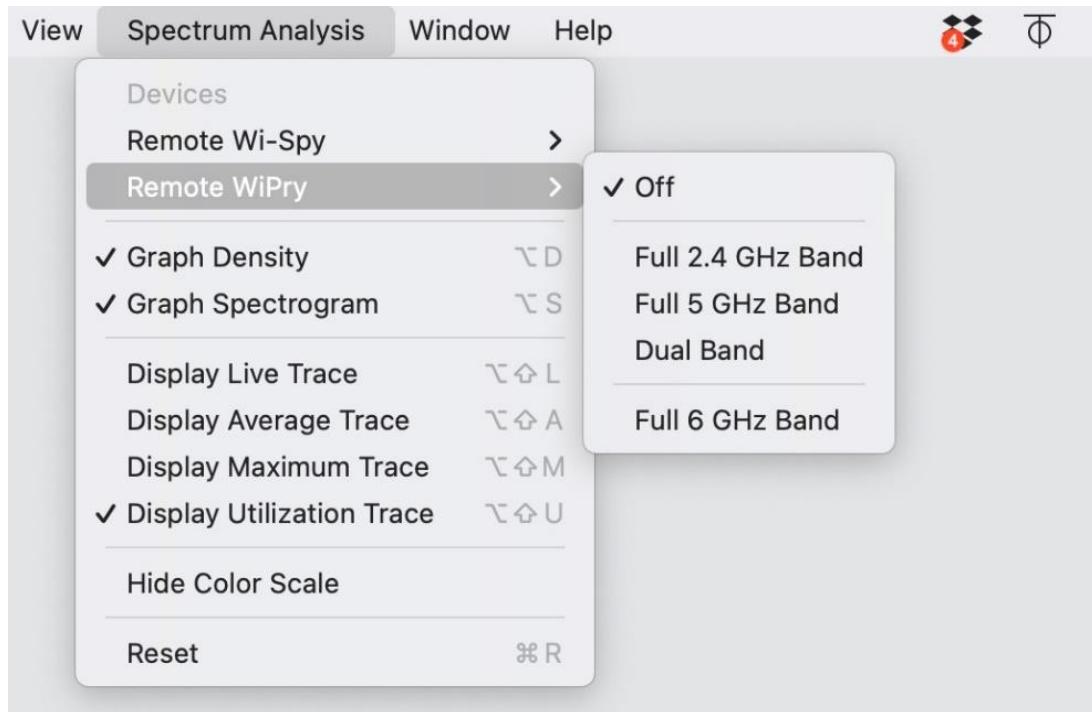


Figure 6-9 - Remote sensor Spectrum Analysis controls

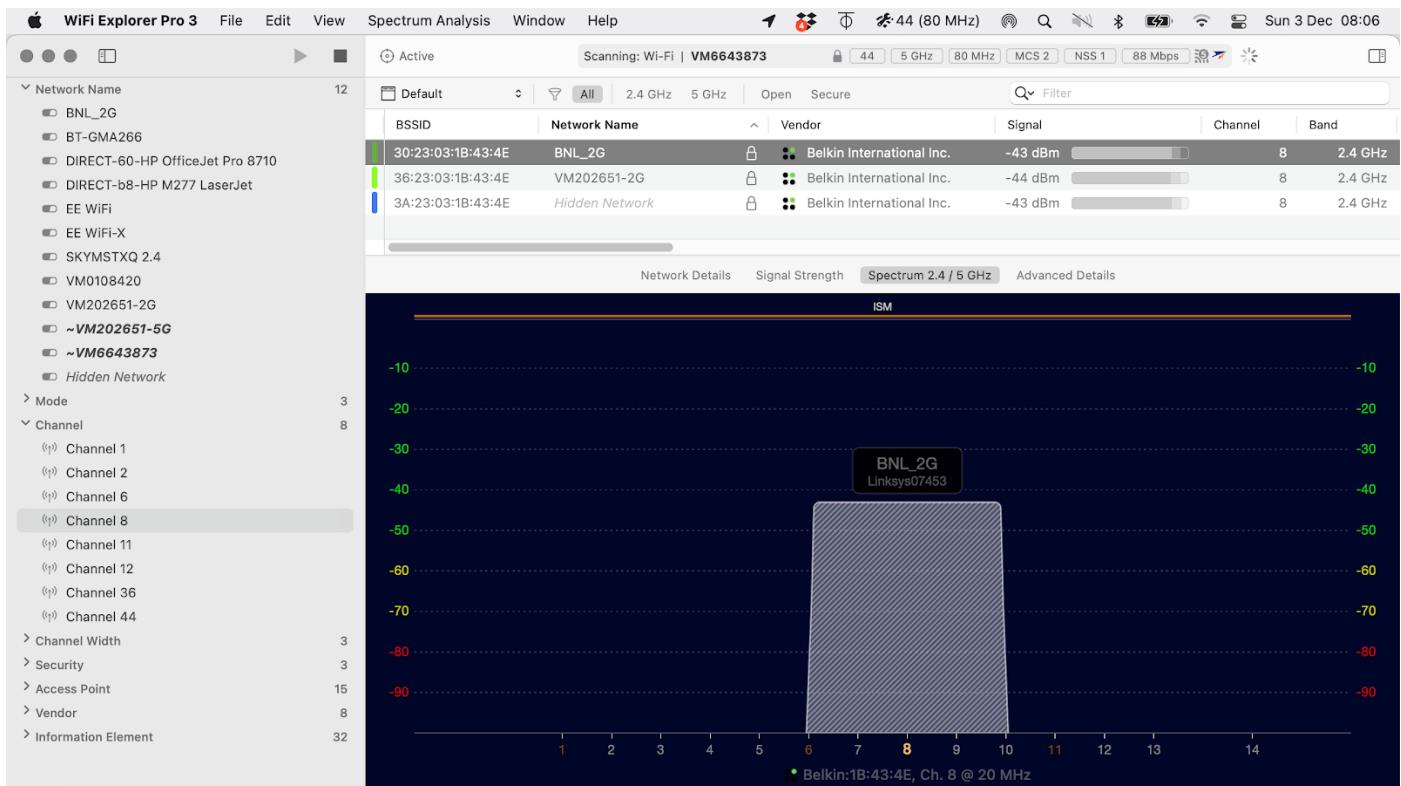


Figure 6-10 - Sample WLAN

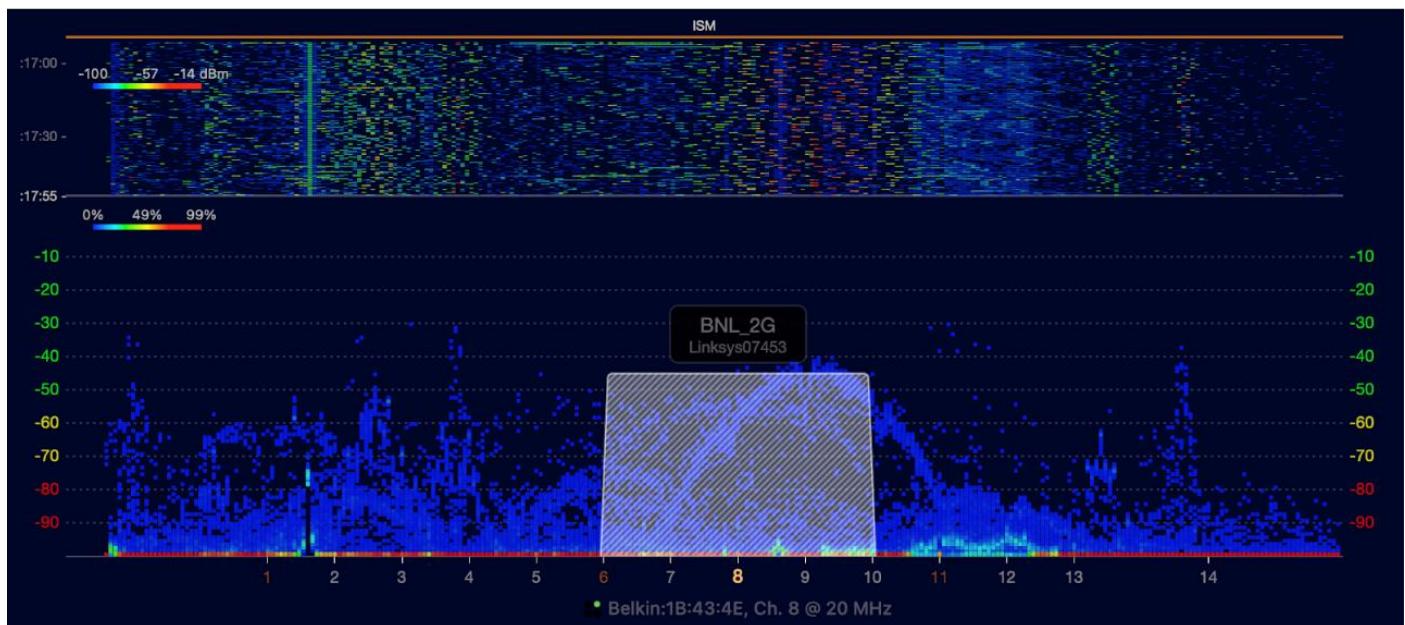


Figure 6-11 - Sample WLAN with Density & Spectrogram views enabled

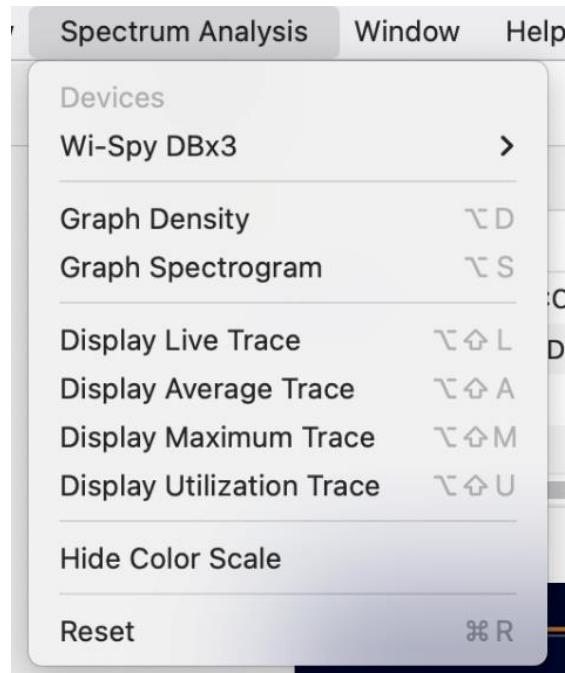


Figure 6-12 - WFE Pro 3 Spectrum Analysis options

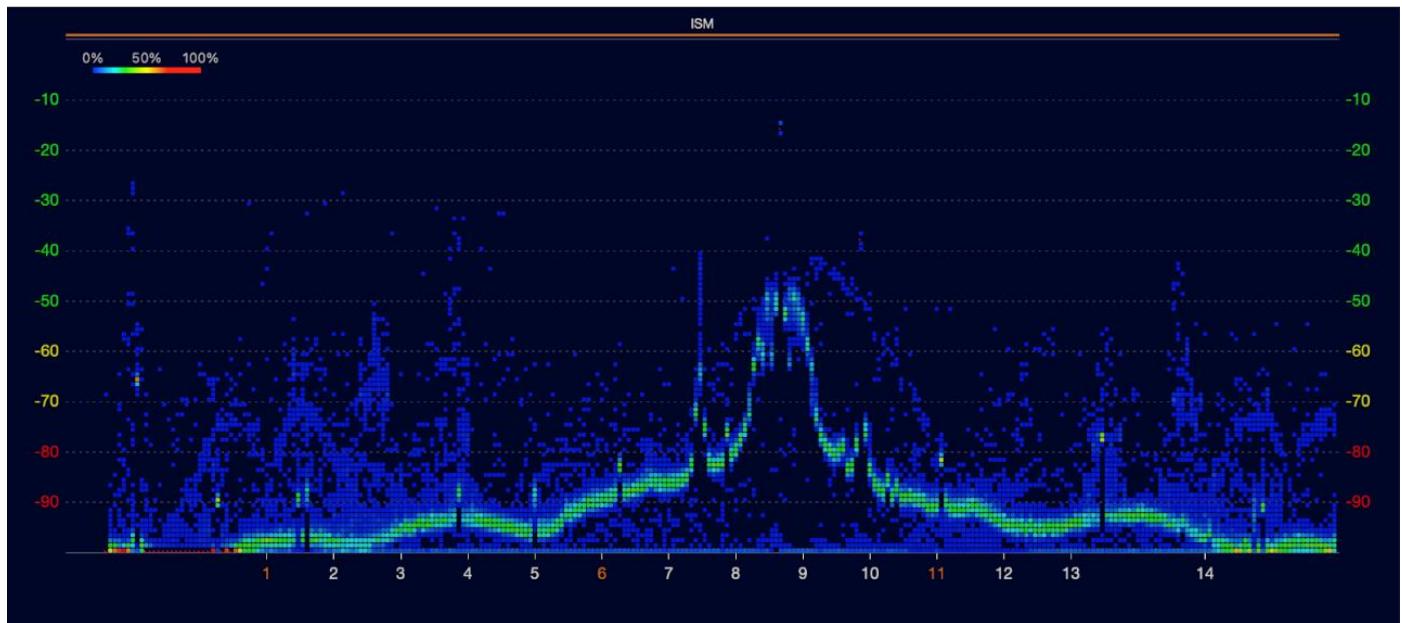


Figure 6-13 - Graph Density view detail with an interferer

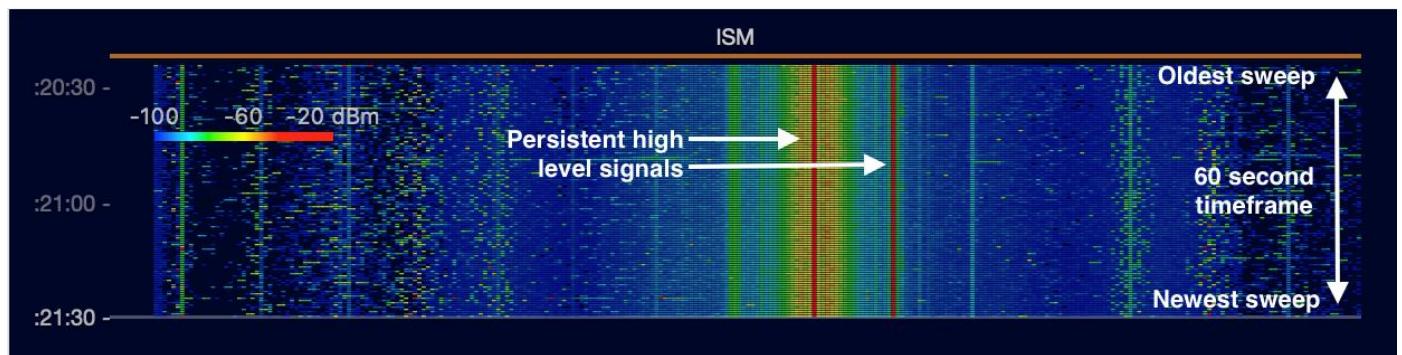


Figure 6-14 - Spectrogram view detail with an interferer

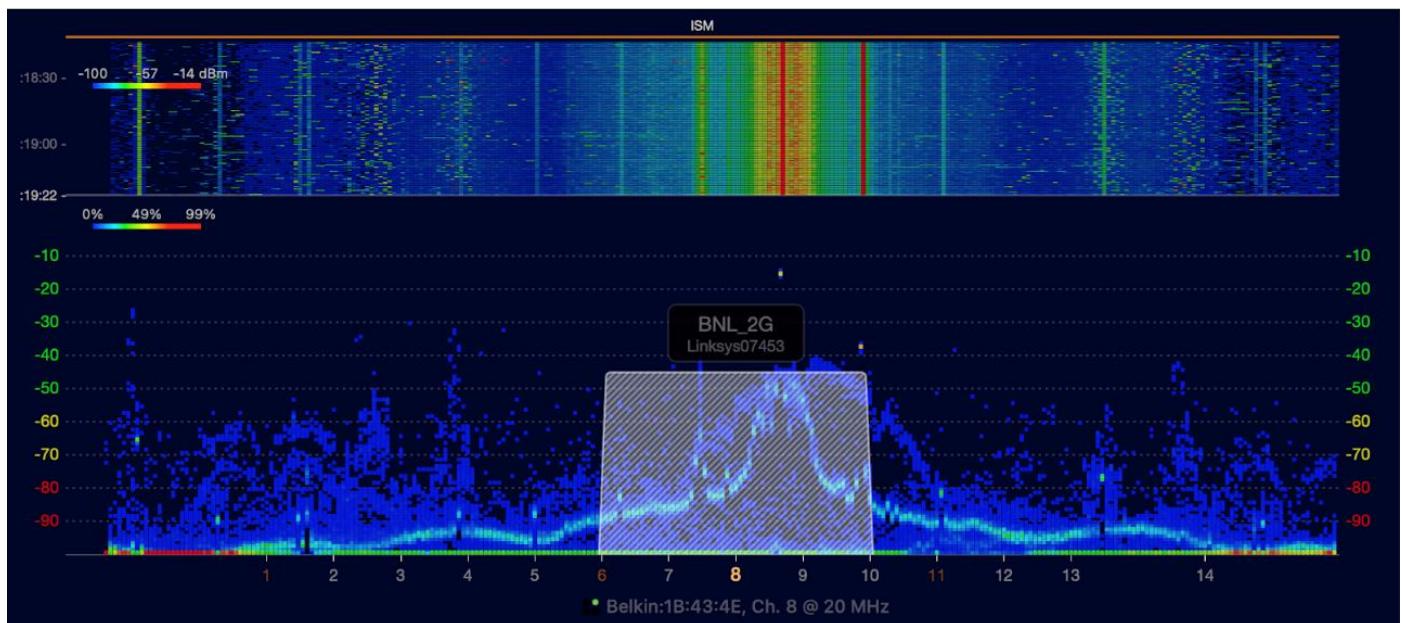


Figure 6-15 - Spectrogram (top) and density view (bottom) with an interferer

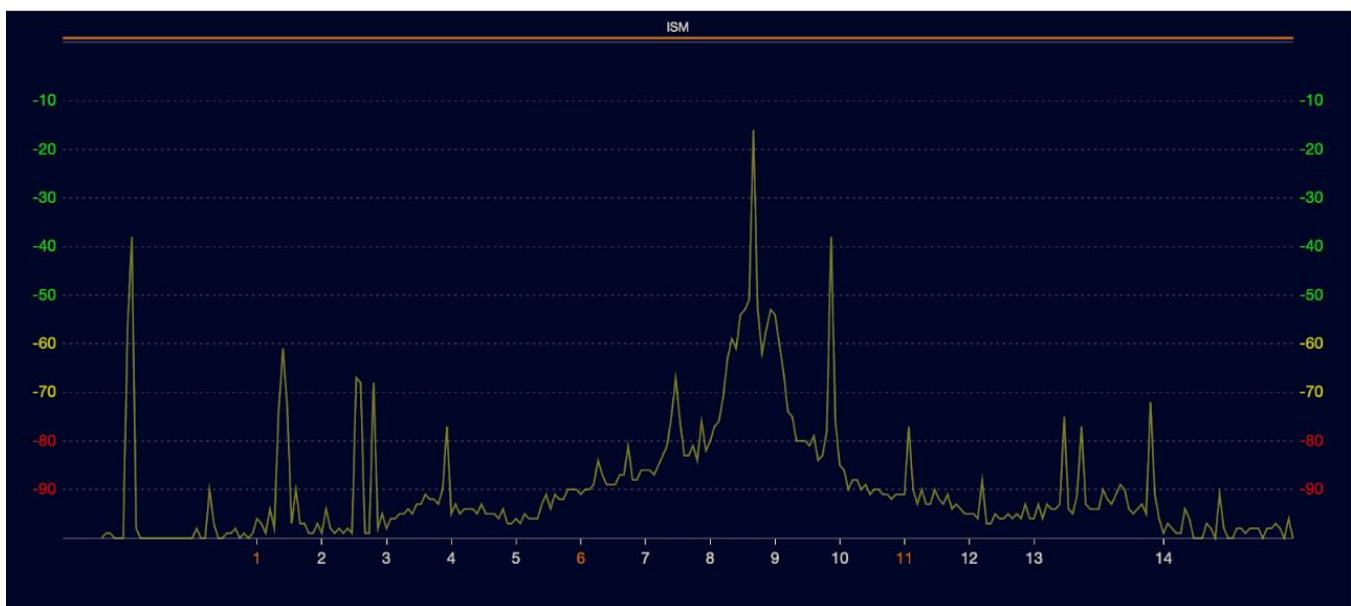


Figure 6-16 - Live trace

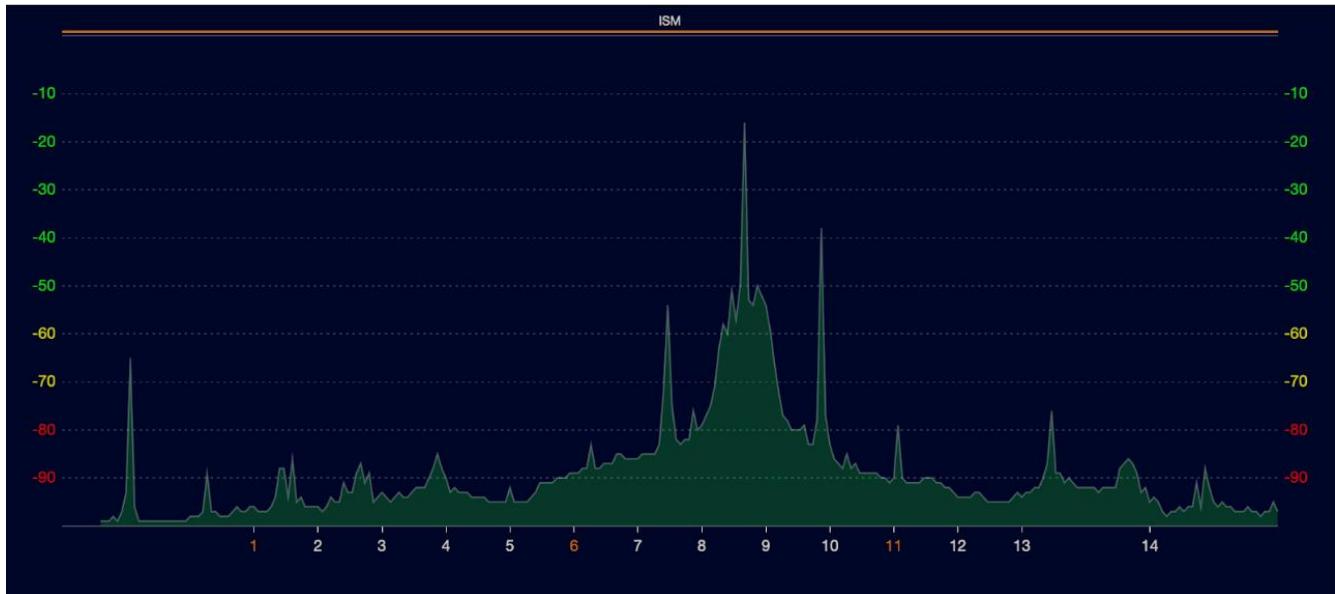


Figure 6-17 - Average trace

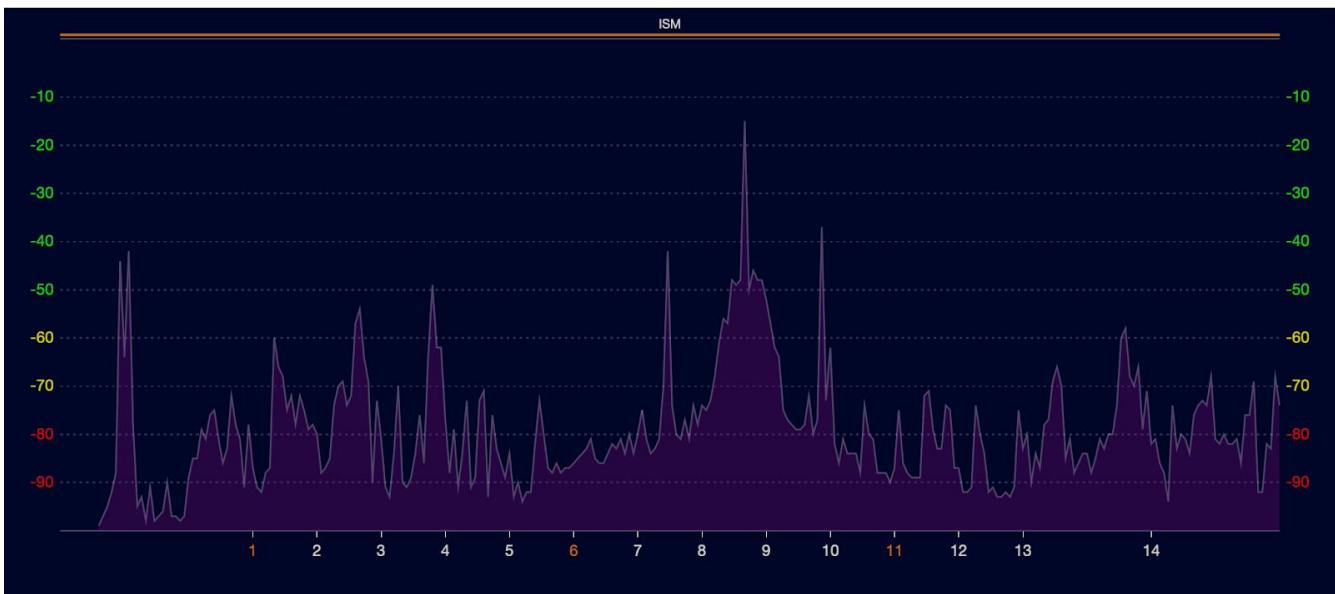


Figure 6-18 - Maximum trace

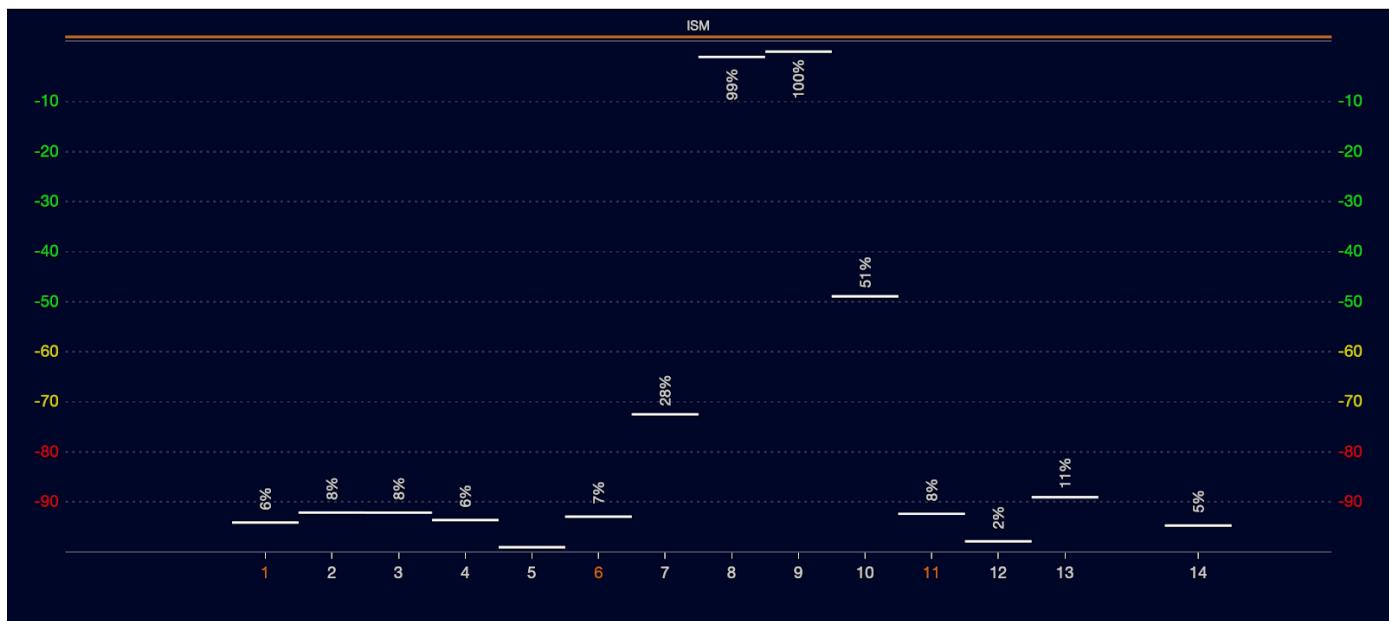


Figure 6-19 - Utilization trace

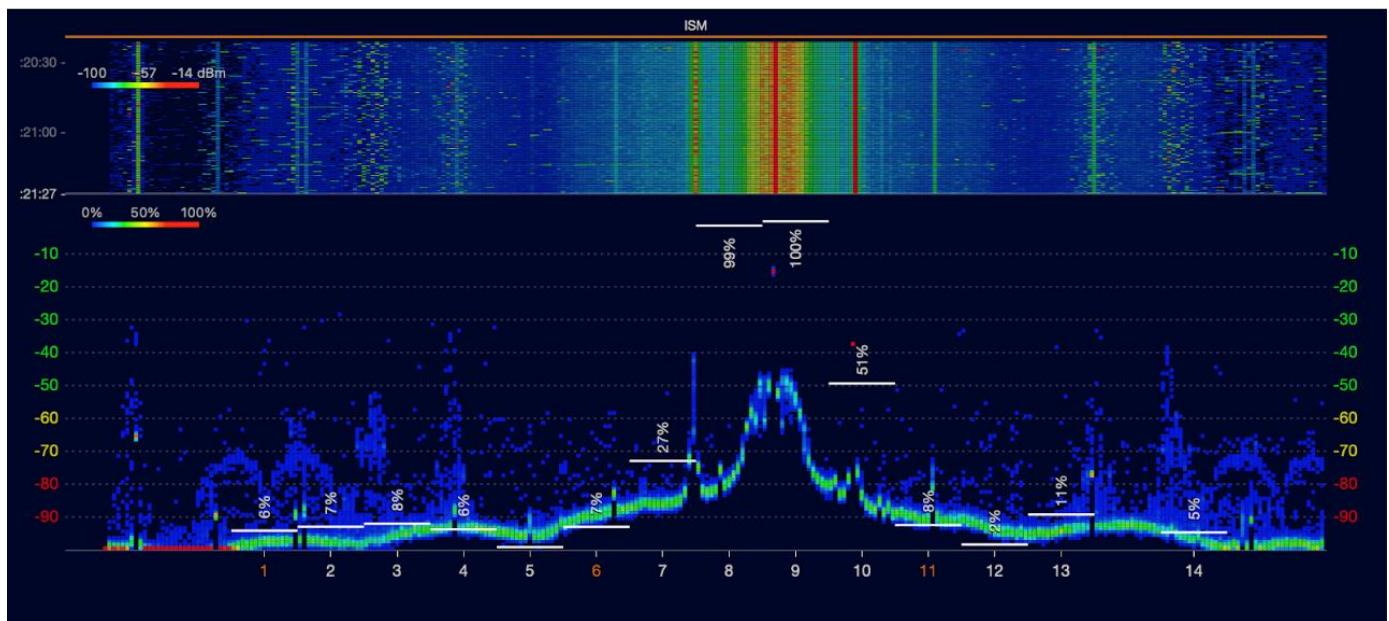


Figure 6-20 - Combined traces showing a wireless camera interferer

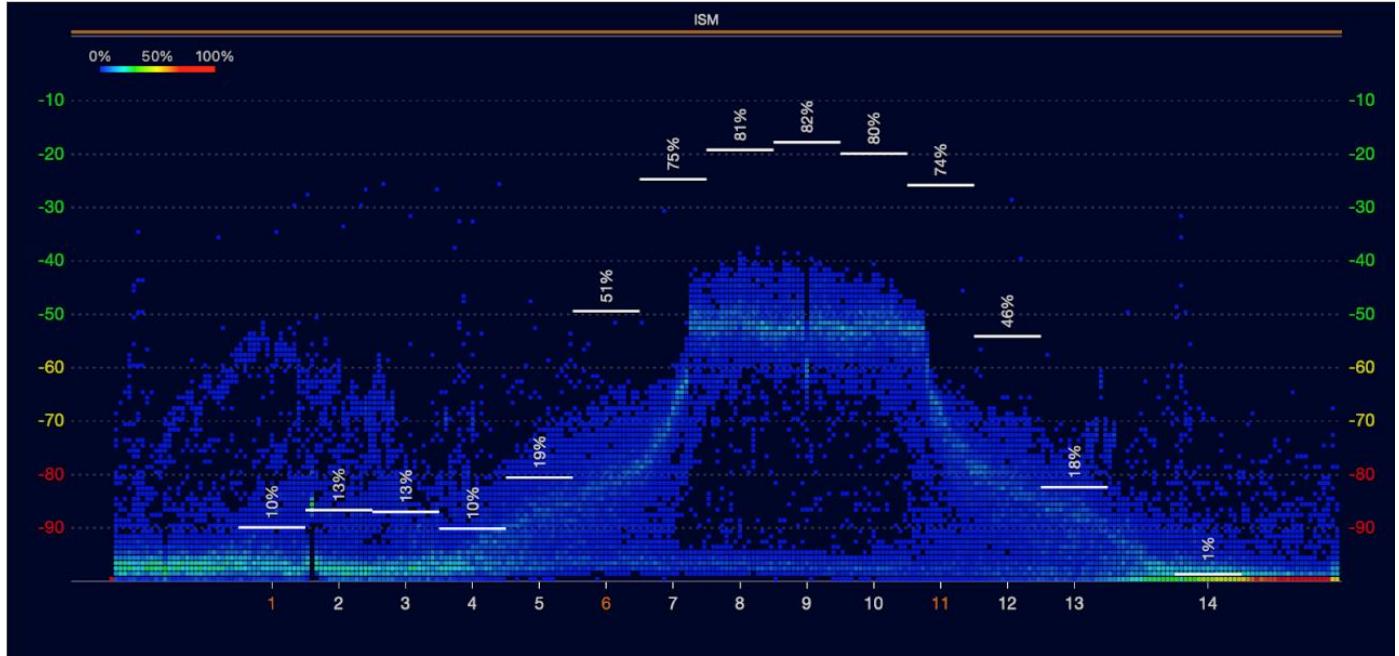


Figure 6-21 - 2.4 GHz WLAN density graph & utilization trace

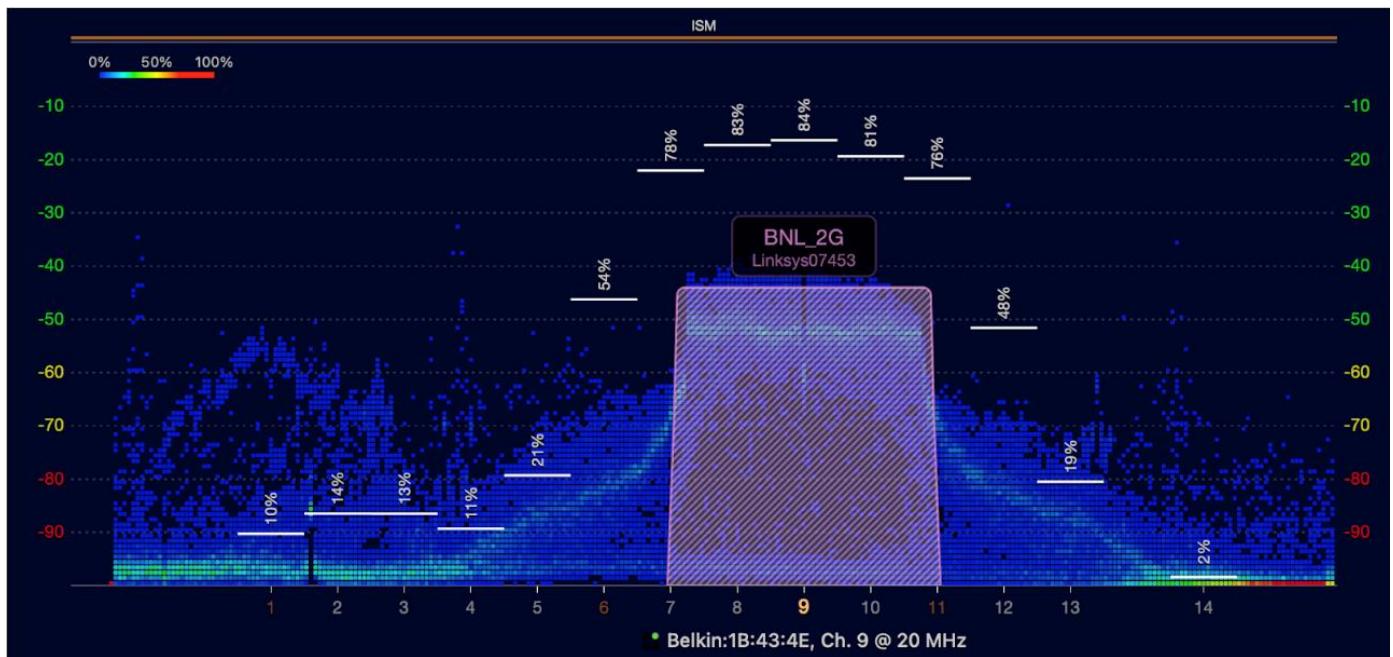


Figure 6-22 - 2.4 GHz WLAN density graph & utilization trace with network overlay

Chapter 7 - Bluetooth & Zigbee Data

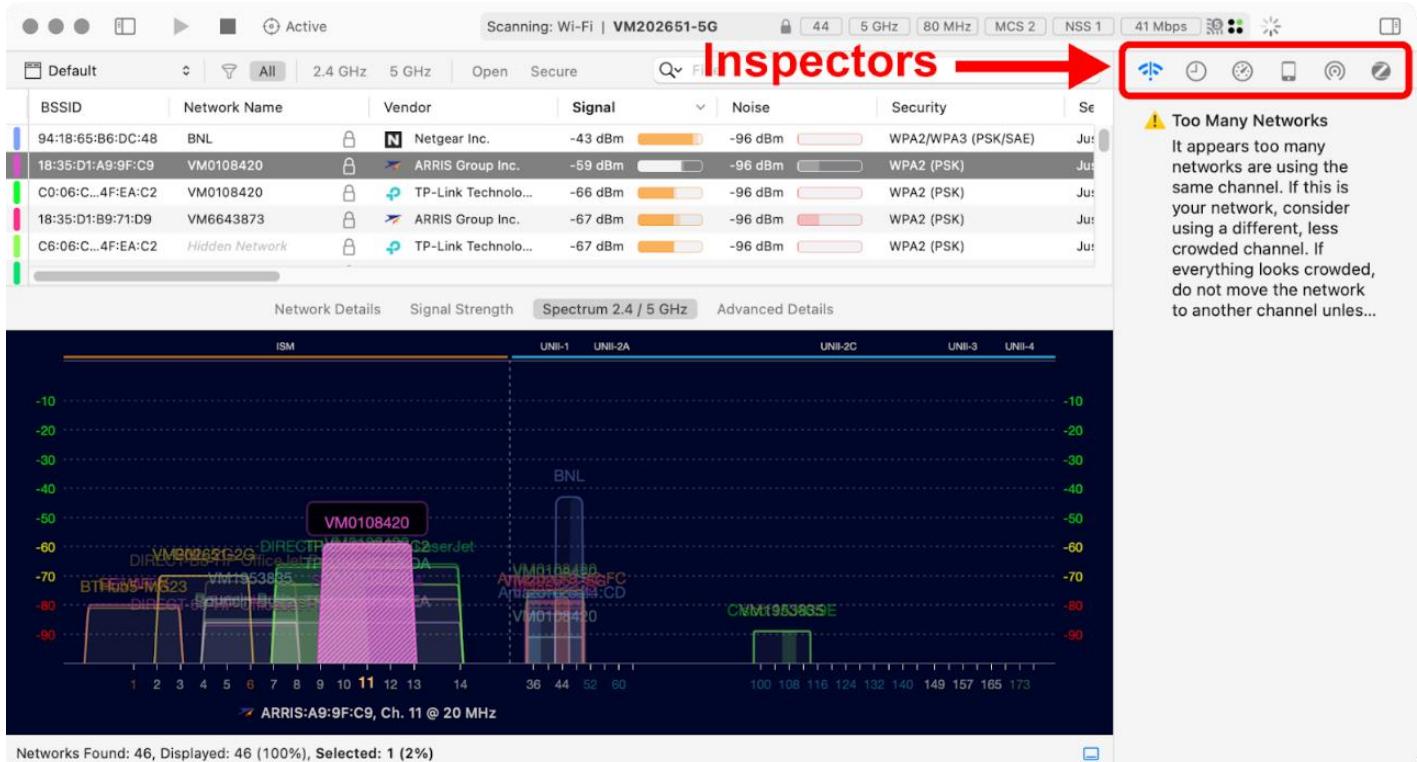


Figure 7-1 - WFE Pro 3 Inspectors panel

Proximity UUID	Protocol	Signal	Measured Power	Major	Minor
50765...613A492	iBeacon	-68 dBm	-50 dBm	2499	61507
2F2344...9FFA6	iBeacon	-64 dBm	-66 dBm	1	1
2F2344...9FFA6	AltBeacon	-64 dBm	-66 dBm	1	1
1CA92E...A4BF6	iBeacon	-72 dBm	3 dBm	5152	0
1CA92E...A4BF6	iBeacon	-62 dBm	3 dBm	5151	0

Figure 7-2 - Proximity beacon inspector

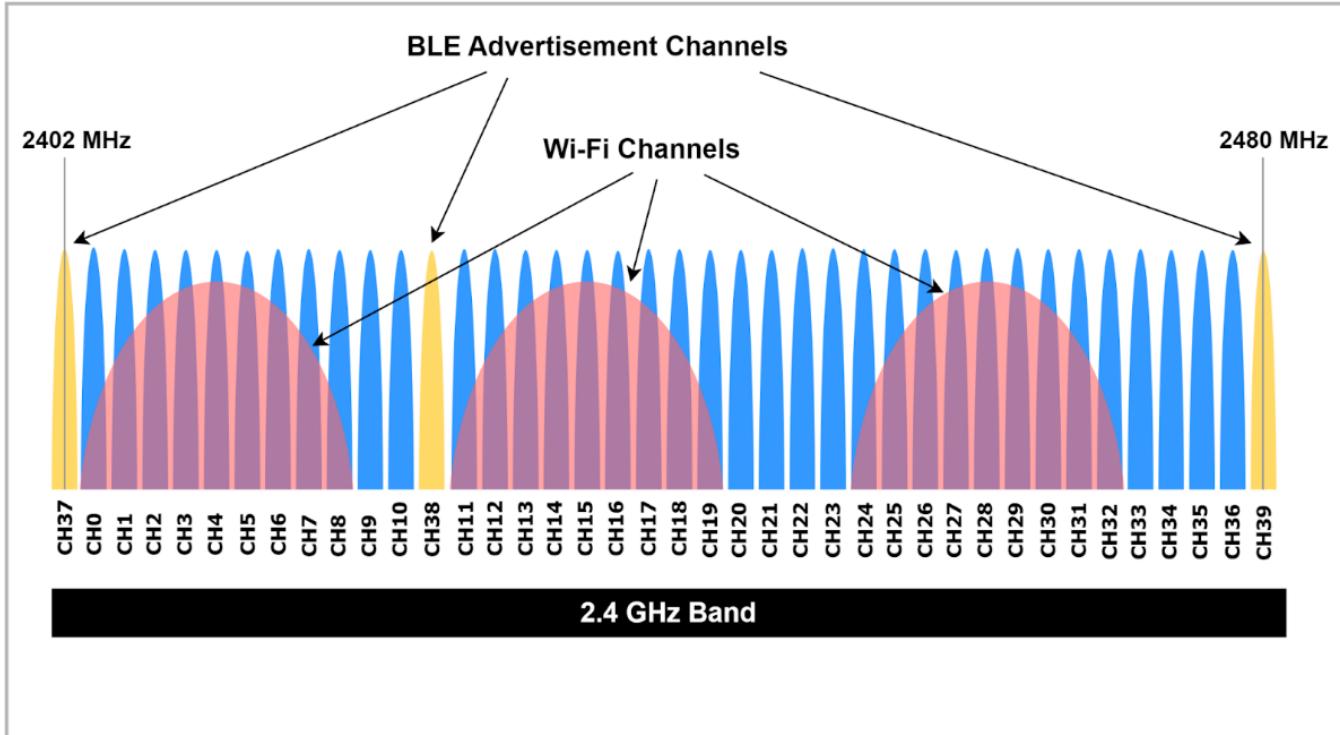


Figure 7-3 - 2.4GHz band showing BLE channels with Wi-Fi band overlaid

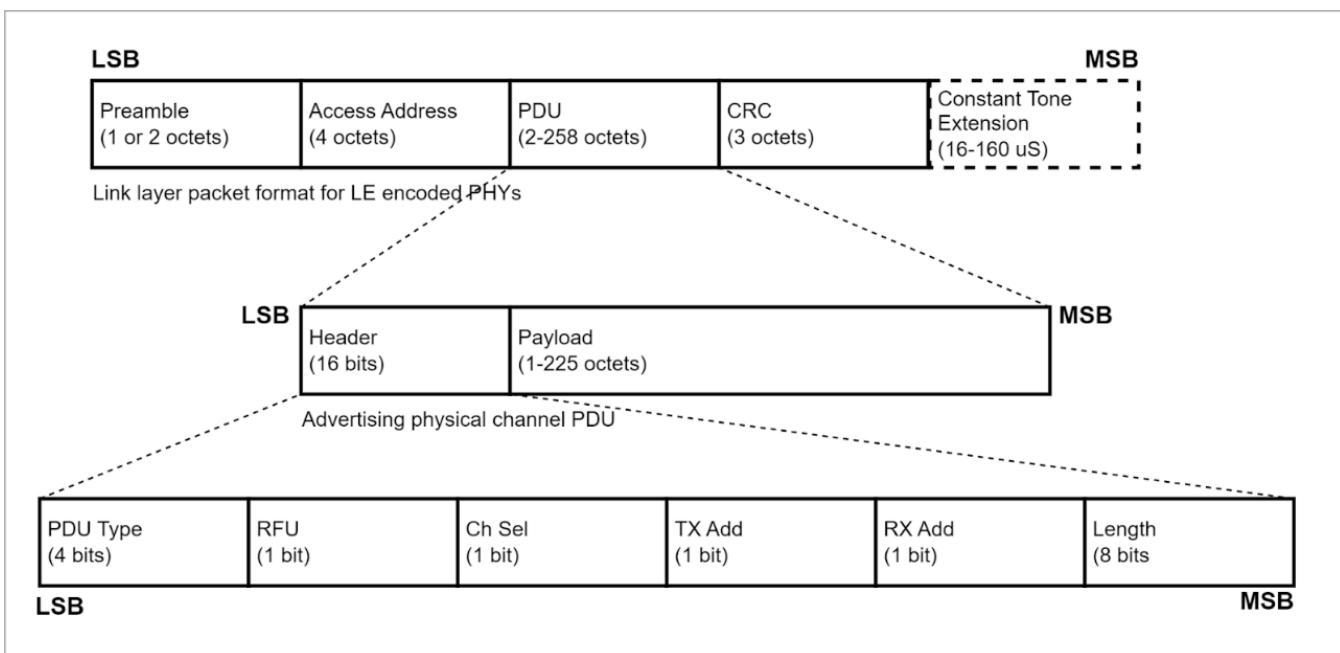


Figure 7-4 - BLE PDU details

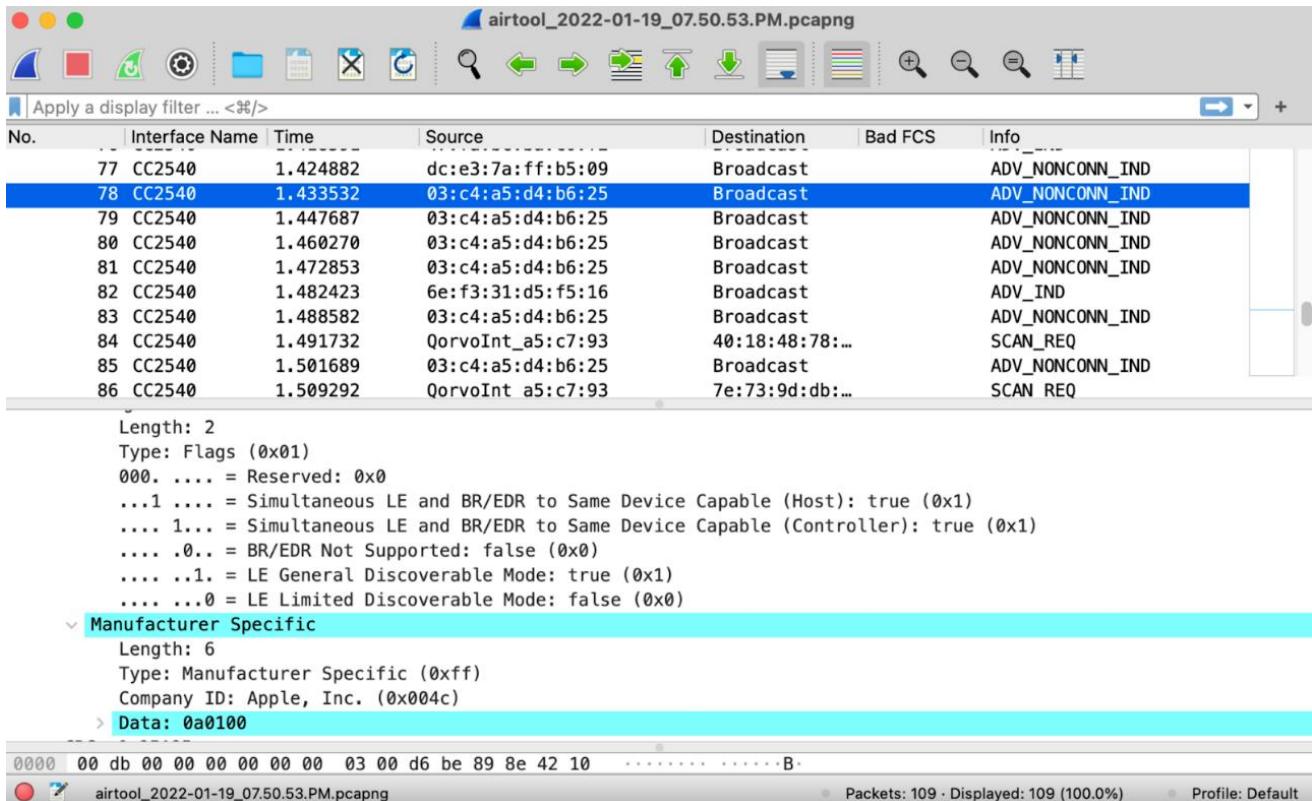


Figure 7-5 - A capture showing BLE advertisements

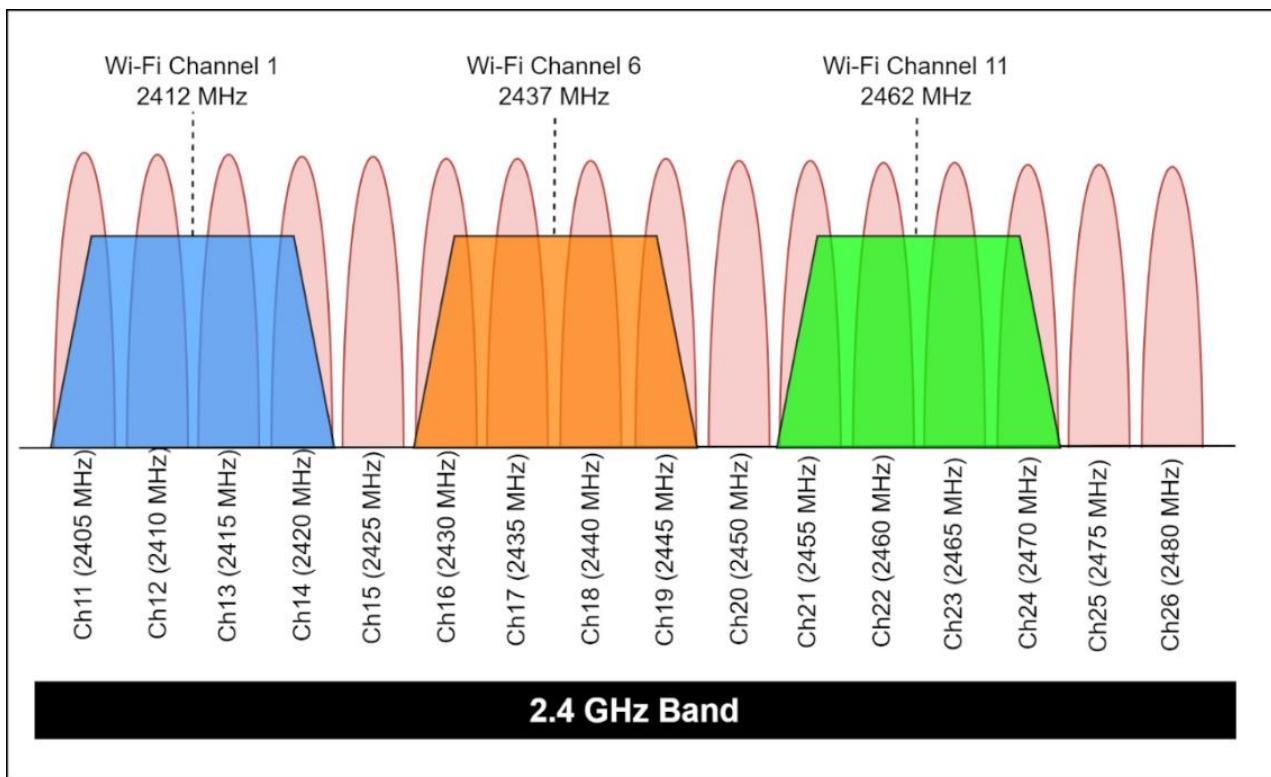


Figure 7-6 - Zigbee channel plan

WiFi Explorer Pro 3: The Definitive User Guide

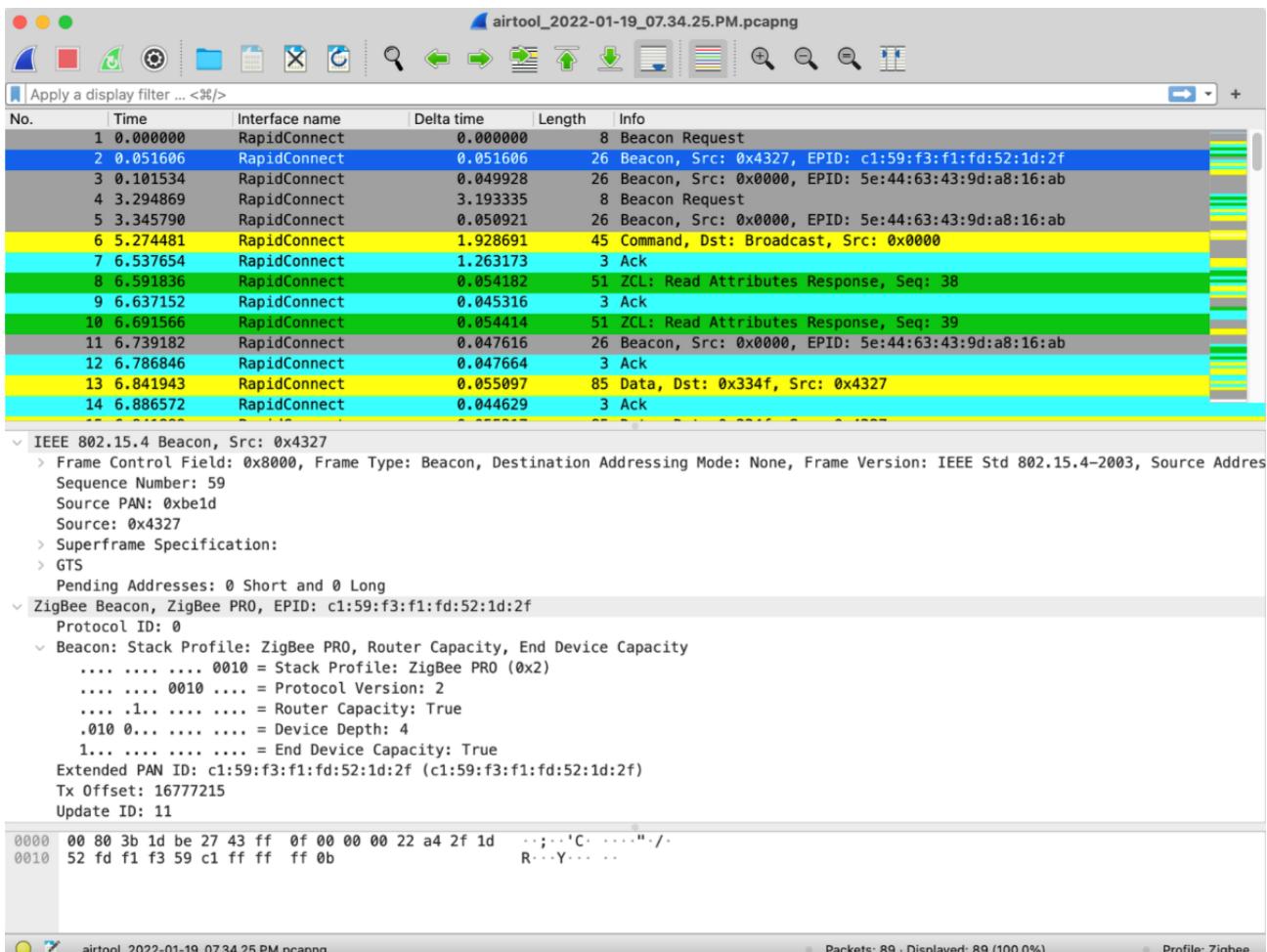


Figure 7-7 - A capture showing a Zigbee beacons

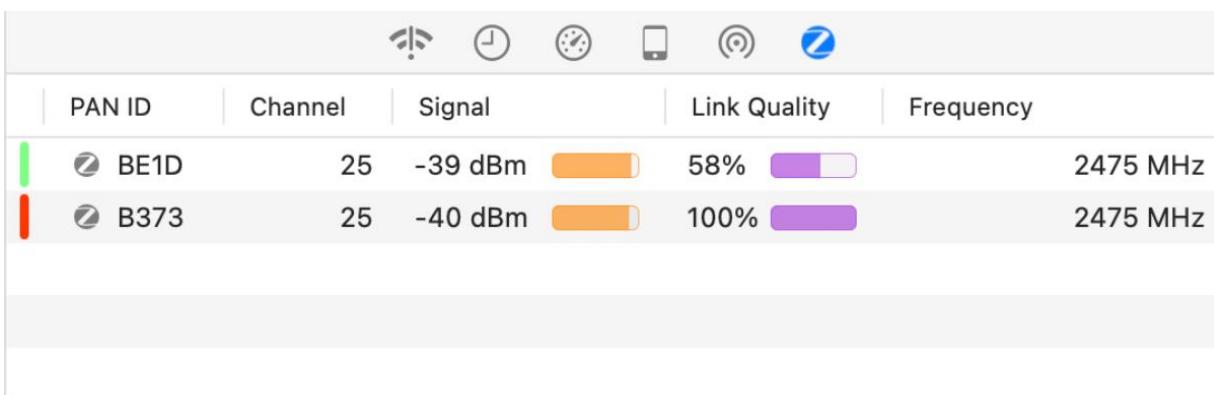


Figure 7-8 - Zigbee network discovery

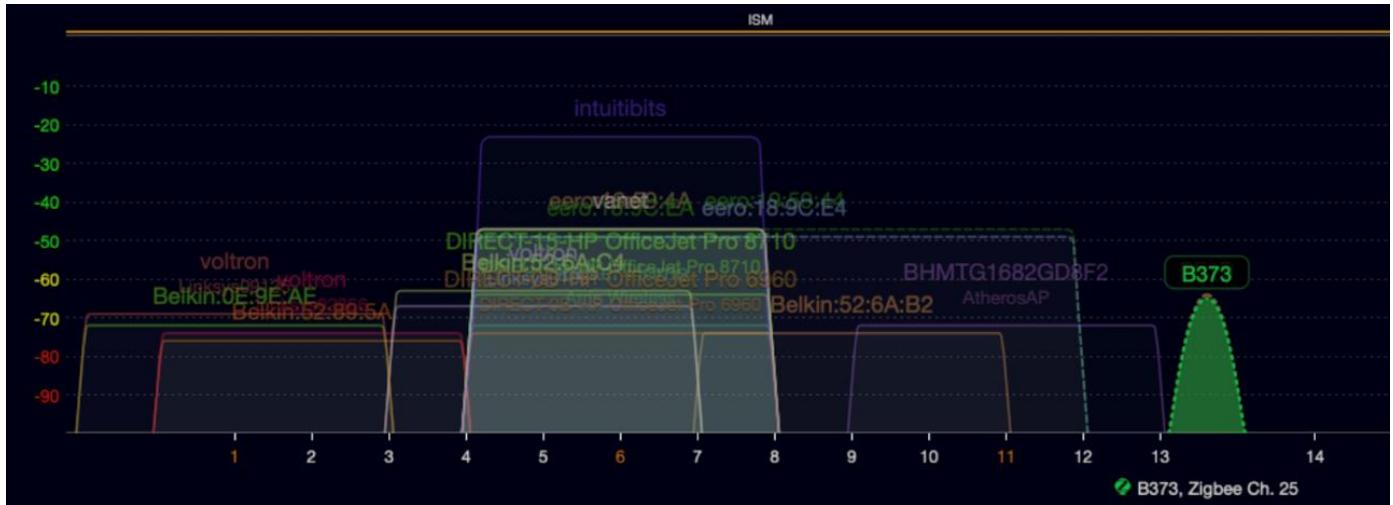


Figure 7-9 - Zigbee network overlaid on Wi-Fi networks

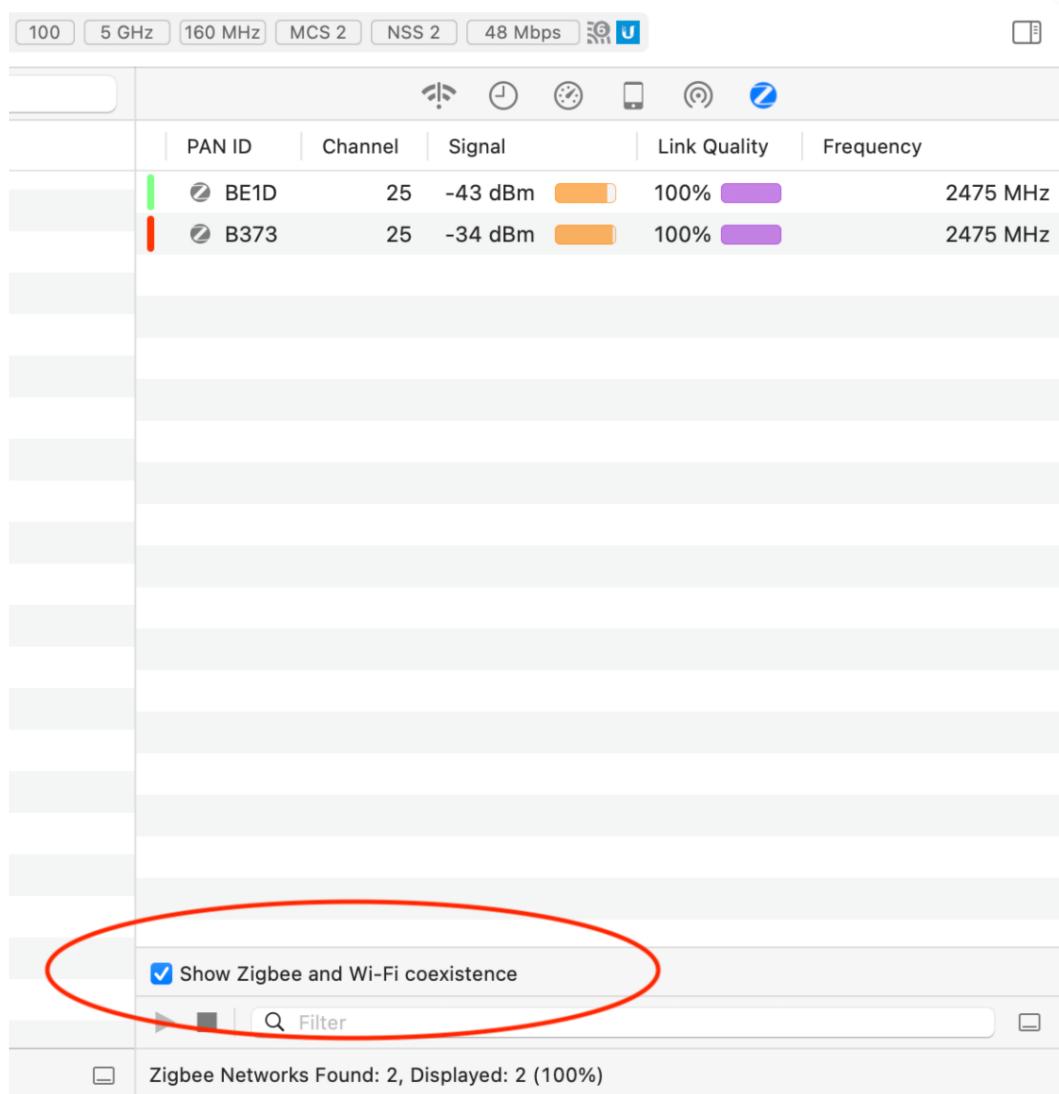


Figure 7-10 - Control to enable/disable Zigbee overlay on Wi-Fi networks



Figure 7-11 - The RapidConnect Zigbee Smart Energy USE Stick

Chapter 8 - WiFi Explorer Pro 3 UI Tour

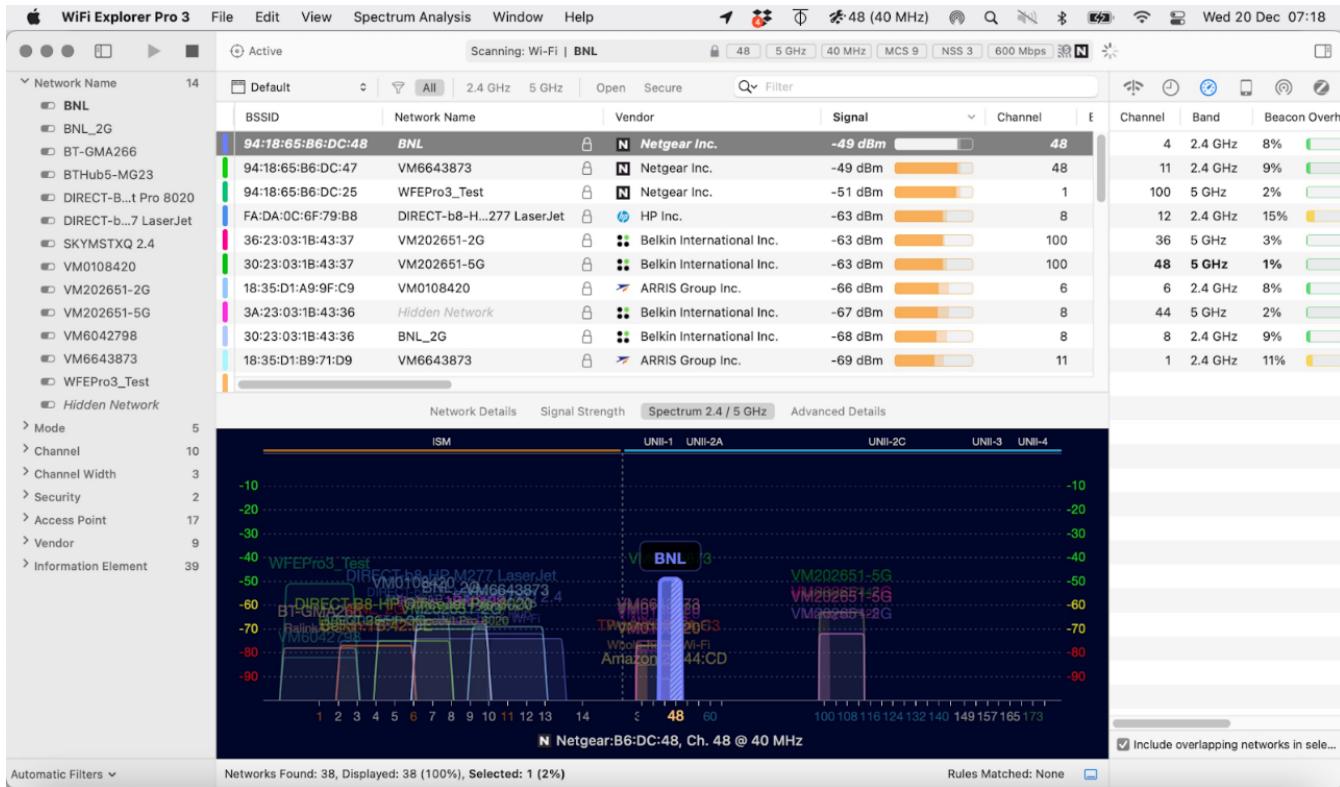


Figure 8-1 - WFE Pro 3's user interface

WiFi Explorer Pro 3: The Definitive User Guide

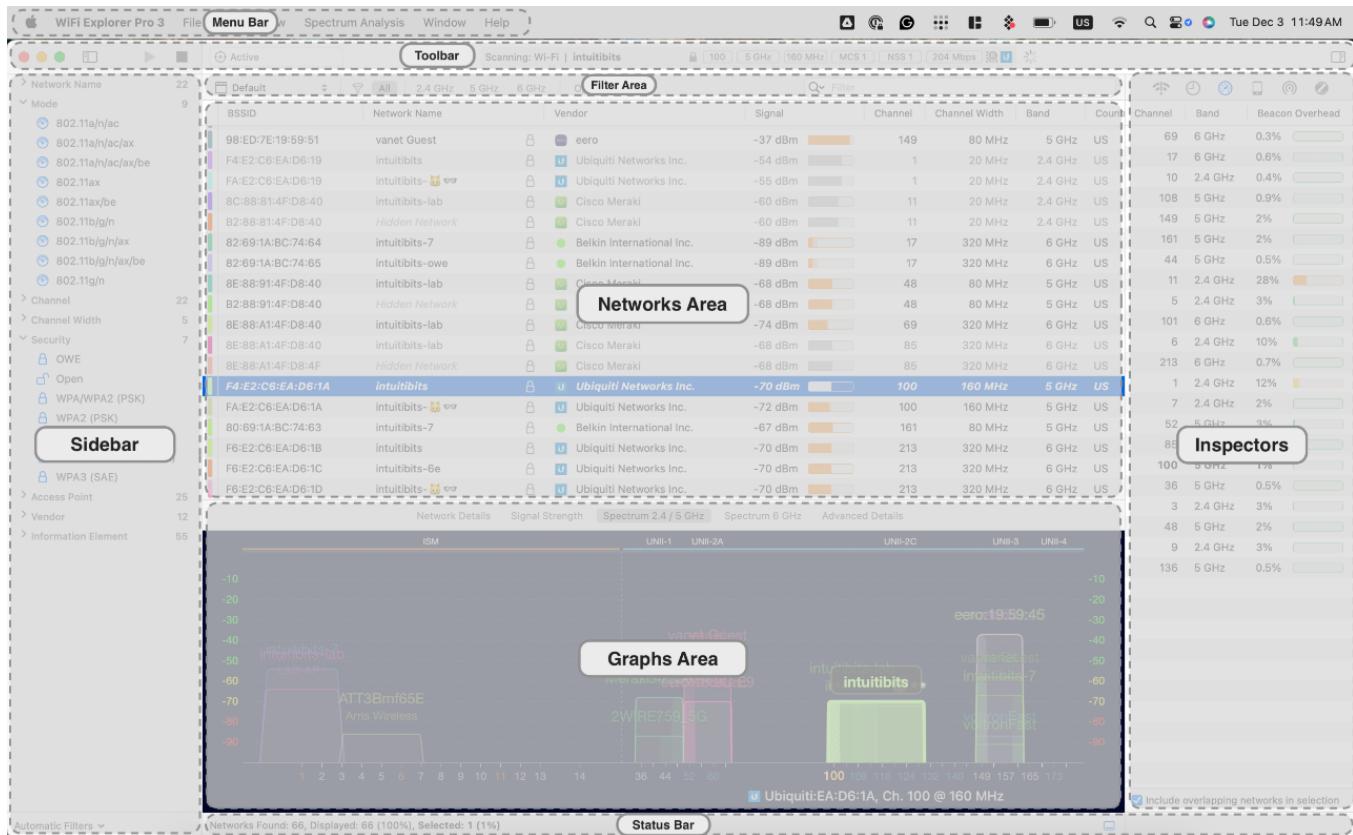


Figure 8-2 - WFE Pro 3's user interface areas

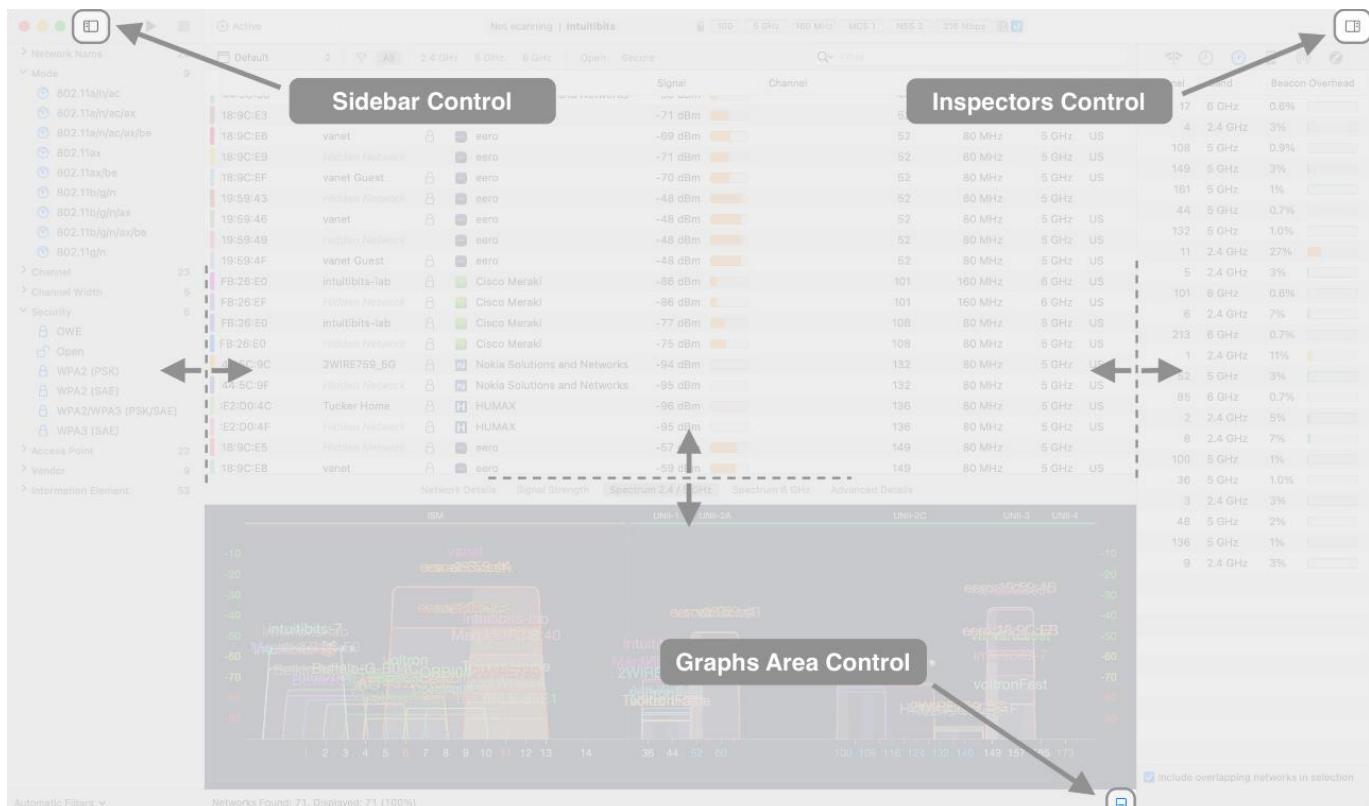


Figure 8-3 - WFE Pro 3's UI area reveal/hide controls

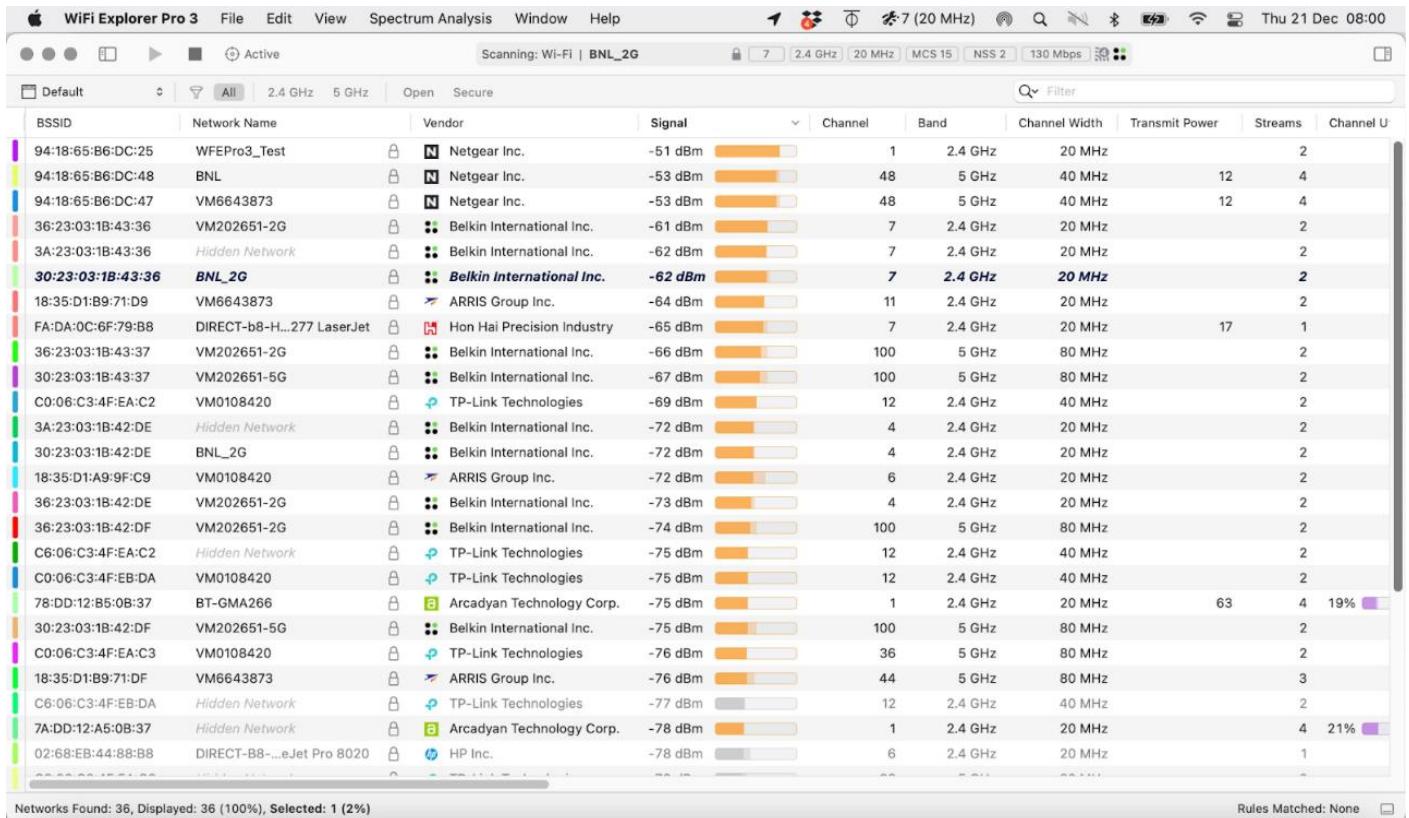


Figure 8-4 - WFE Pro 3's UI with sidebar, inspectors, and graphs areas hidden

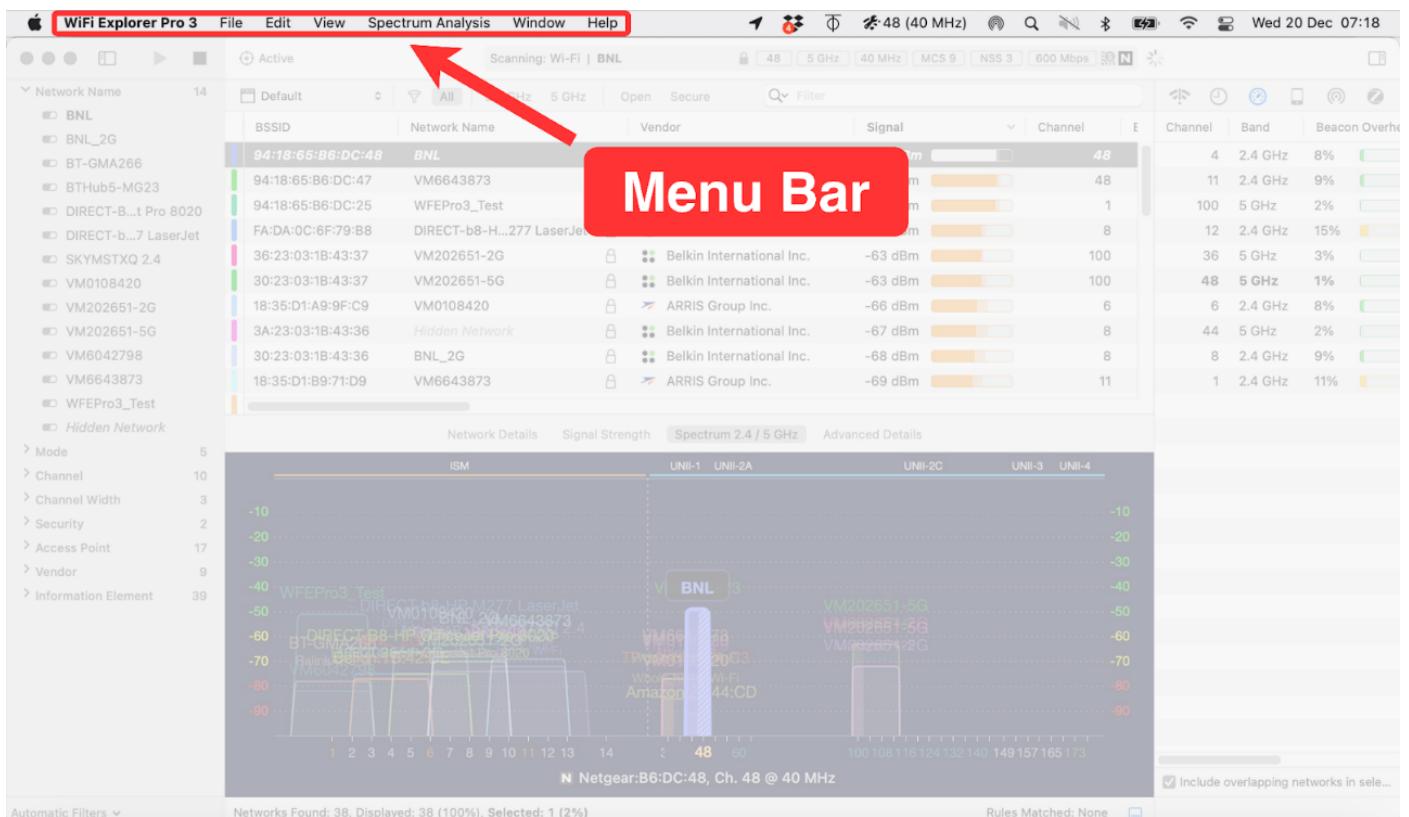


Figure 8-5 - WFE Pro 3 menu bar UI location

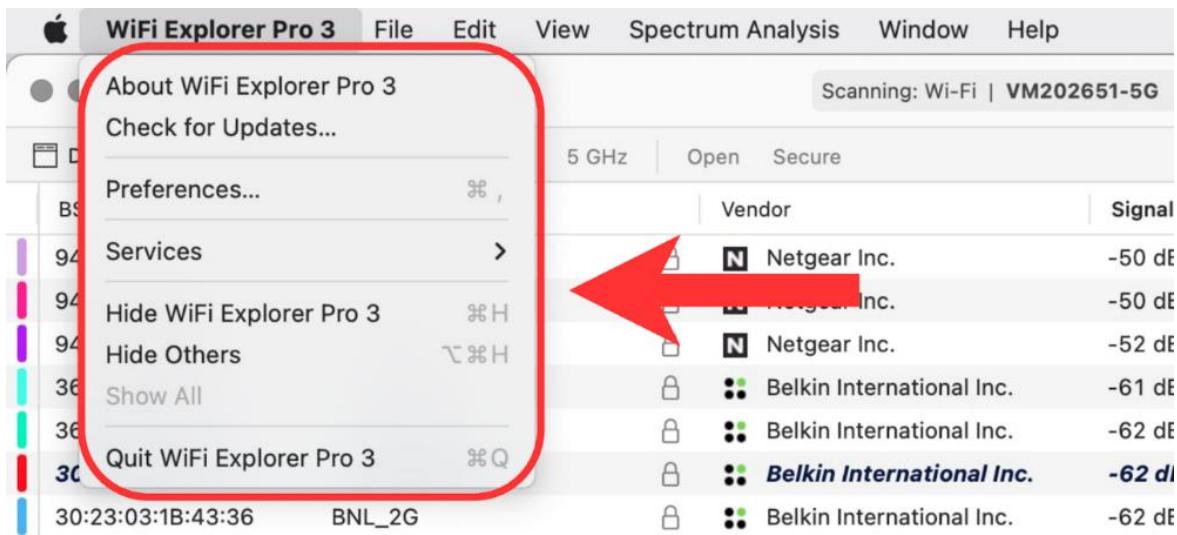


Figure 8-6 - WFE Pro 3 menu bar item

Each of the options is detailed in the table below.

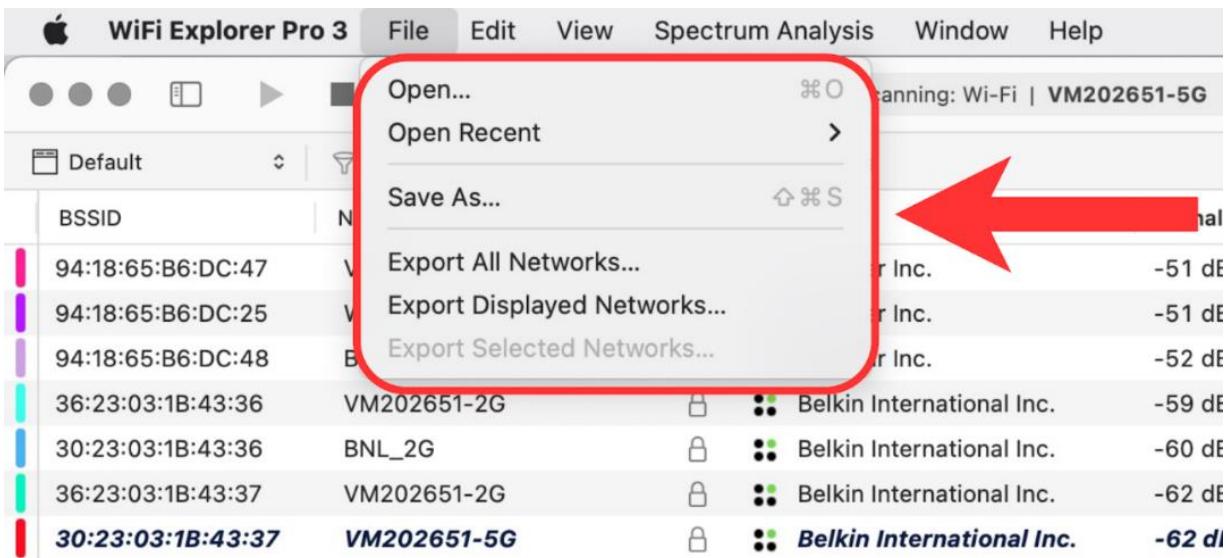


Figure 8-7 - File menu bar item

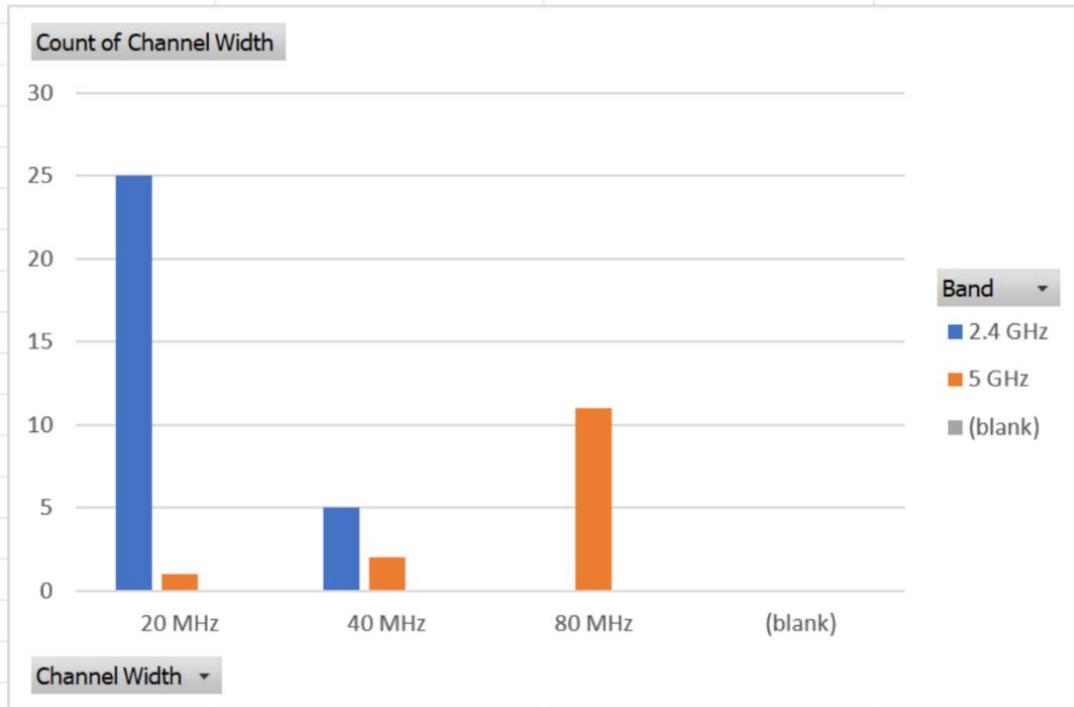


Figure 8-8 - Sample report created from exported CSV data using Excel

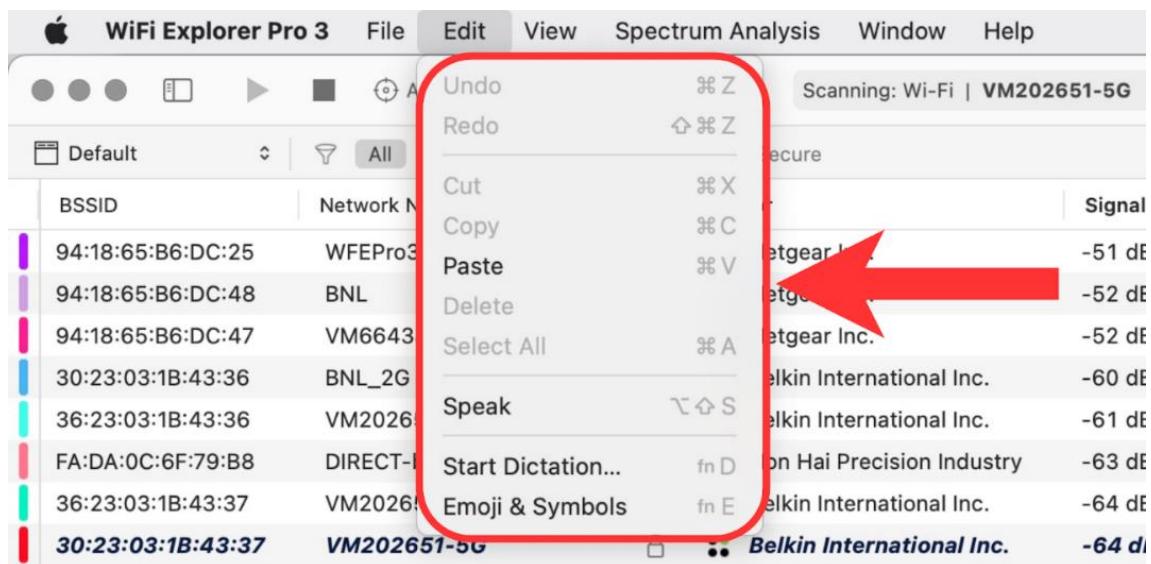


Figure 8-9 Edit menu bar item

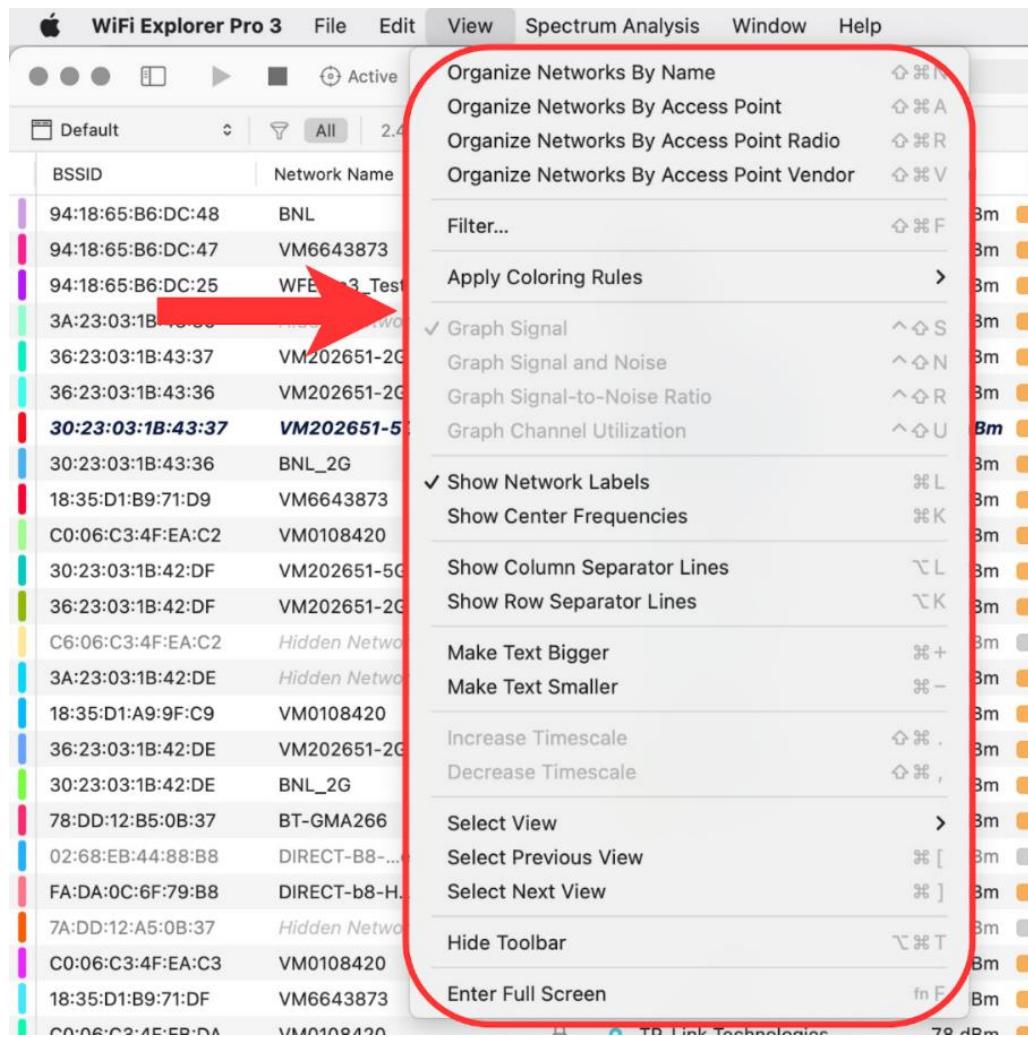


Figure 8-10 - View menu bar item

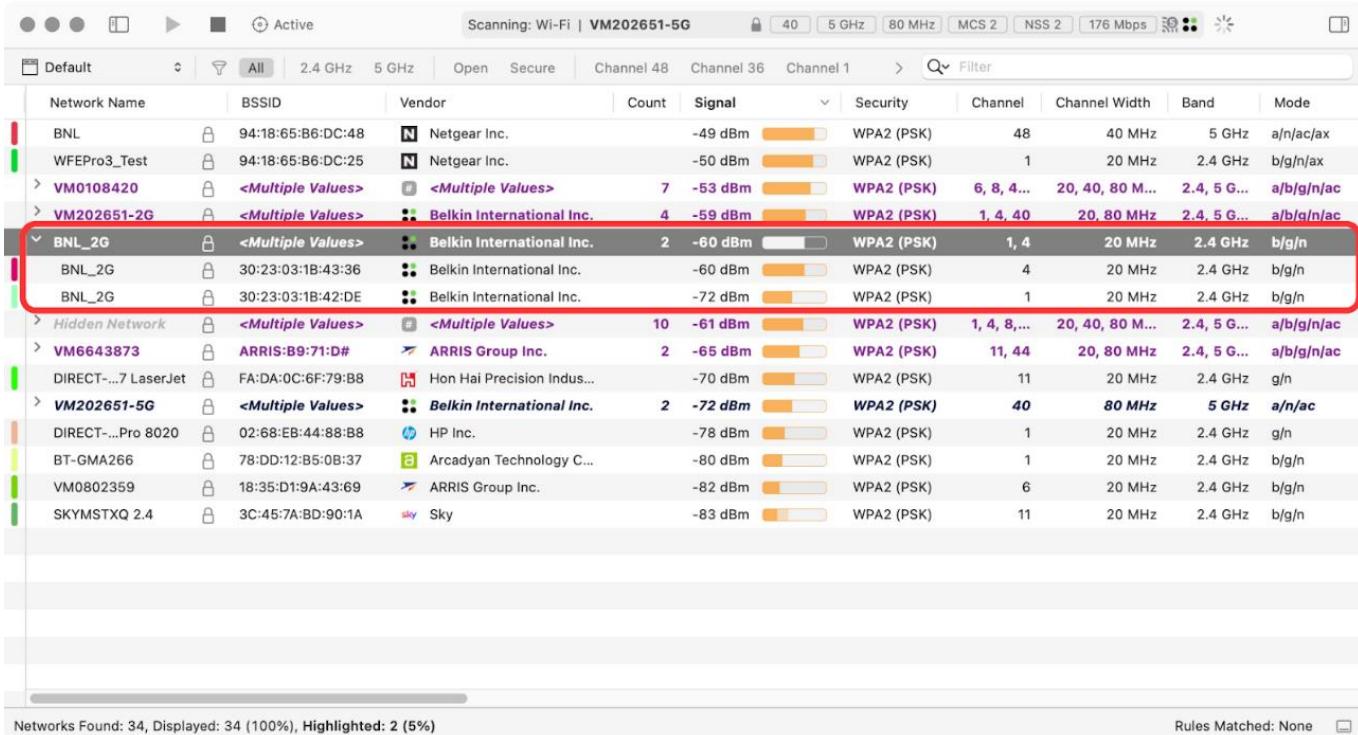


Figure 8-11 - Networks organized by name

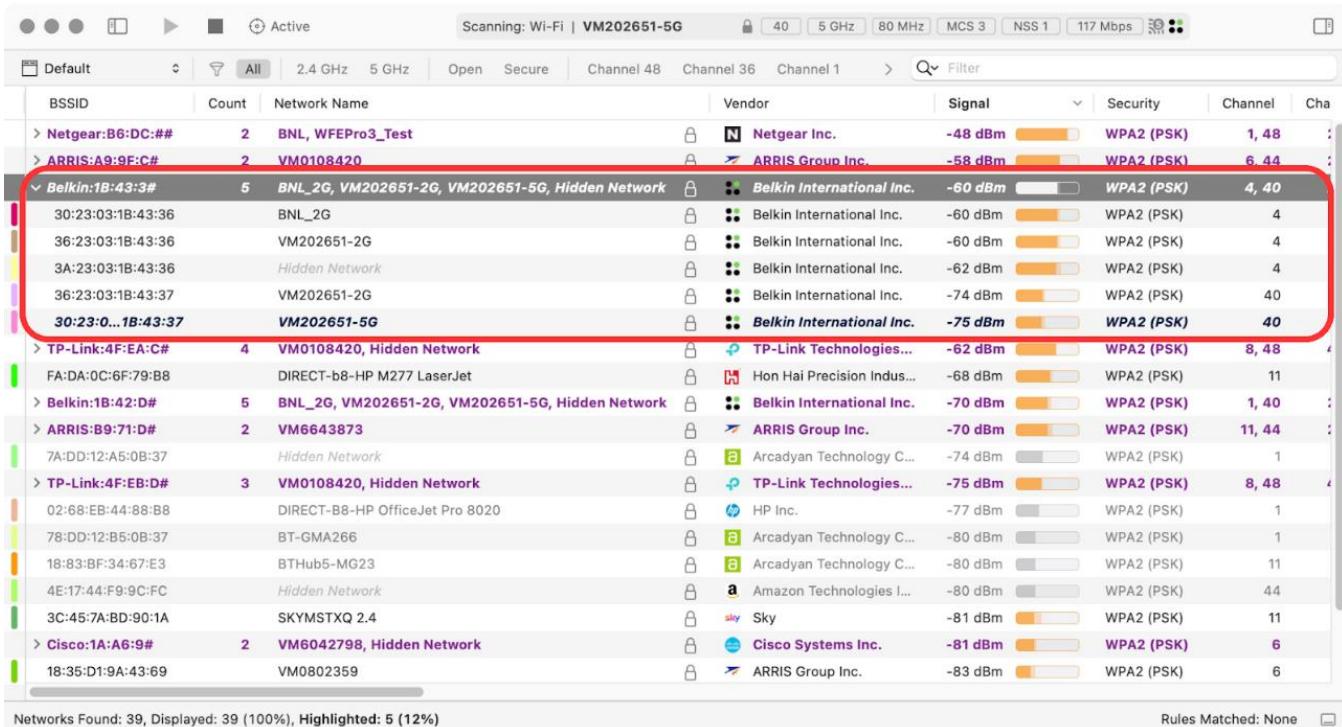


Figure 8-12 - Networks organized by access point

WiFi Explorer Pro 3: The Definitive User Guide

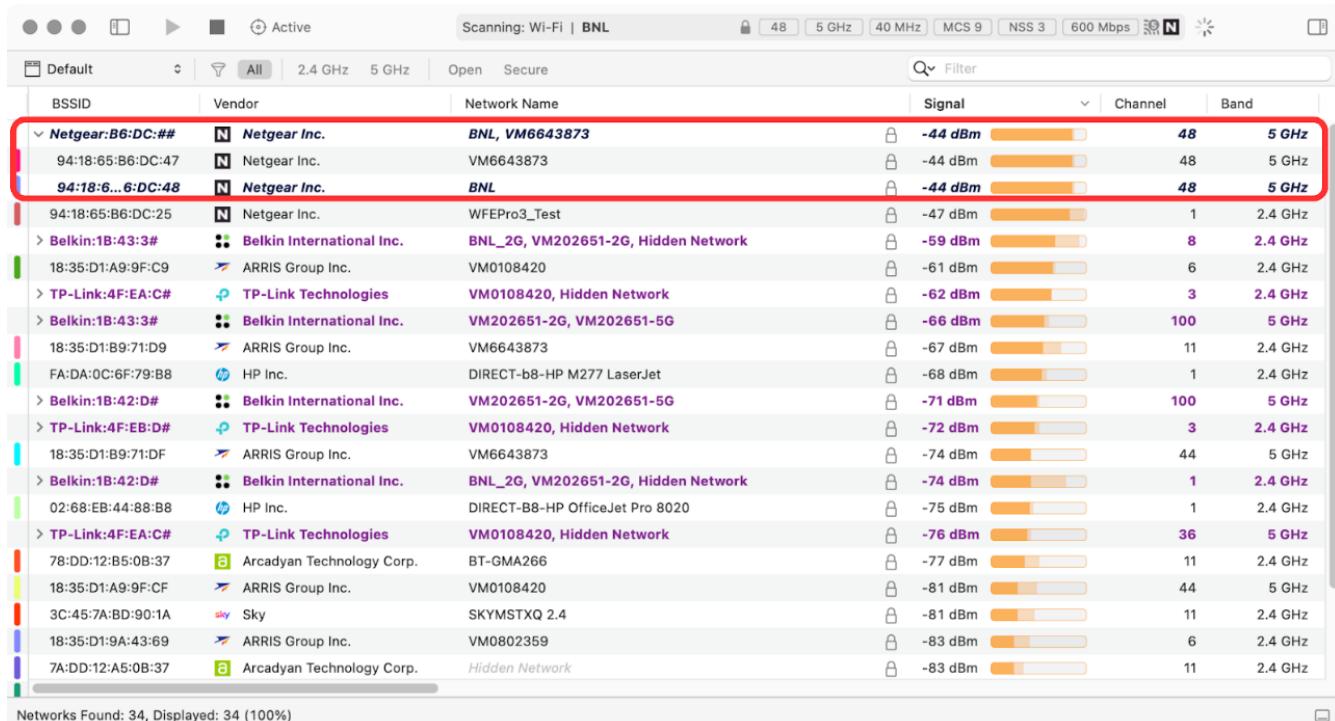


Figure 8-13 - Networks organized by access point radio

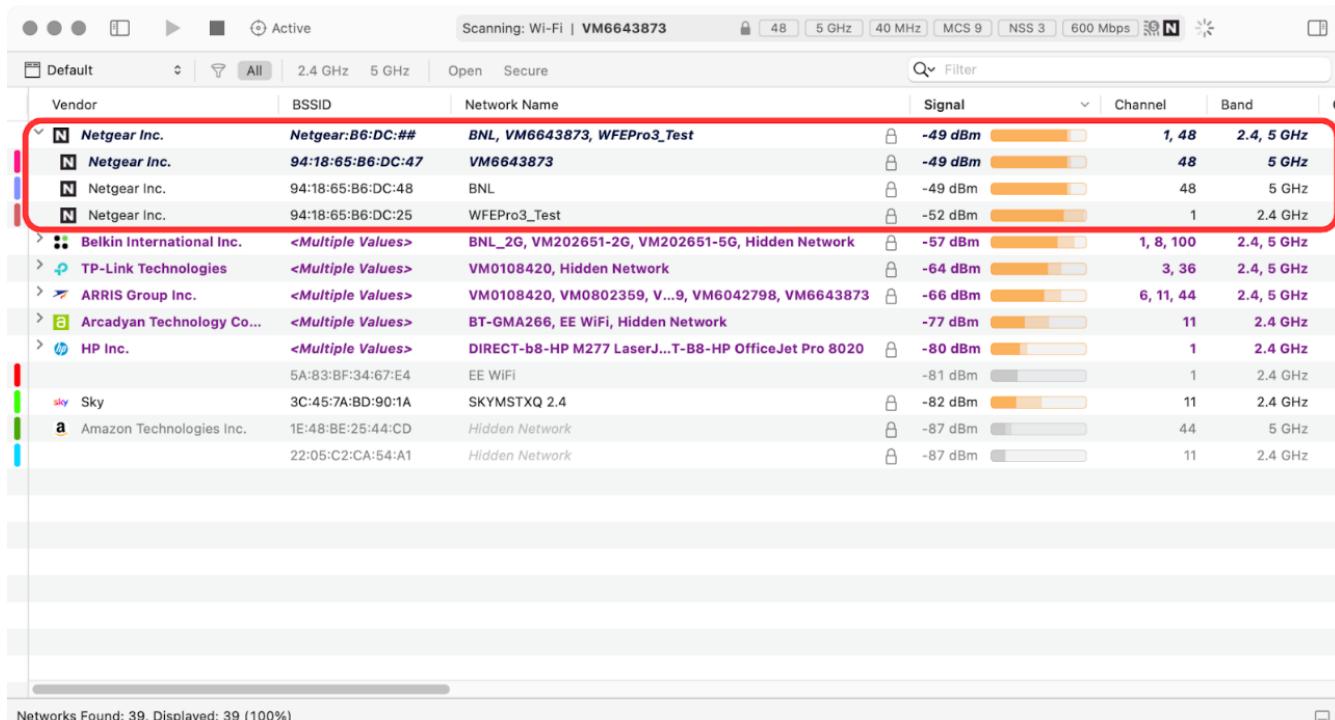


Figure 8-14 - Networks organized by access point radio

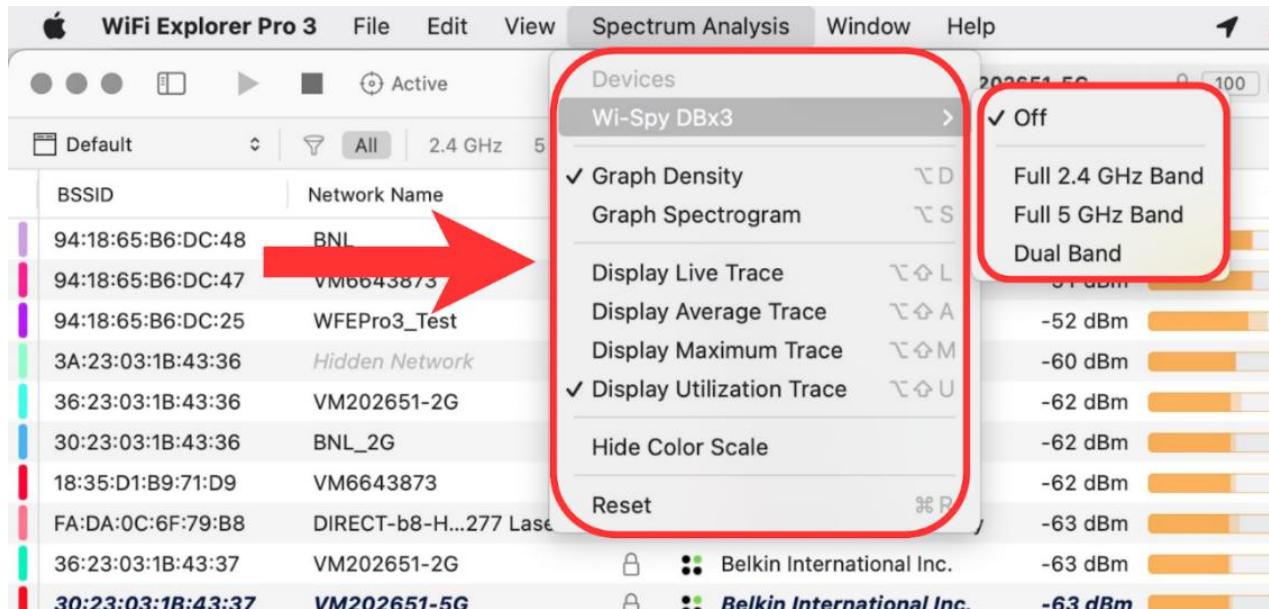


Figure 8-15 - Spectrum Analysis menu items

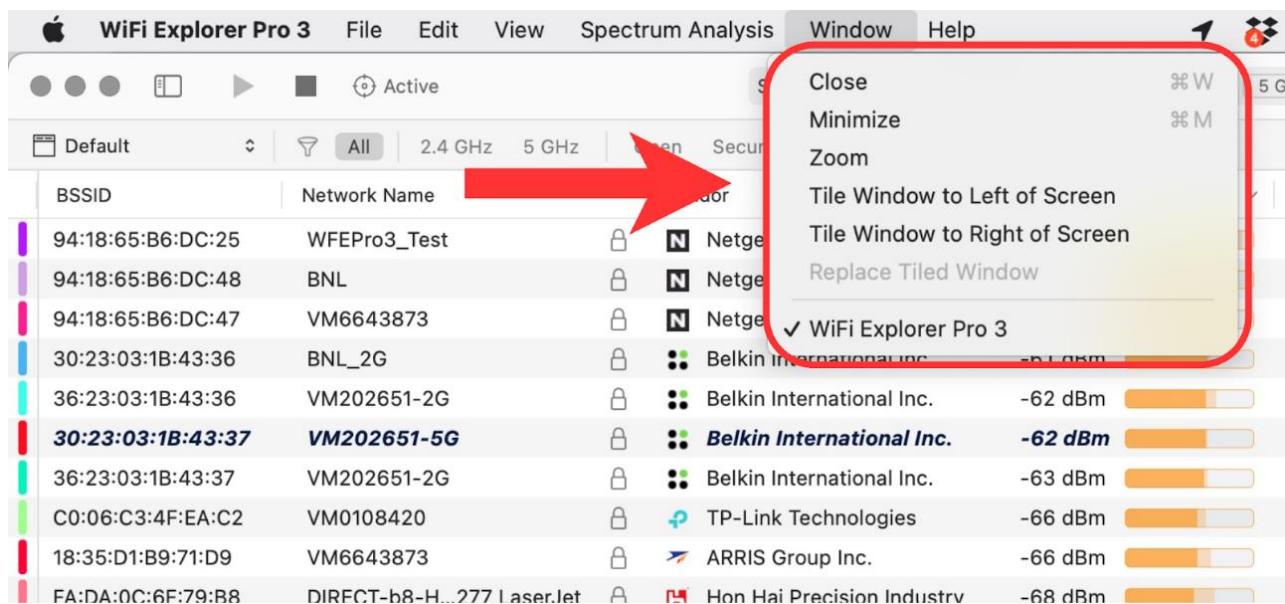


Figure 8-16 - Window menu items

WiFi Explorer Pro 3: The Definitive User Guide

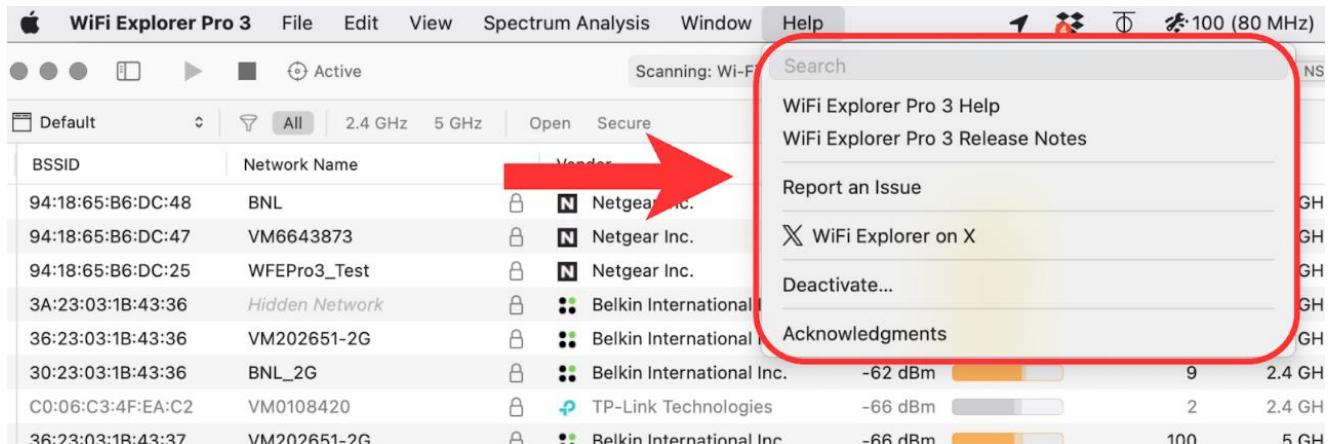


Figure 8-17 - Help menu items

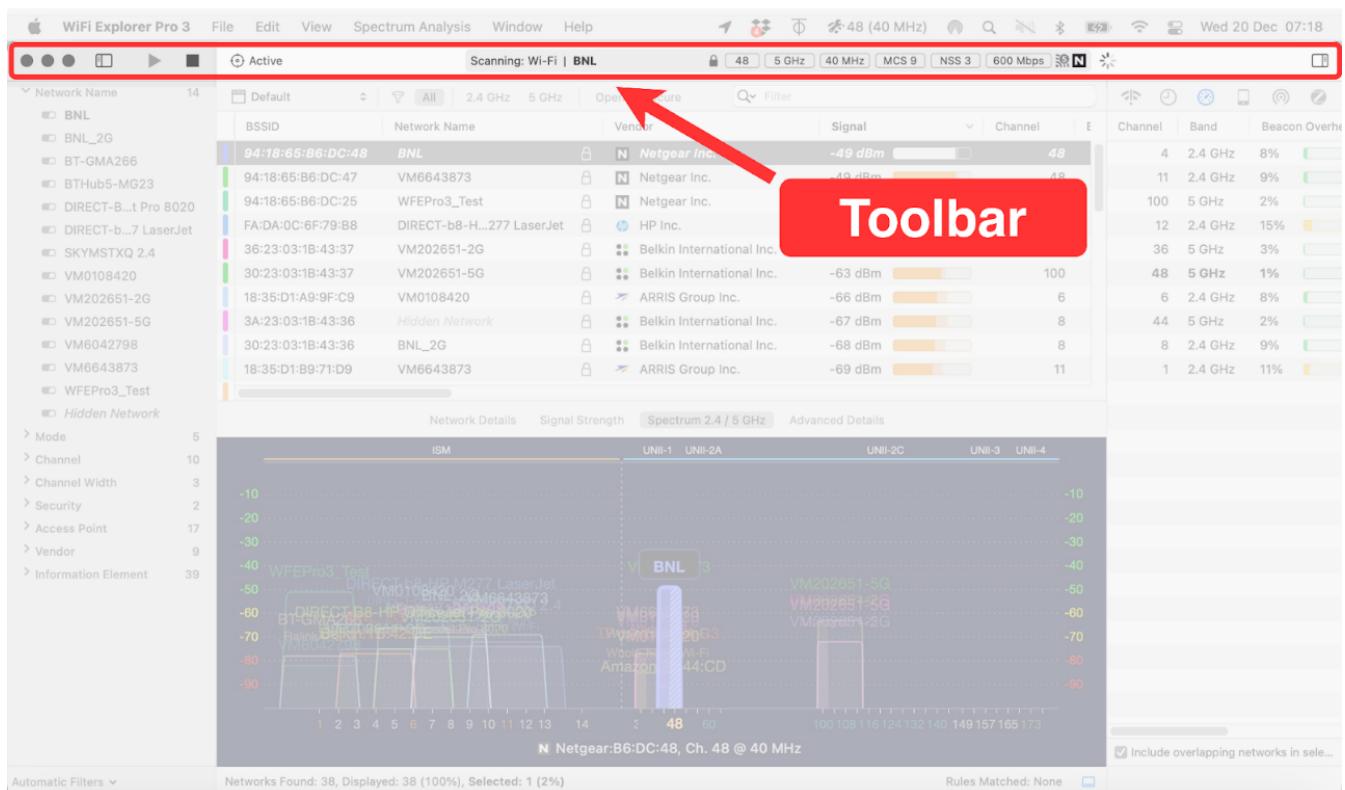


Figure 8-18 - Toolbar UI location

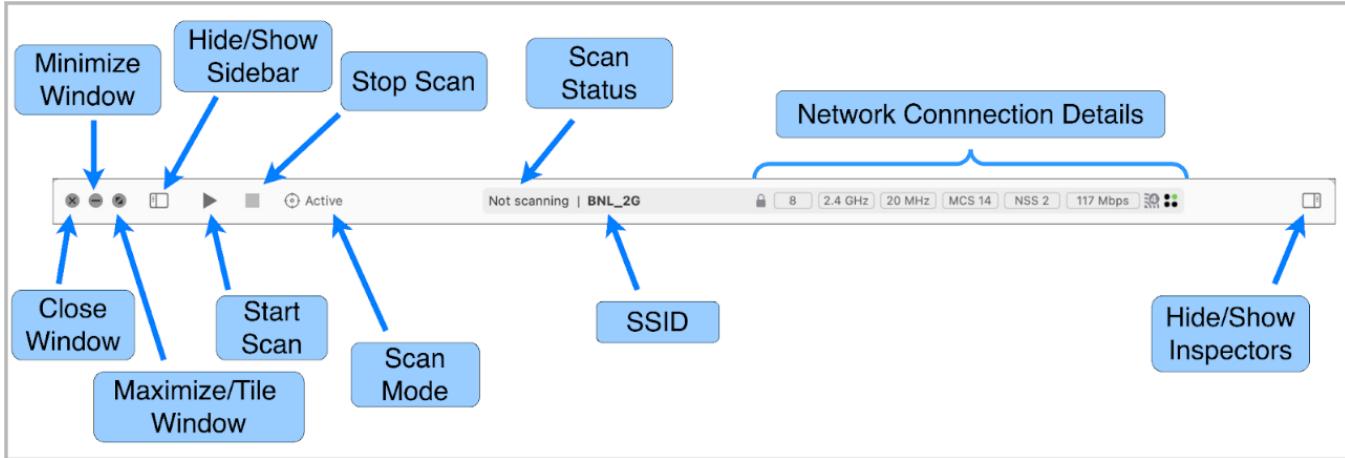


Figure 8-19 - Toolbar Details

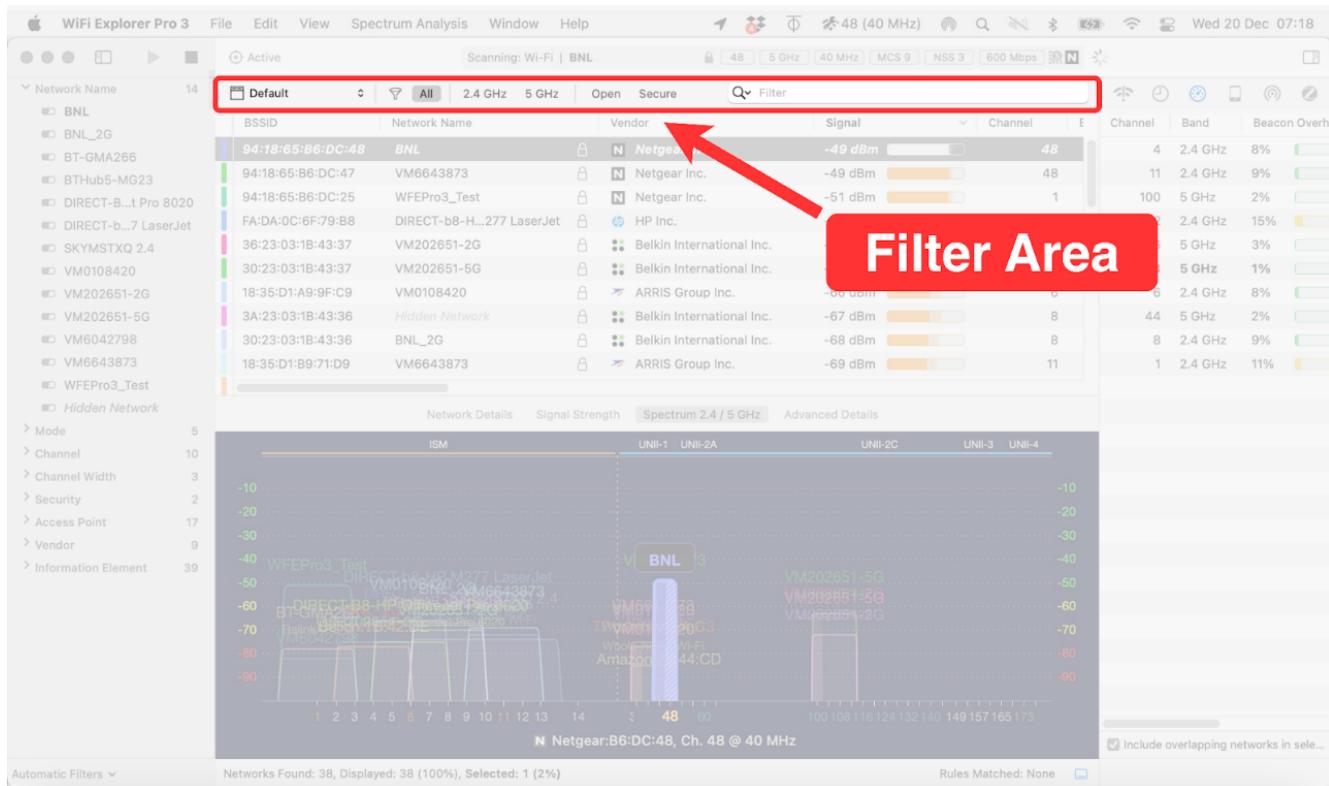


Figure 8-20 - Filter Area UI location

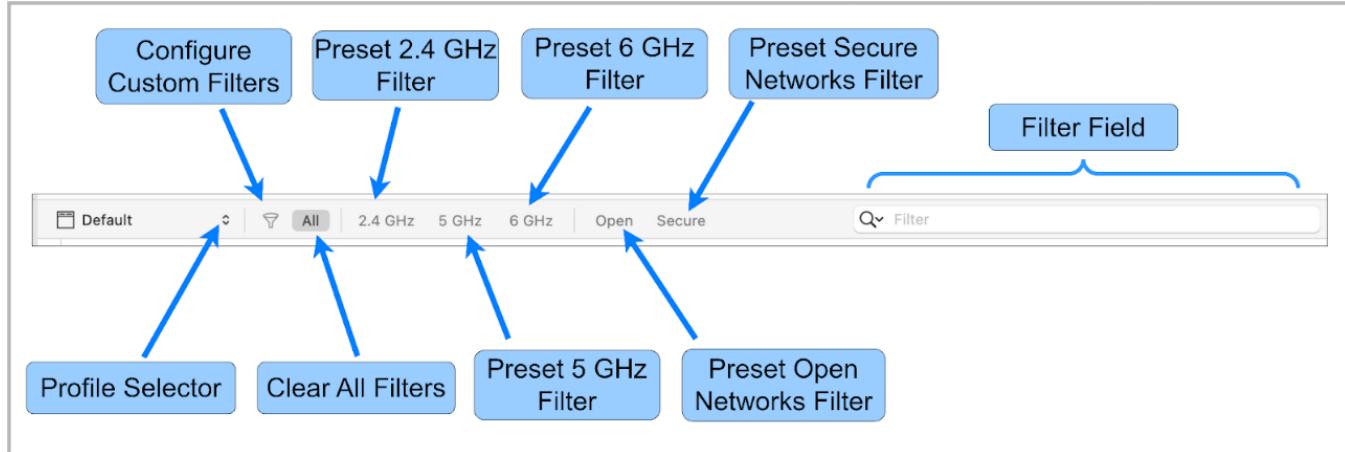


Figure 8-21 - Filter Area Details

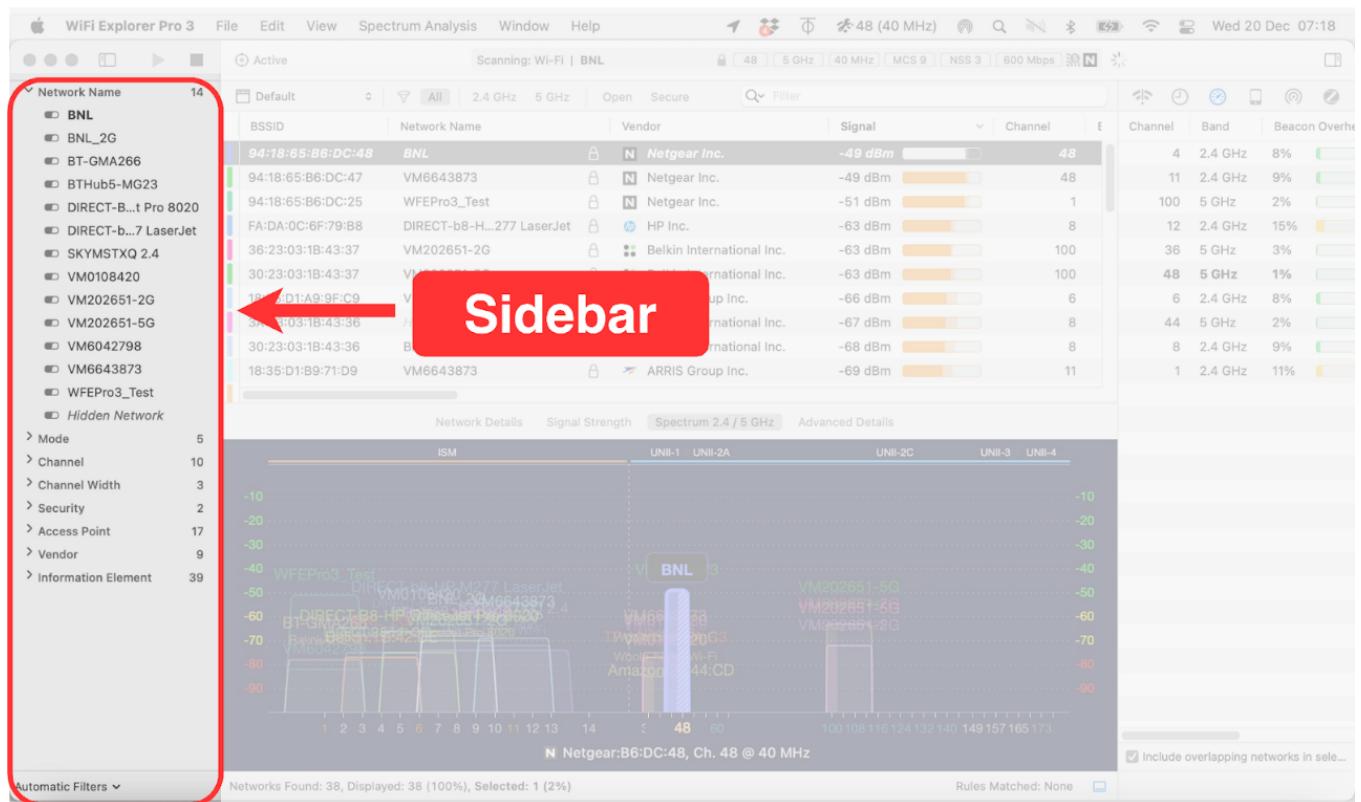


Figure 8-22 - Sidebar UI location

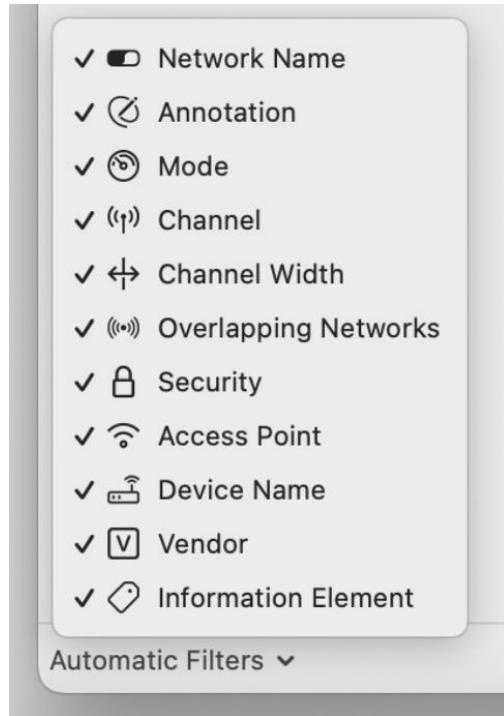


Figure 8-23 - Sidebar Automatic Filter Options

The screenshot shows the main interface of WiFi Explorer Pro 3. The sidebar on the left has the following tree structure:

- > Network Name 17
- > Annotation 1
- Mode 5
 - 802.11a/n/ac
 - 802.11a/n/ac/ax (highlighted)
 - 802.11b/g/n
 - 802.11b/g/n/ax
 - 802.11g/n
- > Channel 9
- > Channel Width 3
- > Overlapping Networks 21
- > Security 3
- > Access Point 20
- > Device Name 9
- > Vendor 9
- > Information Element 41

The main pane shows a table of wireless networks:

BSSID	Vendor	Network Name	Signal
94:18:65:B6:DC:47	Netgear Inc.	VM6643873	-46 dBm
94:18:65:B6:DC:48	Netgear Inc.	BNL	-46 dBm

Figure 8-24 - Sidebar Filter example using the Mode filter

WiFi Explorer Pro 3: The Definitive User Guide

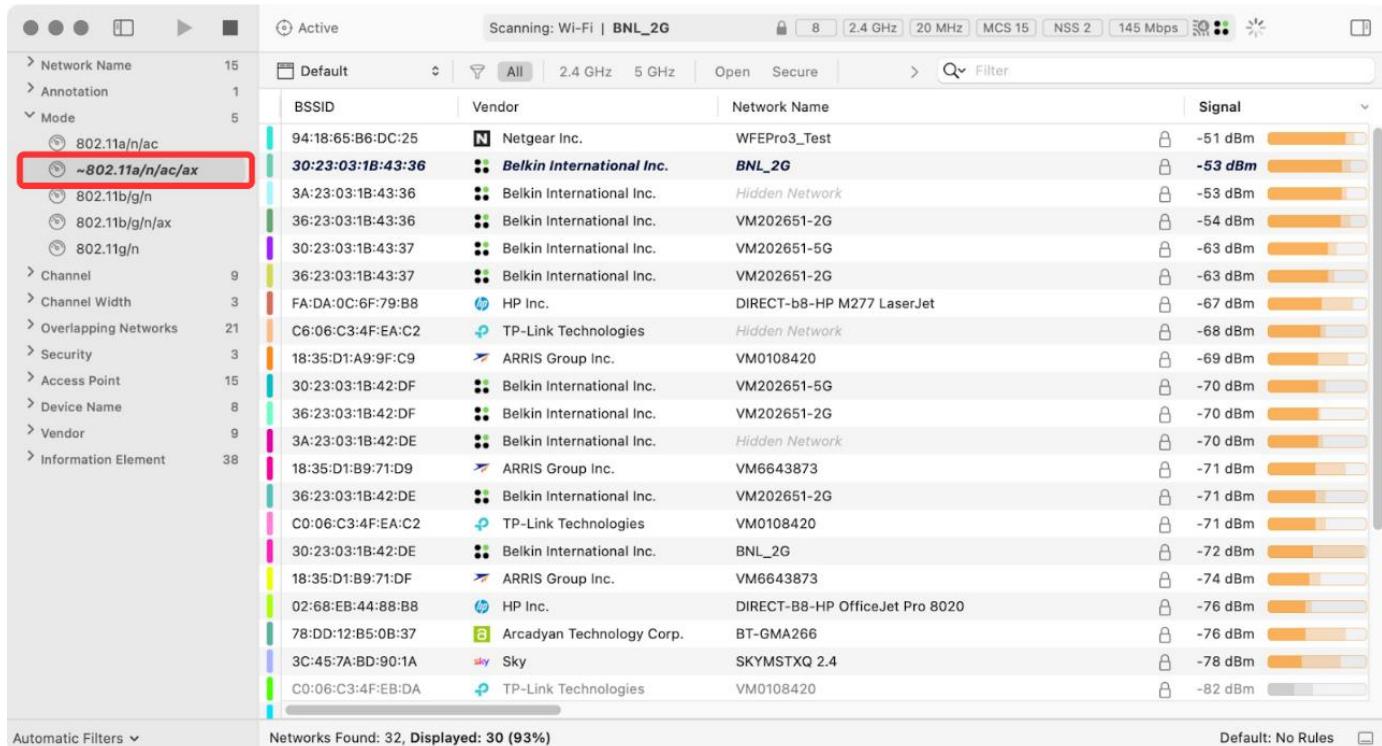


Figure 8-25 - Sidebar filter example using negated Mode filter

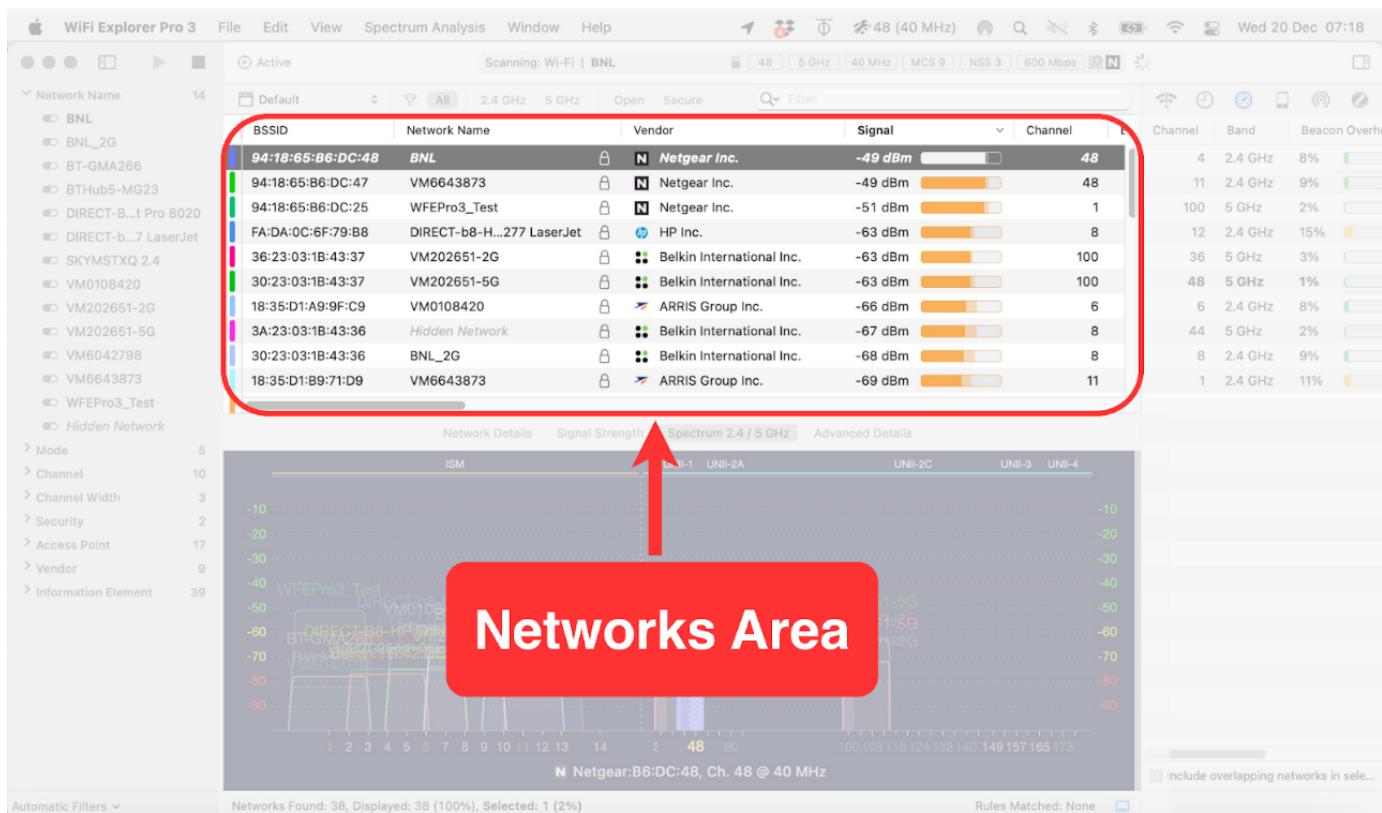


Figure 8-26 - Networks Area UI location (also referred to as the "networks table")

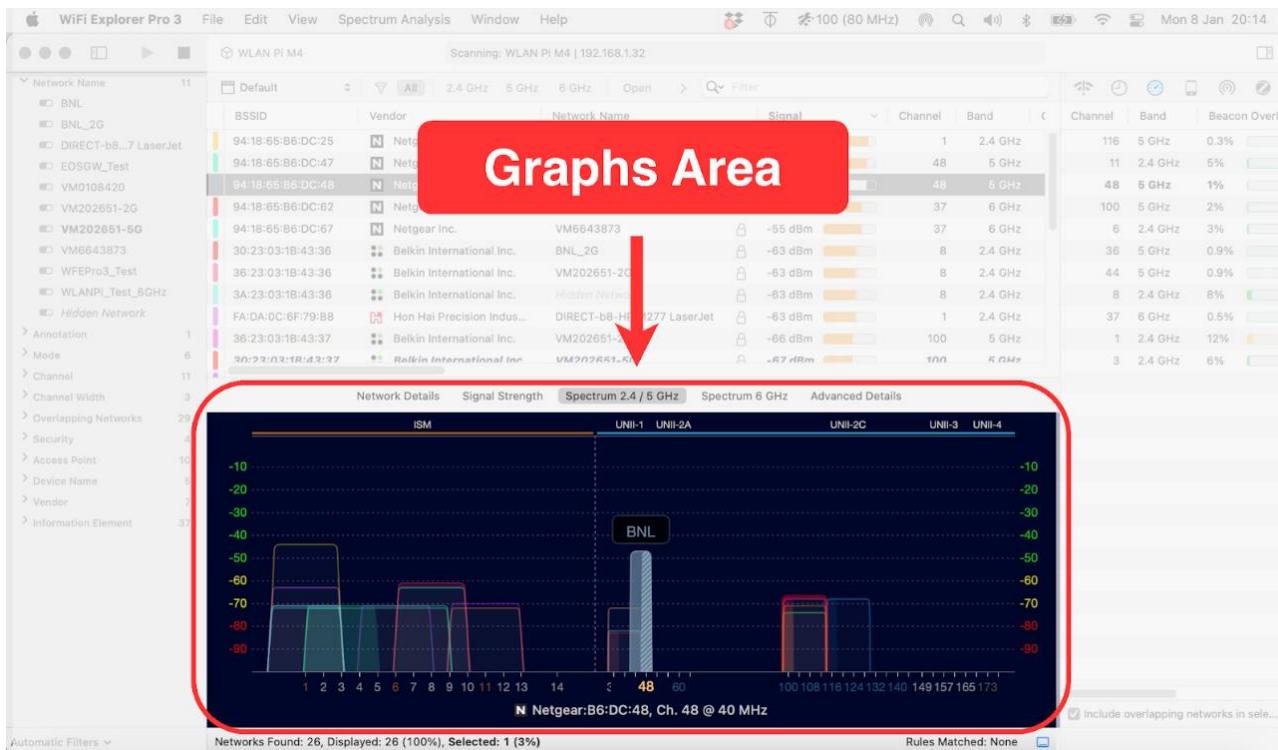


Figure 8-27 - Graphs Area UI location

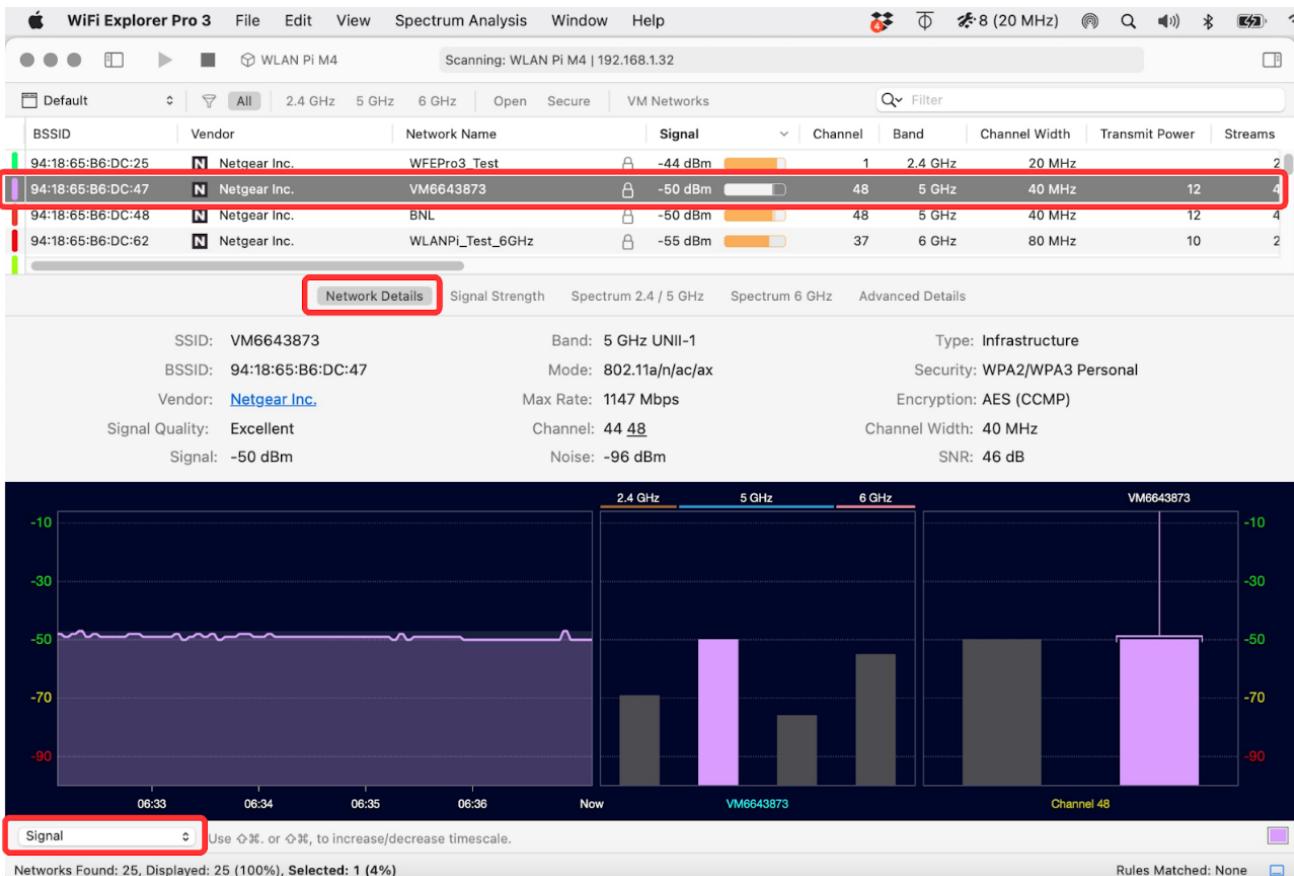


Figure 8-28- Graphs Area: Network Details panel

WiFi Explorer Pro 3: The Definitive User Guide



Figure 8-29 - Graphs Area: Network Details showing channel utilization graph

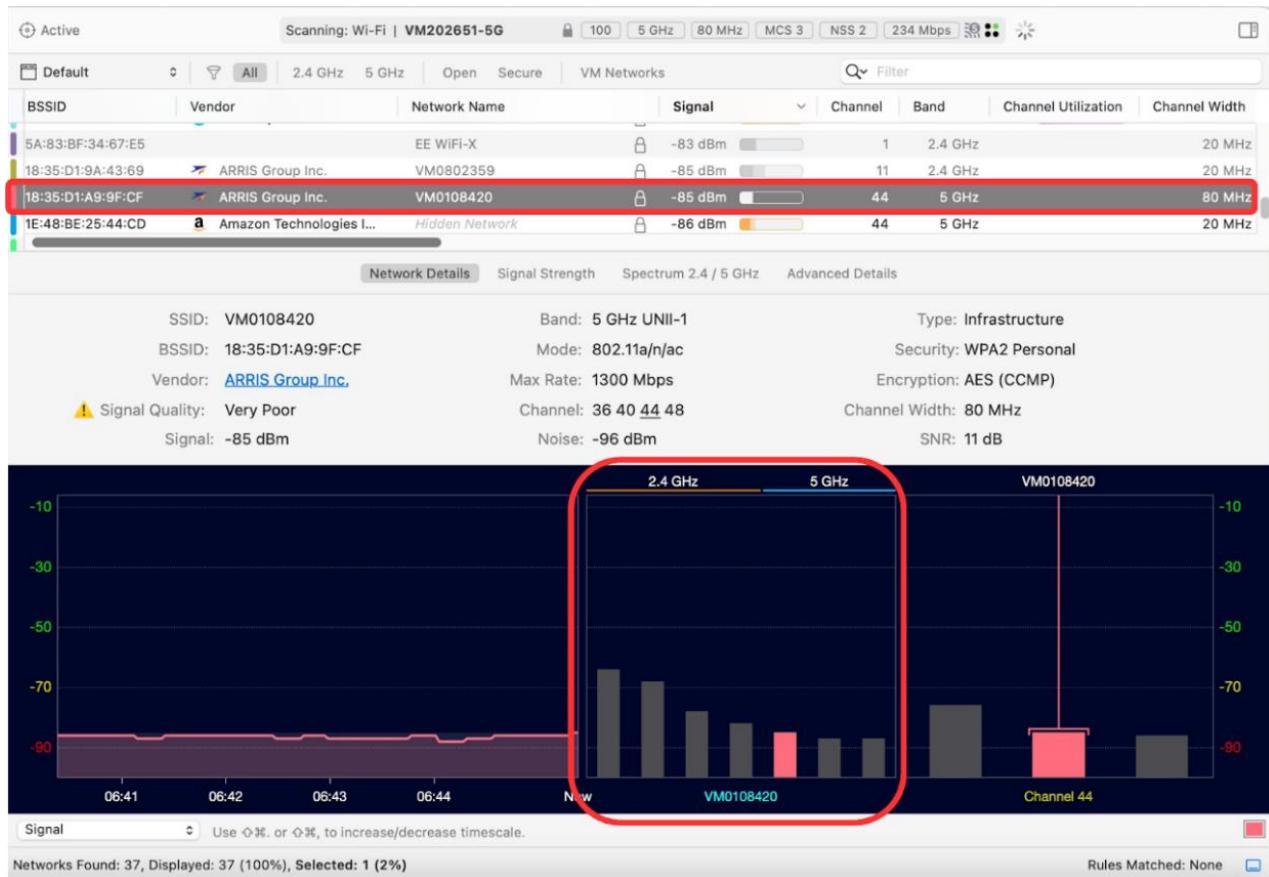


Figure 8-30 - Graphs Area: Network Details section with SSID Band Peers Graph highlighted

WiFi Explorer Pro 3: The Definitive User Guide

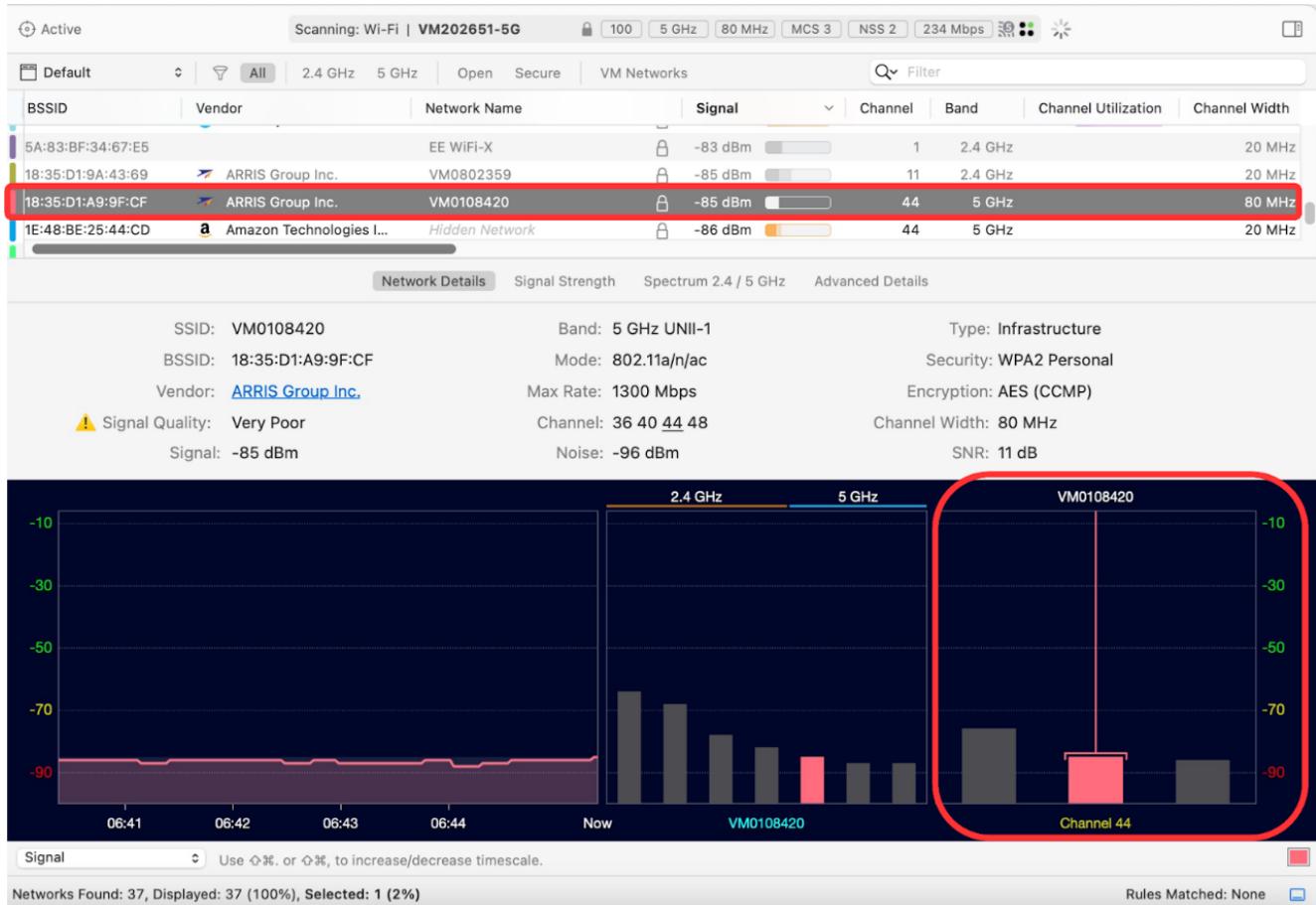


Figure 8-31 - Graphs Area: Network Details area with the Channel Peers Graph highlighted

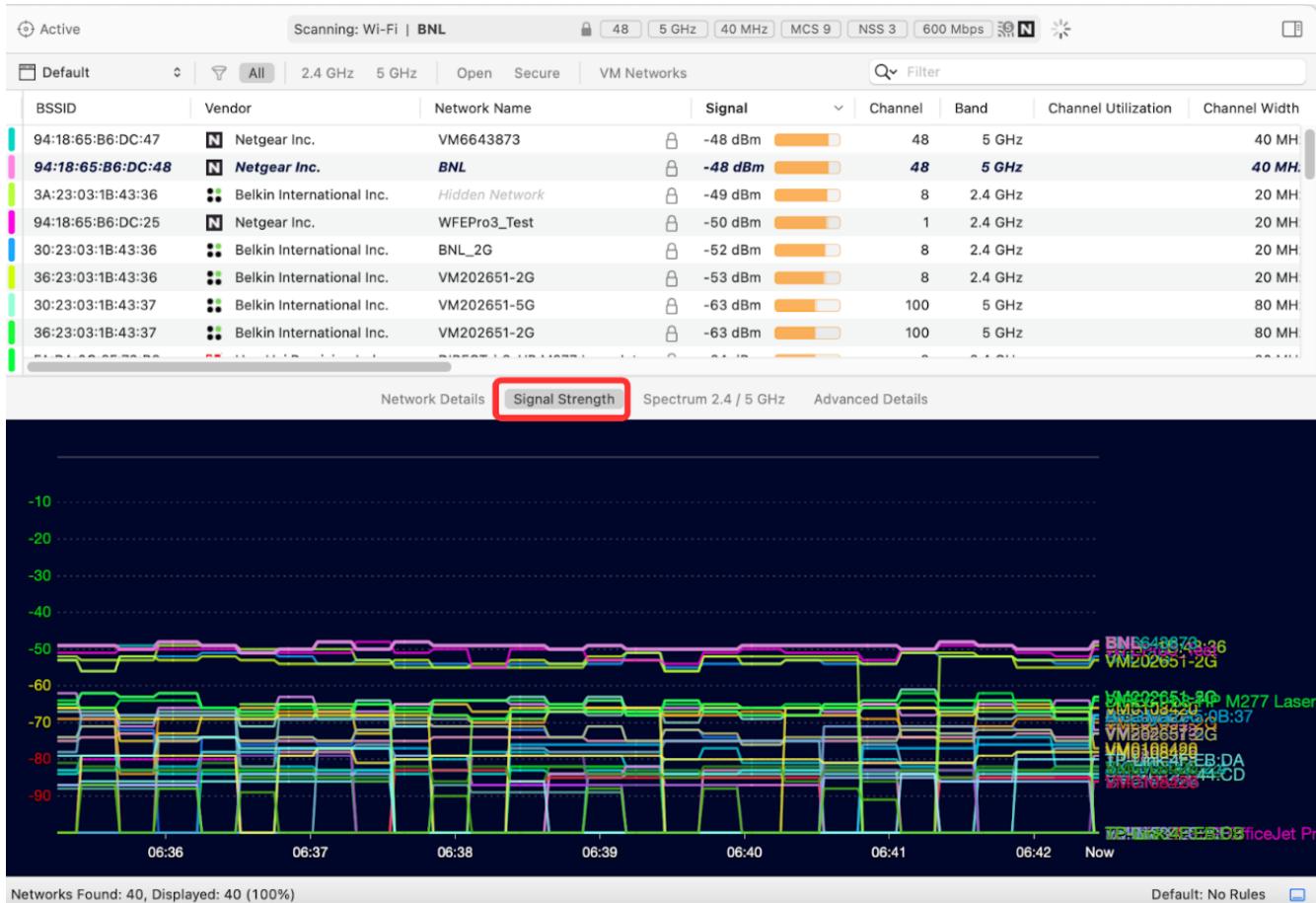


Figure 8-32 - Graphs Area: Signal Strength, all networks

WiFi Explorer Pro 3: The Definitive User Guide

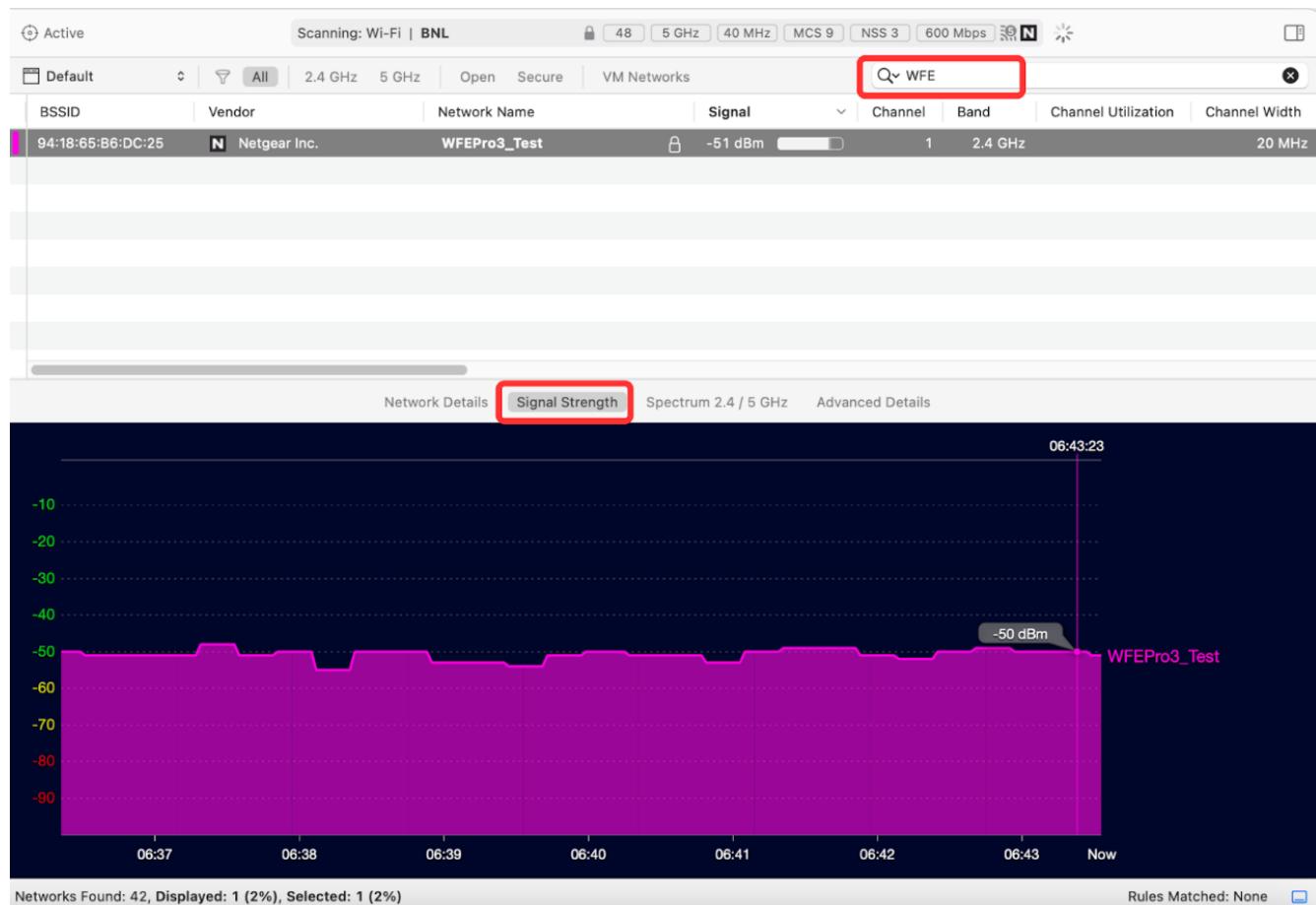


Figure 8-33 - Graphs Area: Signal Strength panel showing a single filtered BSSID

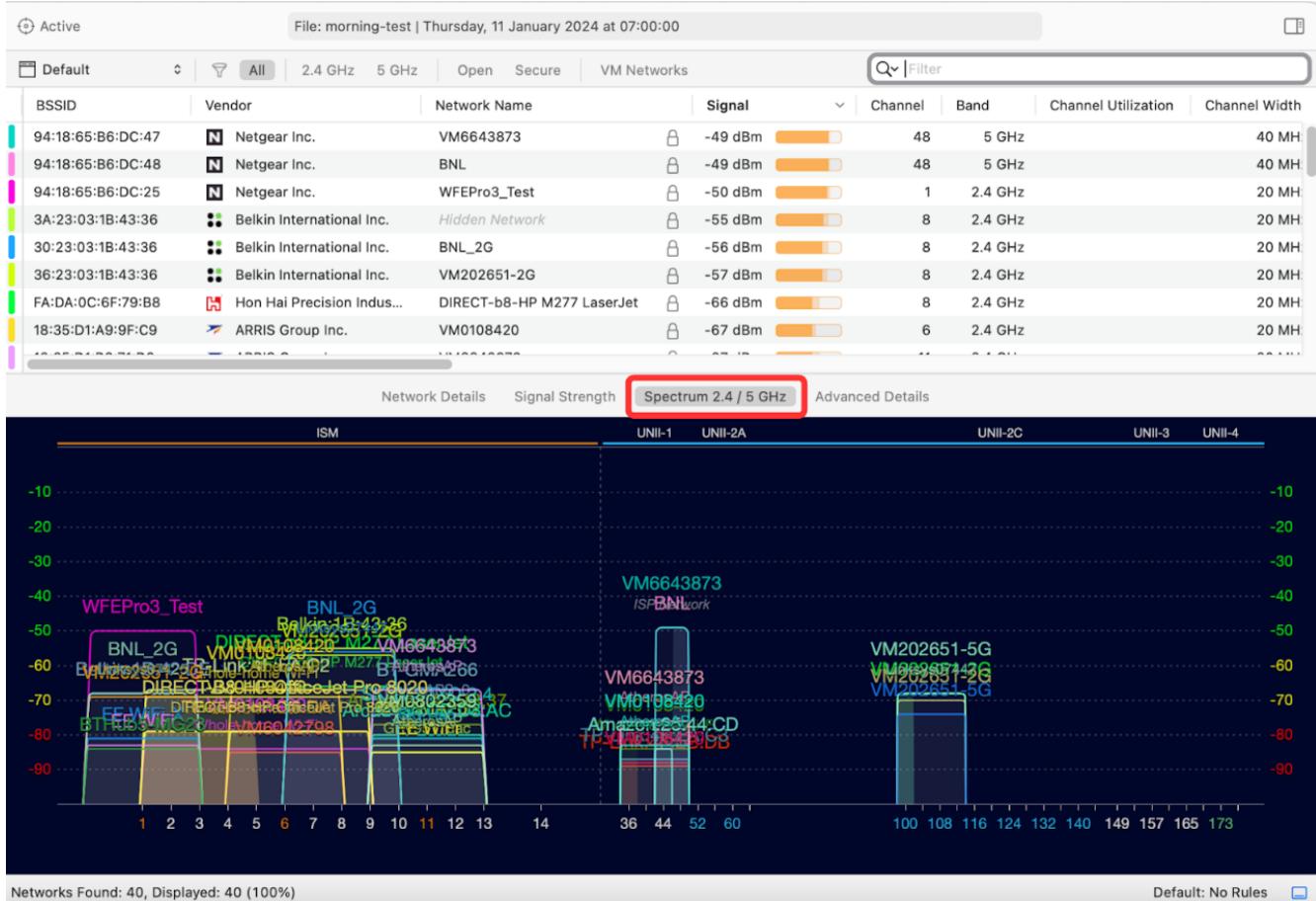


Figure 8-34 - Graphs Area: Spectrum 2.4/5 GHz panel showing all networks

WiFi Explorer Pro 3: The Definitive User Guide

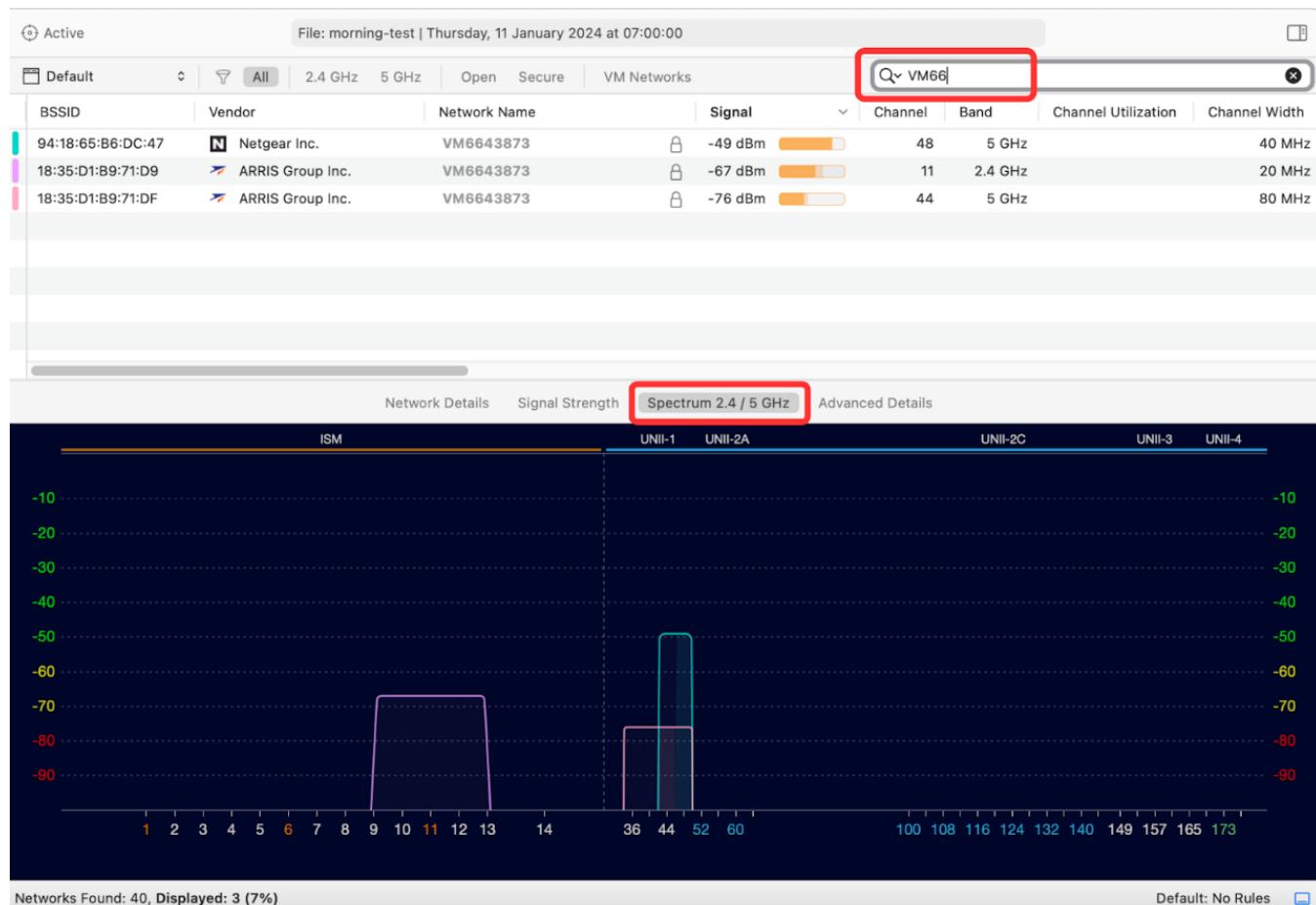


Figure 8-35 - Graphs Area: Spectrum 2.4/5 GHz panel showing a filtered network



Figure 8-36 - Graphs Area: Spectrum 2.4/5 GHz panel indicating a primary channel (ch. 100)

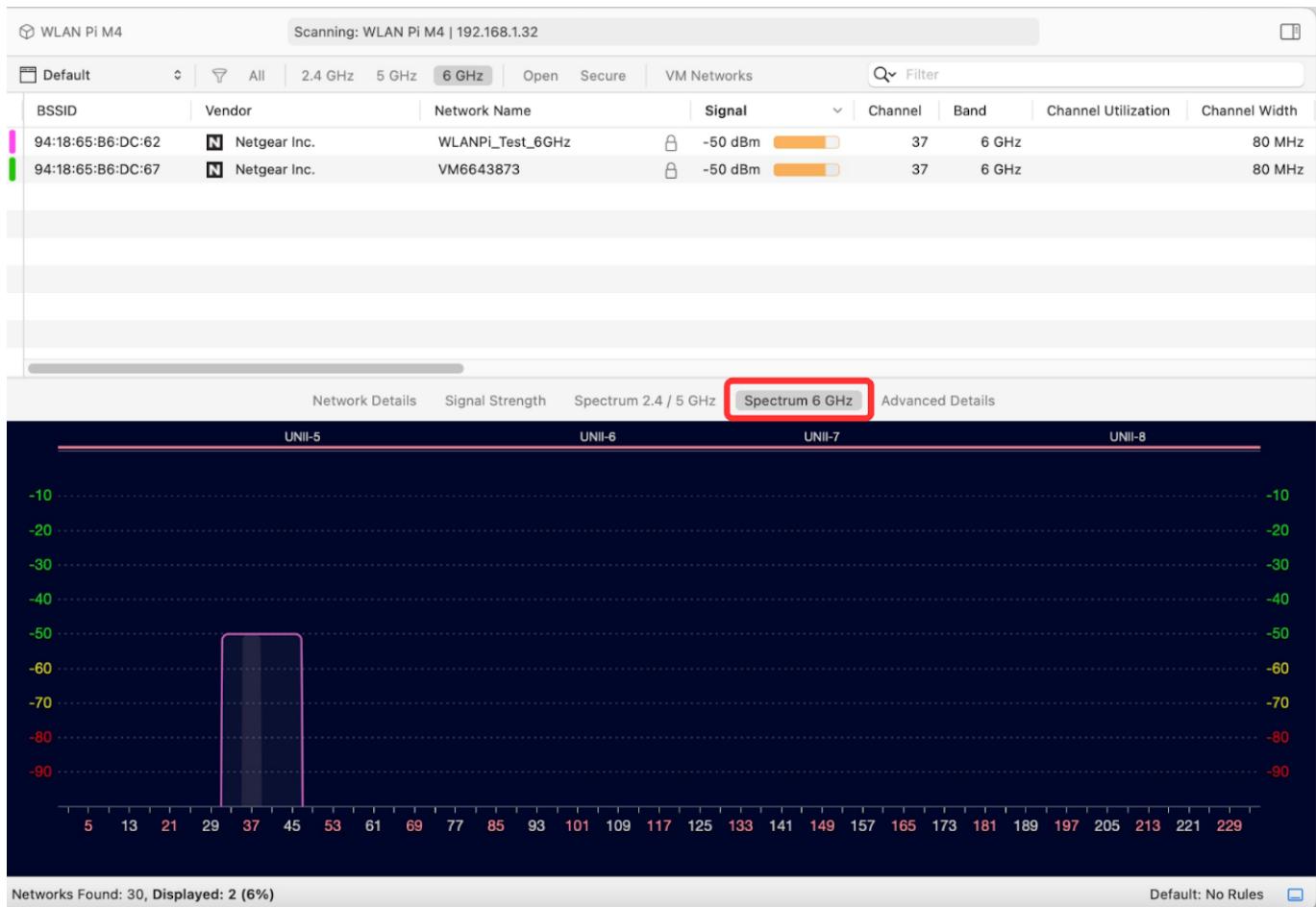


Figure 8-37 - Graphs Area: Spectrum 6GHz showing two networks

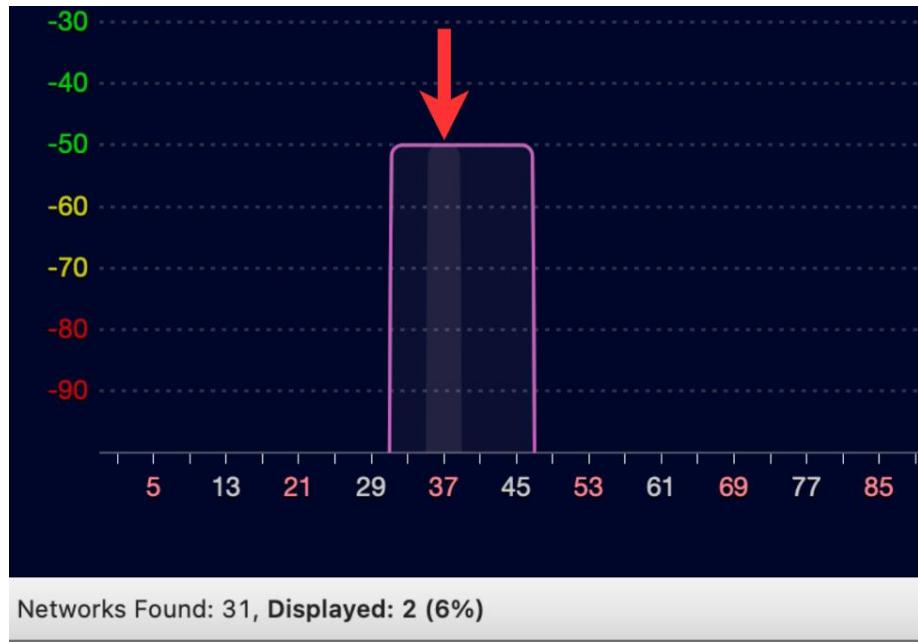


Figure 8-38 - Graphs Area: Spectrum 6GHz showing a primary channel (ch. 37)

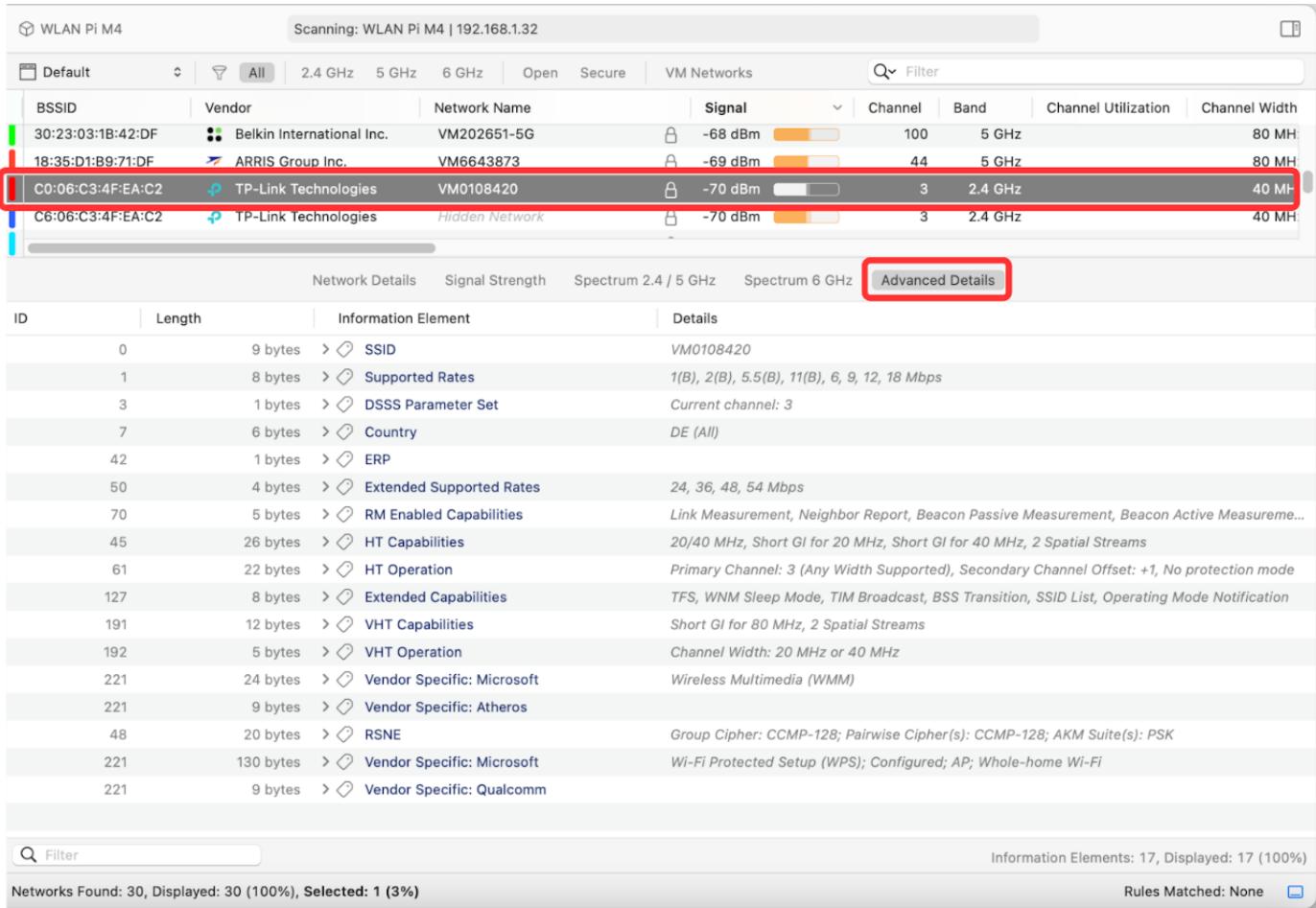


Figure 8-39 - Graphs Area: Advanced Details panel showing IEs for a selected network

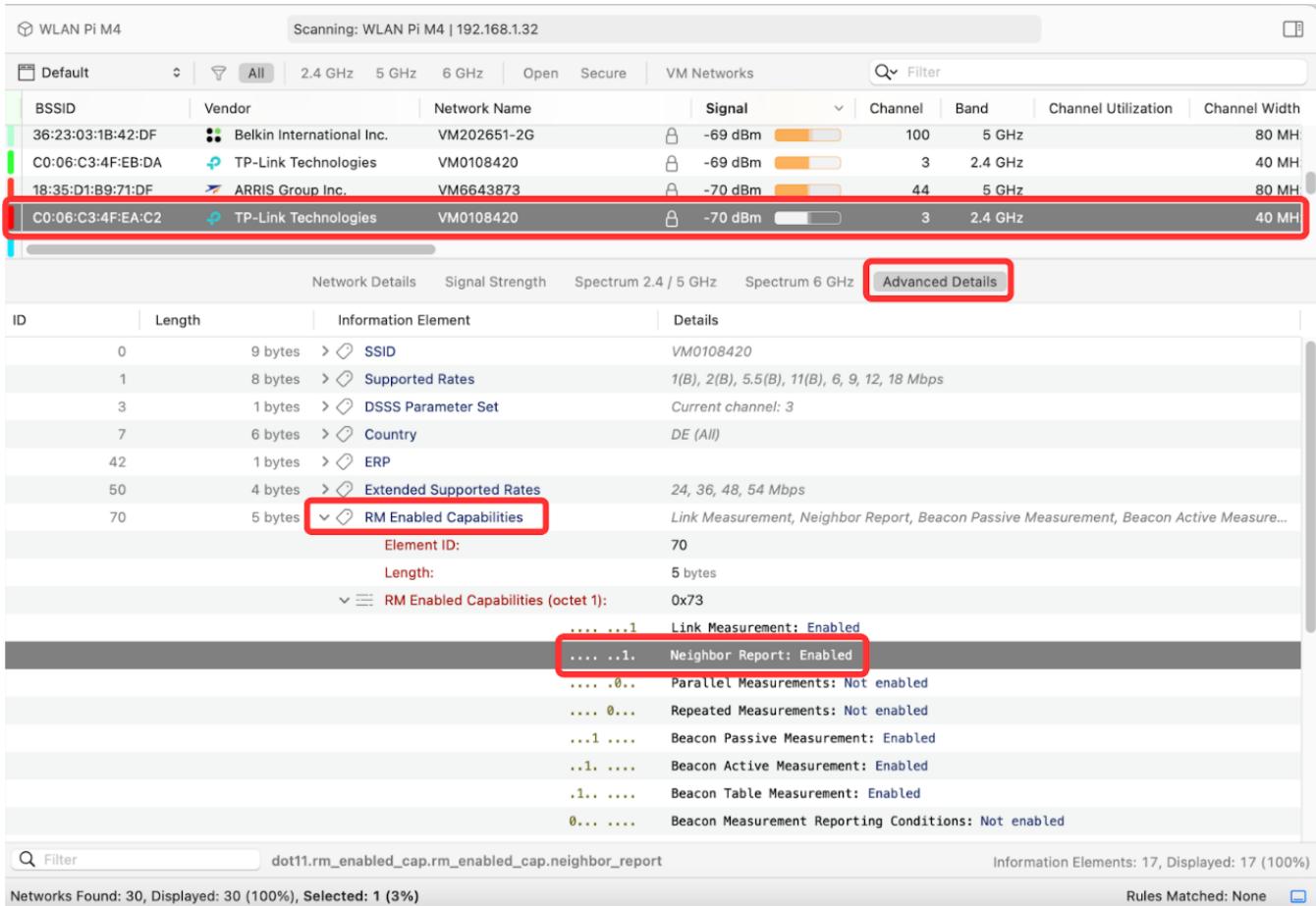


Figure 8-40 - Graphs Area: Advanced Details showing the Neighbor Report field for a selected BSSID

WiFi Explorer Pro 3: The Definitive User Guide

The screenshot shows the WiFi Explorer Pro 3 interface. At the top, it says "Scanning: WLAN Pi M4 | 192.168.1.32". Below is a table of networks:

BSSID	Vendor	Network Name	Signal	Channel	Neighbor Report	Band	Channel Utilizati
3A:23:03:1B:42:DE	Belkin International Inc.	Hidden Network	-71 dBm	1	Enabled	2.4 GHz	
C0:06:C3:4F:EA:C2	TP-Link Technologies	VM0108420	-71 dBm	3	Enabled	2.4 GHz	
C6:06:C3:4F:EA:C2	TP-Link Technologies	Hidden Network	-71 dBm	3	Enabled	2.4 GHz	
18:35:D1:B9:71:D9	ARRIS Group Inc.	VM6643873	-72 dBm	11	Enabled	2.4 GHz	

Below the table is the "Advanced Details" tab. A context menu is open over the "RM Enabled Capabilities" section, with the "Apply as Column" option highlighted. Other options in the menu include:

- Apply as Filter
- New Filter...
- New Coloring Rule...
- Copy Element
- Copy All Elements
- Expand Item
- Expand All Items
- Collapse Item
- Collapse All Items

At the bottom left, there is a filter bar and the text "Networks Found: 30, Displayed: 30 (100%), Selected: 1 (3%)".

Figure 8-41 - Graphs Area: Advanced Details panel showing how to add Neighbor Report as a column

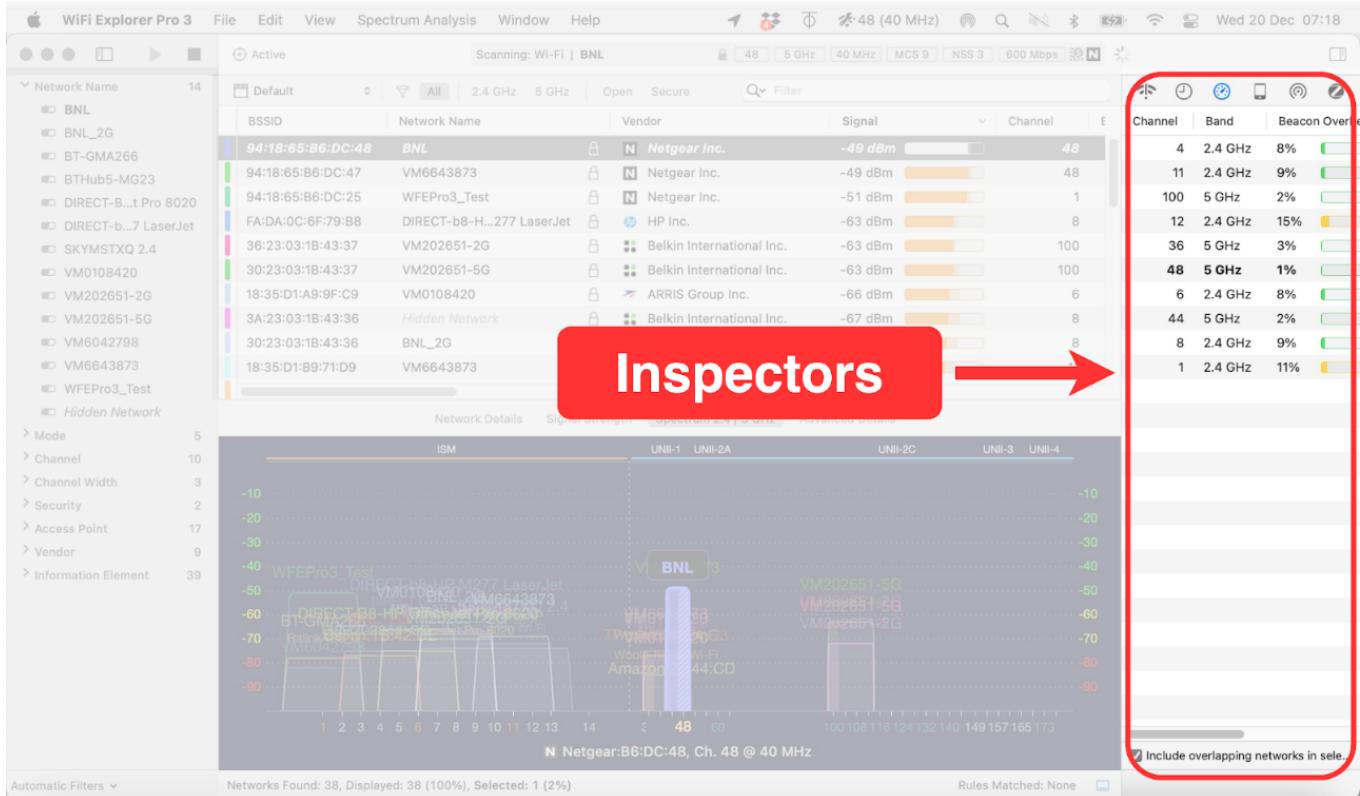


Figure 8-42 - Inspectors UI location

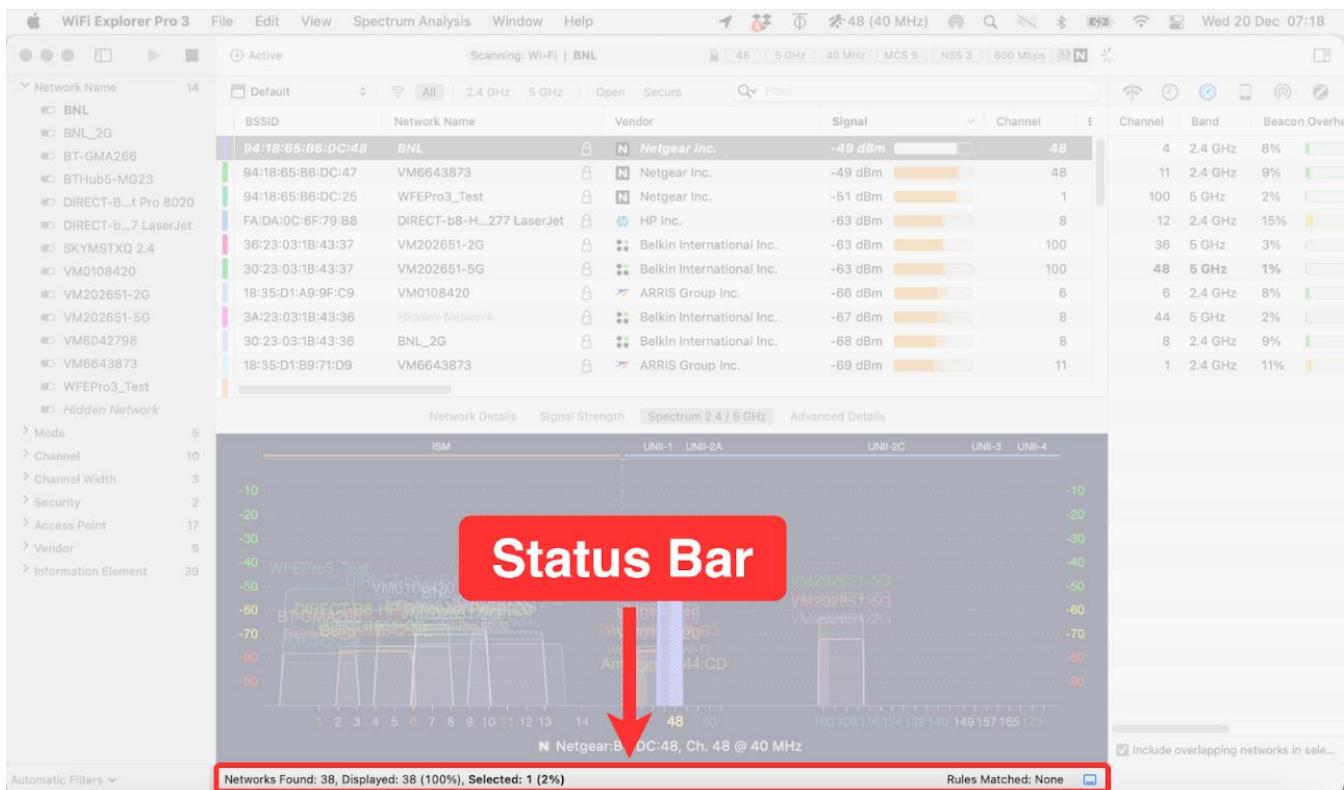


Figure 8-43 - Status Bar UI location

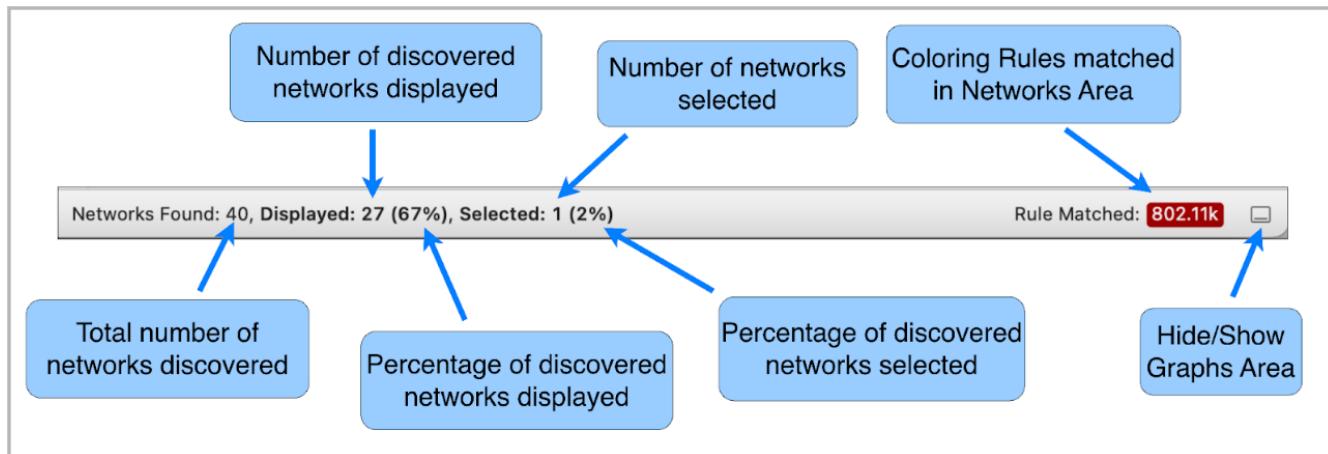


Figure 8-44 - Status Bar Details

Chapter 9 - WiFi Explorer Pro 3 Settings

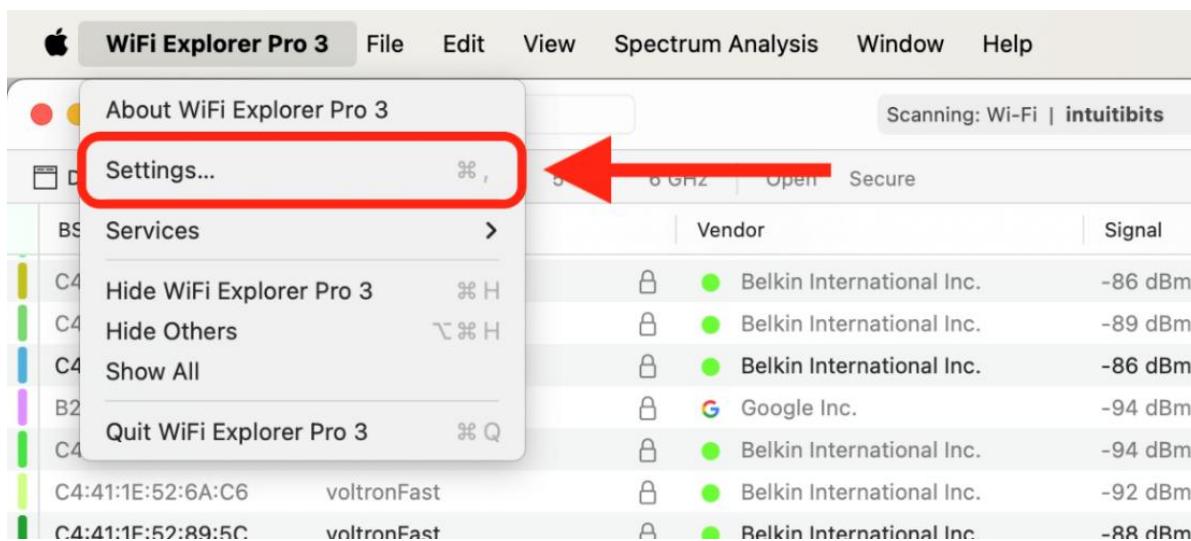
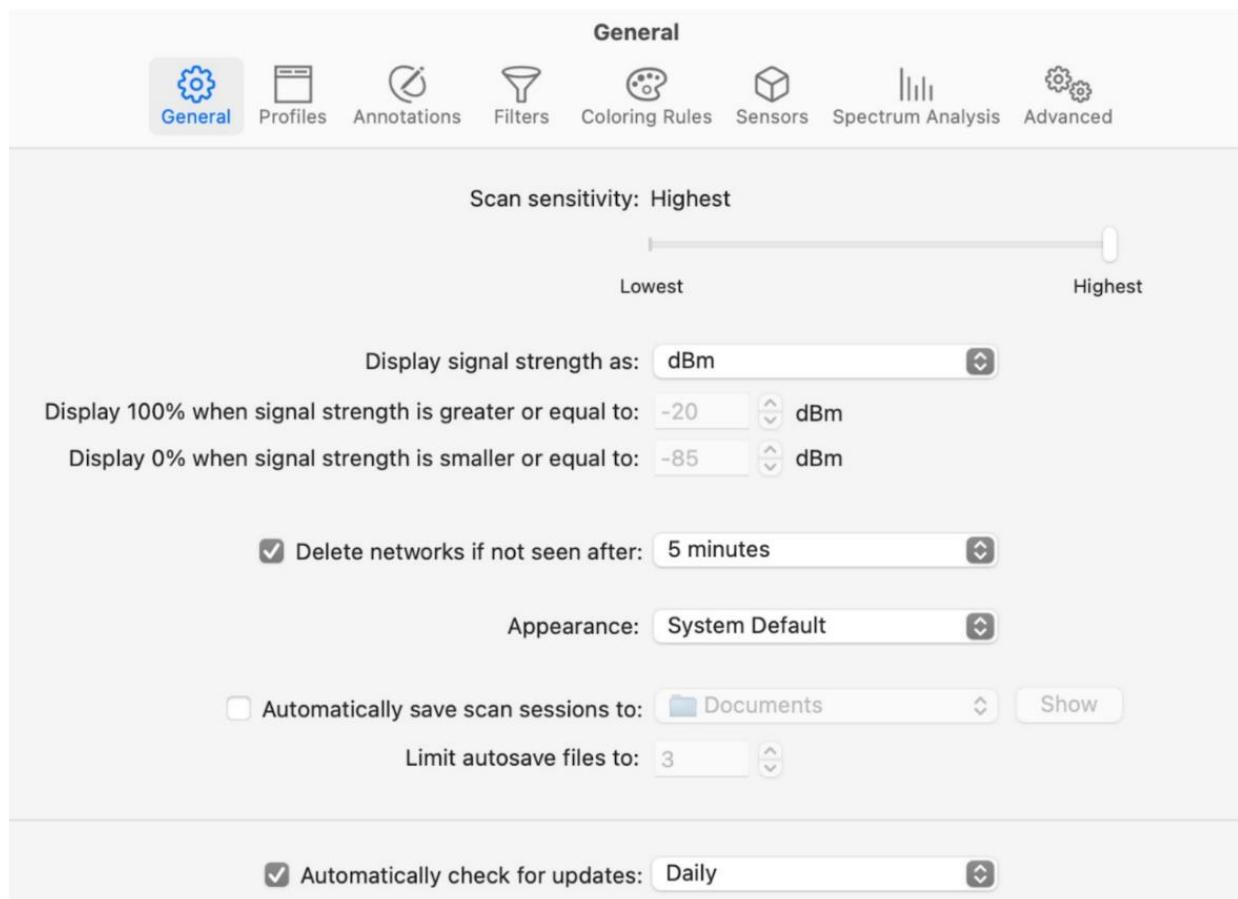


Figure 9-1 - Accessing the Settings window

Figure 9-2 - The *General* settings tab

WiFi Explorer Pro 3: The Definitive User Guide

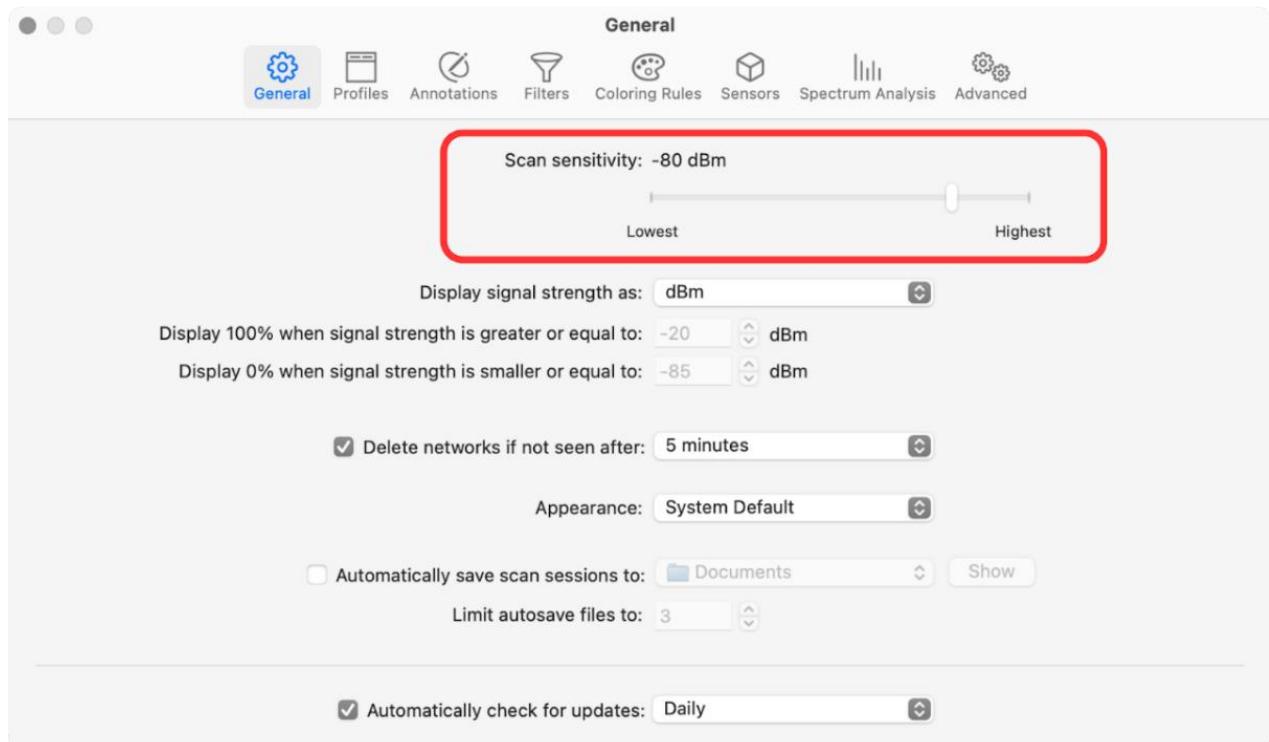


Figure 9-3 - Scan sensitivity adjustment under the *General* tab

The screenshot shows the main WiFi Explorer Pro 3 interface displaying a list of scanned networks. A red box highlights the 'Signal' column, which shows the signal strength for each network entry. The table includes columns for BSSID, Network Name, Vendor, Annotations, Channel, Channel Width, Band, and Country Code.

BSSID	Network Name	Vendor	Annotations	Signal	Channel	Channel Width	Band	Country Code
78:DD:12:B5:0B:37	BT-GMA266	Arcadyan Technology C...		-80 dBm	11	20 MHz	2.4 GHz	GB
3C:45:7A:BD:90:1A	SKYMTXQ 2.4	Sky		-80 dBm	11	20 MHz	2.4 GHz	
C0:06:C3:4F:EB:DA	VM0108420	TP-Link Technologies C...		-80 dBm	3	40 MHz	2.4 GHz	DE
02:68:EB:44:88:BB	DIRECT...ro 8020	HP Inc.		-79 dBm	6	20 MHz	2.4 GHz	
18:35:D1:B9:71:DF	VM6643873	ARRIS Group Inc.		-77 dBm	44	80 MHz	5 GHz	GB
C6:06:C3:4F:EA:C3	Hidden Network	TP-Link Technologies C...		-77 dBm	36	80 MHz	5 GHz	DE
C0:06:C3:4F:EA:C3	VM0108420	TP-Link Technologies C...		-76 dBm	36	80 MHz	5 GHz	DE
0A:1F:26:1A:A6:9C	VM6042798	Cisco Systems Inc.		-76 dBm	11	20 MHz	2.4 GHz	EU
36:23:03:1B:42:DF	VM202651-2G	Belkin International Inc.		-75 dBm	100	80 MHz	5 GHz	
30:23:03:1B:42:DF	VM202651-5G	Belkin International Inc.		-75 dBm	100	80 MHz	5 GHz	
30:23:03:1B:42:DE	BNL_2G	Belkin International Inc.		-73 dBm	1	20 MHz	2.4 GHz	
FA:DA:0C:6F:79:B8	DIRECT...LaserJet	Hon Hai Precision Indus...		-71 dBm	1	20 MHz	2.4 GHz	
36:23:03:1B:42:DE	VM202651-2G	Belkin International Inc.		-71 dBm	1	20 MHz	2.4 GHz	
18:35:D1:B9:71:D9	VM6643873	ARRIS Group Inc.		-69 dBm	11	20 MHz	2.4 GHz	GB
3A:23:03:1B:42:DE	Hidden Network	Belkin International Inc.		-69 dBm	1	20 MHz	2.4 GHz	
18:35:D1:A9:9F:C9	VM0108420	ARRIS Group Inc.		-67 dBm	6	20 MHz	2.4 GHz	GB
FA:DA:0C:6F:79:B8	DIRECT...LaserJet	Hon Hai Precision Indus...		-66 dBm	9	20 MHz	2.4 GHz	
3A:23:03:1B:43:36	Hidden Network	Belkin International Inc.		-66 dBm	8	20 MHz	2.4 GHz	GB
30:23:03:1B:43:36	BNL_2G	Belkin International Inc.	Office AP	-65 dBm	8	20 MHz	2.4 GHz	GB
C0:06:C3:4F:EA:C2	VM0108420	TP-Link Technologies C...		-65 dBm	3	40 MHz	2.4 GHz	DE
C6:06:C3:4F:EA:C2	Hidden Network	TP-Link Technologies C...		-64 dBm	3	40 MHz	2.4 GHz	DE

Figure 9-4 - The effect of adjusting scan sensitivity

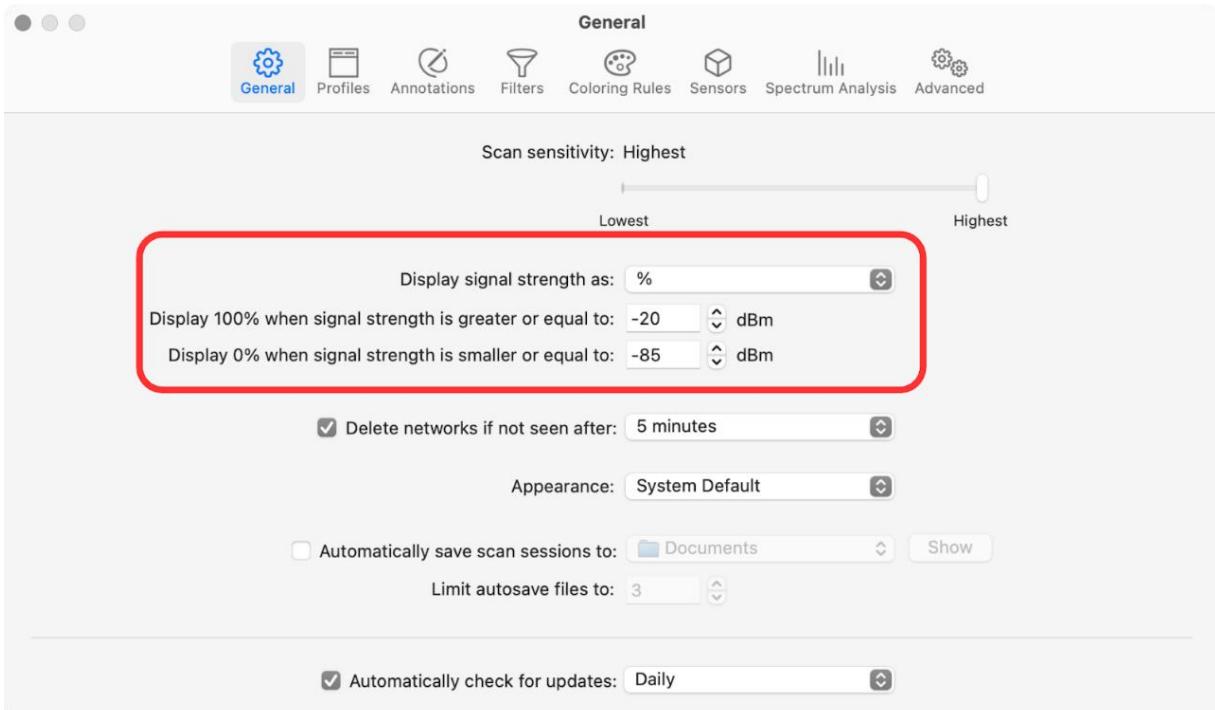
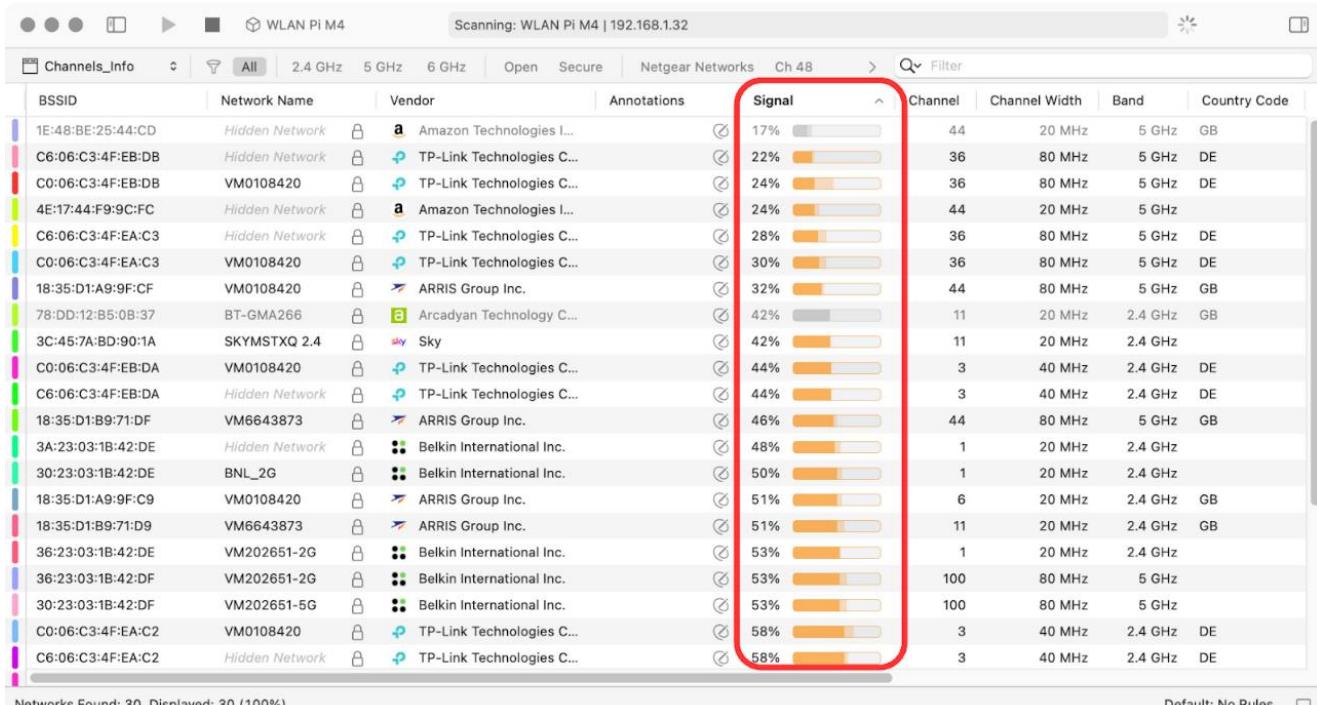
Figure 9-5 - Signal strength units under the **General** settings tab

Figure 9-6 - The effect of setting signal level units to percentage values

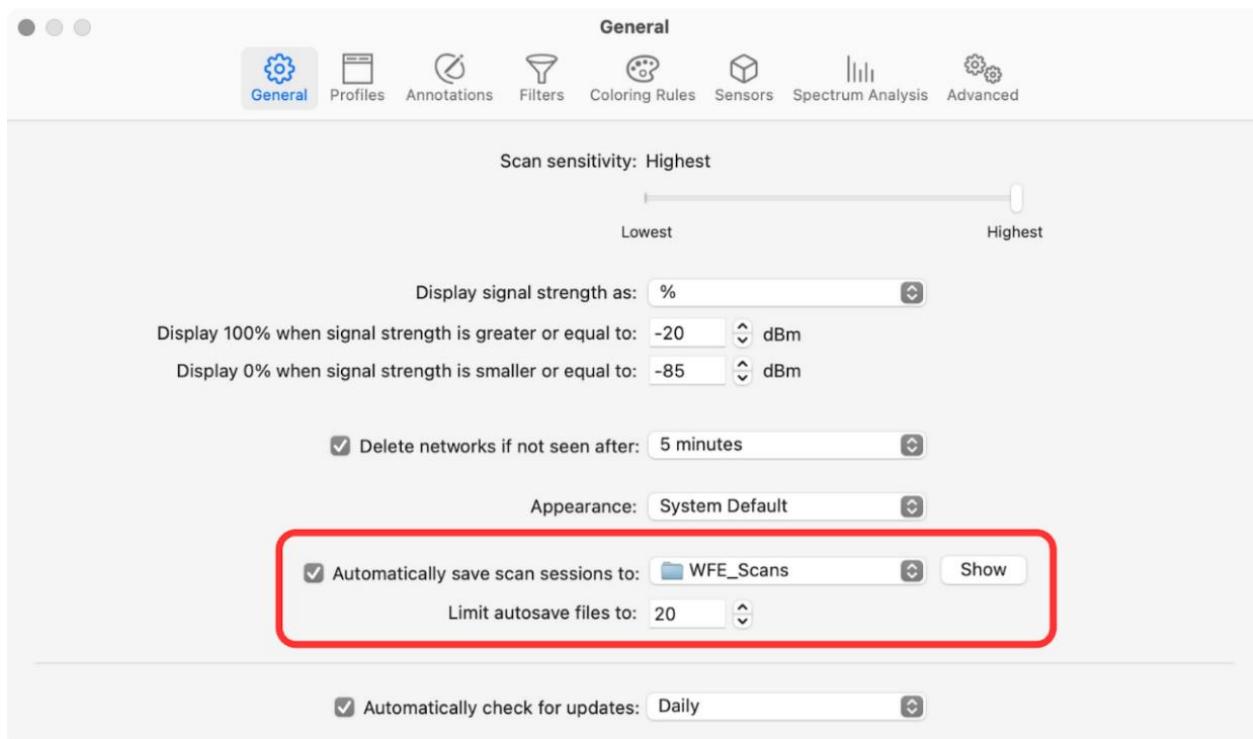


Figure 9-7 - Setting WFE Pro 3 to auto-save scan data to files

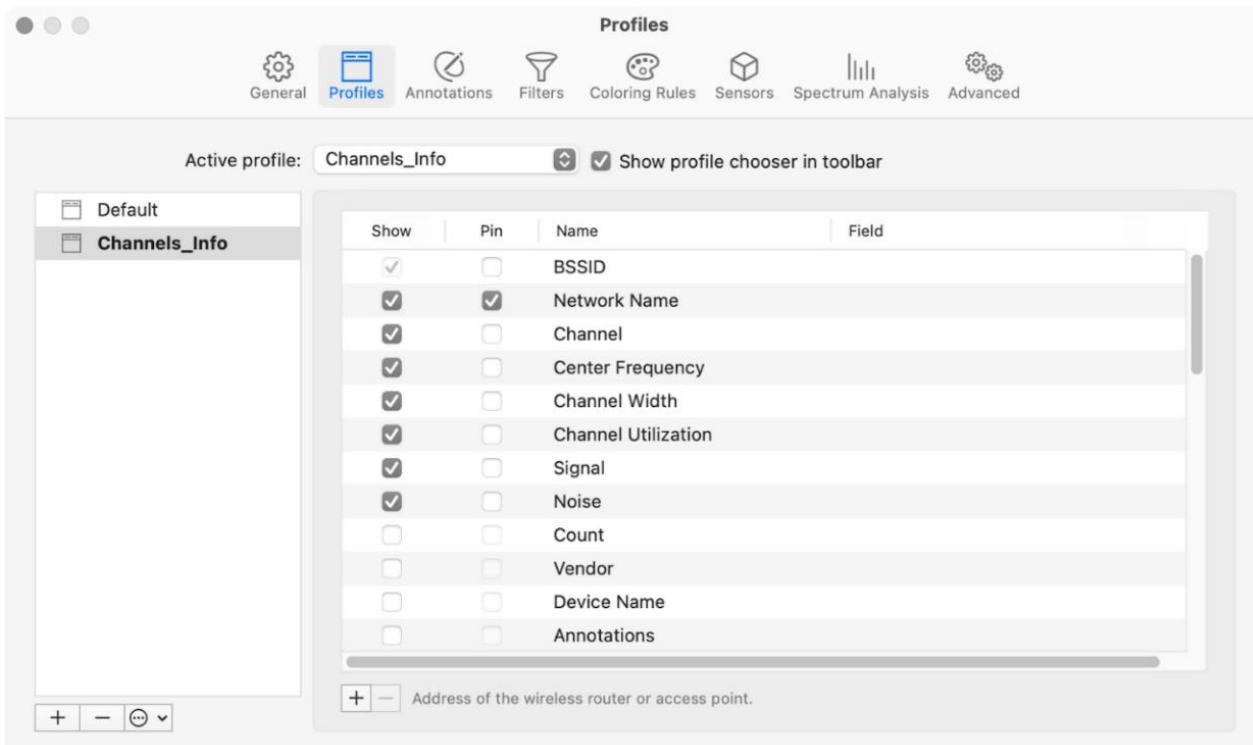


Figure 9-8 - The settings Profiles tab

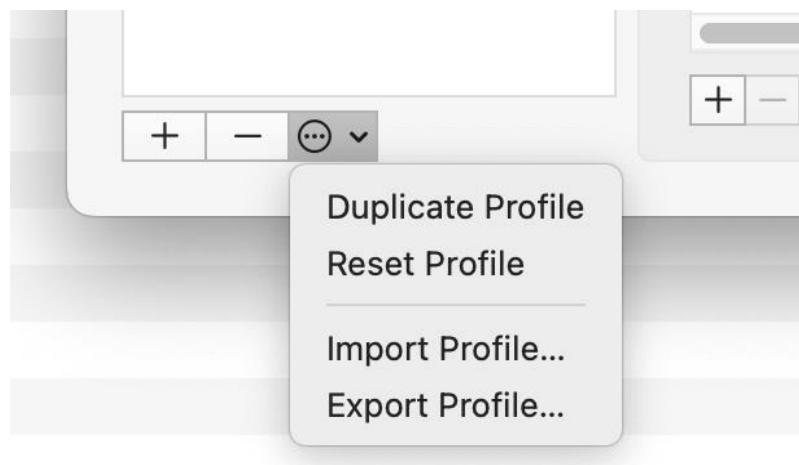


Figure 9-9 - The profiles list buttons

A screenshot of the WiFi Explorer Pro 3 settings window, specifically the Annotations tab. The tab bar includes General, Profiles, Annotations (which is selected and highlighted in blue), Filters, Coloring Rules, Sensors, Spectrum Analysis, and Advanced. Below the tab bar is a search bar labeled "Search". The main area displays a table with columns for "BSSID" and "Annotation". The data rows are:

BSSID	Annotation
30:23:03:1B:43:3?	Office AP
94:18:65:B6:DC:25	Test AP
94:18:65:B6:DC:47	ISP Network

At the bottom left are standard window control buttons (+, -, ⊖, ⊙, ⊚). A note at the bottom states: "BSSID may include * or ?, for example: 88:1F:A1:31:*. or 88:1F:A1:31:E6:?:E.".

Figure 9-10 - The settings Annotations tab

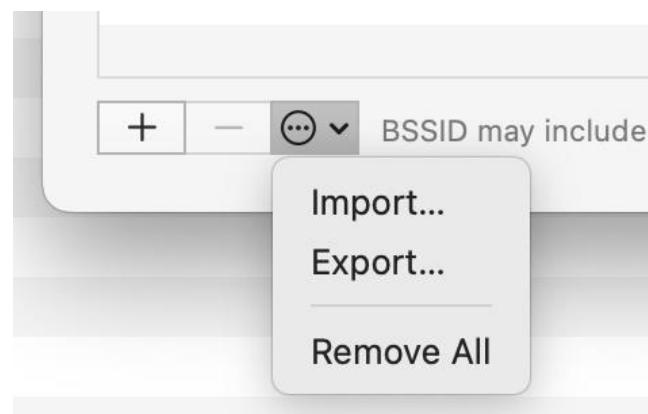


Figure 9-11 - The annotations list buttons

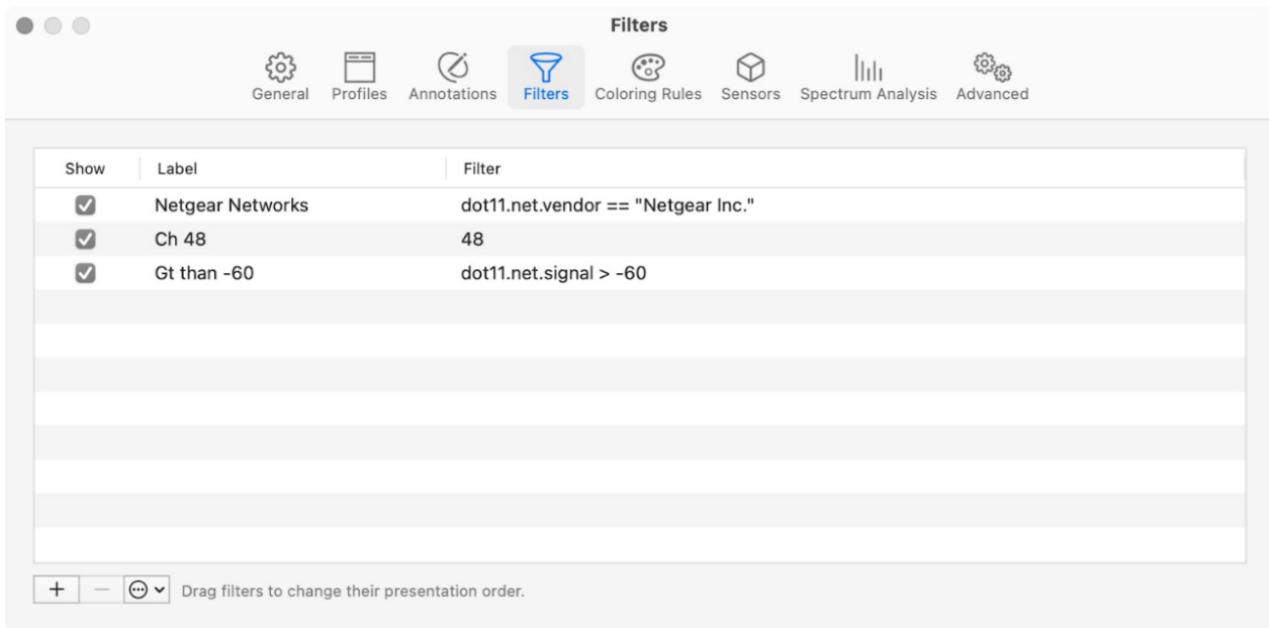


Figure 9-12 - The Filters settings tab

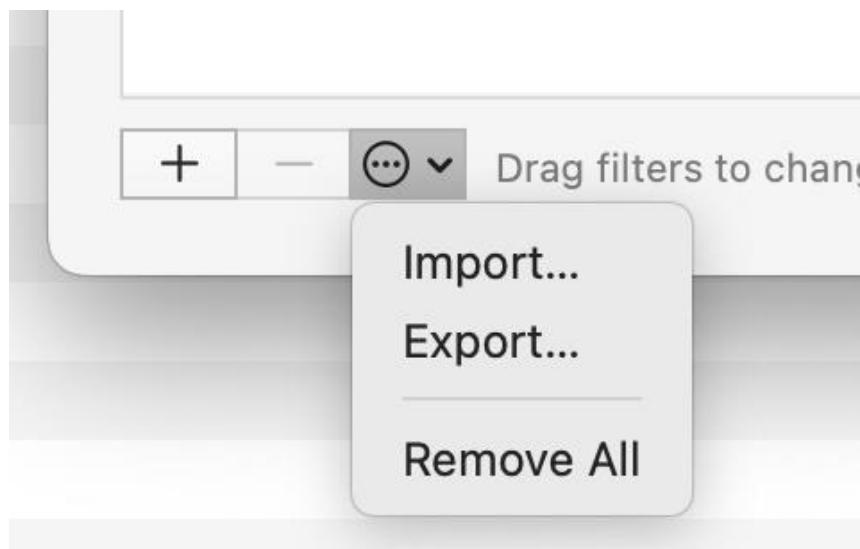


Figure 9-13 - The Filters list buttons

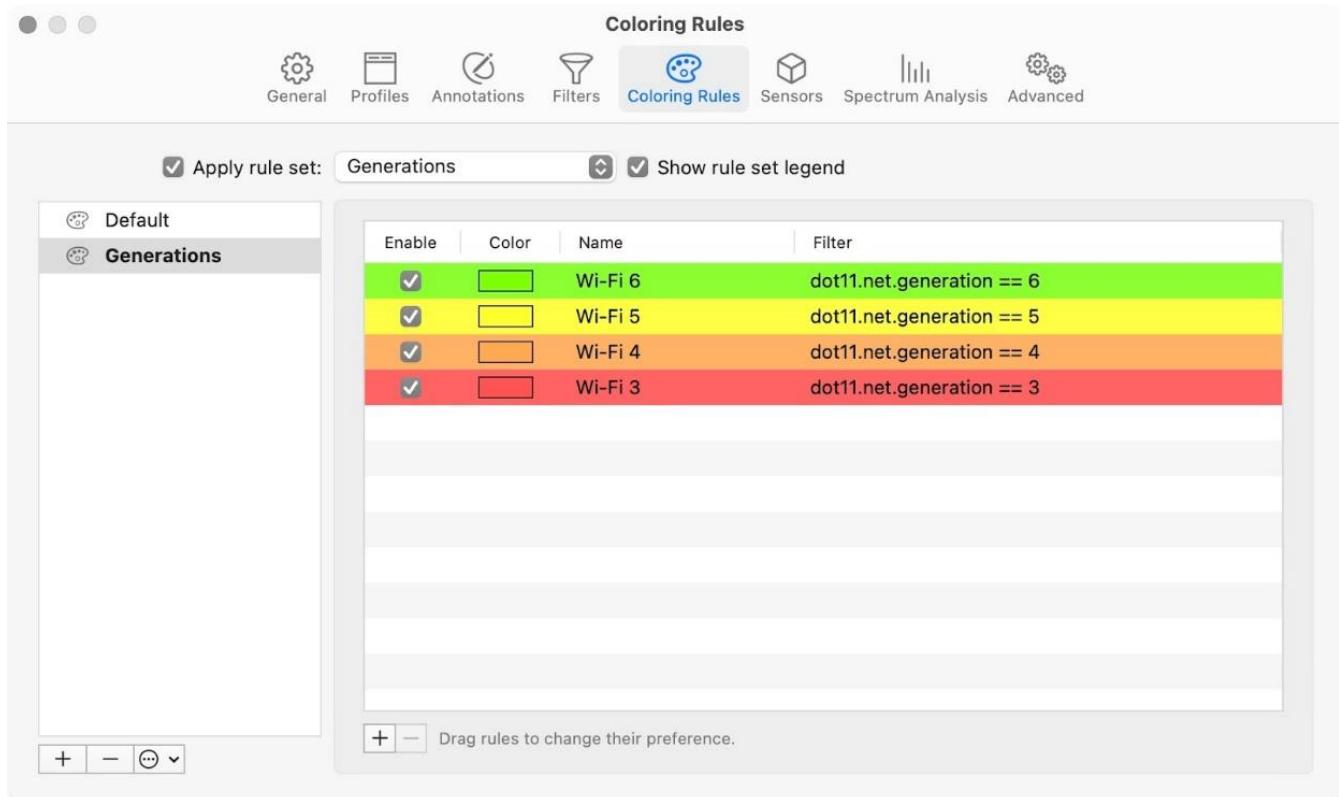
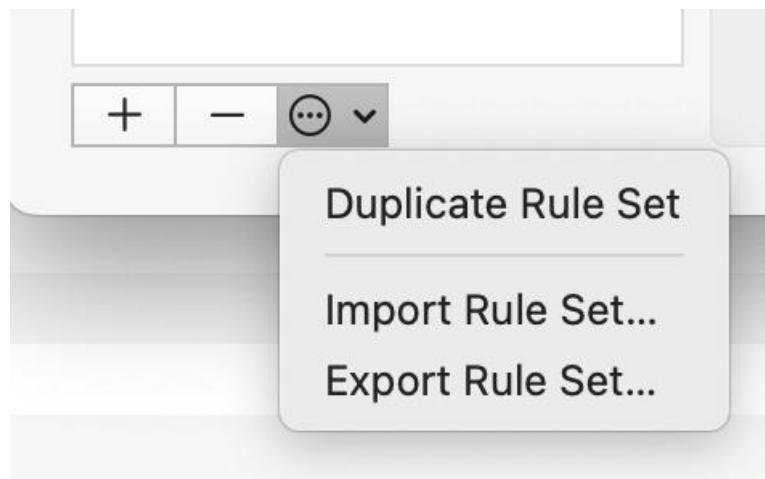
Figure 9.14 - The *Coloring Rules* settings tab

Figure 9-15 - The coloring rules list buttons

The screenshot shows the 'Sensors' settings tab in WiFi Explorer Pro 3. The interface includes a toolbar with icons for General, Profiles, Annotations, Filters, Coloring Rules, Sensors (selected), Spectrum Analysis, and Advanced. Below the toolbar is a table listing four sensors:

Name	Address	Interface	Mode	Port
Analti	10.147.17.217	Auto	Auto	19000
RPi3b	192.168.1.41	wlan1	Active	22
Neo3	192.168.1.65	Auto	Auto	22
WLAN Pi M4	192.168.1.32	Auto	Auto	22

At the bottom left are buttons for adding (+), removing (-), and refreshing (refresh icon with dropdown).

Figure 9-16 - The *Sensors* settings tab

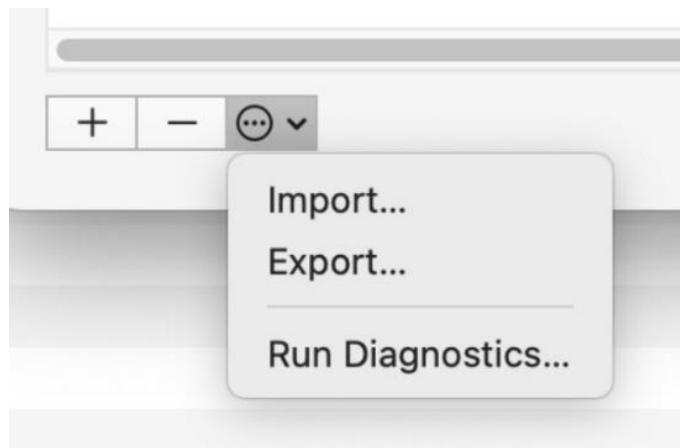


Figure 9-17 - The sensors list buttons

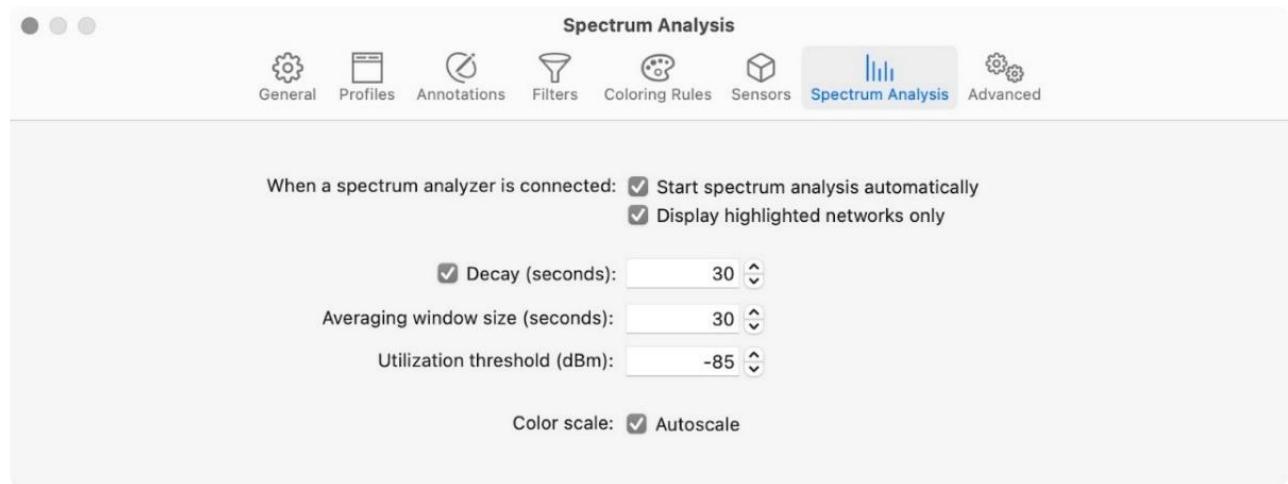


Figure 9-18 - The *Spectrum Analysis* settings tab

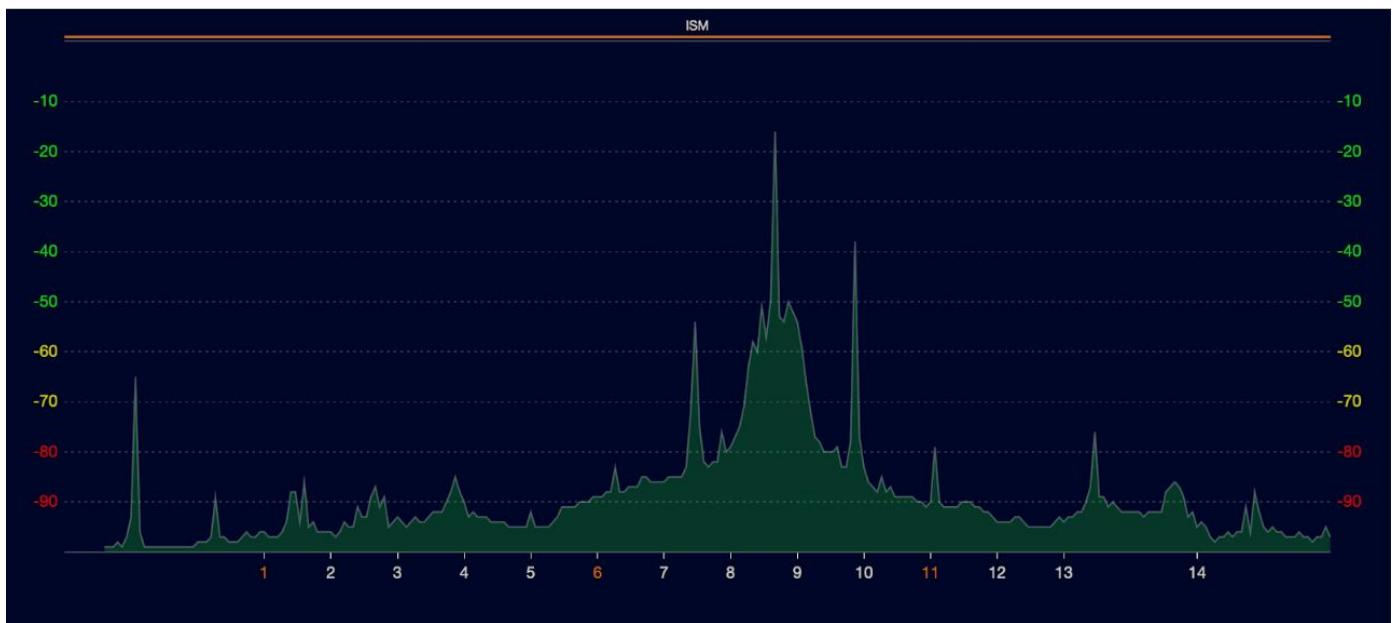


Figure 9-19 - Spectrum analysis Average Trace

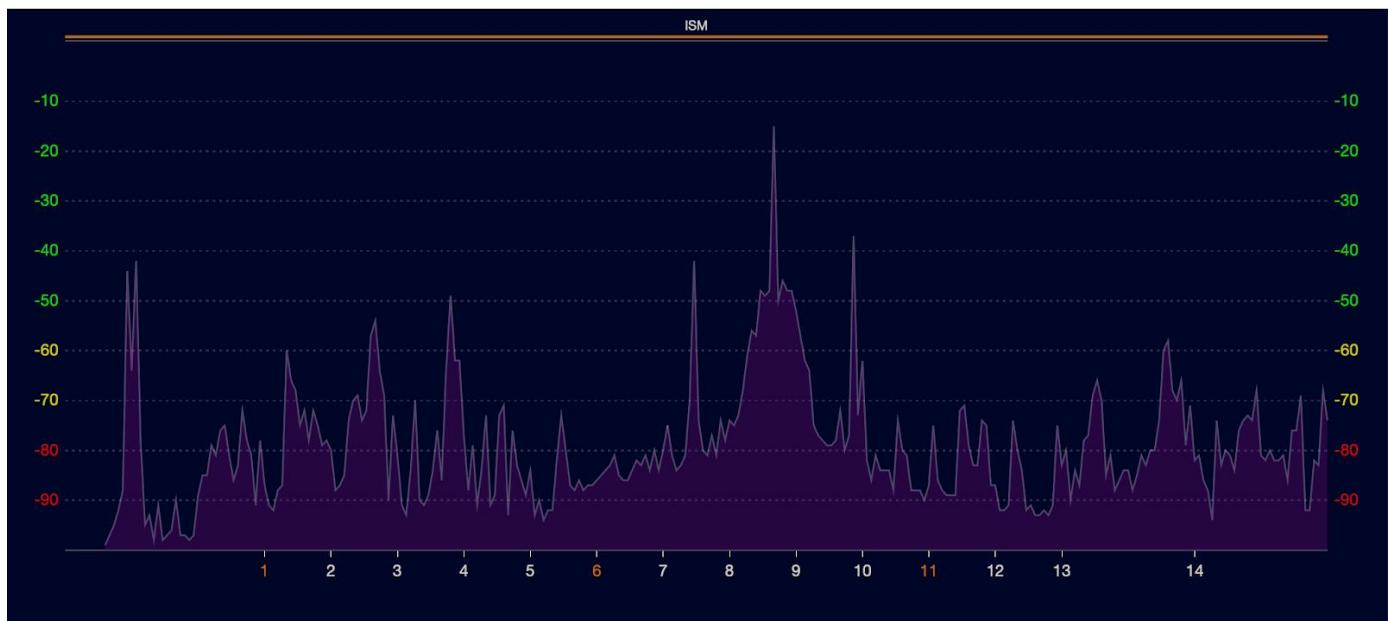


Figure 9-20 - Spectrum analysis Maximum Trace

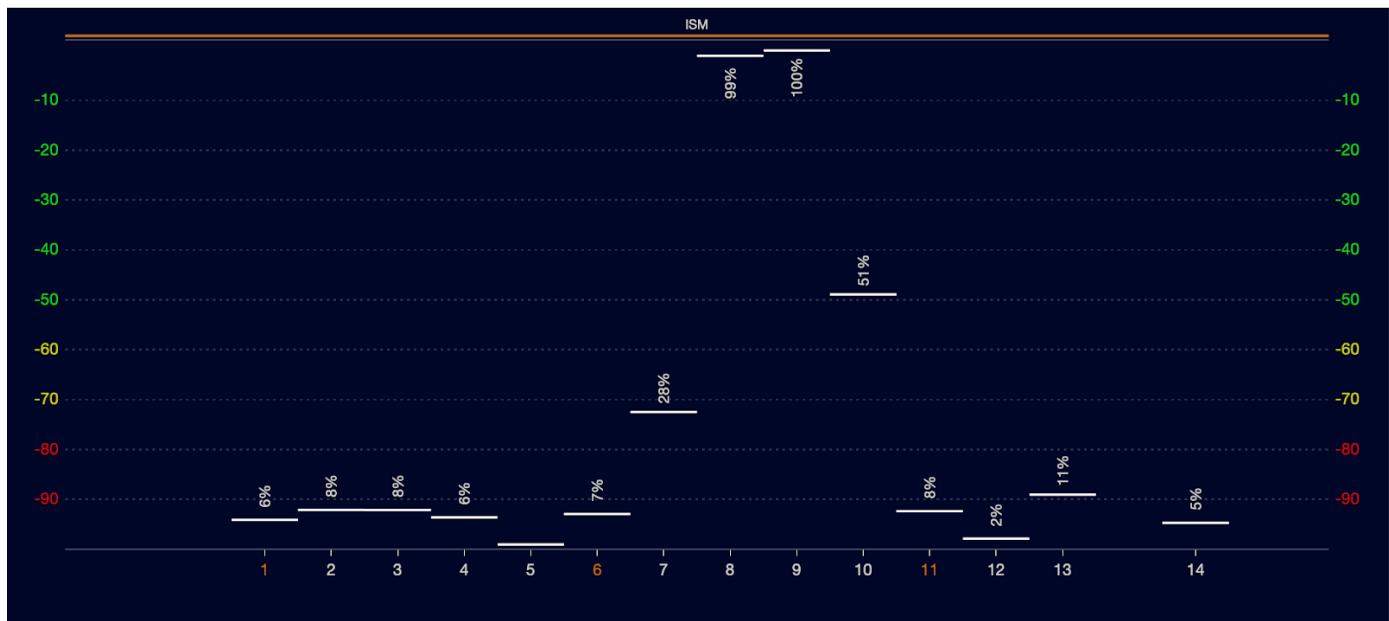


Figure 9-21 - Spectrum analysis Utilization Trace

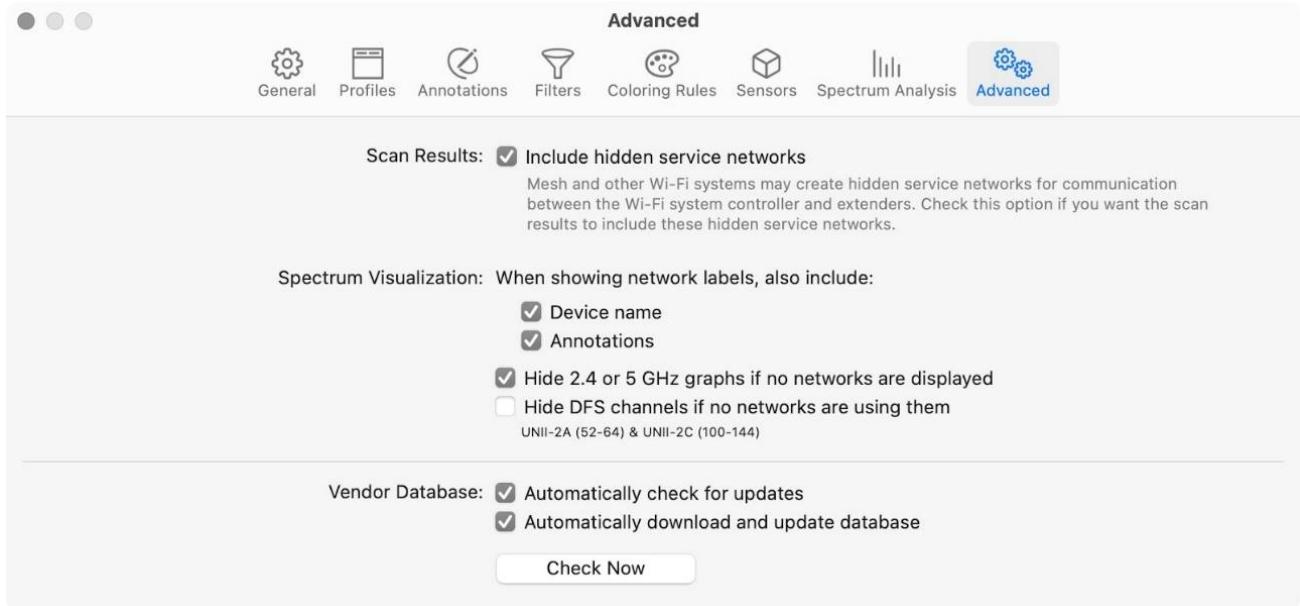
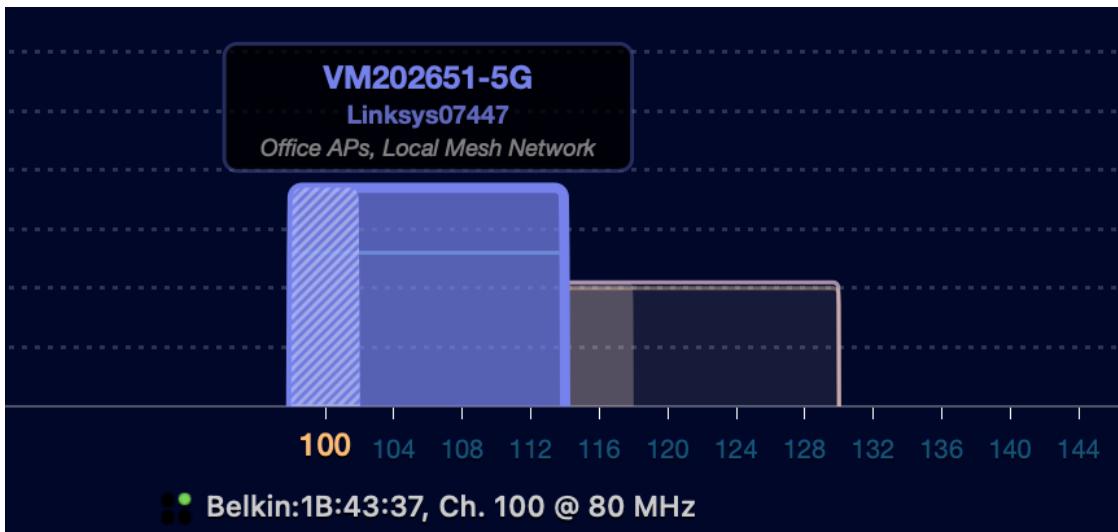
Figure 9-22 - The *Advanced* settings tab

Figure 9-23 - Spectrum Visualization with device names & annotations enabled

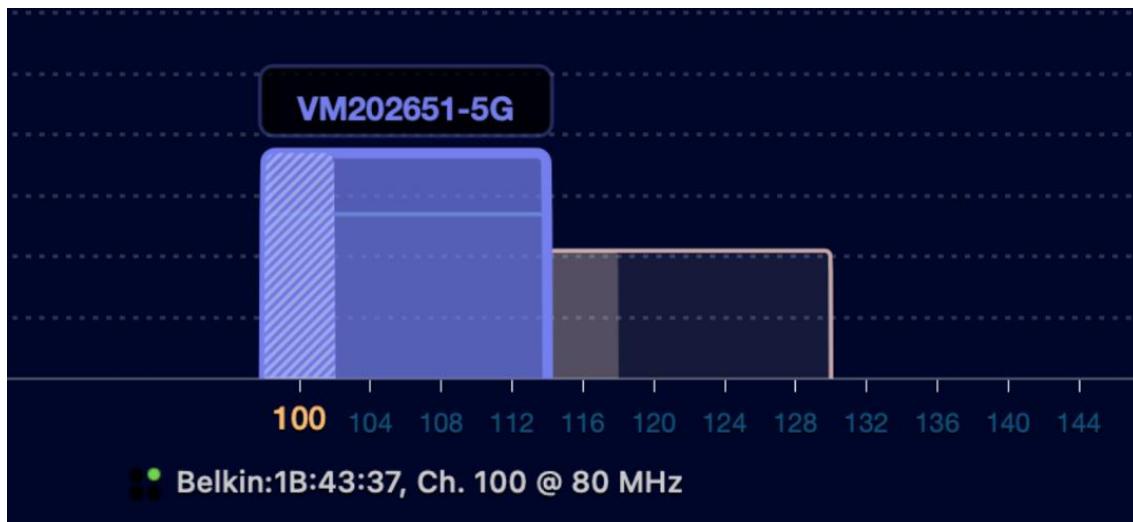


Figure 9-24 - Spectrum Visualization with device names & annotations disabled

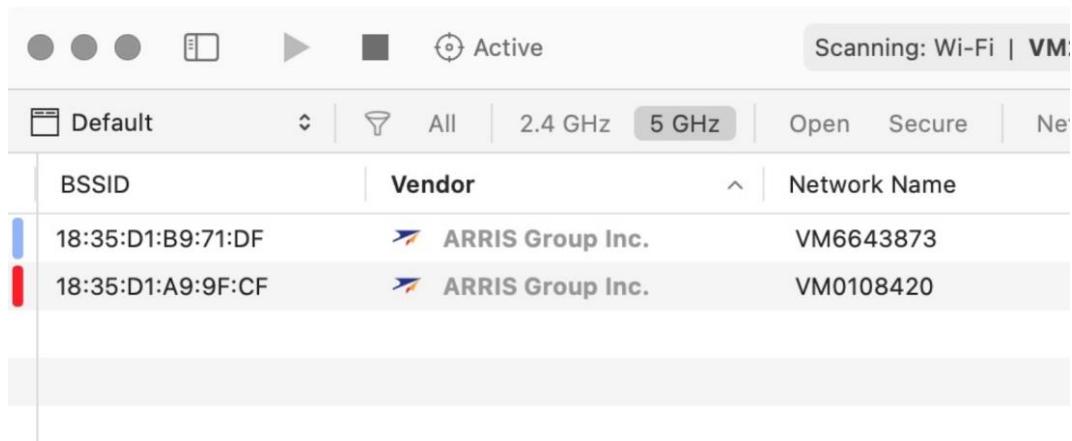


Figure 9-25 - Network list showing Arris Group Inc. devices



Figure 9-26 - Online lookup of the 18:35:D1 OUI details

Chapter 10 - Data Visualization: Filter Expressions & Display Filters

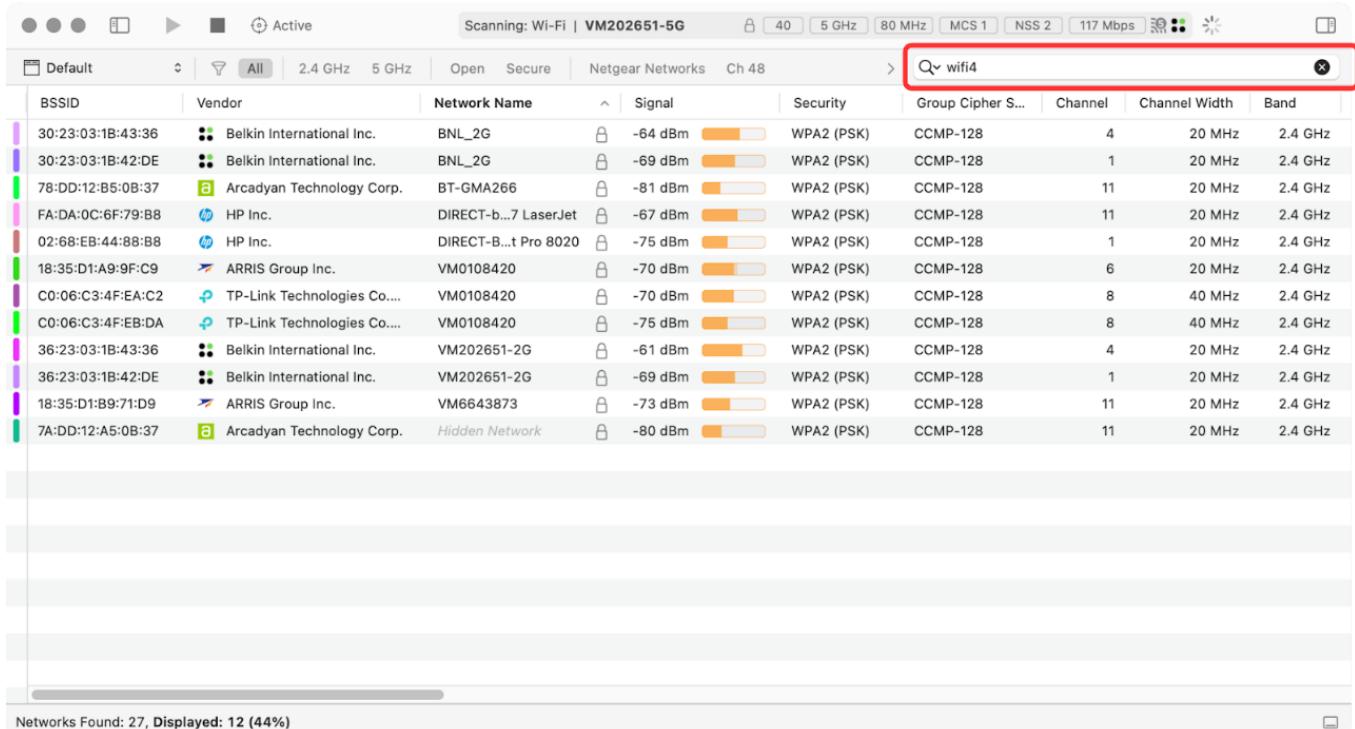


Figure 10-1 - Filtering with keywords

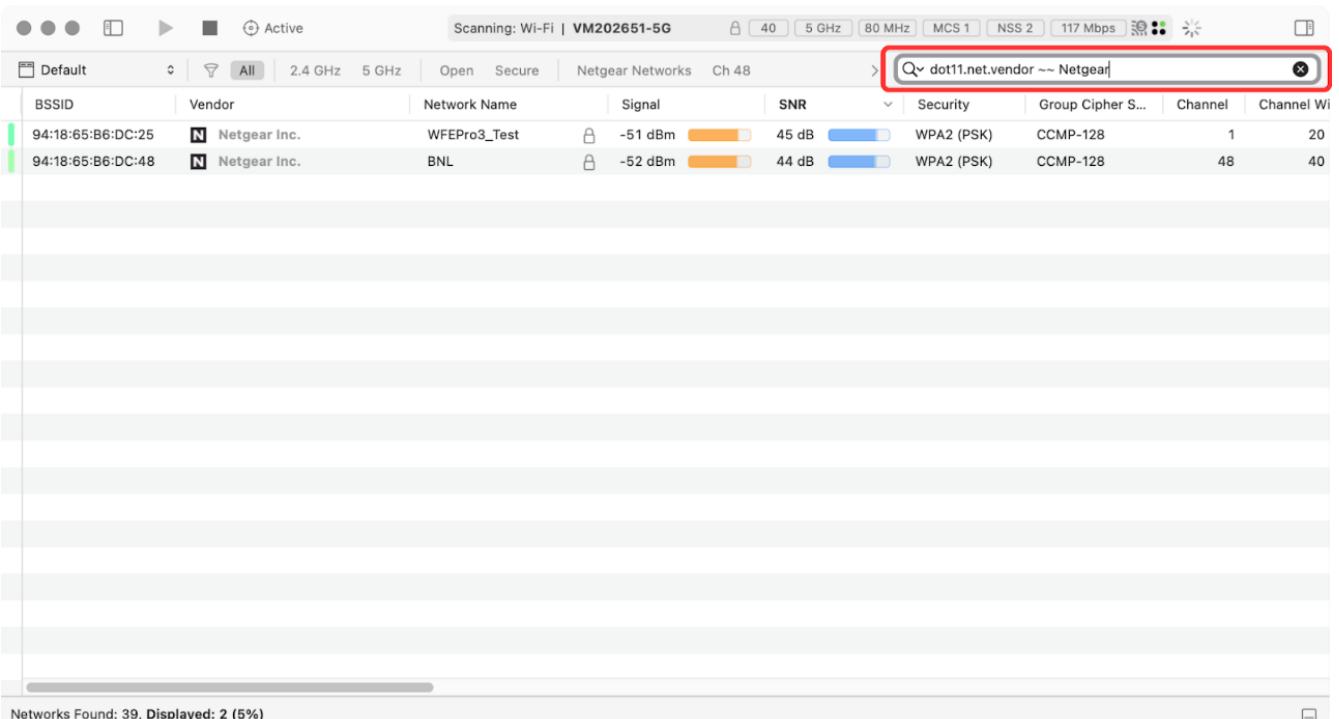


Figure 10-2 - Network attribute filter applied to the networks table

WiFi Explorer Pro 3: The Definitive User Guide

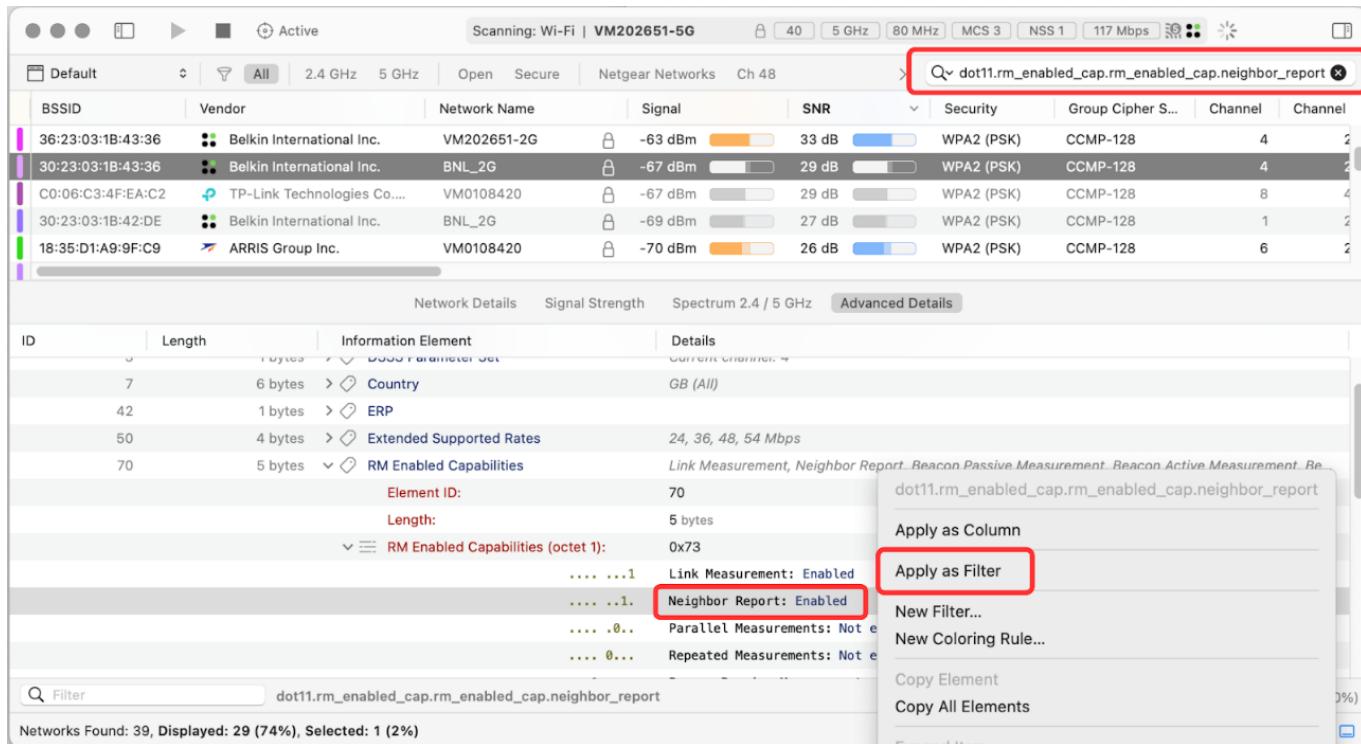


Figure 10-3 - Information element field filter applied to the networks table

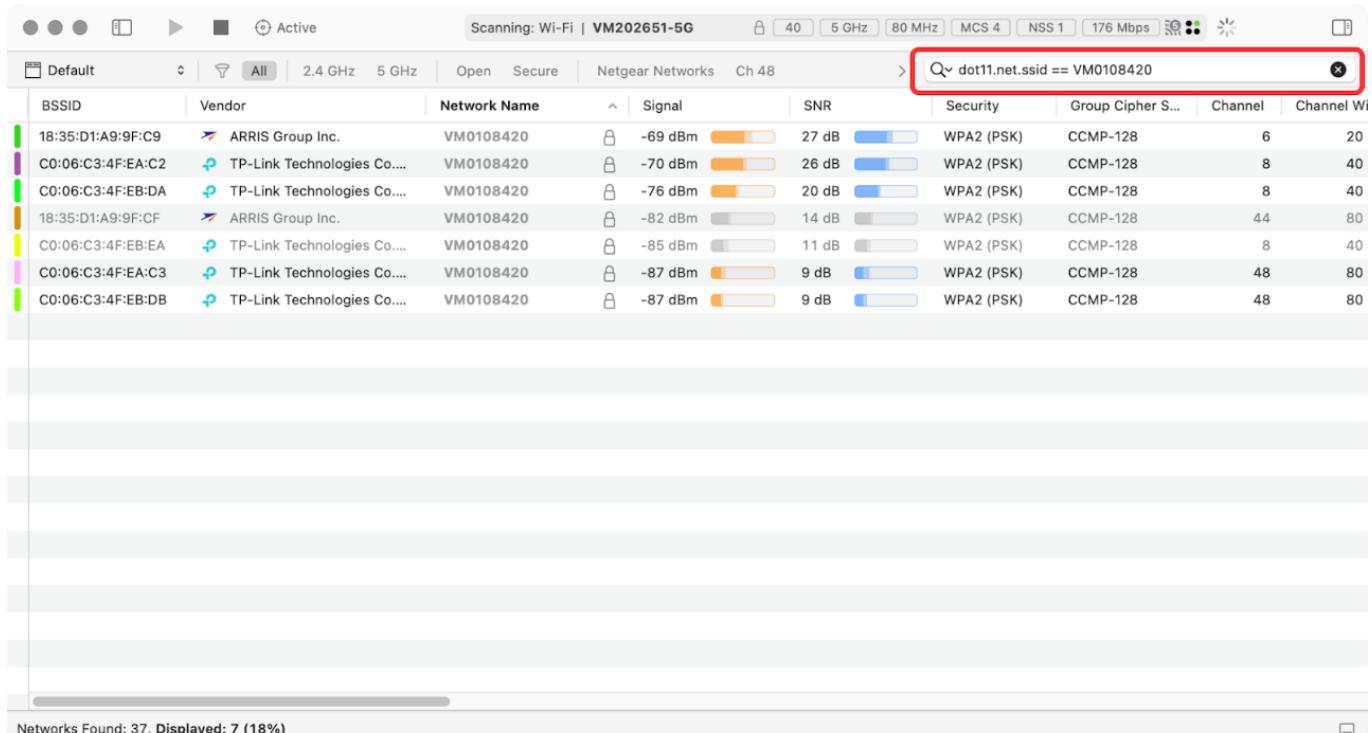


Figure 10-4 - Filtering using a comparison operator

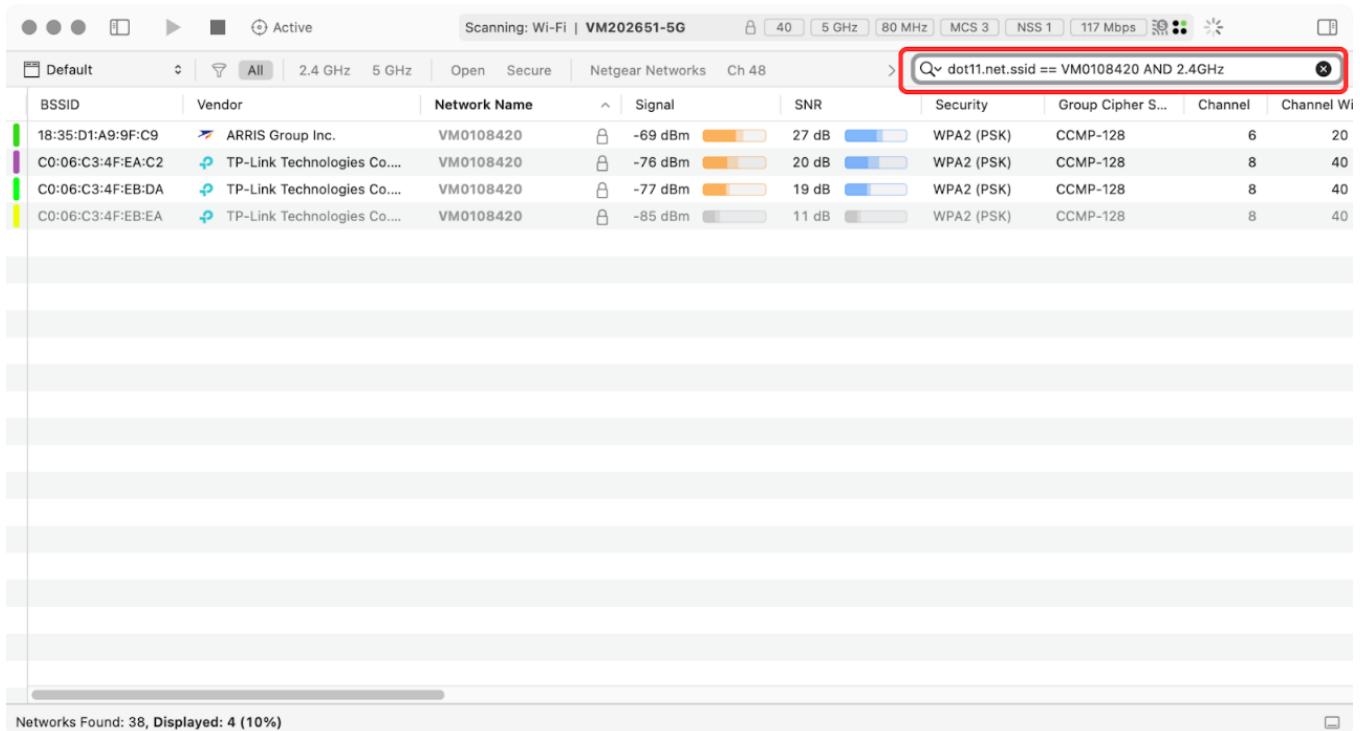


Figure 10.5 - Filtering example using multiple expressions

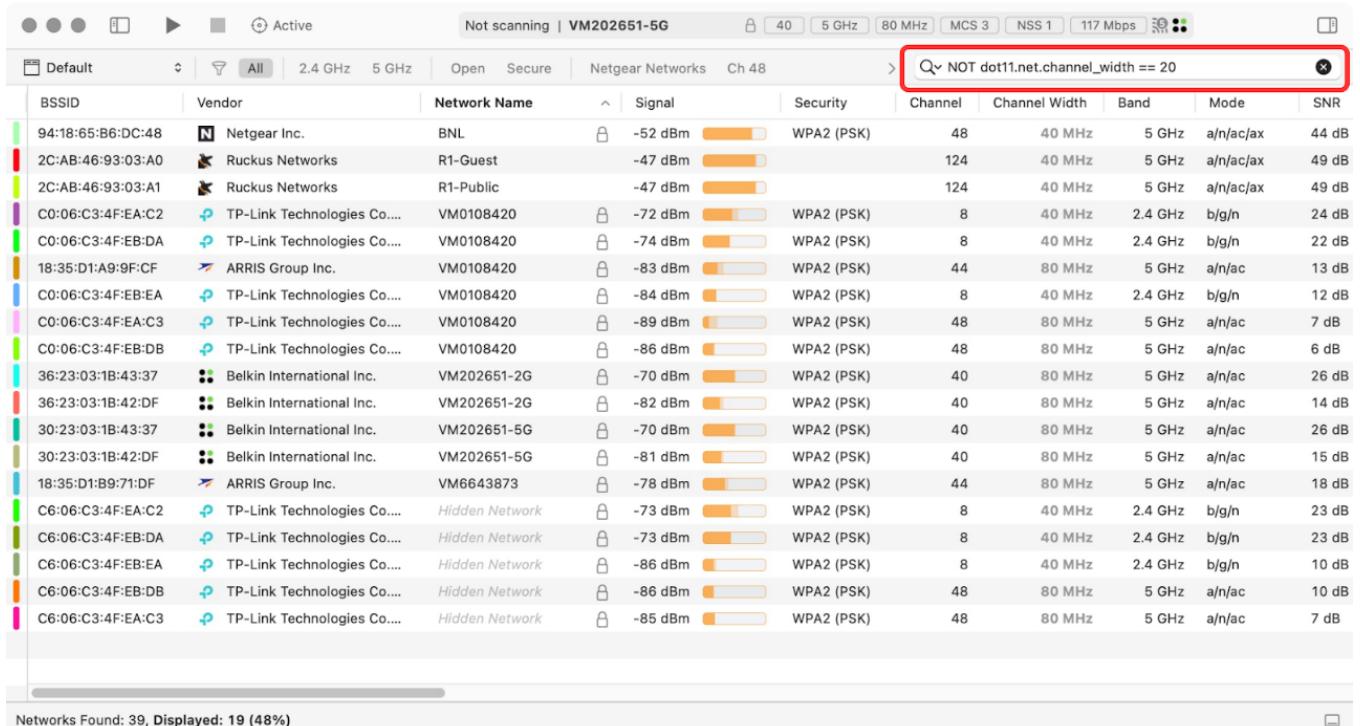


Figure 10.6 - Filtering using the negation operator

WiFi Explorer Pro 3: The Definitive User Guide

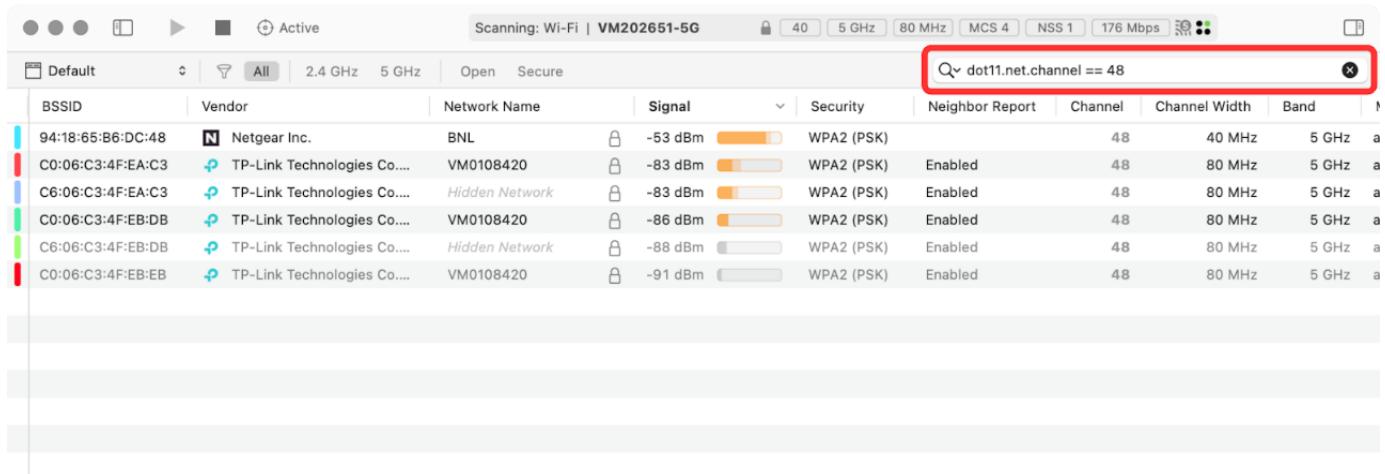


Figure 10-7 - Filter field location

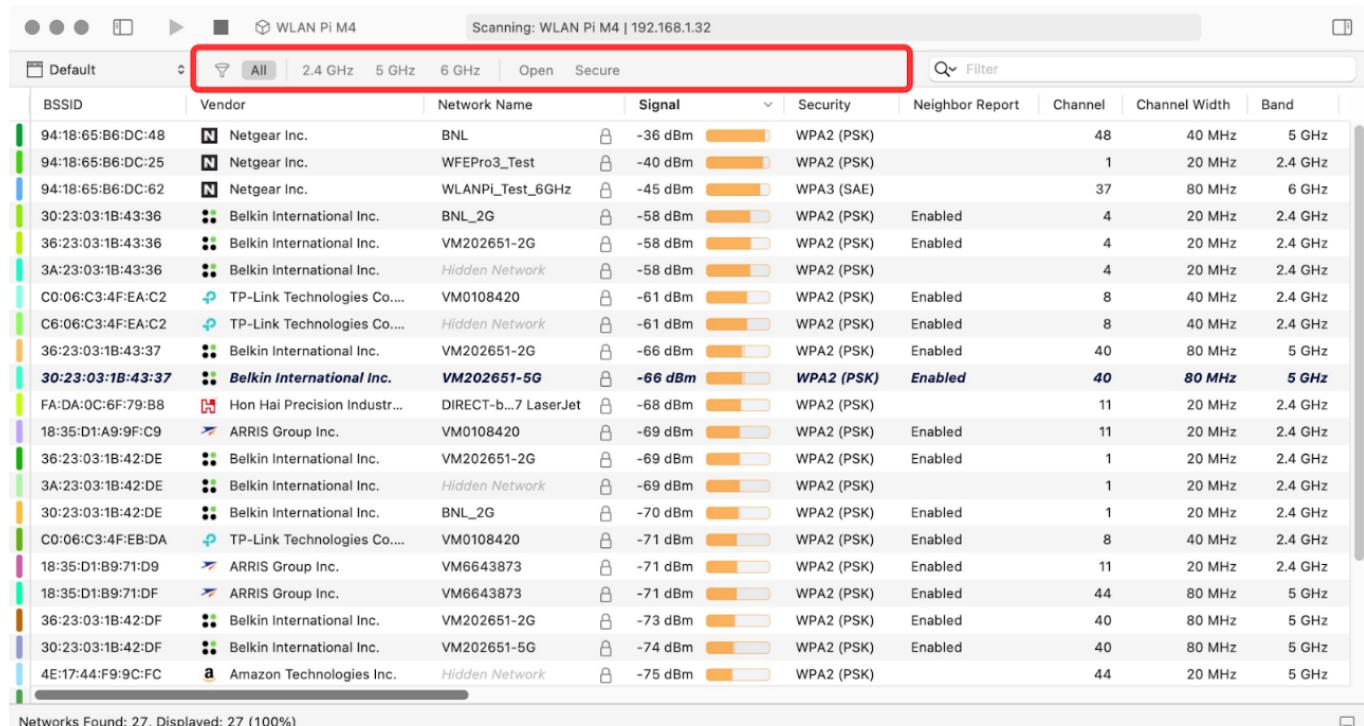
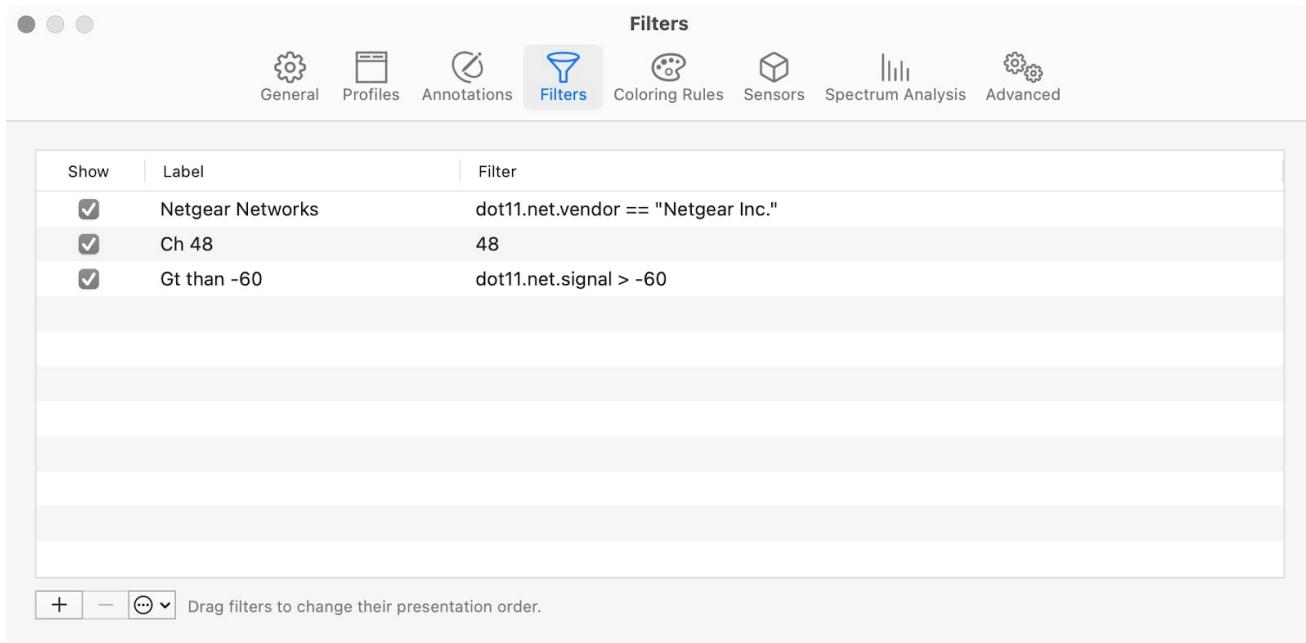


Figure 10-8 - Quick filter bar location

Figure 10-9 - The *Filters* settings tab

Channels_Info		All	2.4 GHz	5 GHz	Open	Secure	Netgear Networks	Ch 48	Gt than -60	Filter
BSSID	Network Name									
94:18:65:B6:DC:48	BNL	<input type="checkbox"/>	Netgear Inc.				<input type="checkbox"/>	-51 dBm	<div style="width: 10%;"> </div>	48
30:23:03:1B:43:36	BNL_2G	<input type="checkbox"/>	Belkin International Inc.	Office APs, L...esh Network	<input type="checkbox"/>		<input type="checkbox"/>	-57 dBm	<div style="width: 10%;"> </div>	8
36:23:03:1B:43:36	VM202651-2G	<input type="checkbox"/>	Belkin International Inc.	Local Mesh Network	<input type="checkbox"/>		<input type="checkbox"/>	-57 dBm	<div style="width: 10%;"> </div>	8
94:18:65:B6:DC:25	WFEPro3_Test	<input type="checkbox"/>	Netgear Inc.	Test AP	<input type="checkbox"/>		<input type="checkbox"/>	-49 dBm	<div style="width: 20%;"> </div>	1
3A:23:03:1B:43:36	Hidden Network	<input type="checkbox"/>	Belkin International Inc.	Local Mesh Network	<input type="checkbox"/>		<input type="checkbox"/>	-57 dBm	<div style="width: 10%;"> </div>	8

Figure 10-10 - Custom filters on the quick filter bar

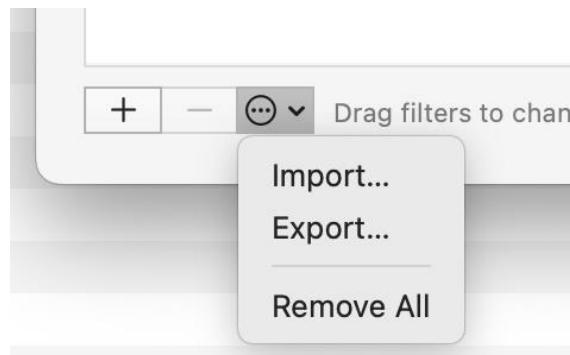


Figure 10-11 - The filters list action buttons

WiFi Explorer Pro 3: The Definitive User Guide

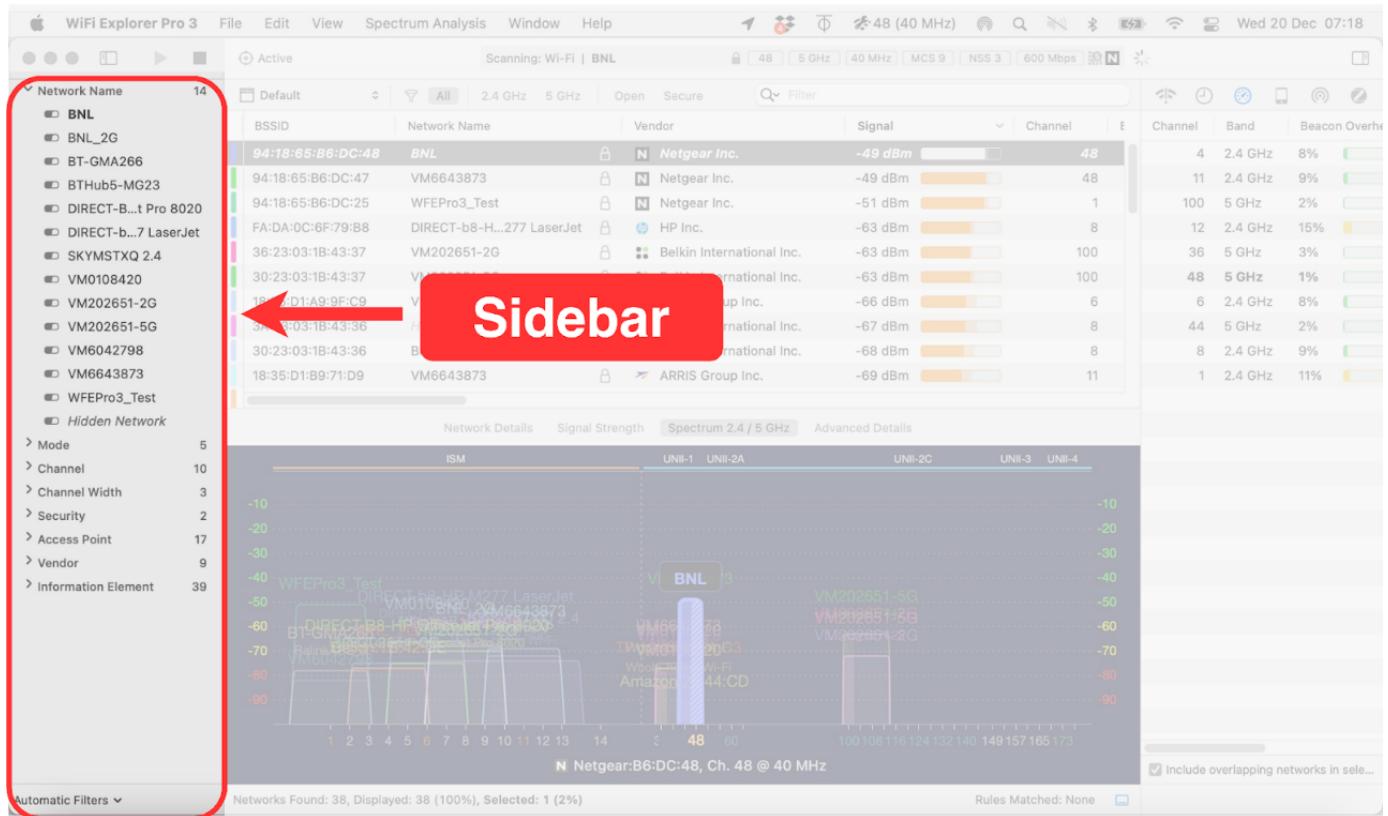


Figure 10-12 - Sidebar UI location

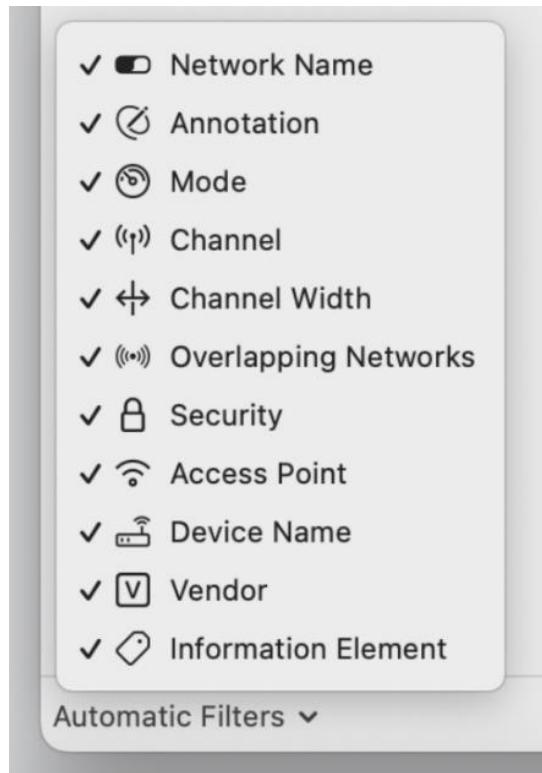
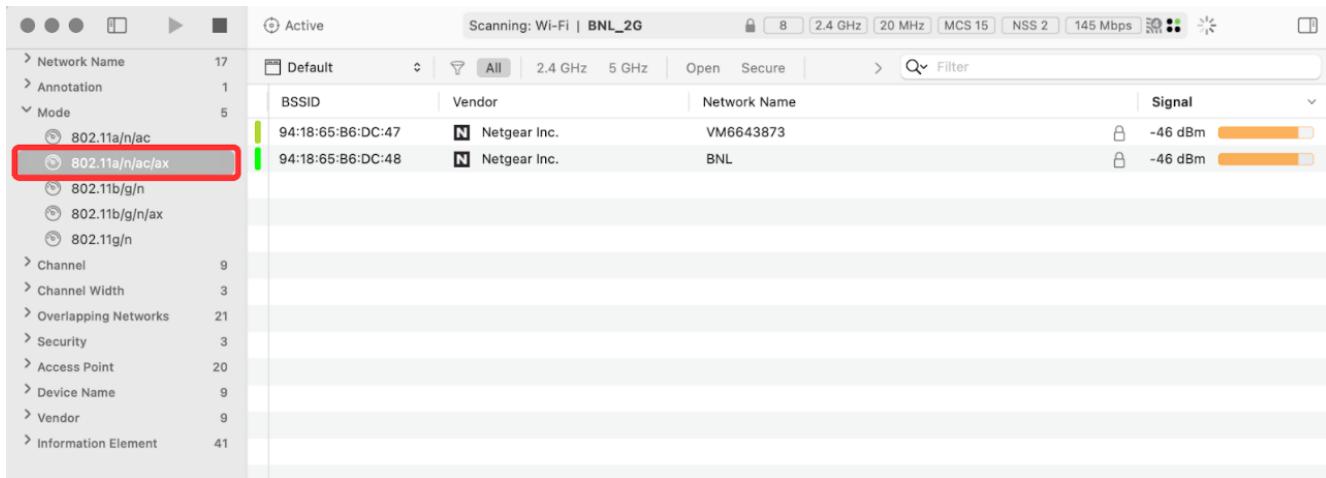
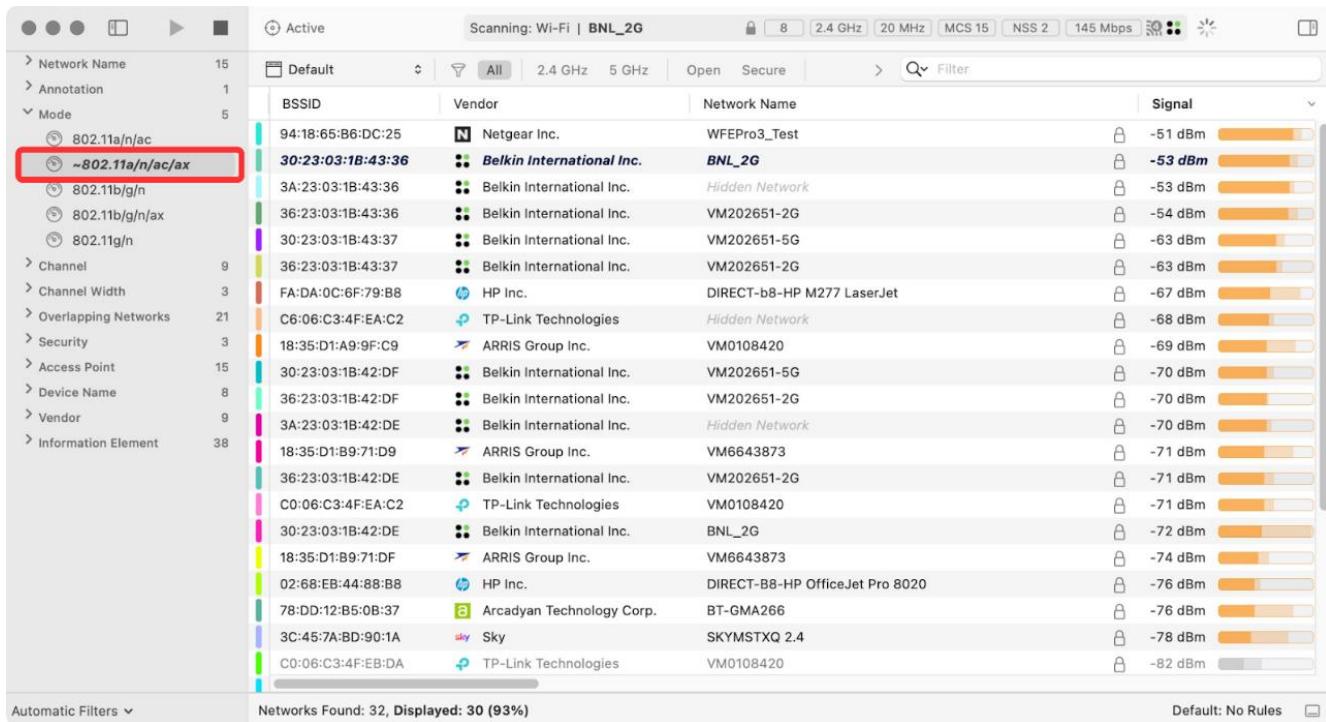


Figure 10-13 - Sidebar Automatic Filter options

Figure 10-14 - Sidebar filter example using a *Mode* filterFigure 10-15 - Sidebar filter example using a negated *Mode* filter

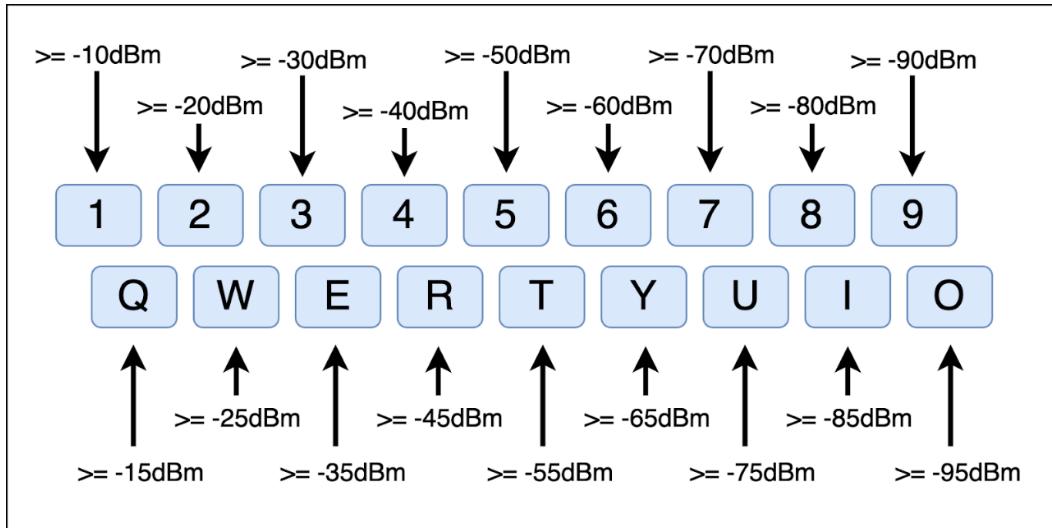


Figure 10-16 - Keyboard shortcut filters

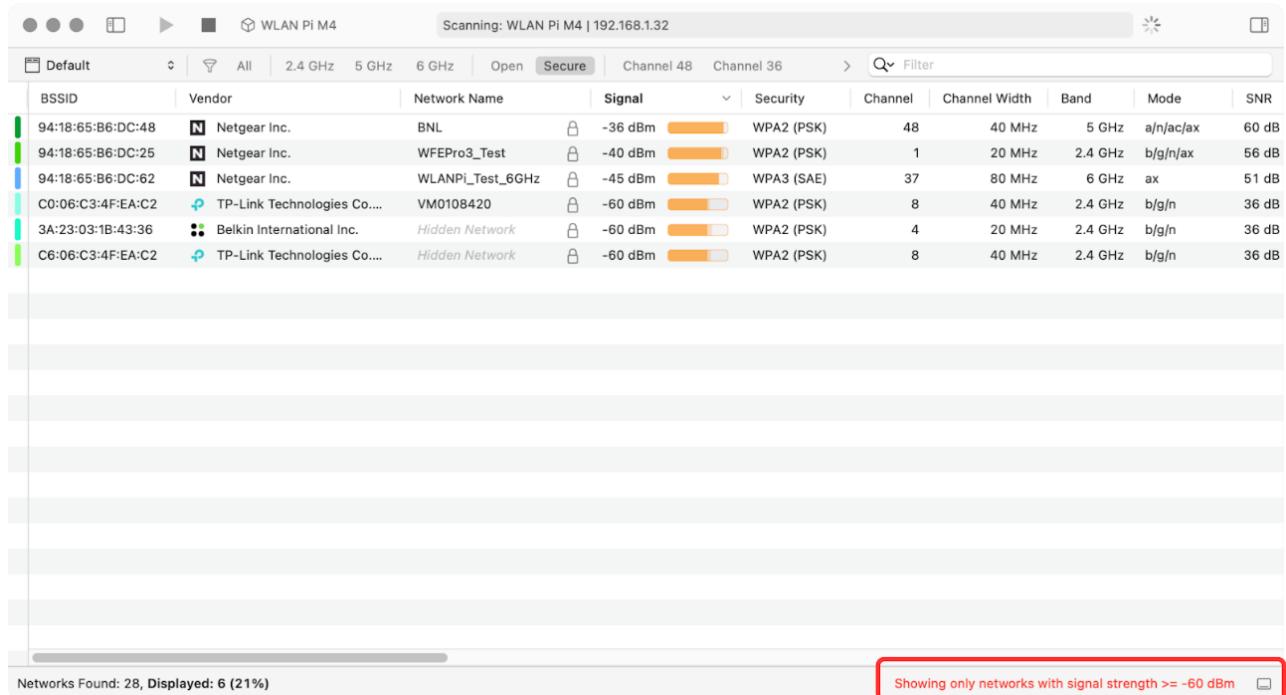


Figure 10-17 - Keyboard shortcut filter applied for -60 dBm (Ctrl-6)

WiFi Explorer / WiFi Explorer Pro 3 Filters Cheat Sheet

intuitibits

Filter by Keyword

- Filter by network name (SSID), annotations, vendor, or device name: Type any text. Use quotation marks for exact matching or names with spaces.
- Filter by BSSID: Type one or more octets in the form :XX or XX:00:, :00:11:, :55:, :44:, :55:, etc.
- Filter by band: Type the band frequency in GHz. 2.4ghz, 2ghz, 5ghz, etc.
- Filter by generation: Type wifi4, wifi5, or wifi6.
- Filter by channel: Type a channel number or range. 1, 36, 7-10, etc.
- Filter by channel width: Type the channel width in MHz. Units may be omitted. 20, 20mhz, 40mhz, etc.
- Filter by signal strength (RSSI): Type <, >, <= or >= and the signal strength in dBm. >-65, <=-70, etc.
- Filter by network mode: Type the letter(s) that identify the mode: a, b, g, n, ac, or ax. You may prefix it with 802.11, 80211 or 11, ac, 802.11b, 80211g, 11n, etc.
- Filter by security or encryption type: Type the acronym for the security or encryption type: open, secure, wep, wpa, wpa2, wpa3, sae, psk, owe, 802.1X.
- Filter by feature: The identifier of the feature: wps (WPS), ft (BSS Fast Transition), dtcp* (DTPC), hs* (Hotspot 2.0).
- Filter by SSID visibility: Type hidden to show hidden networks only.

Combine or Negate Filters

- Combine filters using the OR operator: 20mhz OR 40mhz
- Combine filters using the AND operator: 5ghz AND dot11.net.signal >= -72
- Negate a filter using the NOT operator: NOT 20mhz
- Group filter expressions using parenthesis: (2.4ghz AND 40mhz) OR (5ghz AND 160mhz)

Note: Logical operators are CASE SENSITIVE.

Compare Values

Use the following operators to compare values when filtering using network attributes or information element fields:

==	Equal	Numerical and text values
!=	Not equal	Numerical and text values
~~	Contains	Text values
!~	Does not contain	Text values
>	Greater than	Numerical values
>=	Greater or equal than	Numerical values
<	Less than	Numerical values
<=	Less or equal than	Numerical values

Note: If the value you're using for filtering contains spaces, use quotation marks. E.g., for showing networks named "Guest Network" only, use dot11.net.ssid == "Guest Network".

* This filter or feature is only available in WiFi Explorer Pro 3.

Filter by Network Attribute

- Right-click over a field or subfield to filter by specific attributes. These attributes map to the Network Fields. Columns are identified with the prefix dot11.net. Use the auto-complete function in the Filter field, or select a network then:

dot11.net.amendments*
dot11.net.annotations
dot11.net.band
dot11.net.basic_rates
dot11.net.beacon_airtime*
dot11.net.beacon_interval
dot11.net.beacon_mode*
dot11.net.beacon_rate*
dot11.net.bssid
dot11.net.channel_freq
dot11.net.channel
dot11.net.channel_util
dot11.net.channel_width
dot11.net.clients*
dot11.net.country_code*
dot11.net.device_name
dot11.net.fast_transition
dot11.net.generation
dot11.net.ie_count*
dot11.net.ie_total_length*

Filter by Network Attribute (cont.)

- Maximum supported basic rate (Mbps): dot11.net.max_basic_rate* Maximum supported basic rate (Mbps): dot11.net.max_basic_rate == 54, dot11.net.max_basic_rate >= 24 Mbps
- Minimum supported basic rate (Mbps): dot11.net.min_basic_rate* Minimum supported basic rate (Mbps): dot11.net.min_basic_rate == 24 Mbps
- Band: dot11.net.mode == ax Band: dot11.net.mode == ax
- Mode: dot11.net.mode == "Non-HT Mixed", "None" Mode: dot11.net.mode == "Non-HT Mixed", "None"
- Security: dot11.net.security == OWE Security: dot11.net.security == OWE
- Ssid: dot11.net.ssid -- guest Ssid: dot11.net.ssid -- guest
- Stations: dot11.net.stations > 10 Stations: dot11.net.stations > 10
- Streams: dot11.net.streams > 3 Streams: dot11.net.streams > 3
- Type: dot11.net.type == mesh, wireless Type: dot11.net.type == mesh, wireless
- Vendor: dot11.net.vendor == Aruba Vendor: dot11.net.vendor == Aruba
- Wide Channel: dot11.net.wide_channel == 165 Wide Channel: dot11.net.wide_channel == 165
- Protected Setup: dot11.net.wps == Wi-Fi Protected Setup Protected Setup: dot11.net.wps == Wi-Fi Protected Setup
- Configured: dot11.net.wps == Configured, dot11.net.wps == Locked Configured: dot11.net.wps == Configured, dot11.net.wps == Locked

Filter by Keyword

- Filter by network name (SSID), annotations, vendor, or device name: Type any text. Use quotation marks for exact matching or names with spaces.
- Filter by BSSID: Type one or more octets in the form :XX or XX:00:, :00:11:, :55:, :44:, :55:, etc.
- Filter by band: Type the band frequency in GHz. 2.4ghz, 2ghz, 5ghz, etc.
- Filter by generation: Type wifi4, wifi5, or wifi6.
- Filter by channel: Type a channel number or range. 1, 36, 7-10, etc.
- Filter by channel width: Type the channel width in MHz. Units may be omitted. 20, 20mhz, 40mhz, etc.
- Filter by signal strength (RSSI): Type <, >, <= or >= and the signal strength in dBm. >-65, <=-70, etc.
- Filter by network mode: Type the letter(s) that identify the mode: a, b, g, n, ac, or ax. You may prefix it with 802.11, 80211 or 11, ac, 802.11b, 80211g, 11n, etc.
- Filter by security or encryption type: Type the acronym for the security or encryption type: open, secure, wep, wpa, wpa2, wpa3, sae, psk, owe, 802.1X.
- Filter by feature: The identifier of the feature: wps (WPS), ft (BSS Fast Transition), dtcp* (DTPC), hs* (Hotspot 2.0).
- Filter by SSID visibility: Type hidden to show hidden networks only.

Filter by Information Element Field

You can filter networks by specific information element fields*. The prefix dot11 identifies more than 600 fields (except for the prefix dot11.net, which identifies network attributes). Use the auto-complete function in the Filter field, or select a network, then:

Go to Advanced Details > Right-click over a field or subfield > Choose Apply as Filter

© 2023, intuitibits LLC. All rights reserved. Revision 3.3 (07/17/2023).

Figure 10-18 – Filters cheat sheet available from www.intuitibits.com

Chapter 11 - Data Visualization: Columns & Profiles

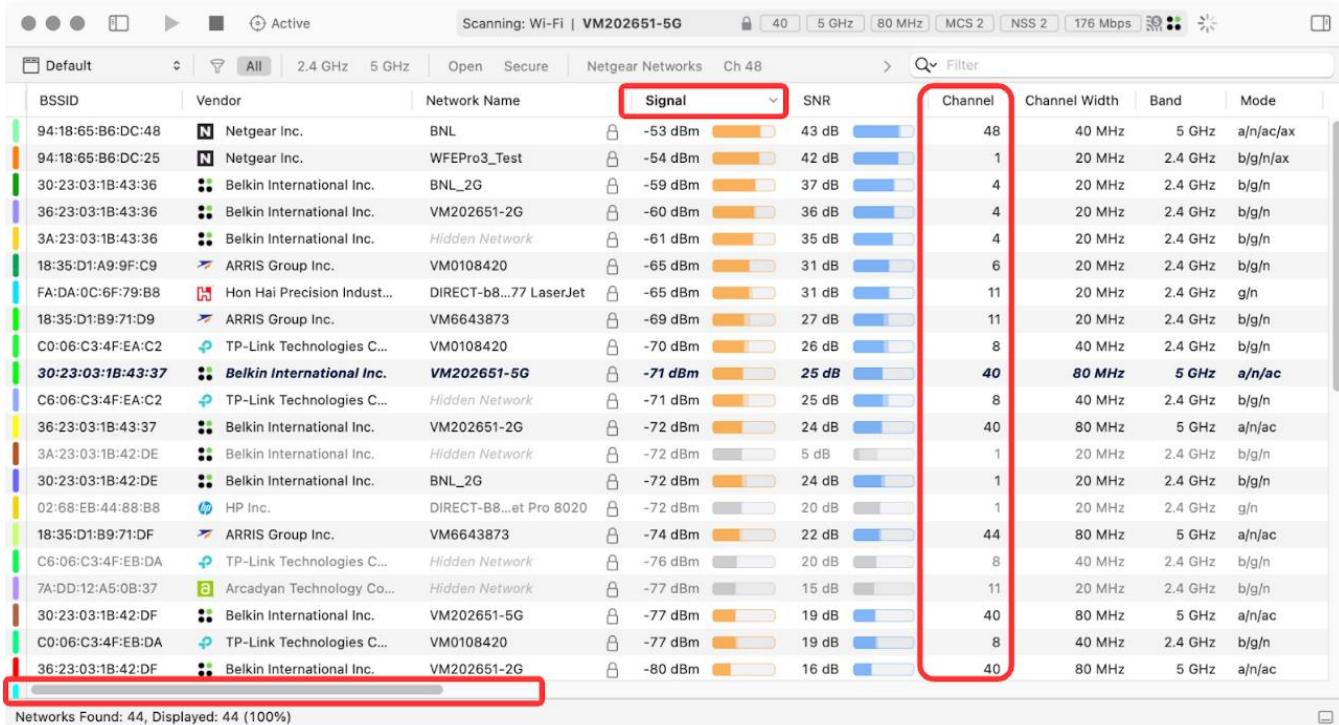


Figure 11-1 - Typical WLAN scan data listing

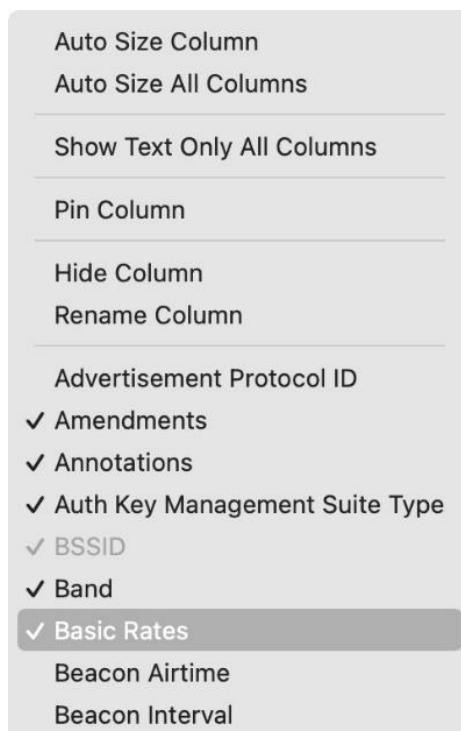


Figure 11-2 - Columns menu (accessed by right-clicking any column header)

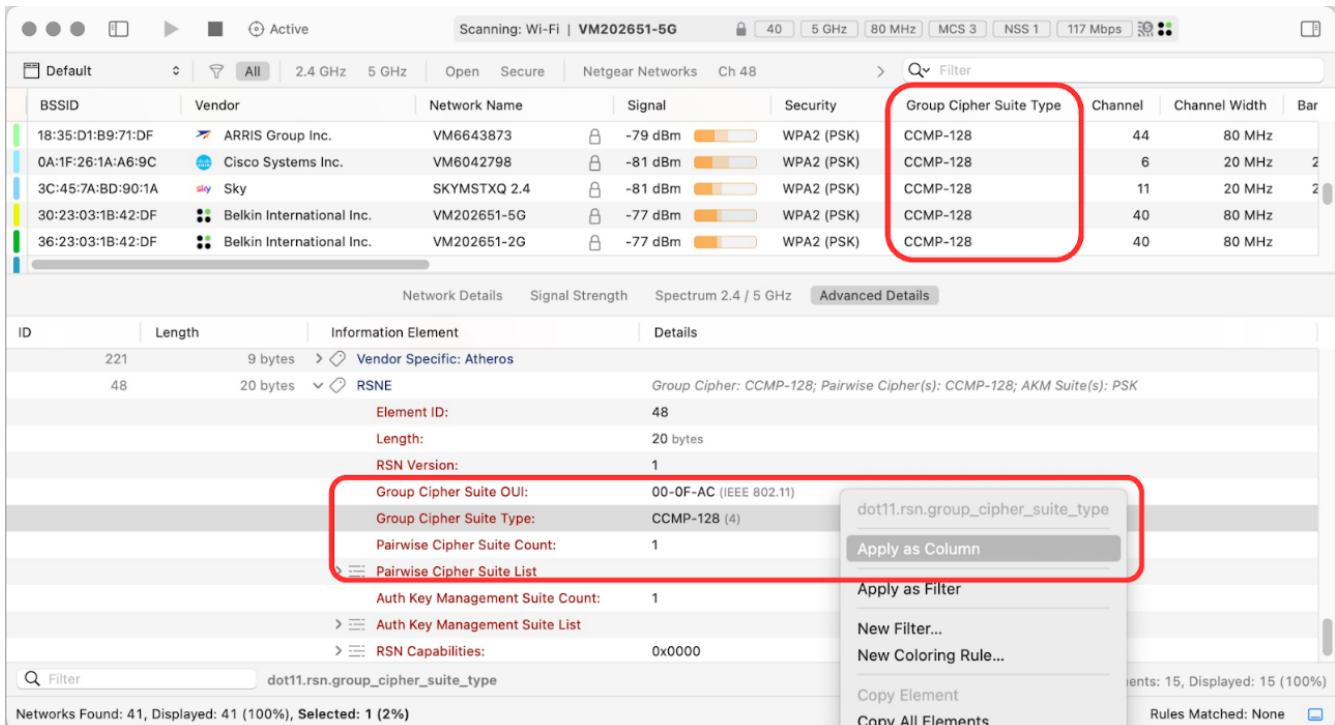


Figure 11-3 - Custom column addition

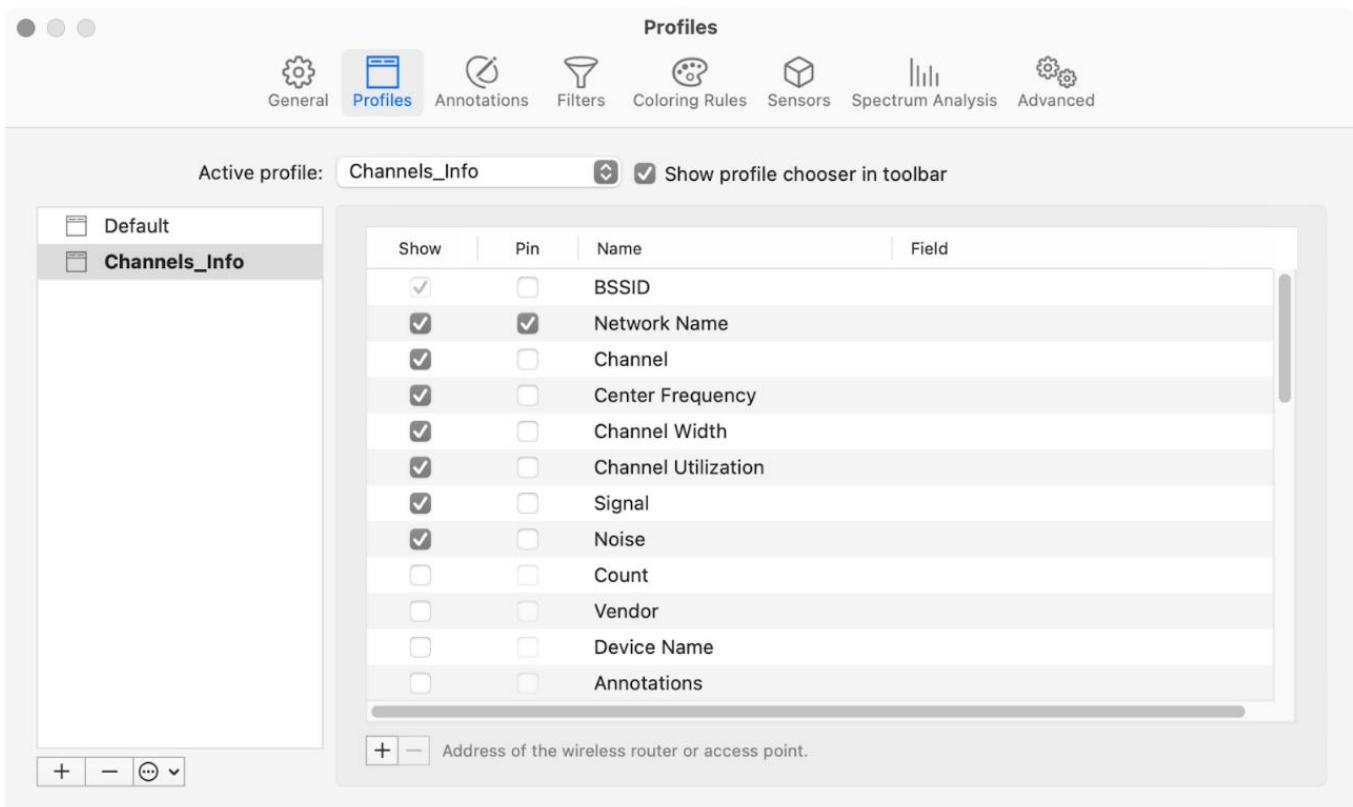


Figure 11-4 - Profiles settings tab showing a custom profile

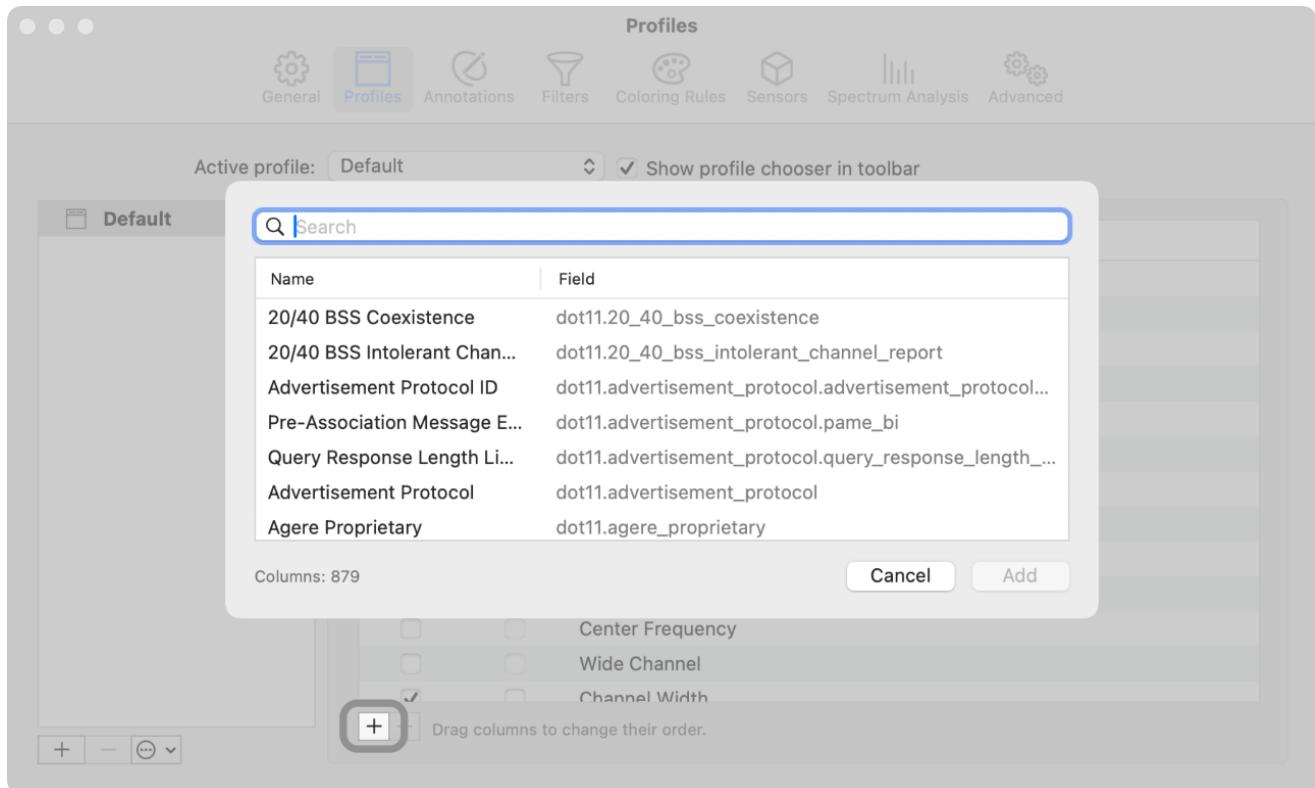
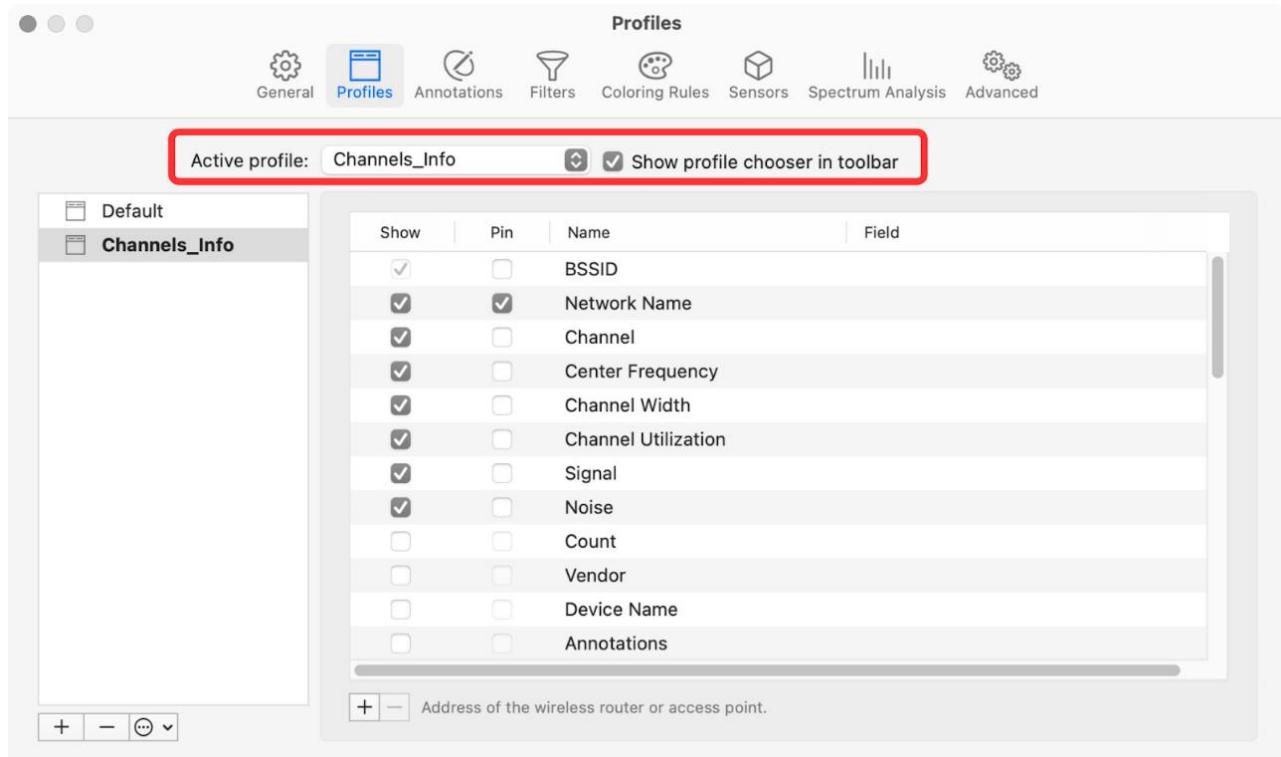


Figure 11-5 - Adding new columns to a profile

The screenshot shows the WiFi Explorer Pro 3 interface with the 'Networks' tab selected. The 'Channels_Info' profile is applied, as indicated by the red box around the dropdown menu. The '5 GHz' tab is selected, also indicated by a red box. The table displays network information for the 5 GHz band.

Network Name	BSSID	Channel	Center Frequency	Channel Width	Channel Utilization	Signal	Noise
BNL	94:18:65:B6:DC:48	48	5240 MHz	40 MHz		-49 dBm	-96 dBm
VM6643873	94:18:65:B6:DC:47	48	5240 MHz	40 MHz		-49 dBm	-96 dBm
VM202651-2G	36:23:03:1B:43:37	100	5500 MHz	80 MHz		-69 dBm	-92 dBm
VM202651-5G	30:23:03:1B:43:37	100	5500 MHz	80 MHz		-69 dBm	-92 dBm
VM202651-2G	36:23:03:1B:42:DF	100	5500 MHz	80 MHz		-72 dBm	-92 dBm
VM202651-5G	30:23:03:1B:42:DF	100	5500 MHz	80 MHz		-73 dBm	-92 dBm
Hidden Network	C6:06:C3:4F:EA:C3	36	5180 MHz	80 MHz		-78 dBm	-96 dBm
VM6643873	18:35:D1:B9:71:DF	44	5220 MHz	80 MHz		-79 dBm	-96 dBm
VM0108420	C0:06:C3:4F:EA:C3	36	5180 MHz	80 MHz		-81 dBm	-96 dBm
Hidden Network	4E:17:44:F9:9C:FC	44	5220 MHz	20 MHz		-85 dBm	-96 dBm
VM0108420	18:35:D1:A9:9F:CF	44	5220 MHz	80 MHz		-86 dBm	-96 dBm
Hidden Network	1E:48:BE:25:44:CD	44	5220 MHz	20 MHz		-86 dBm	-96 dBm
Hidden Network	C6:06:C3:4F:EB:DB	36	5180 MHz	80 MHz		-89 dBm	-96 dBm
VM0108420	C0:06:C3:4F:EB:DB	36	5180 MHz	80 MHz		-90 dBm	-96 dBm

Figure 11-6 - Networks Area with "Channels_Info" profile applied

Figure 11-7 - Active profile selector in *Settings*

Network Name	BSSID	Channel	Center Frequency	Channel Width
BNL	94:18:65:B6:DC:48	48	5240 MHz	40 MHz
VM6643873	94:18:65:B6:DC:47	48	5240 MHz	40 MHz
VM202651-2G	36:23:03:1B:43:37	100	5500 MHz	80 MHz
VM202651-5G	30:23:03:1B:43:37	100	5500 MHz	80 MHz
VM202651-2G	36:23:03:1B:42:DF	100	5500 MHz	80 MHz
VM202651-5G	30:23:03:1B:42:DF	100	5500 MHz	80 MHz
Hidden Network	C6:06:C3:4F:EA:C3	36	5180 MHz	80 MHz
VM6643873	18:35:D1:B9:71:DF	44	5220 MHz	80 MHz
VM0108420	C0:06:C3:4F:EA:C3	36	5180 MHz	80 MHz
Hidden Network	4E:17:44:F9:9C:FC	44	5220 MHz	20 MHz

Figure 11-8 - Profile chooser location

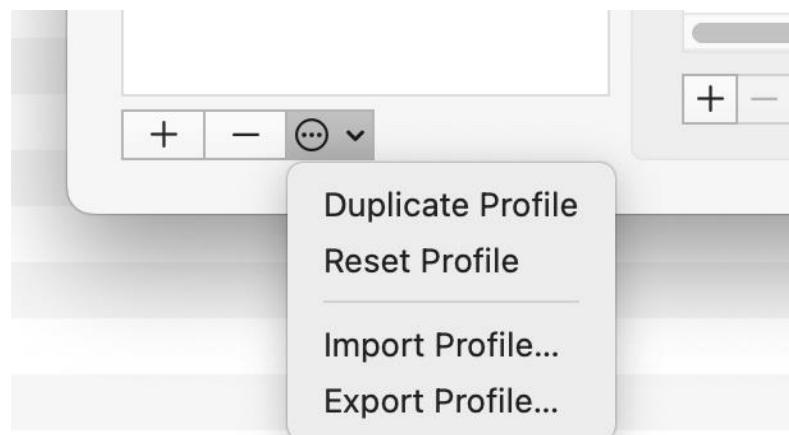


Figure 11-9 - The profiles list action button and available options

A screenshot of the WiFi Explorer Pro 3 application interface. The main window shows a table of wireless networks. A context menu is open over the 'Network Name' column header, which is highlighted with a red box. The menu includes options like Auto Size Column, Show Text Only All Columns, Align Text, Pin Column (which is also highlighted with a red box), Hide Column, Rename Column, and several checked options at the bottom: ✓ Amendments, Annotations, ✓ Auth Key Management Suite Type, and ✓ BSSID. The table has columns for BSSID, Vendor, and Network Name. The 'Network Name' column contains entries such as WFEPro3_Test, BNL, BNL_2G, VM0108420, VM202651-2G, etc.

Figure 11-10 - Pinning a column using a column header

Chapter 12 - Data Visualization: Scan Results Organization, Coloring Rules, Data Enhancements & Hidden Gems

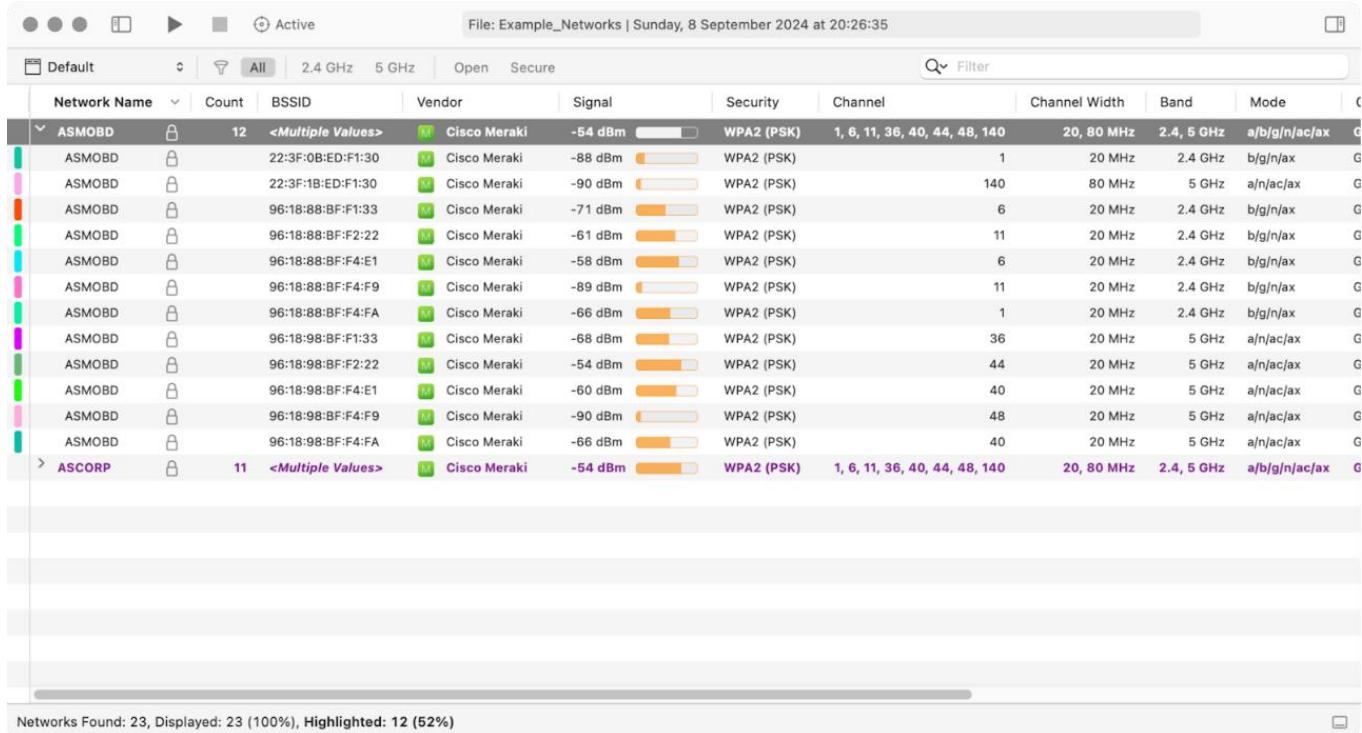


Figure 12-1 - Networks organized by name

WiFi Explorer Pro 3: The Definitive User Guide

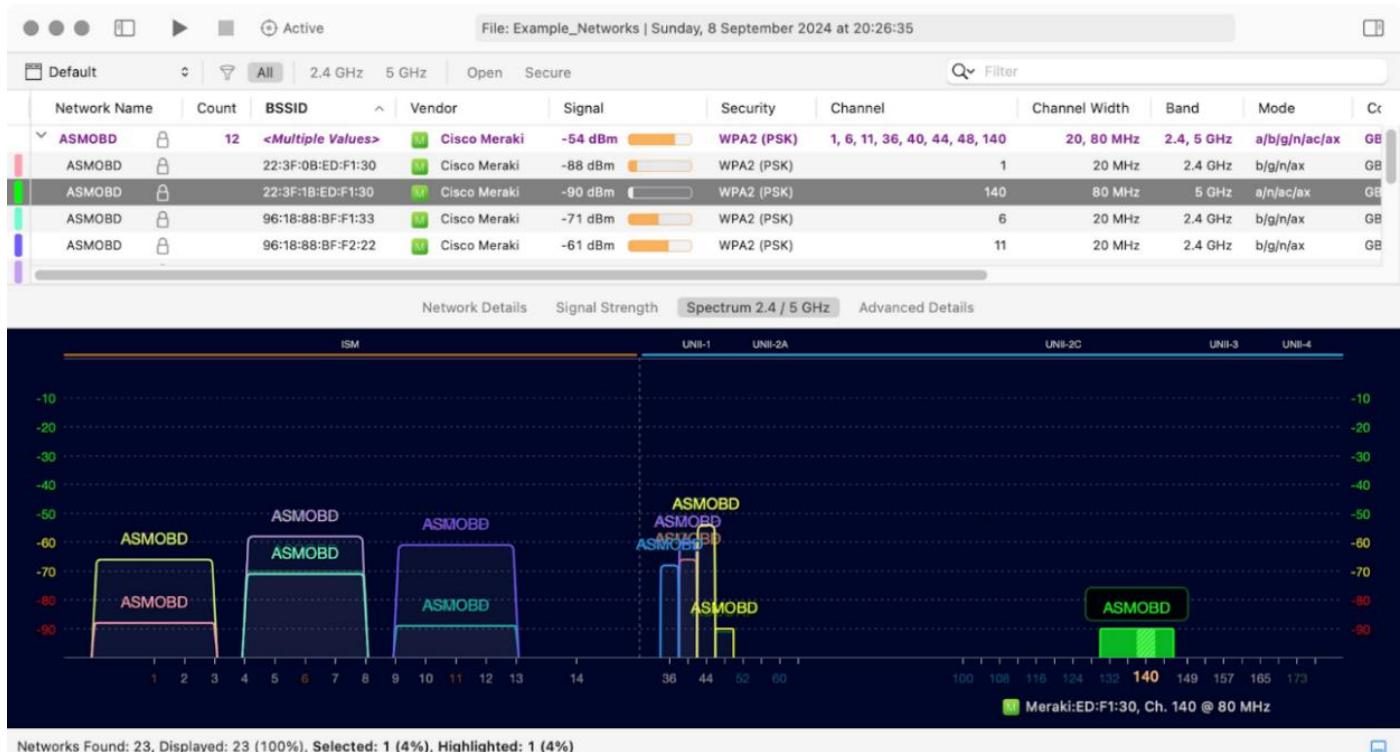


Figure 12-2 - Networks organized by name spectrum view

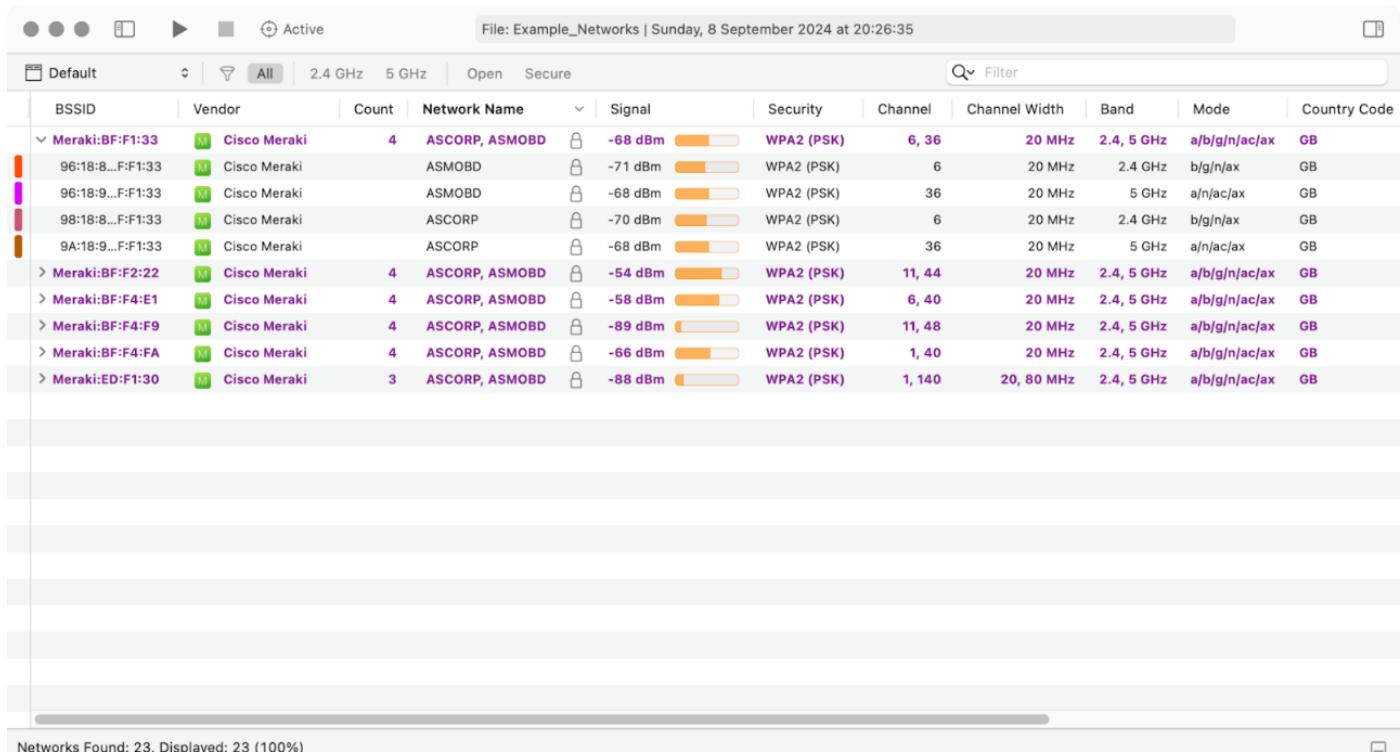


Figure 12-3 - Networks organized by access point

Chapter 12 - Data Visualization: Scan Results Organization, Coloring Rules, Data Enhancements & Hidden Gems

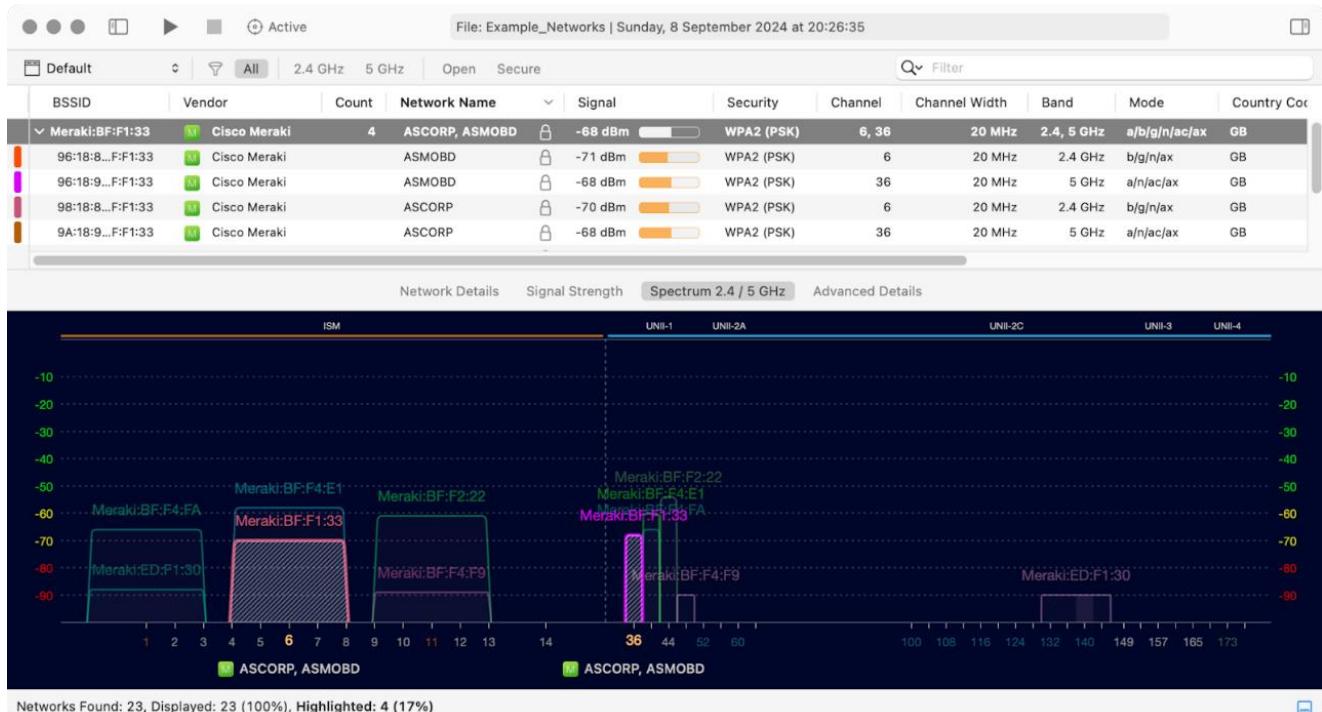


Figure 12-4 - Networks organized by access point spectrum view with a group selected

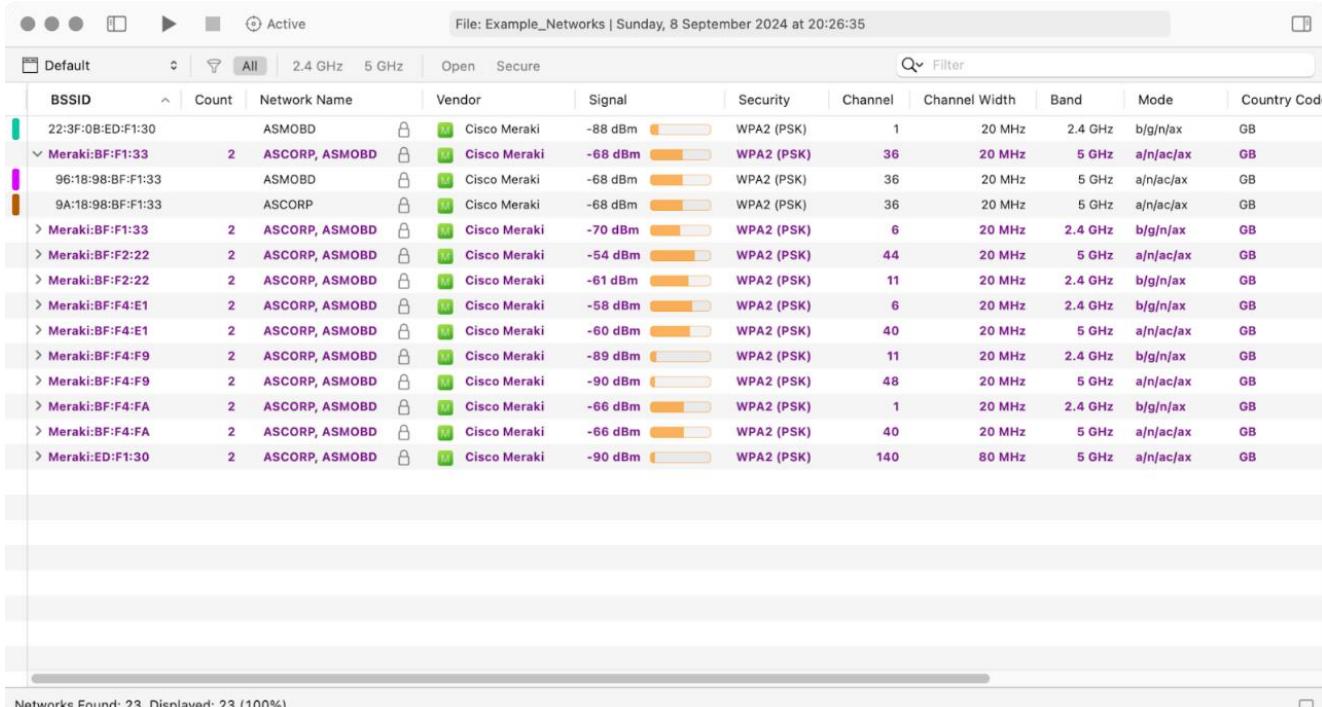


Figure 12-5 - Networks organized by access point radio

WiFi Explorer Pro 3: The Definitive User Guide

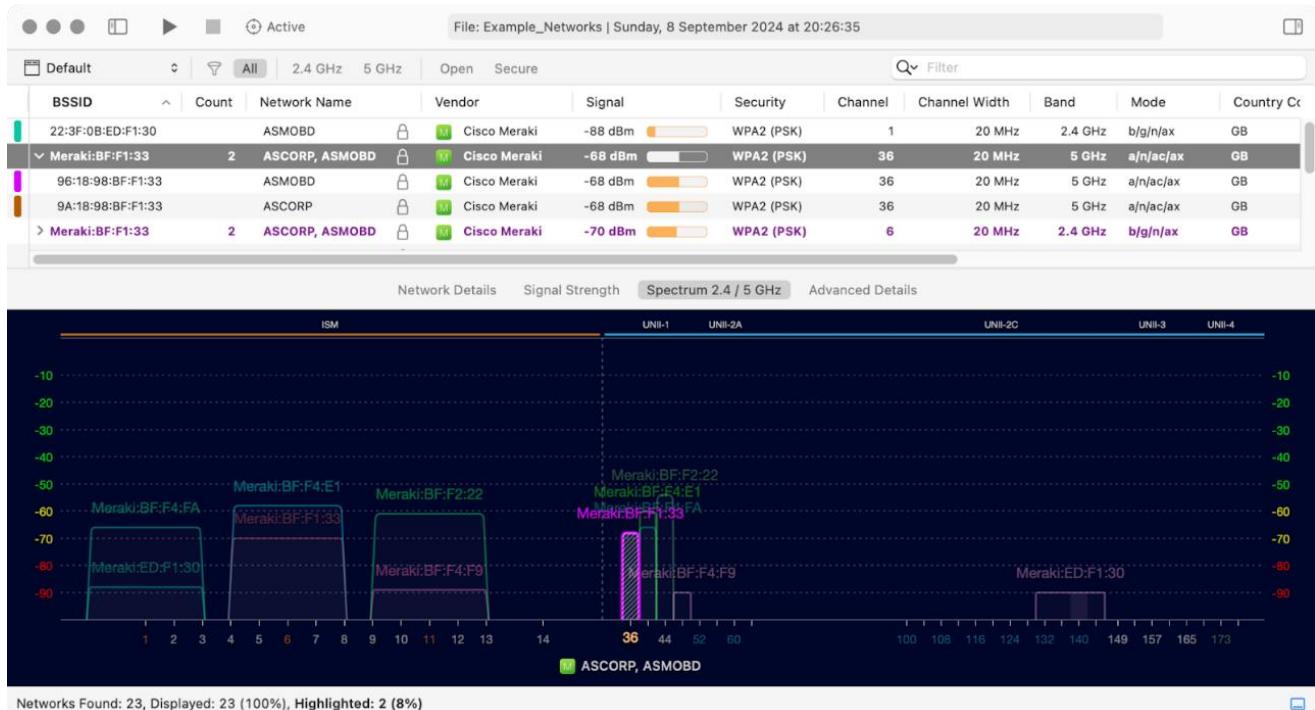


Figure 12-6 - Networks organized by access point radio in the spectrum view

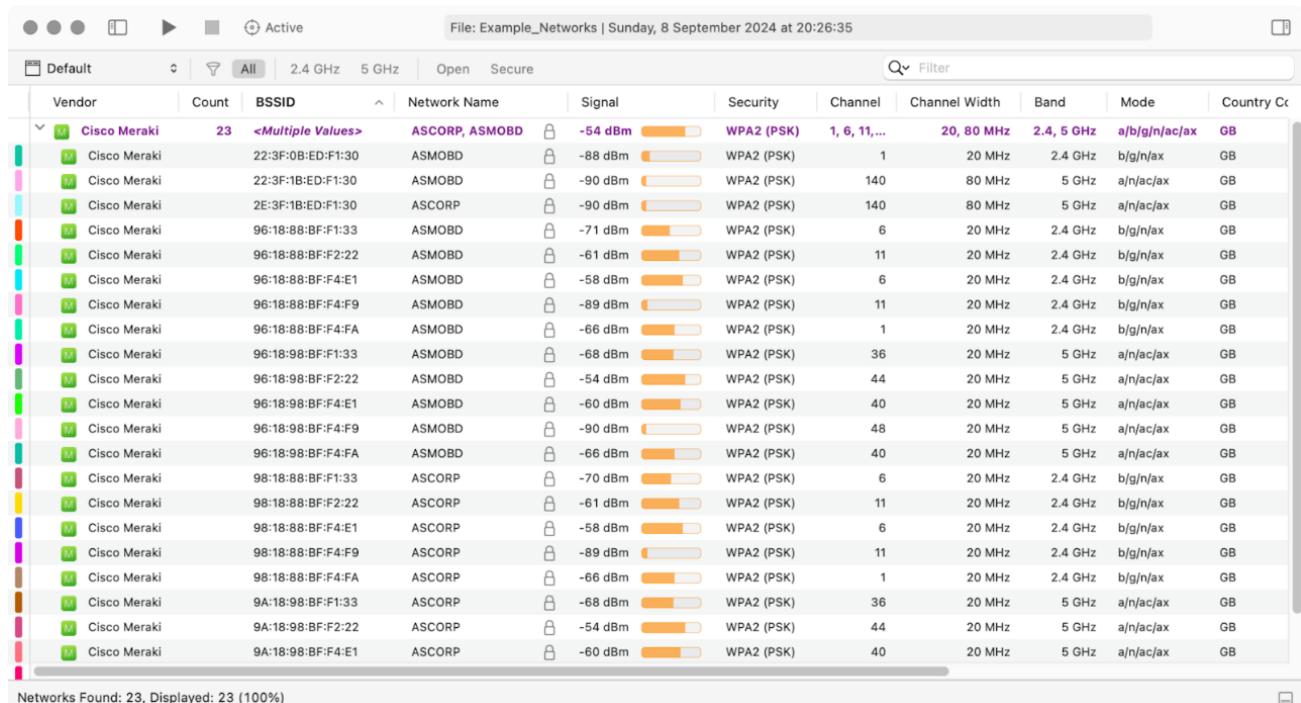


Figure 12-7 - Networks organized by access point vendor

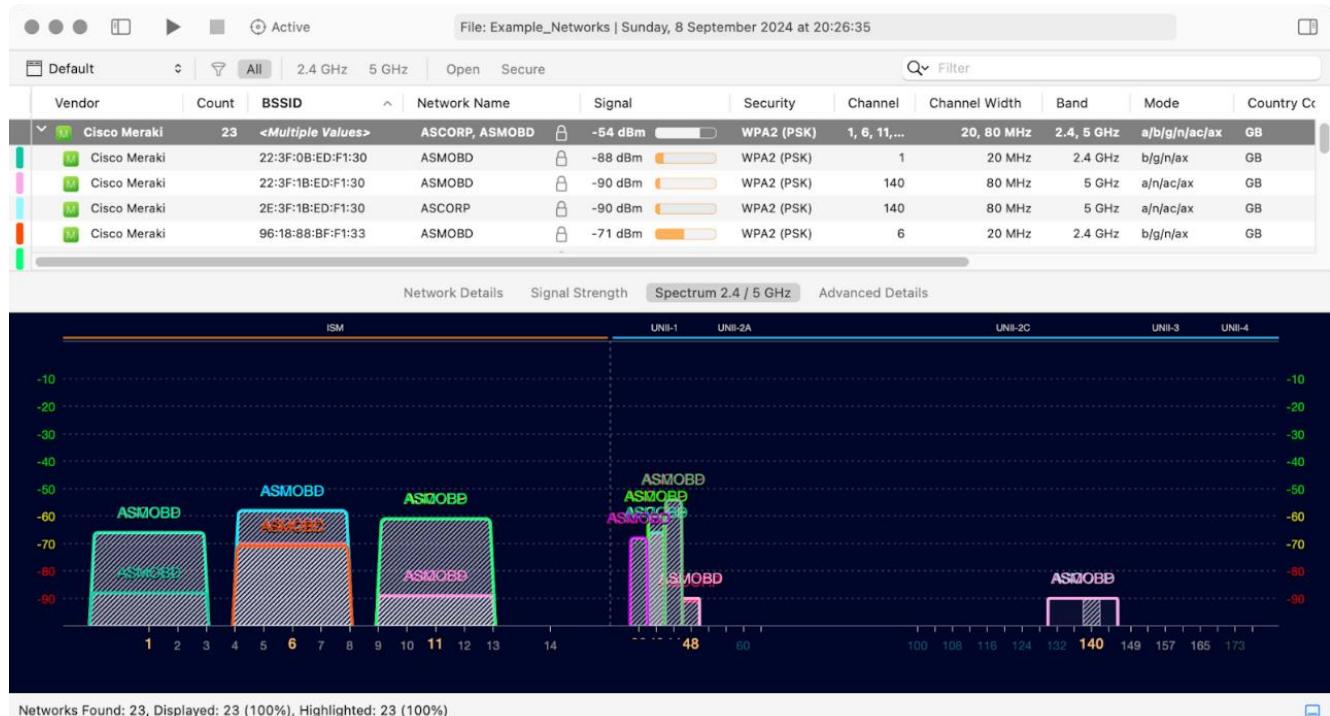


Figure 12-8 - Networks organized by vendor spectrum view with the vendor selected

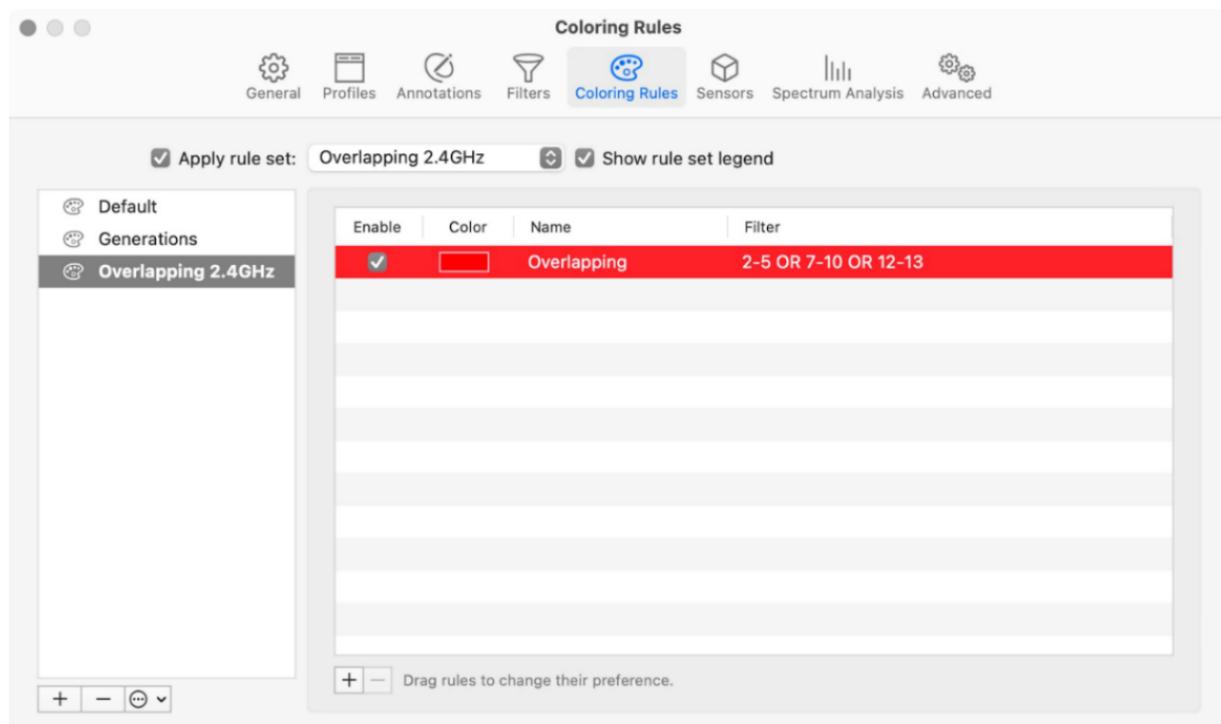


Figure 12-9 - Example coloring rule definition for 2.4 GHz overlapping channels

WiFi Explorer Pro 3: The Definitive User Guide

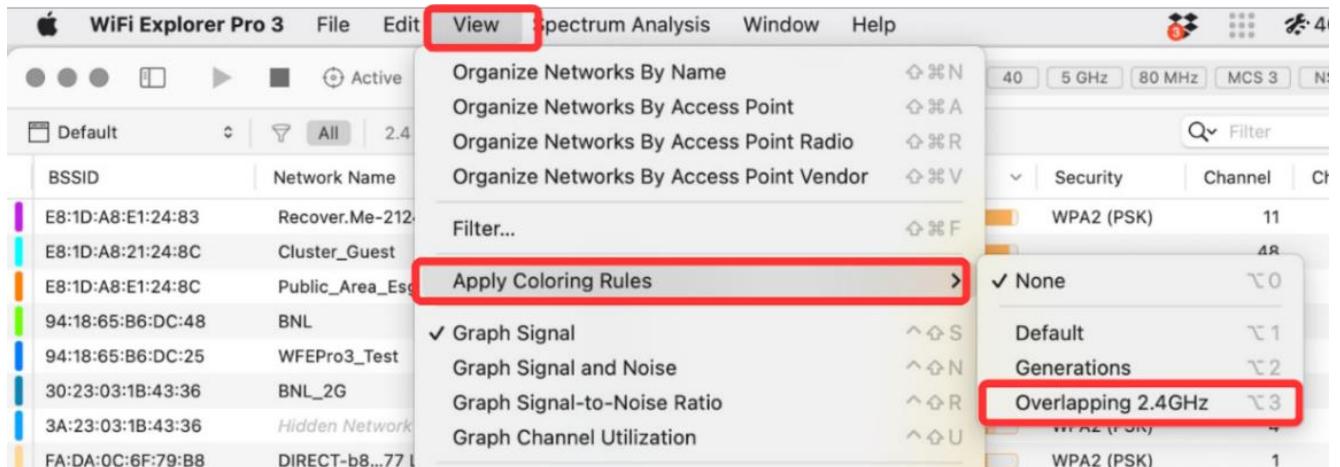


Figure 12-10 - Selecting coloring rule set for 2.4 GHz overlapping channels

The screenshot shows the main interface of WiFi Explorer Pro 3. At the top, it displays 'Scanning: Wi-Fi | VM202651-5G' and various scanning parameters: 40, 5 GHz, 80 MHz, MCS 2, NSS 2, 176 Mbps. Below this is a table of wireless networks. The columns include: BSSID, Network Name, Vendor, Signal, Security, Channel, Channel Width, Band, and Mode. A red box highlights the 'Overlapping 2.4GHz' rule applied to the table, which is shown in red. The table lists several networks, including 'Recover.Me-212480', 'Cluster_Guest', 'Public_Area_Esg', 'BNL', 'WFEPro3_Test', 'BNL_2G', 'Hidden Network', 'VM202651-2G', 'Belkin International Inc.', 'TP-Link Technologies C...', 'ARRIS Group Inc.', 'HP Inc.', 'Arcadyan Technology C...', 'VM0108420', 'Belkin International Inc.', 'VM202651-5G', 'ARRIS Group Inc.', 'Belkin International Inc.', and 'TP-Link Technologies C...'. The 'VM202651-5G' row is also highlighted in red. At the bottom left, it says 'Networks Found: 43, Displayed: 43 (100%)'. At the bottom right, it says 'Overlapping 2.4GHz: Overlapping'.

Figure 12-11 - Coloring rule for 2.4 GHz overlapping channels applied to networks table

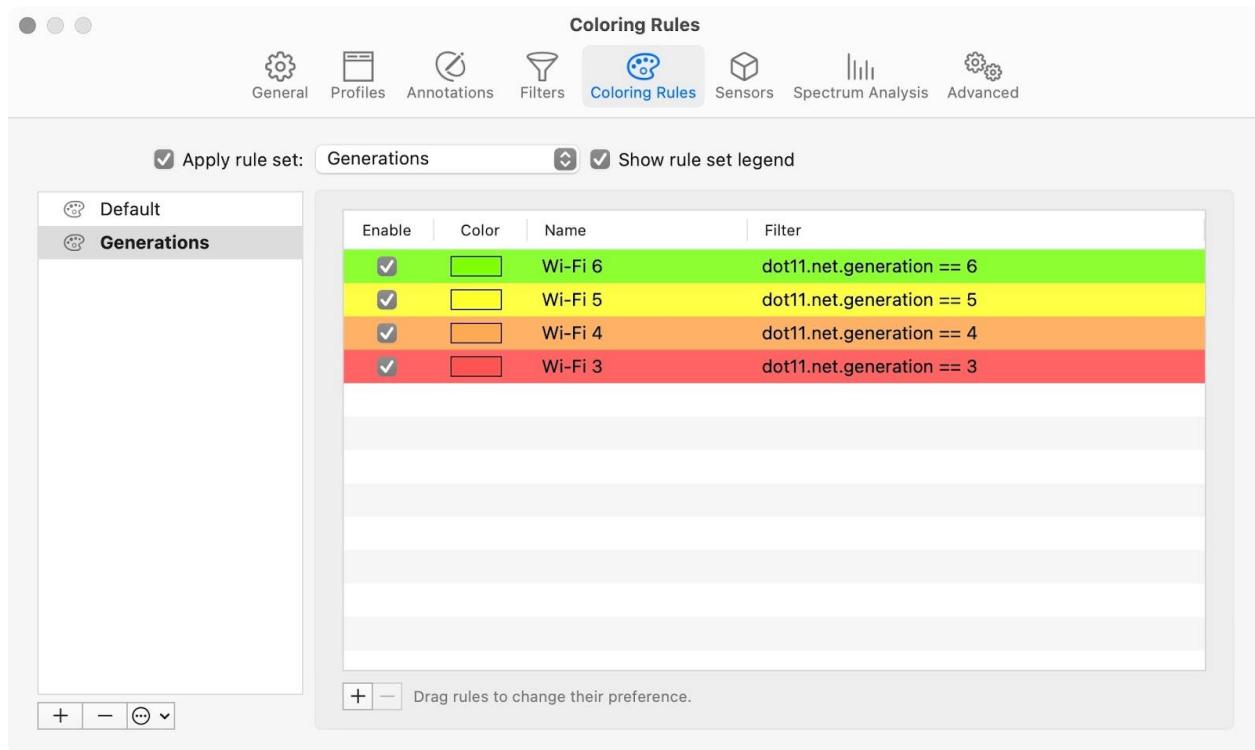
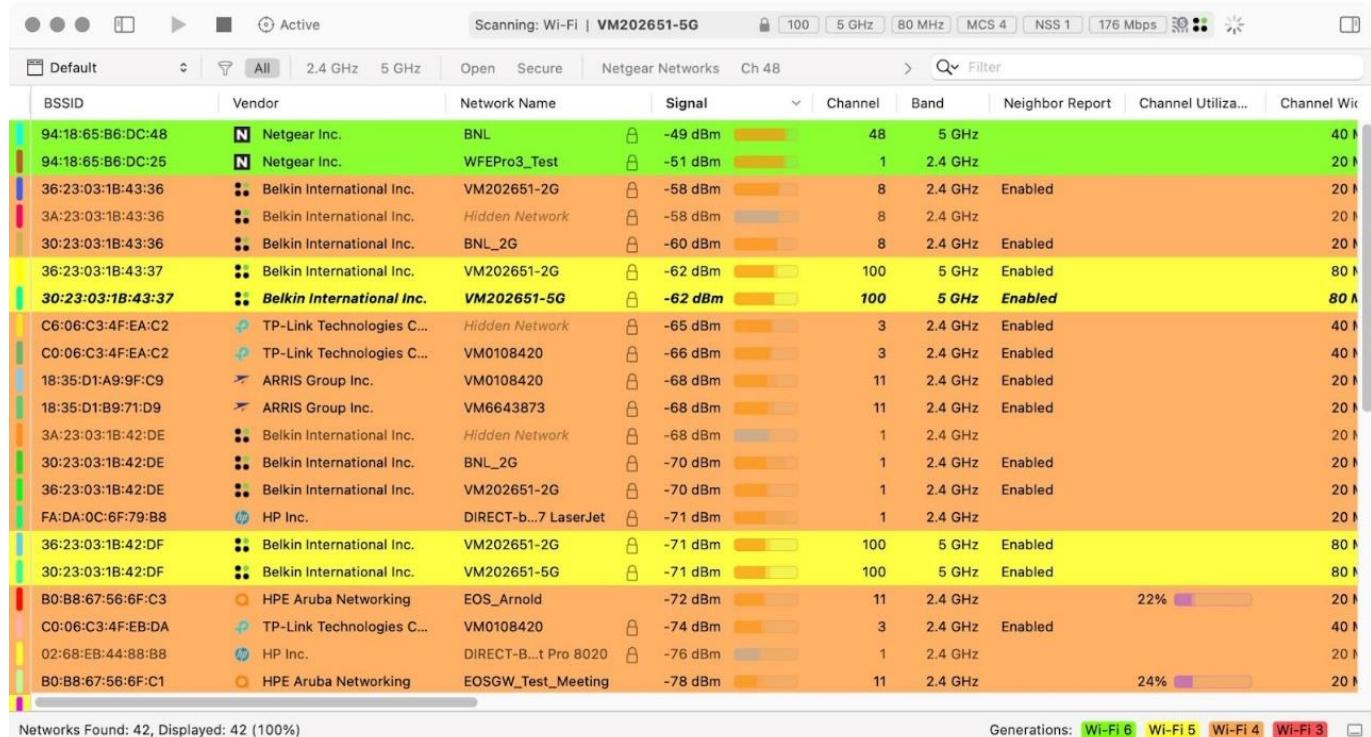

 Figure 12-12 - The *Coloring Rules* settings tab


Figure 12-13 - Networks Area with Generations coloring rule applied

WiFi Explorer Pro 3: The Definitive User Guide

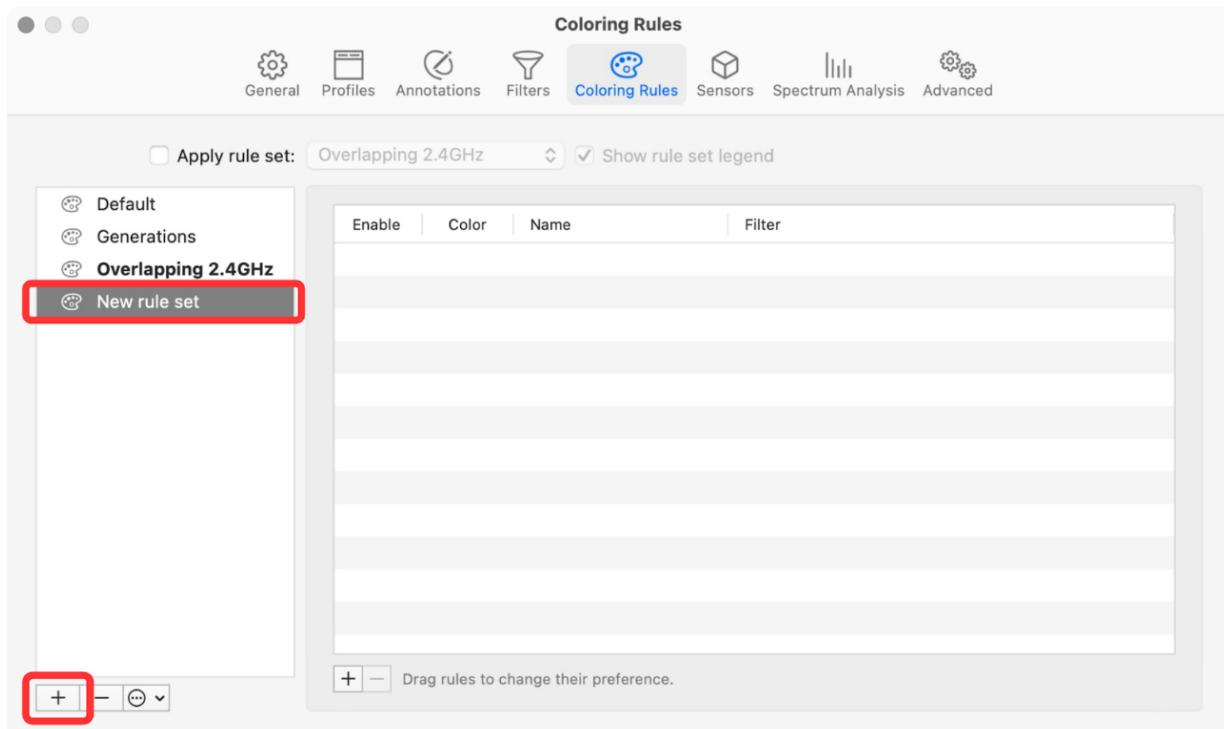


Figure 12-14 - Adding a new rule set

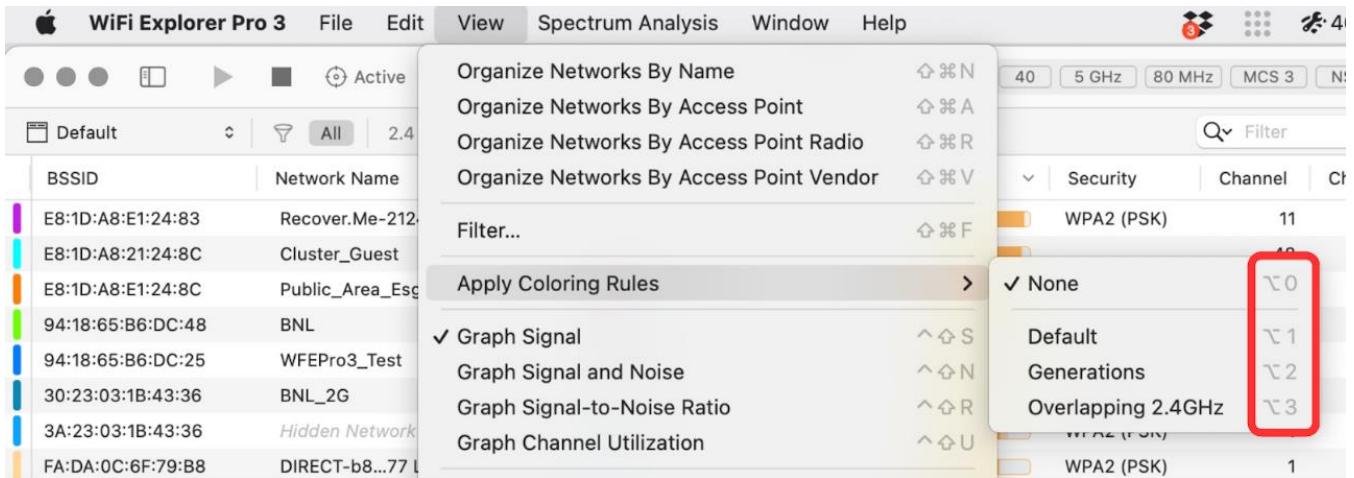


Figure 12-15 - Coloring rule set selection shortcuts

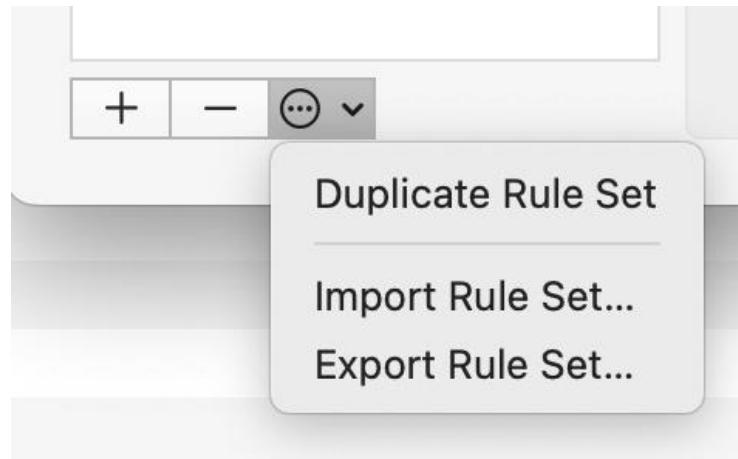


Figure 12-16 - Coloring rules Action button options

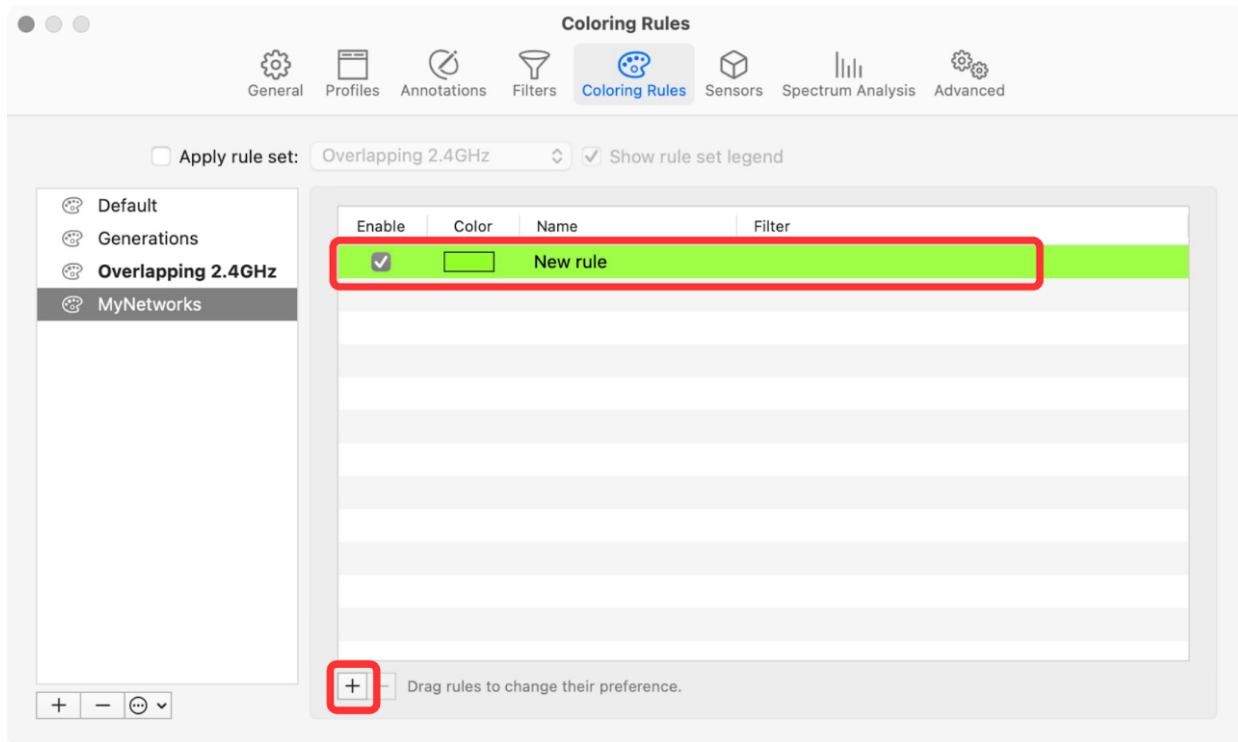


Figure 12-17 - Adding a new rule to a rule set

WiFi Explorer Pro 3: The Definitive User Guide

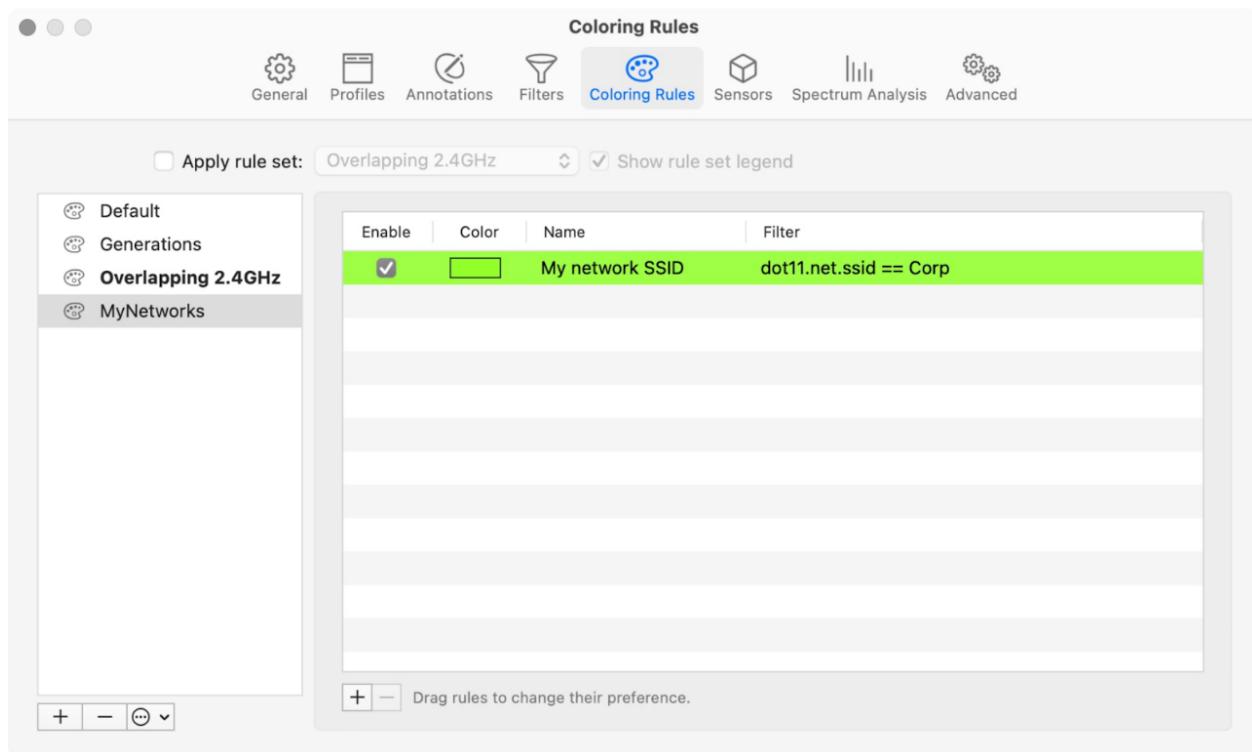


Figure 12-18 - A sample rule to colorize a specific SSID

The screenshot shows a network list in WiFi Explorer Pro 3. The top bar includes icons for scanning (Wi-Fi, VM, Sensors, Spectrum Analysis) and a status indicator 'Active'. Below the bar is a toolbar with buttons for Default, Scan, Filter, All, 2.4 GHz, 5 GHz (selected), Open, Secure, and Network Name. The main area is a table with columns: BSSID, Vendor, Network Name. Two rows are visible: one for BSSID 18:35:D1:B9:71:DF, Vendor ARRIS Group Inc., Network Name VM6643873; and another for BSSID 18:35:D1:A9:9F:CF, Vendor ARRIS Group Inc., Network Name VM0108420.

BSSID	Vendor	Network Name
18:35:D1:B9:71:DF	ARRIS Group Inc.	VM6643873
18:35:D1:A9:9F:CF	ARRIS Group Inc.	VM0108420

Figure 12-19 - Network list showing Arris Group Inc. devices



Figure 12-20 - Online lookup of the 18:35:D1 OUI details

The screenshot shows a Wi-Fi scanning application interface. At the top, there are various icons and a status bar indicating "Scanning: Wi-Fi | BNL" and frequency bands "48", "5 GHz", and "40 MHz". Below this is a toolbar with filters: "Default", "All", "2.4 GHz", "5 GHz", "Open", and "Secure". The main area is a table displaying network scan results:

BSSID	Network Name	Vendor	Annotations	Signal
18:35:D1:B9:71:D9	VM6643873	ARRIS Group Inc.	MyNetwork, Slow	-70 dBm
18:35:D1:B9:71:DF	VM6643873	ARRIS Group Inc.	MyNetwork, Fast	-79 dBm

Figure 12-21 - Simple addition of annotations

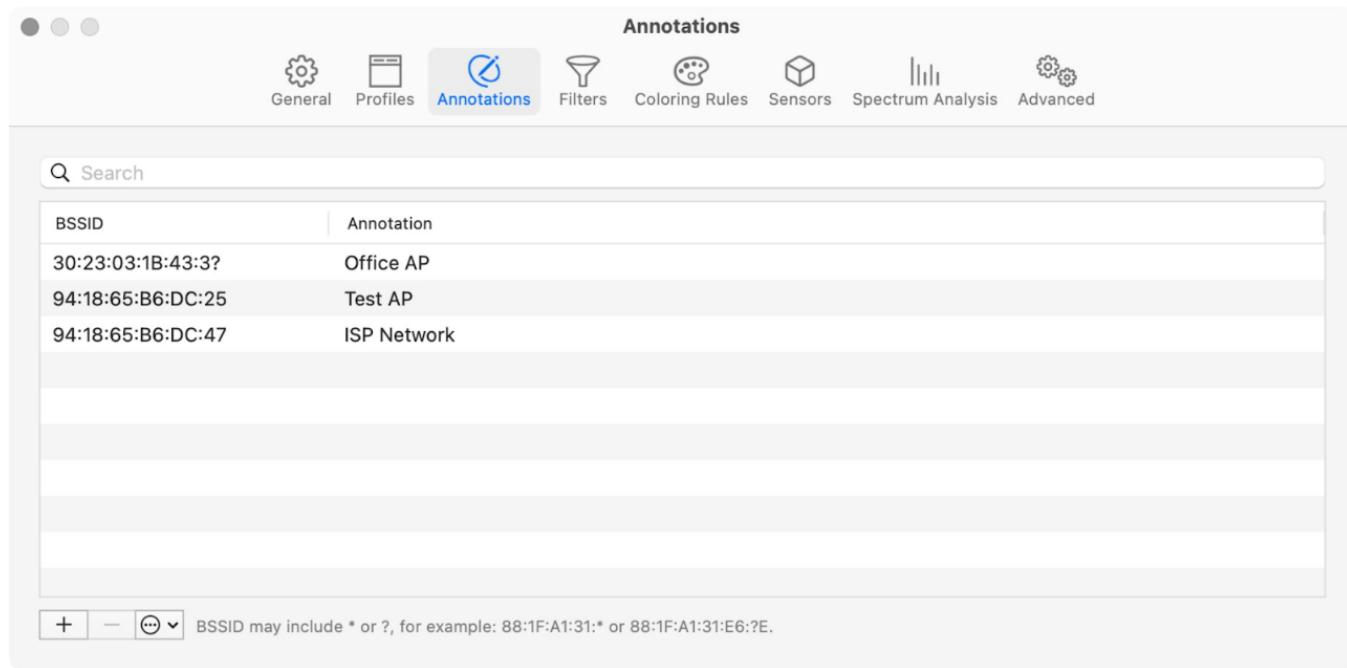


Figure 12-22 - The *Annotations* settings tab showing three annotations

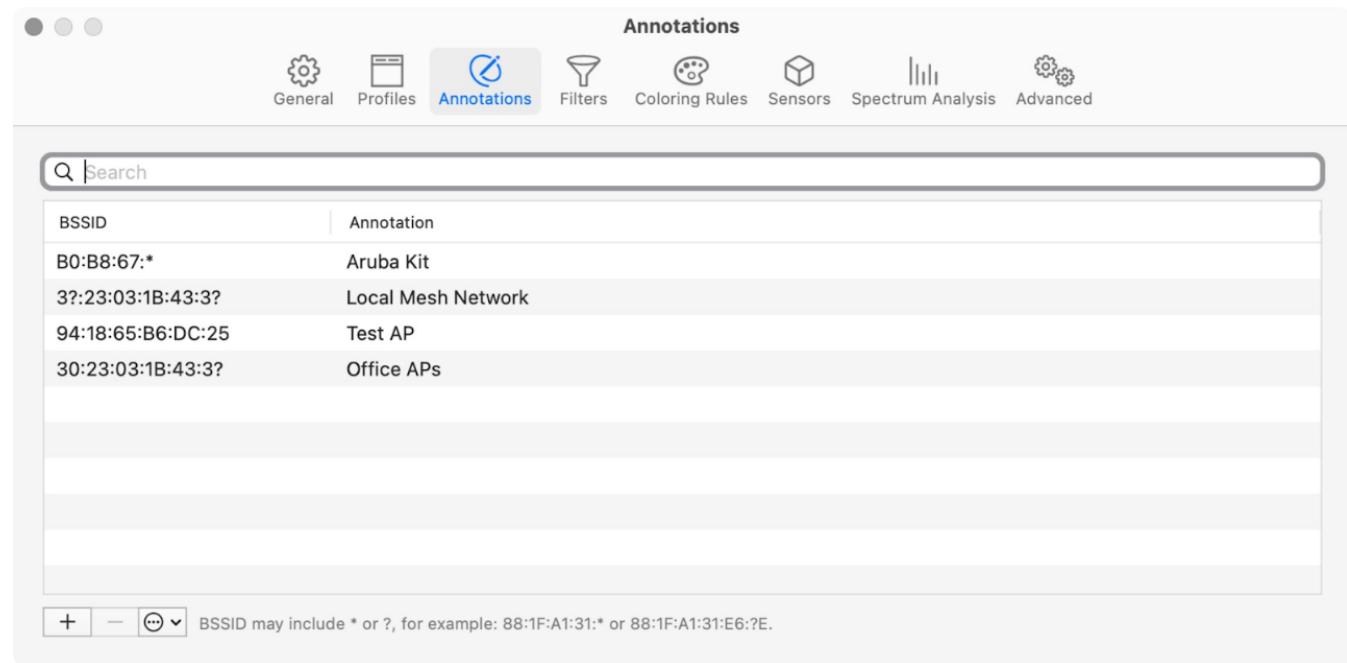


Figure 12-23 - *Annotations* examples using various matching patterns

Scanning: Wi-Fi | VM202651-5G

Active | All | 2.4 GHz | 5 GHz | Open | Secure | Netgear Networks | Ch 48 | Filter

BSSID	Network Name	Vendor	Annotations	Signal	SNR	Channel	Chans
94:18:65:B6:DC:25	WFEPro3_Test	Netgear Inc.	Test AP	75%	43 dB	1	
30:23:03:1B:43:36	BNL_2G	Belkin International Inc.	Office APs, Local Mesh Network	63%	34 dB	8	
30:23:03:1B:43:37	VM202651-5G	Belkin International Inc.	Office APs, Local Mesh Network	55%	25 dB	100	
3A:23:03:1B:43:36	Hidden Network	Belkin International Inc.	Local Mesh Network	67%	37 dB	8	
36:23:03:1B:43:36	VM202651-2G	Belkin International Inc.	Local Mesh Network	64%	35 dB	8	
36:23:03:1B:43:37	VM202651-2G	Belkin International Inc.	Local Mesh Network	55%	25 dB	100	
B0:B8:67:56:6F:C2	EOS_GW_Public	HPE Aruba Networking	Aruba Kit	40%	21 dB	11	
B0:B8:67:56:6F:C0	EOSGW...t_Guest	HPE Aruba Networking	Aruba Kit	40%	21 dB	11	
B0:B8:67:56:6F:C1	EOSGW...Meeting	HPE Aruba Networking	Aruba Kit	40%	21 dB	11	
B0:B8:67:56:6F:D2	EOS_GW_Public	HPE Aruba Networking	Aruba Kit	26%	14 dB	116	
B0:B8:67:56:6F:D0	EOSGW...t_Guest	HPE Aruba Networking	Aruba Kit	26%	14 dB	116	
B0:B8:67:56:6F:D1	EOSGW...Meeting	HPE Aruba Networking	Aruba Kit	26%	14 dB	116	
94:18:65:B6:DC:48	BNL	Netgear Inc.	Aruba Kit	75%	43 dB	48	
18:35:D1:B9:71:D9	VM6643873	ARRIS Group Inc.	Aruba Kit	63%	30 dB	11	
C0:06:C3:4F:EA:C2	VM0108420	TP-Link Technologies C...	Aruba Kit	56%	30 dB	3	
18:35:D1:A9:9F:C9	VM0108420	ARRIS Group Inc.	Aruba Kit	55%	29 dB	6	
C6:06:C3:4F:EA:C2	Hidden Network	TP-Link Technologies C...	Aruba Kit	55%	29 dB	3	
30:23:03:1B:42:DE	BNL_2G	Belkin International Inc.	Aruba Kit	51%	27 dB	1	
36:23:03:1B:42:DE	VM202651-2G	Belkin International Inc.	Aruba Kit	51%	27 dB	1	
36:23:03:1B:42:DF	VM202651-2G	Belkin International Inc.	Aruba Kit	48%	21 dB	100	
30:23:03:1B:42:DF	VM202651-5G	Belkin International Inc.	Aruba Kit	48%	21 dB	100	

Networks Found: 43, Displayed: 43 (100%) Default: No Rules

Figure 12-24 - Annotations example results in the networks table

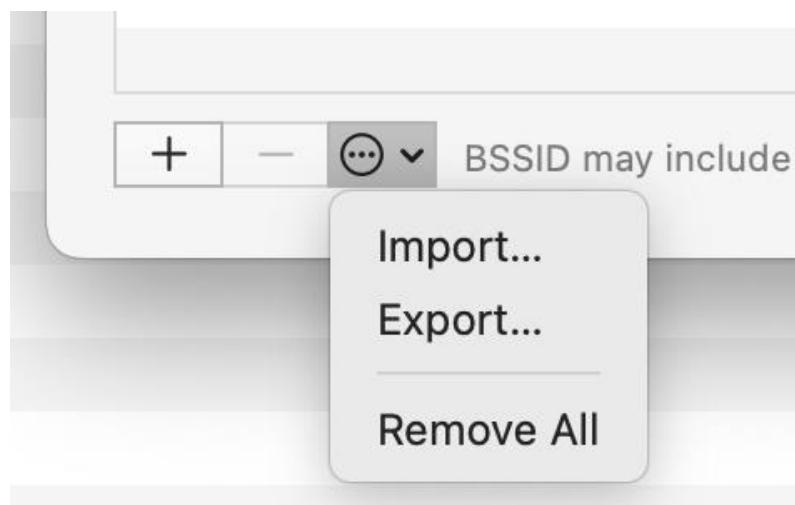


Figure 12-25 - The annotations list buttons (Action button selected)

WiFi Explorer Pro 3: The Definitive User Guide

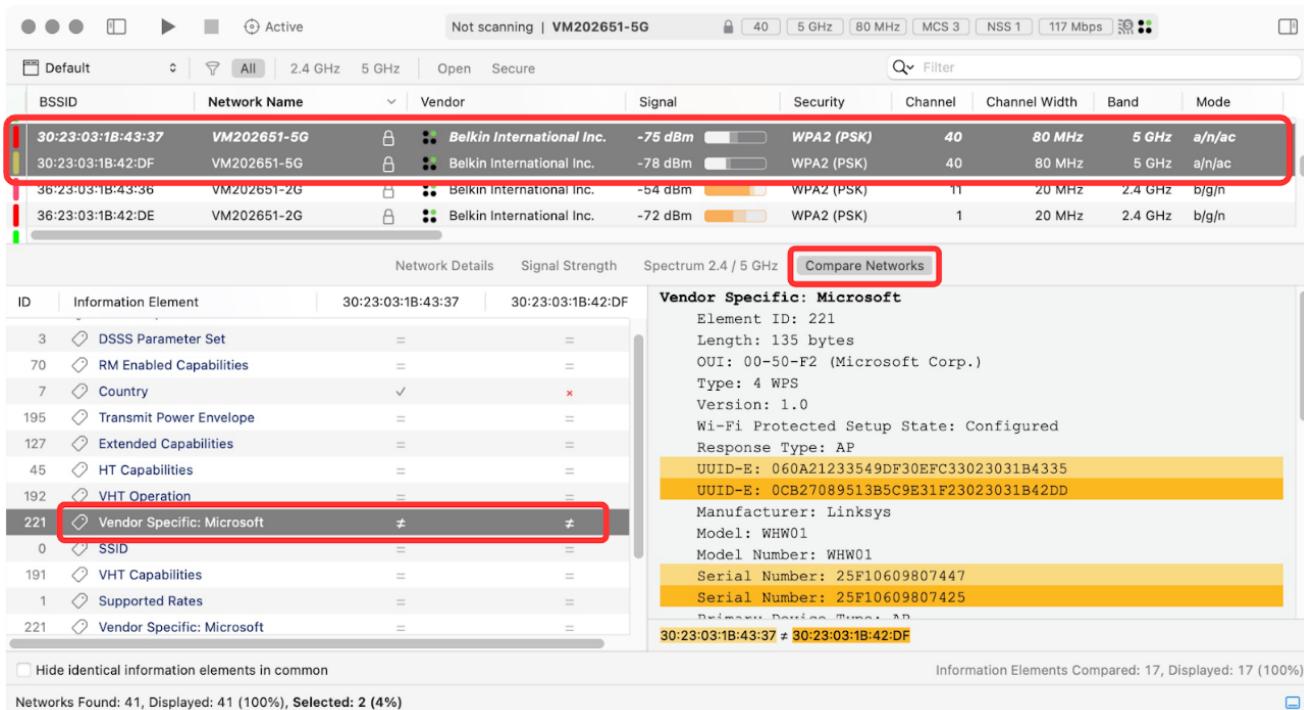


Figure 12-26 - Network Compare example

Chapter 13 - Inspectors

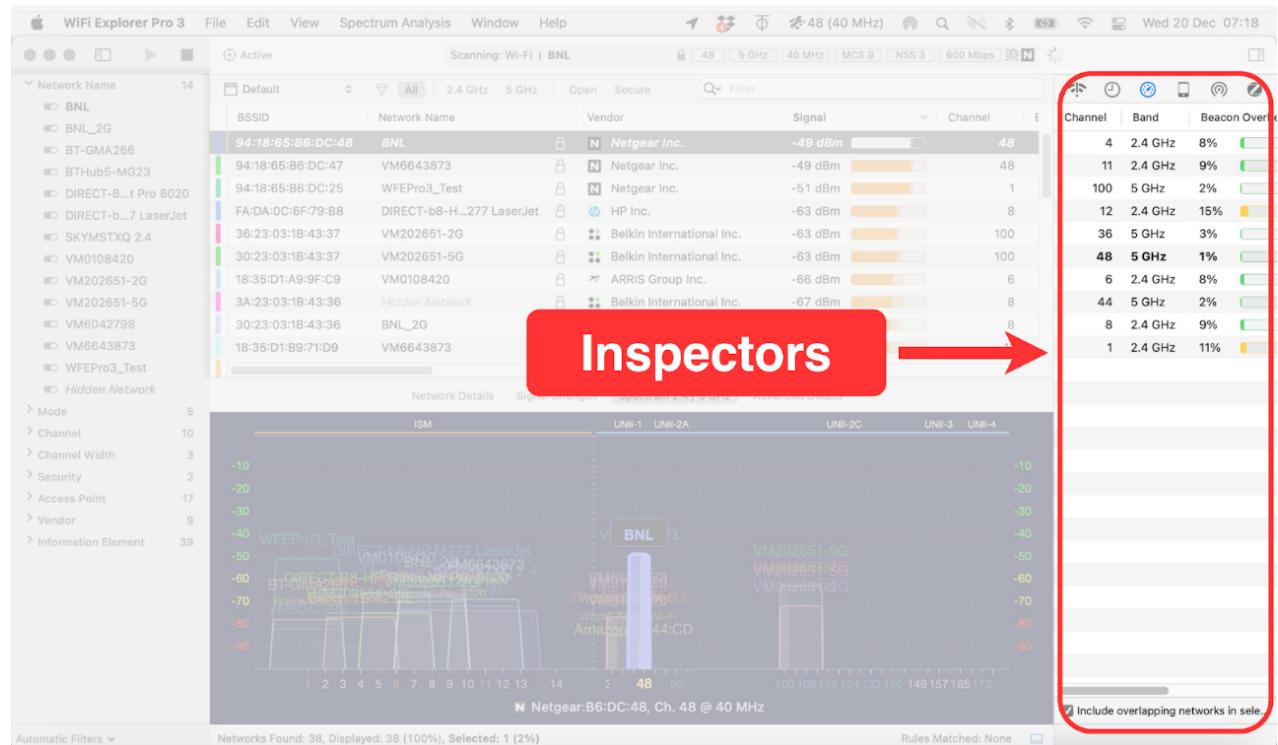


Figure 13-1 - Inspectors UI location

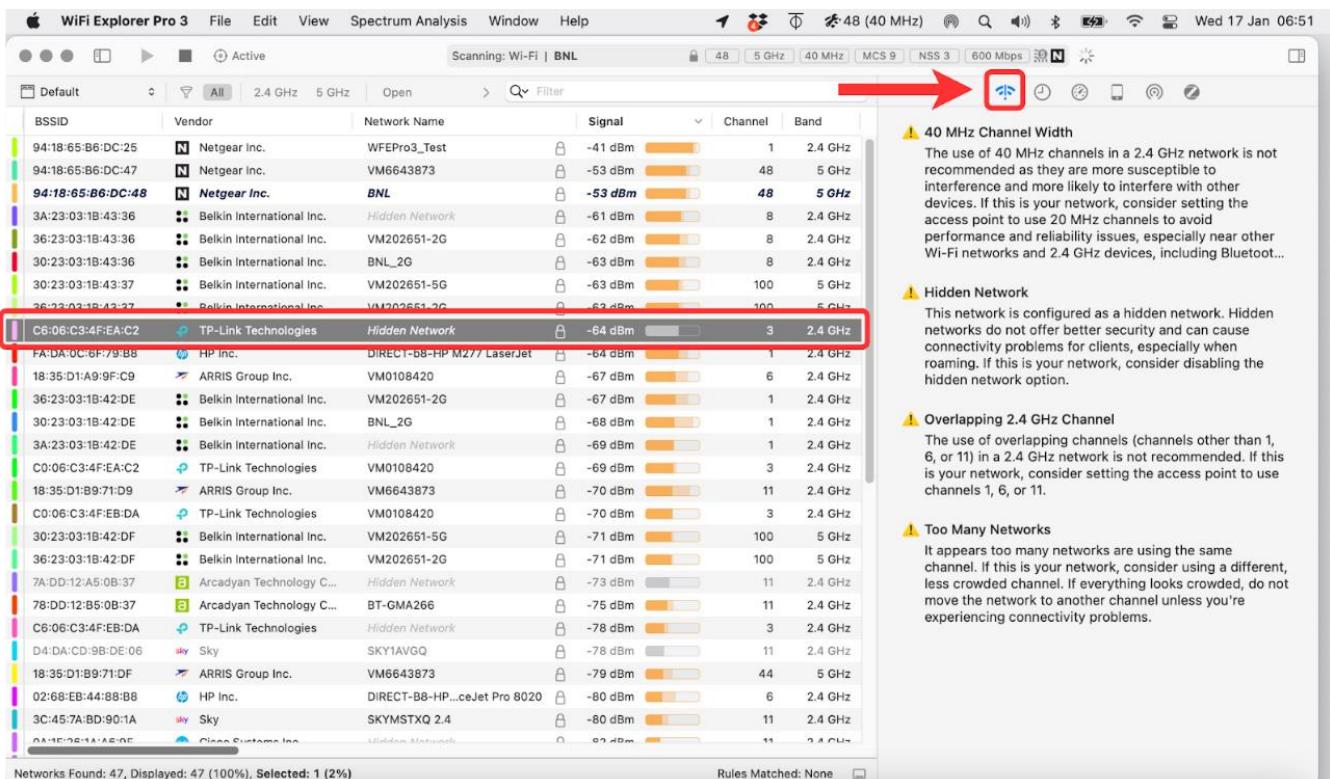


Figure 13-2 - Issues Inspector example showing multiple issues for a selected network

WiFi Explorer Pro 3: The Definitive User Guide

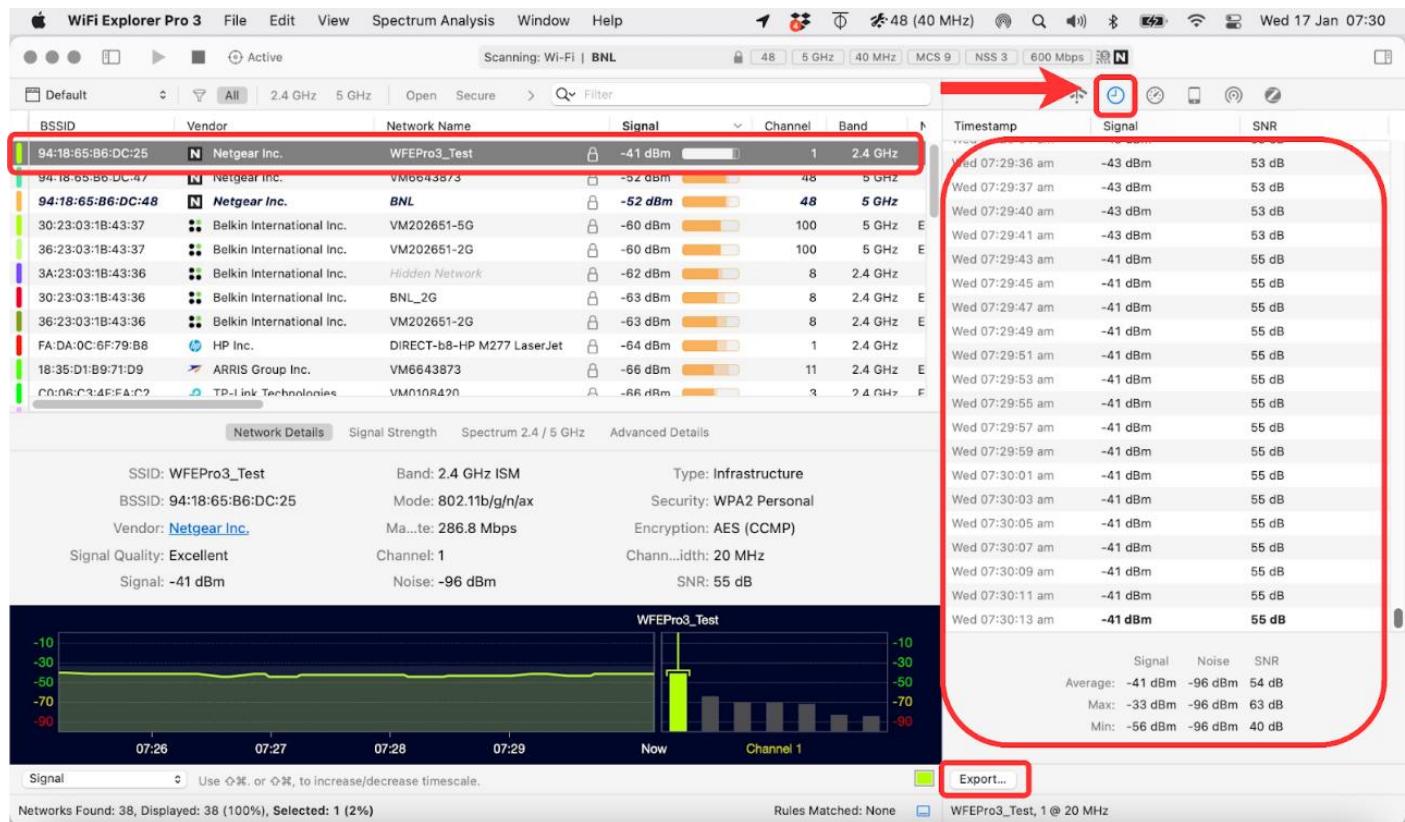
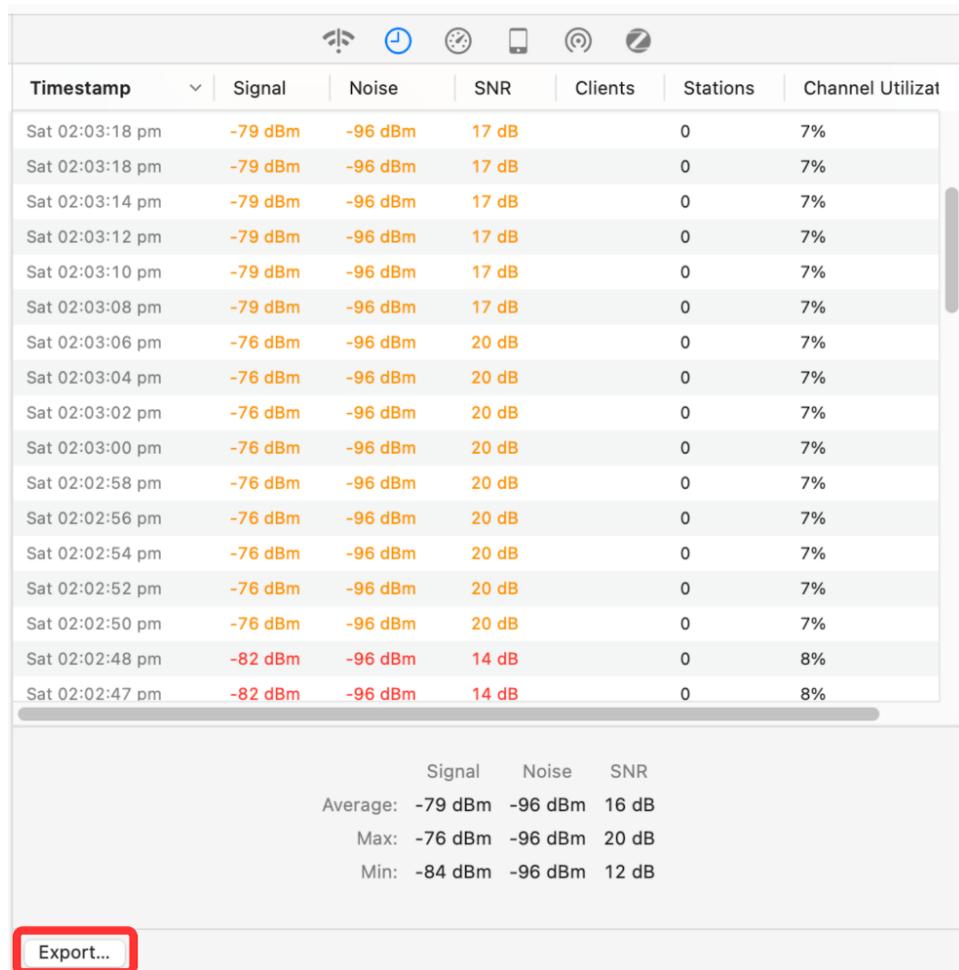


Figure 13-3 - History Inspector showing historical data for a selected network

A context menu is open over the historical data table, showing options for column selection. The menu includes "Auto Size Column", "Auto Size All Columns", and several checkboxes for selecting columns: "Timestamp", "Signal", "Noise", "SNR", "Clients", "Stations", and "Channel Utilization". The "SNR" checkbox is currently selected. The table below shows historical data with columns for Timestamp, Signal, Noise, SNR, and Channel Utilization.

Timestamp	Signal	Noise	SNR	Channel U.
Sat 04:34:26 pm				
Sat 04:34:28 pm				
Sat 04:34:30 pm				
Sat 04:34:32 pm				
Sat 04:34:34 pm				
Sat 04:34:36 pm				
Sat 04:34:38 pm				
Sat 04:34:40 pm				
Sat 04:34:42 pm				
Sat 04:34:44 pm	-34 dBm	-93 dBm	59 dB	1%

Figure 13-4 - History Inspector column selection options

Figure 12-5 - *History Inspector* all columns enabled

VM6042798_Cisco-1A-A6-9C									
Timestamp	SSID	BSSID	Channel	Channel Width	Signal (dBm)	Noise (dBm)	SNR (dB)	Stations	Channel Utilization (%)
Fri 05:52:48 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-83	-96	13	1	16
Fri 05:52:49 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-83	-96	13	1	16
Fri 05:53:02 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 05:53:03 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 05:53:06 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 05:53:27 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 05:53:29 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 05:53:31 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 06:06:38 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 06:06:43 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 06:06:44 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 06:06:46 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 06:06:48 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 06:06:50 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16
Fri 06:06:52 am	VM6042798	0A:1F:26:1A:A6:9C	11	20 MHz	-82	-96	14	1	16

Figure 13-6 - *History Inspector* exported CSV data shown in a spreadsheet app

WiFi Explorer Pro 3: The Definitive User Guide

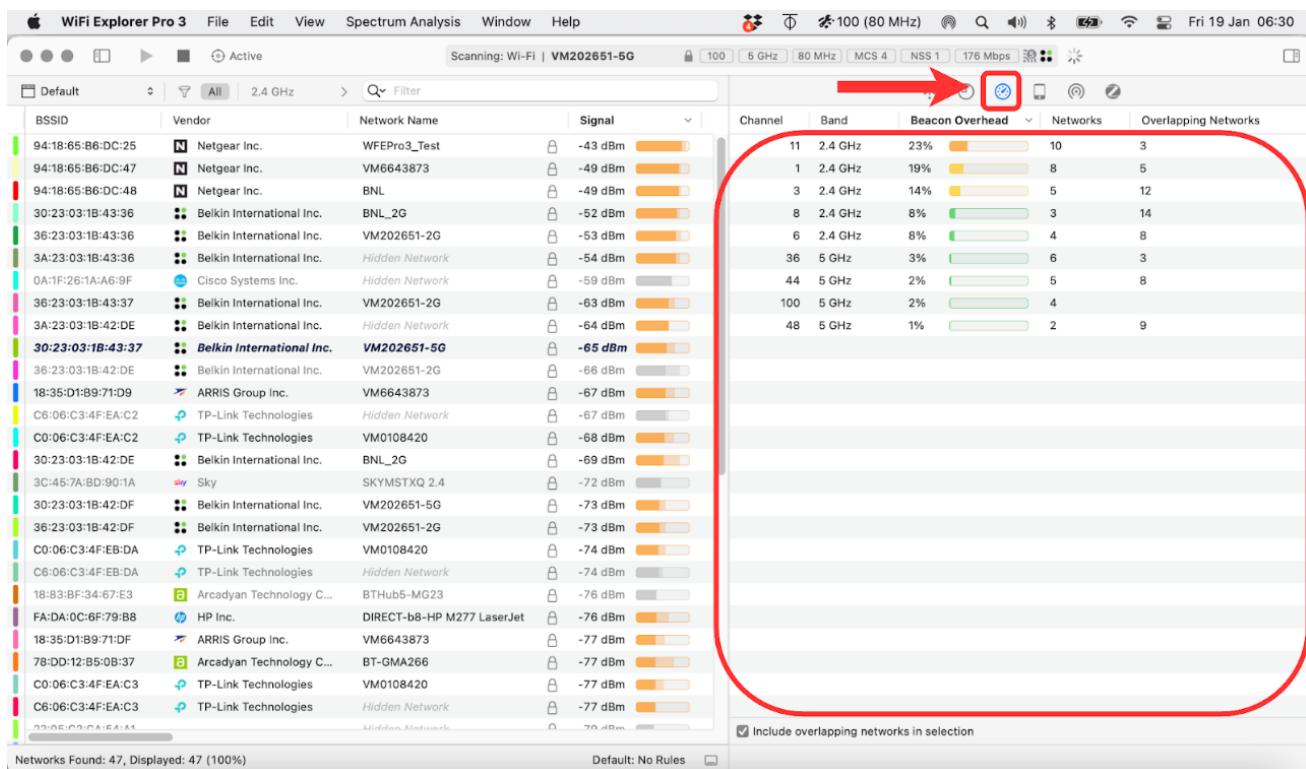


Figure 13-7 - Utilization Inspector summary data

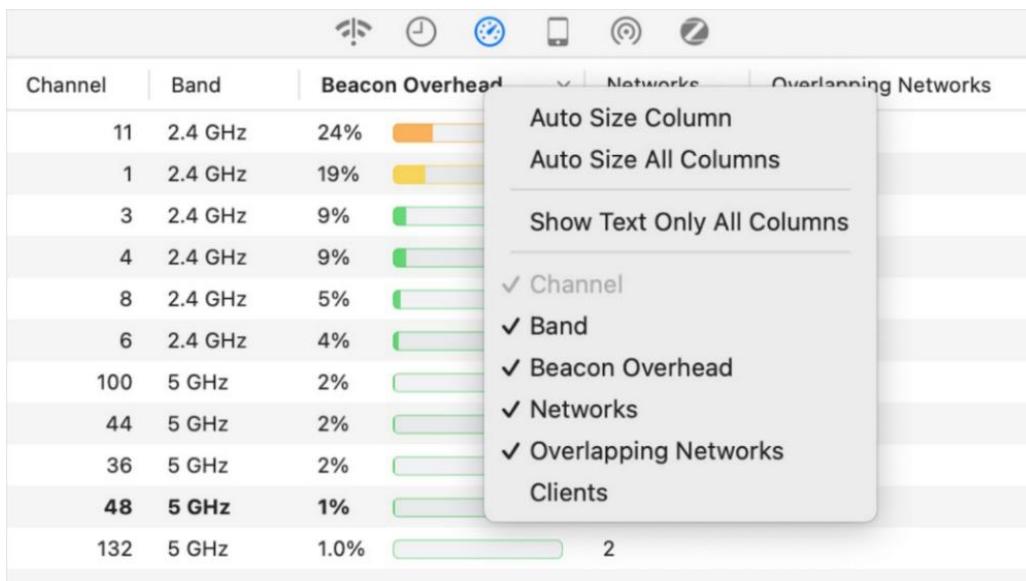


Figure 13-8 - Utilization Inspector column selection options

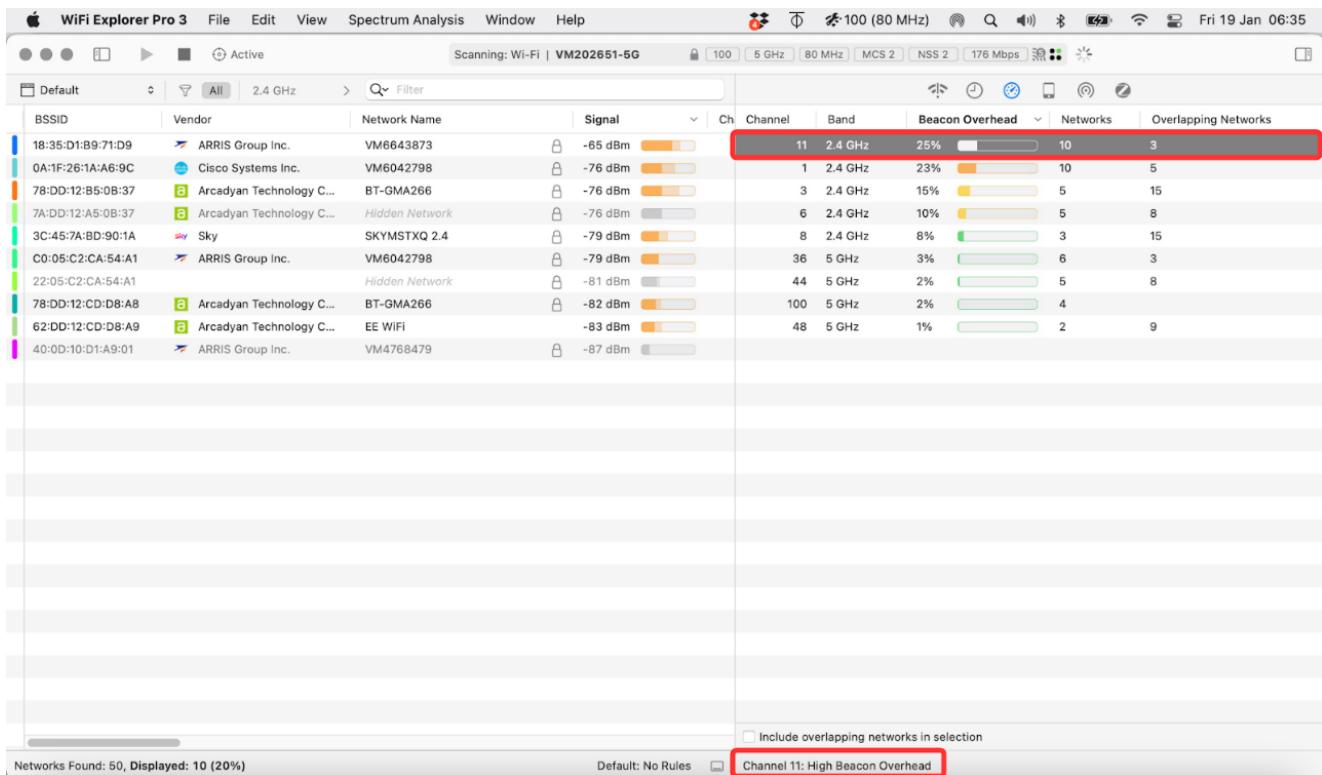


Figure 13-9 - Utilization Inspector with selected entry

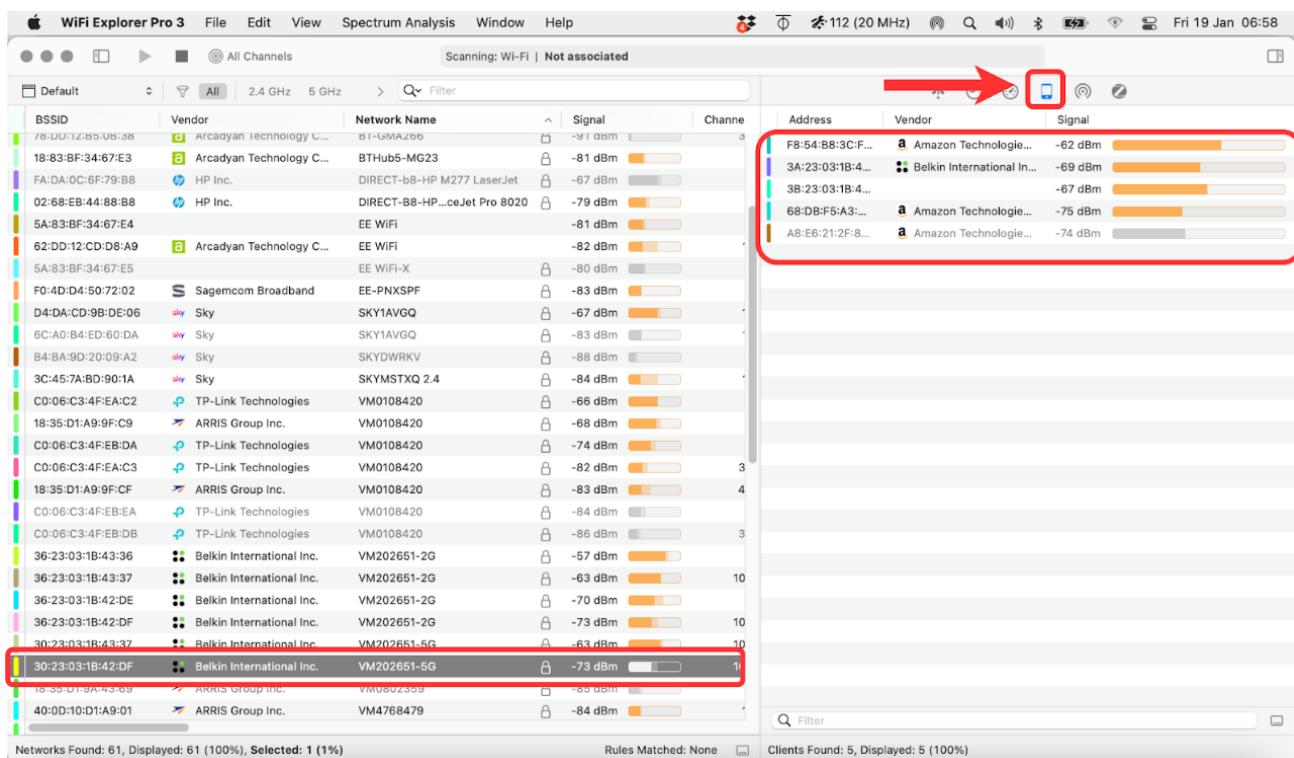
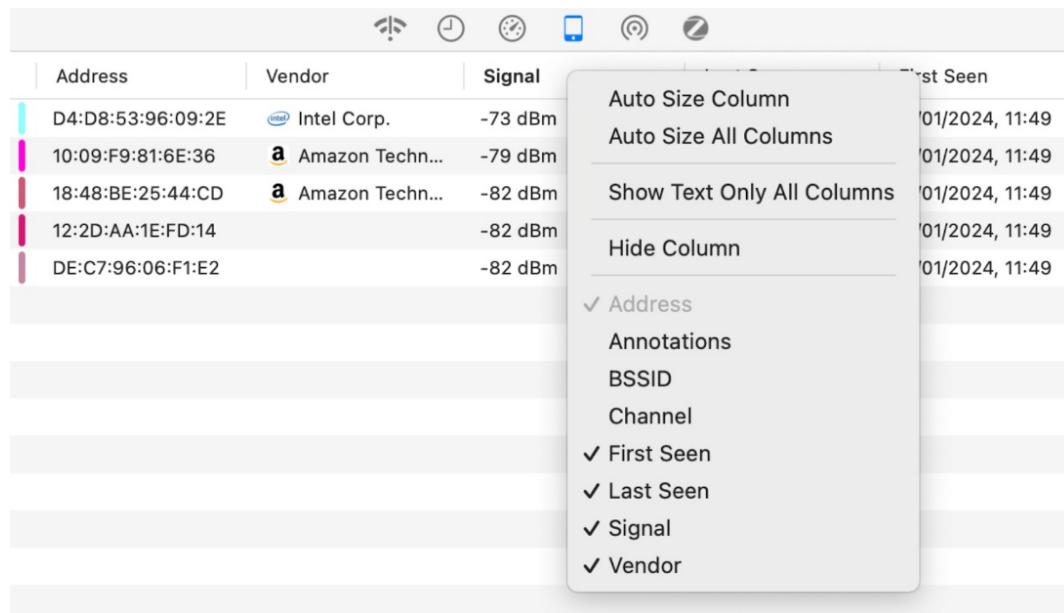
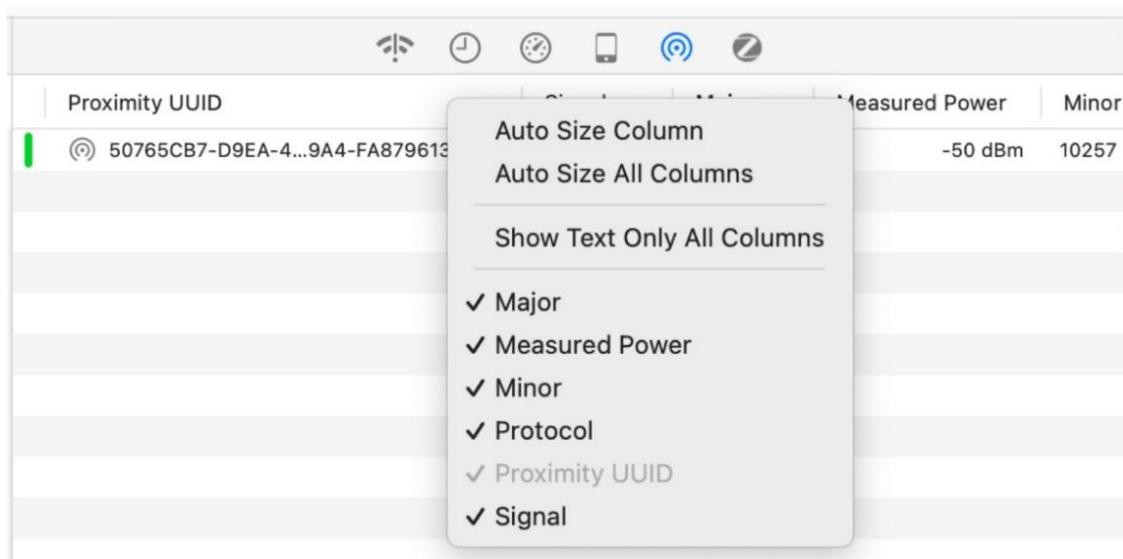


Figure 13-10 - Clients Inspector showing client data for a selected network

Figure 13-11 - *Clients Inspector* column selection optionsFigure 13-12 - *Proximity Beacons Inspector* column selection options

Chapter 14 - Troubleshooting Workflow

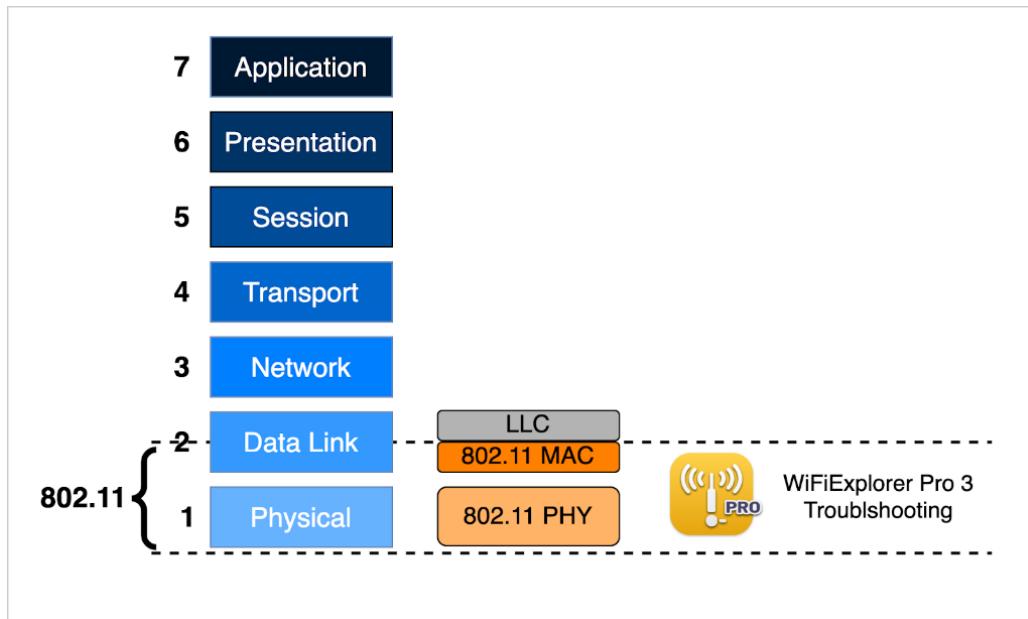


Figure 14-1 - WFE Pro 3 capabilities within the OSI seven-layer model

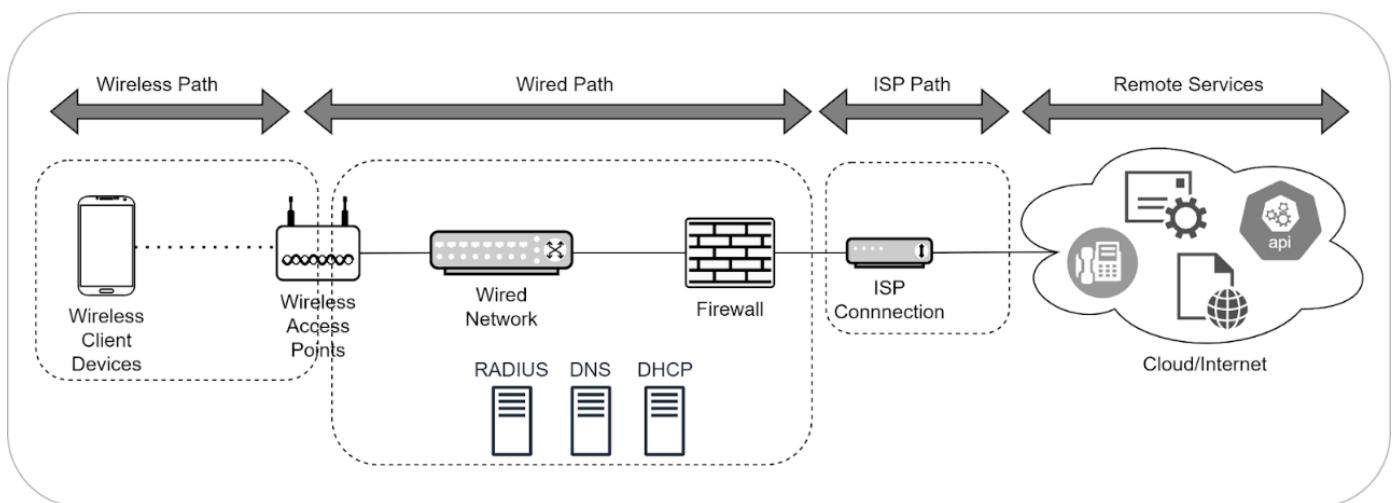


Figure 14-2 - Simplified Network Model

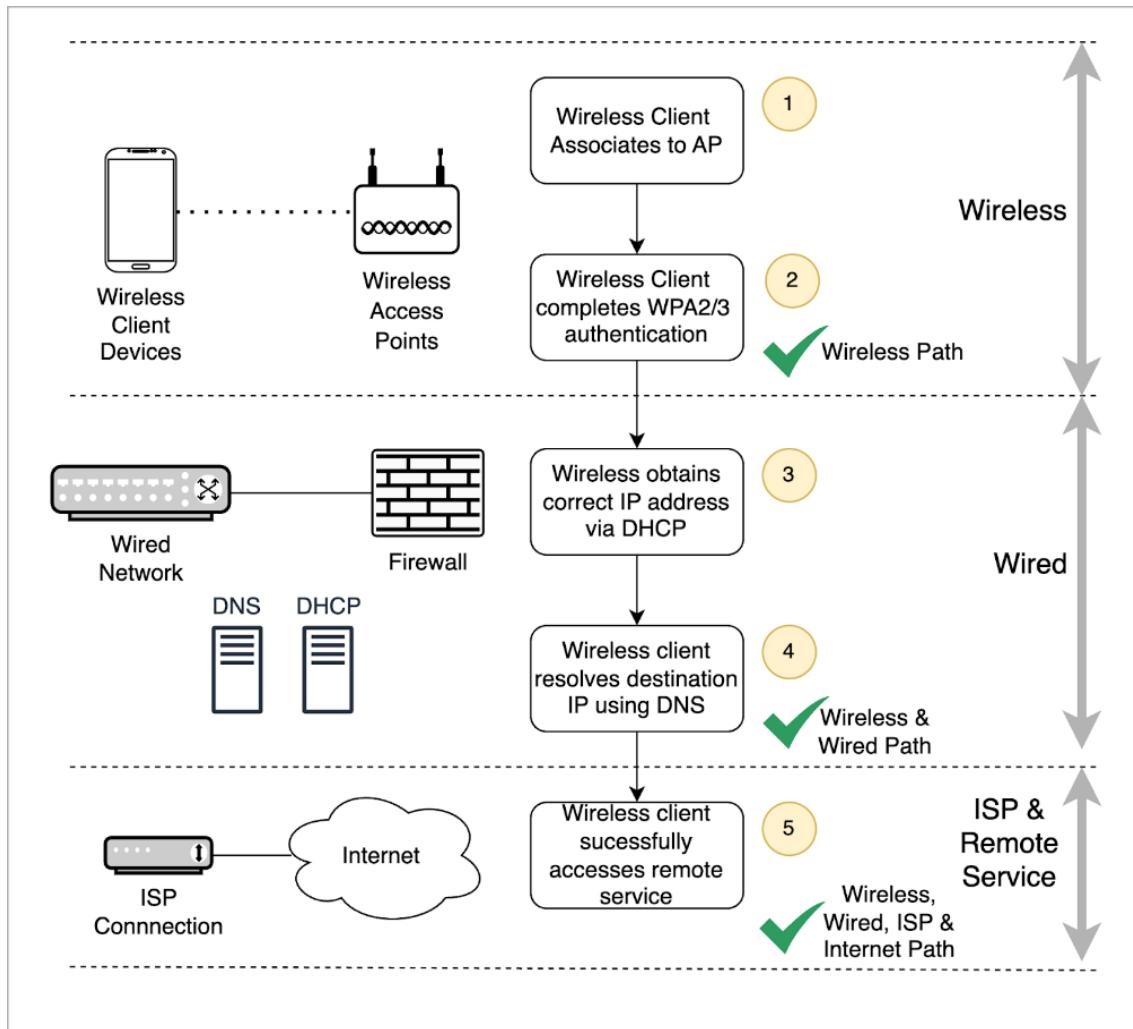


Figure 14-3 - Connectivity flow & dependencies

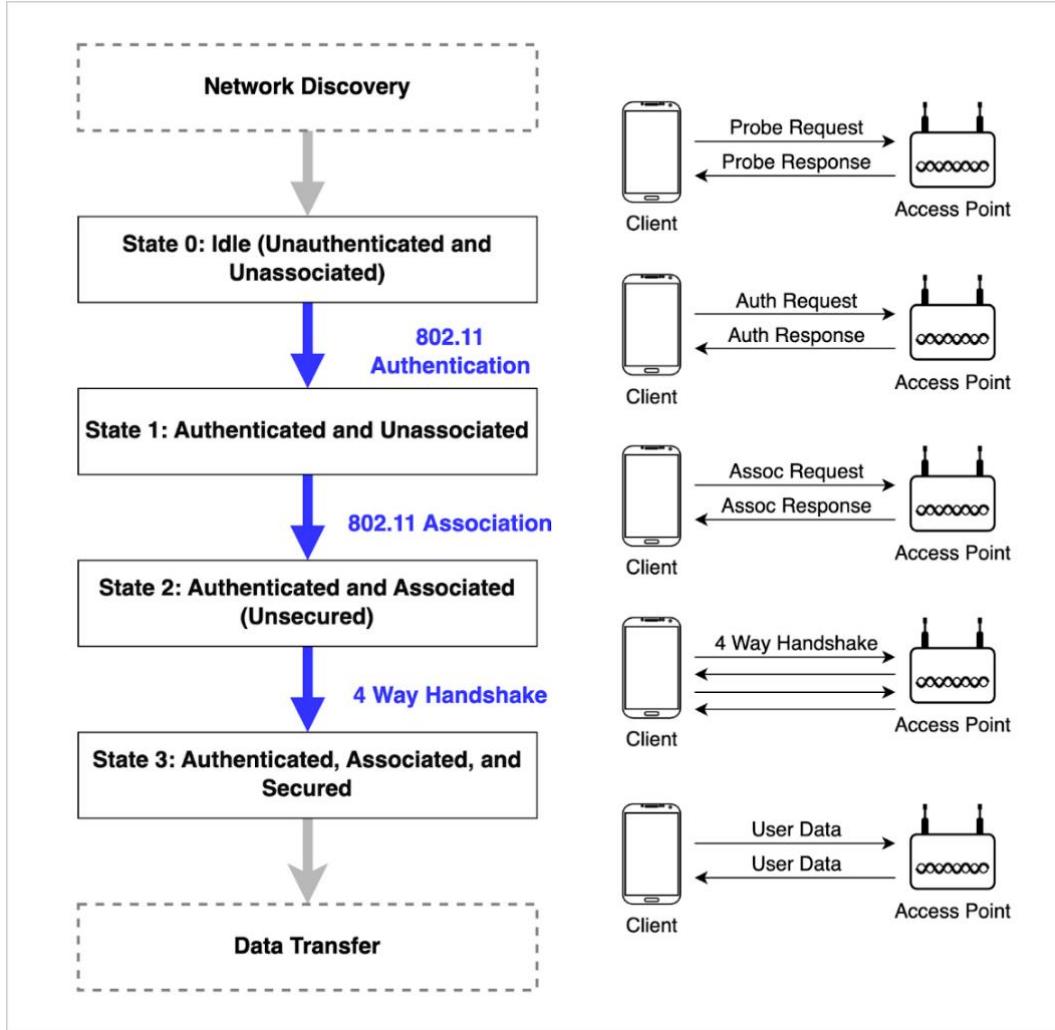


Figure 14-4 - 802.11 state machine

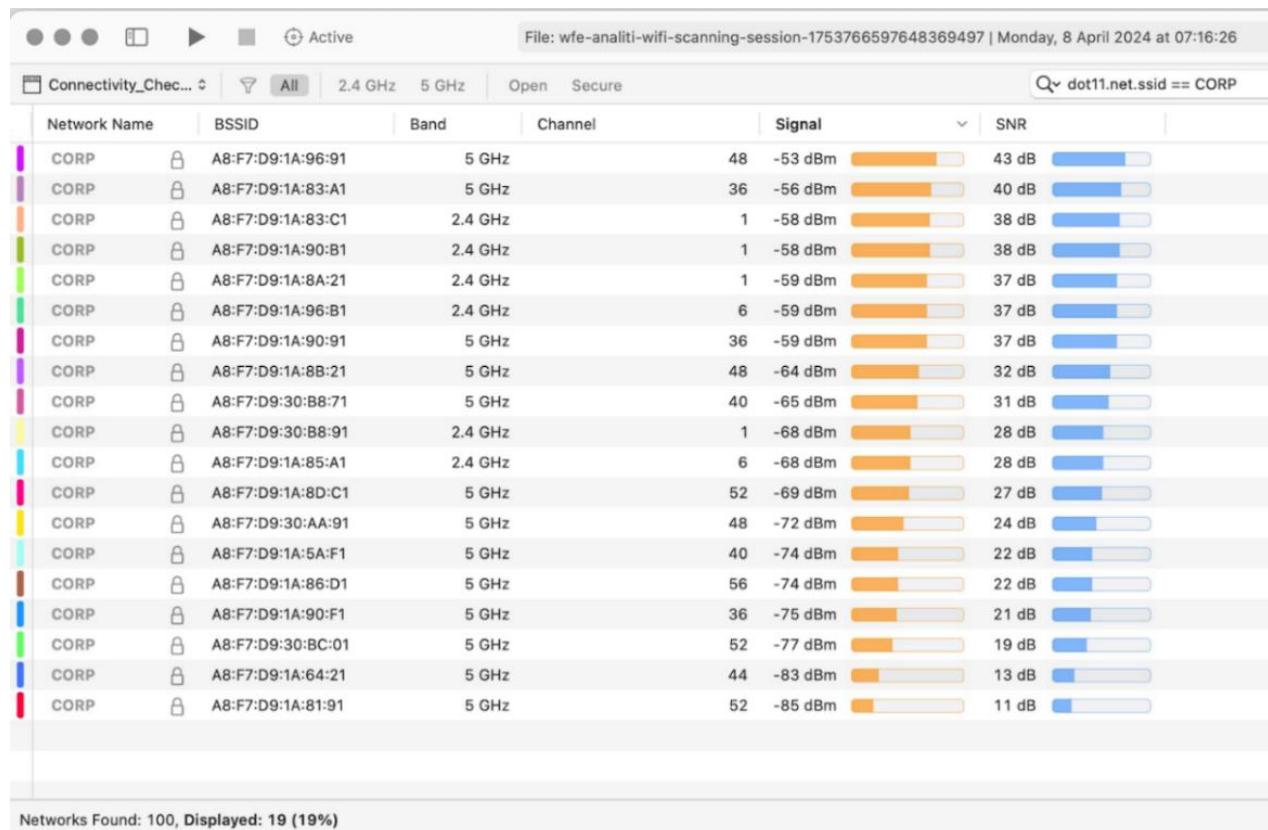


Figure 14-5 - CORP SSID checking

Details of the profile definition are shown below.

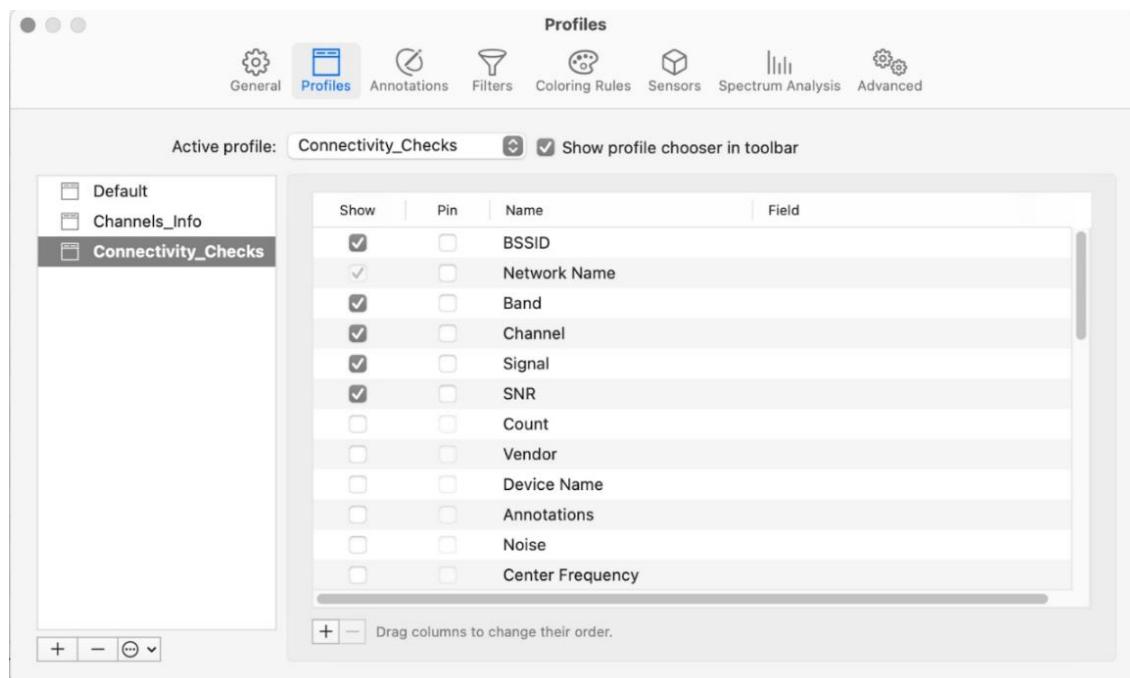


Figure 14-6 - Connectivity checks profile

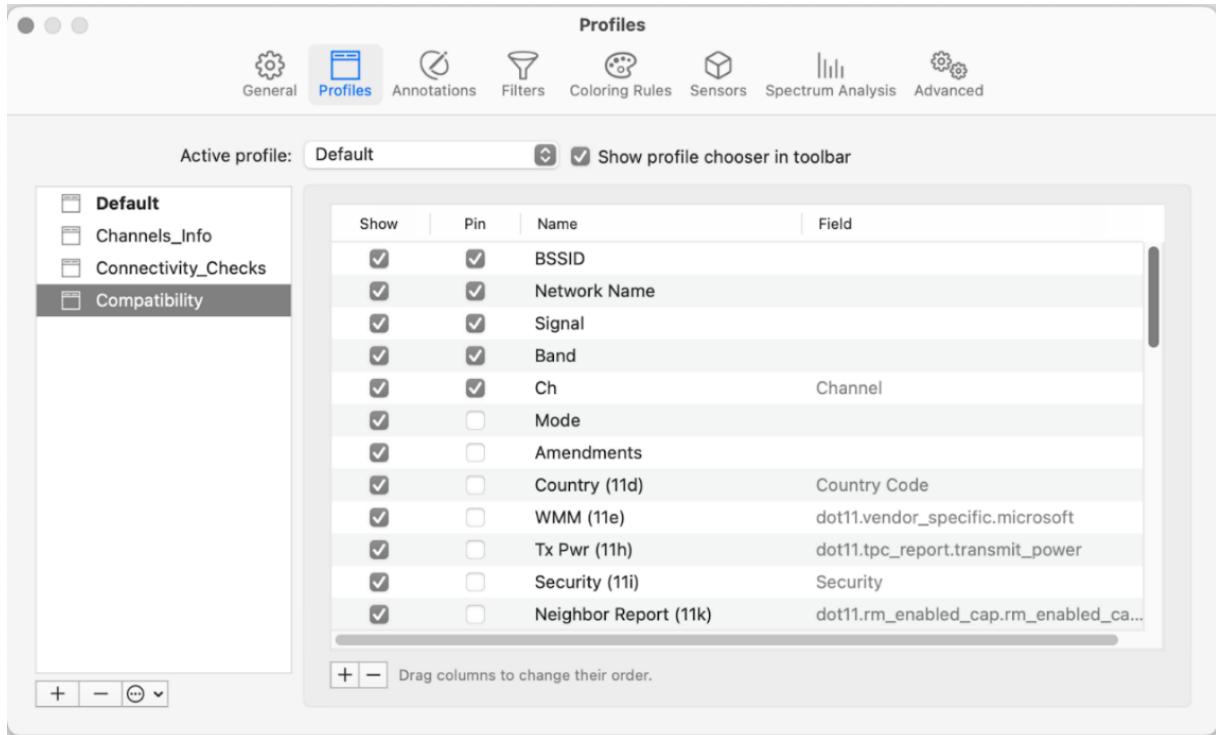


Figure 14-7 - Compatibility profile (1/2)

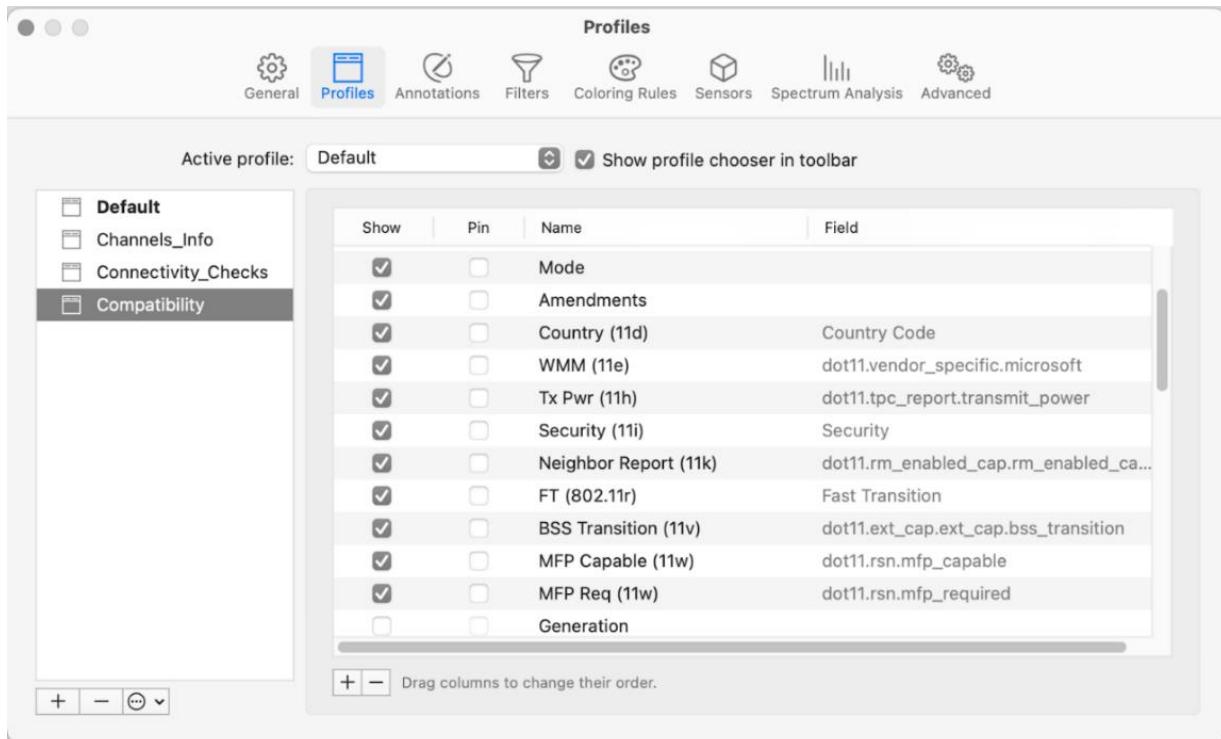


Figure 14-8 - Compatibility profile (2/2)

WiFi Explorer Pro 3: The Definitive User Guide

Active

File: wfe-analiti-wifi-scanning-session-1753766597648369497 | Monday, 8 April 2024 at 07:16:26

Compatibility All 2.4 GHz 5 GHz Open Secure

Q dot11.net.ssid == CORP

BSSID	Network Name	Signal	Ch	Band	Mode	Amendments	Country (11d)	WMM (11e)	Tx Pwr (11h)	Security (11i)
A8:F7:D9:1A:96:91	CORP	-53 dBm	48	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:83:A1	CORP	-56 dBm	36	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:83:C1	CORP	-58 dBm	1	2.4 GHz	g/n/ax	d/e/h/i/k/r/v	GB	✓	13	WPA2 (802.1X)
A8:F7:D9:1A:90:B1	CORP	-58 dBm	1	2.4 GHz	g/n/ax	d/e/h/i/k/r/v	GB	✓	13	WPA2 (802.1X)
A8:F7:D9:1A:8A:21	CORP	-59 dBm	1	2.4 GHz	g/n/ax	d/e/h/i/k/r/v	GB	✓	13	WPA2 (802.1X)
A8:F7:D9:1A:90:91	CORP	-59 dBm	36	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:96:B1	CORP	-59 dBm	6	2.4 GHz	g/n/ax	d/e/h/i/k/r/v	GB	✓	13	WPA2 (802.1X)
A8:F7:D9:1A:8B:21	CORP	-64 dBm	48	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:30:8B:71	CORP	-65 dBm	40	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:85:A1	CORP	-68 dBm	6	2.4 GHz	g/n/ax	d/e/h/i/k/r/v	GB	✓	13	WPA2 (802.1X)
A8:F7:D9:30:8B:91	CORP	-68 dBm	1	2.4 GHz	g/n/ax	d/e/h/i/k/r/v	GB	✓	13	WPA2 (802.1X)
A8:F7:D9:1A:8D:C1	CORP	-69 dBm	52	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:30:AA:91	CORP	-72 dBm	48	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:5A:F1	CORP	-74 dBm	40	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:86:D1	CORP	-74 dBm	56	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:90:F1	CORP	-75 dBm	36	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:30:BC:01	CORP	-77 dBm	52	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:64:21	CORP	-83 dBm	44	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)
A8:F7:D9:1A:81:91	CORP	-85 dBm	52	5 GHz	a/n/ac/ax	d/e/h/i/k/r/v	GB	✓	18	WPA2 (802.1X)

Networks Found: 100, Displayed: 19 (19%)

Figure 14-9 - 802.11 feature (amendments) checks (1/2)

Active

File: wfe-analiti-wifi-scanning-session-1753766597648369497 | Monday, 8 April 2024 at 07:16:26

Compatibility All 2.4 GHz 5 GHz Open Secure

Q dot11.net.ssid == CORP

BSSID	Network Name	Signal	Ch	Band	Neighbor Report (11k)	FT (802.11r)	BSS Transition...	MFP Capable (1...	MFP Req (11w)
A8:F7:D9:1A:96:91	CORP	-53 dBm	48	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:83:A1	CORP	-56 dBm	36	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:83:C1	CORP	-58 dBm	1	2.4 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:90:B1	CORP	-58 dBm	1	2.4 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:8A:21	CORP	-59 dBm	1	2.4 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:90:91	CORP	-59 dBm	36	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:96:B1	CORP	-59 dBm	6	2.4 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:8B:21	CORP	-64 dBm	48	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:30:8B:71	CORP	-65 dBm	40	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:85:A1	CORP	-68 dBm	6	2.4 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:30:8B:91	CORP	-68 dBm	1	2.4 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:8D:C1	CORP	-69 dBm	52	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:30:AA:91	CORP	-72 dBm	48	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:5A:F1	CORP	-74 dBm	40	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:86:D1	CORP	-74 dBm	56	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:90:F1	CORP	-75 dBm	36	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:30:BC:01	CORP	-77 dBm	52	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:64:21	CORP	-83 dBm	44	5 GHz	Enabled	OTD	Supported	No	No
A8:F7:D9:1A:81:91	CORP	-85 dBm	52	5 GHz	Enabled	OTD	Supported	No	No

Networks Found: 100, Displayed: 19 (19%)

Figure 14-10 - 802.11 feature (amendments) checks (2/2)

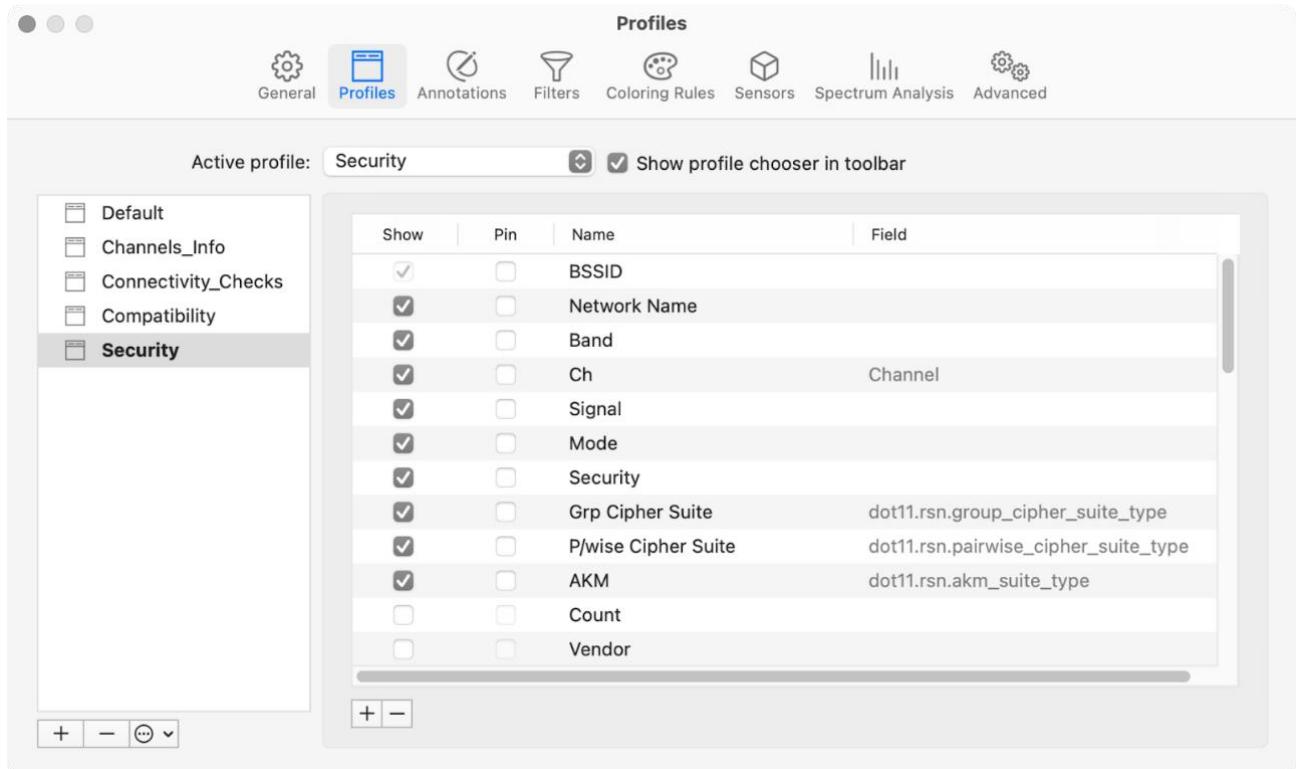


Figure 14-11 - Security profile

File: wfe-analiti-wifi-scanning-session-1753766597648369497 Monday, 8 April 2024 at 07:16:26									
Active									
Security	BSID	Network...	Band	Ch	Signal	Mode	Security	Grp Cipher Suite	P/wise Cipher Suite
	A8:F7:D9:1A:96:94	Te...iFi	5 GHz	48	-53 dBm	a/n/ac/...			
	A8:F7:D9:1A:96:95	_...i-fi	5 GHz	48	-53 dBm	a/n/ac/...			
	A8:F7:D9:1A:96:91	CORP	5 GHz	48	-53 dBm	a/n/ac/...	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:96:92	C...UE	5 GHz	48	-53 dBm	a/n/ac/...	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:96:93	C...YS	5 GHz	48	-53 dBm	a/n/ac/...	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:83:A4	Te...iFi	5 GHz	36	-56 dBm	a/n/ac/...			
	A8:F7:D9:1A:83:A5	_...i-fi	5 GHz	36	-56 dBm	a/n/ac/...			
	A8:F7:D9:1A:83:C3	Te...iFi	2.4 GHz	1	-56 dBm	g/n/ax			
	A8:F7:D9:1A:83:A1	CORP	5 GHz	36	-56 dBm	a/n/ac/...	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:83:A2	C...UE	5 GHz	36	-56 dBm	a/n/ac/...	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:83:A3	C...YS	5 GHz	36	-56 dBm	a/n/ac/...	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:83:C4	_...i-fi	2.4 GHz	1	-58 dBm	g/n/ax			
	A8:F7:D9:1A:96:B3	Te...iFi	2.4 GHz	6	-58 dBm	g/n/ax			
	A8:F7:D9:1A:83:C1	CORP	2.4 GHz	1	-58 dBm	g/n/ax	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:83:C2	C...UE	2.4 GHz	1	-58 dBm	g/n/ax	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:90:B1	CORP	2.4 GHz	1	-58 dBm	g/n/ax	WPA2 (802.1X)	CCMP-128	CCMP-128
	A8:F7:D9:1A:8A:23	Te...iFi	2.4 GHz	1	-59 dBm	g/n/ax			
	A8:F7:D9:1A:8A:24	_...i-fi	2.4 GHz	1	-59 dBm	g/n/ax			
	A8:F7:D9:1A:90:94	Te...iFi	5 GHz	36	-59 dBm	a/n/ac/...			
	A8:F7:D9:1A:90:95	_...i-fi	5 GHz	36	-59 dBm	a/n/ac/...			
	A8:F7:D9:1A:90:B3	Te...iFi	2.4 GHz	1	-59 dBm	g/n/ax			
	A8:F7:D9:1A:90:R4	i-fi	2.4 GHz	1	-59 dBm	g/n/ax			

Networks Found: 100, Displayed: 100 (100%)

Figure 14-12 - Security check #1

WiFi Explorer Pro 3: The Definitive User Guide

File: analiti... -lower-floor-wifi-scanning-session-1506 | Saturday, 23 March 2024 at 08:10:41

Security

All 2.4 GHz 5 GHz Open Secure Filter

BSSID	Network...	Band	Ch	Signal	Mode	Security	Grp Cipher Suite	P/wise Cipher Suite	AKM
84:24:8D:BE:C8:C4	M...RE	5 GHz	52	-66 dBm	a/n/ac	WPA/WPA2 (PSK)	TKIP	TKIP, CCMP-128	PSK
84:24:8D:BB:79:52	C...RA	2.4 GHz	1	-67 dBm	g/n	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BE:CD:67	M...ZO	5 GHz	48	-67 dBm	a/n/ac	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BB:15:80	M...RE	2.4 GHz	1	-67 dBm	g/n	WPA/WPA2 (PSK)	TKIP	TKIP, CCMP-128	PSK
84:24:8D:BE:CD:64	M...RE	5 GHz	48	-67 dBm	a/n/ac	WPA/WPA2 (PSK)	TKIP	TKIP, CCMP-128	PSK
84:24:8D:BB:79:53	...ree	2.4 GHz	1	-68 dBm	g/n				
84:24:8D:BE:A5:B5	S...INA	5 GHz	44	-68 dBm	a/n/ac	WPA2/WPA3 (802.1X)	CCMP-128	CCMP-128	802.1X
84:24:8D:BB:79:51	B...NA	2.4 GHz	1	-68 dBm	g/n	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BE:A5:B2	V...IUS	5 GHz	44	-68 dBm	a/n/ac	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BE:A5:B7	M...ZO	5 GHz	44	-68 dBm	a/n/ac	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BB:75:60	M...RE	2.4 GHz	1	-68 dBm	g/n	WPA/WPA2 (PSK)	TKIP	TKIP, CCMP-128	PSK
84:24:8D:BB:75:63	...ree	2.4 GHz	1	-69 dBm	g/n				
84:24:8D:BE:A5:B0	L...NO	5 GHz	44	-69 dBm	a/n/ac	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BE:A5:B1	B...NA	5 GHz	44	-69 dBm	a/n/ac	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BE:A5:B3	LIPARI	5 GHz	44	-69 dBm	a/n/ac	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BE:A5:B6	C...NO	5 GHz	44	-69 dBm	a/n/ac	WPA2 (PSK)	CCMP-128	CCMP-128	PSK
84:24:8D:BE:A5:B4	M...RE	5 GHz	44	-69 dBm	a/n/ac	WPA/WPA2 (PSK)	TKIP	TKIP, CCMP-128	PSK
84:24:8D:BA:ED:33	...ree	2.4 GHz	6	-70 dBm	g/n				
84:24:8D:BB:15:83	...ree	2.4 GHz	1	-70 dBm	g/n				
84:24:8D:BE:CA:F5	S...INA	5 GHz	56	-70 dBm	a/n/ac	WPA2/WPA3 (802.1X)	CCMP-128	CCMP-128	802.1X
84:24:8D:BB:15:81	B...NA	2.4 GHz	1	-70 dBm	g/n	WPA2 (PSK)	CCMP-128	CCMP-128	PSK

Networks Found: 175, Displayed: 175 (100%), Selected: 1 (0%)

Figure 14-13 - Security check #2

Profiles

General Profiles Annotations Filters Coloring Rules Sensors Spectrum Analysis Advanced

Active profile: Performance Show profile chooser in toolbar

Default
Channels_Info
Connectivity_Checks
Compatibility
Security
Performance

Show	Pin	Name	Field
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	BSSID	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Network Name	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Signal	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	SNR	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Band	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Channel	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Channel Width	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Channel Utilization	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gen	Generation
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mode	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Stations	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Streams	

+ - ⓘ ↴ Drag columns to change their order.

Figure 14-14 - Performance Profile (1/2)

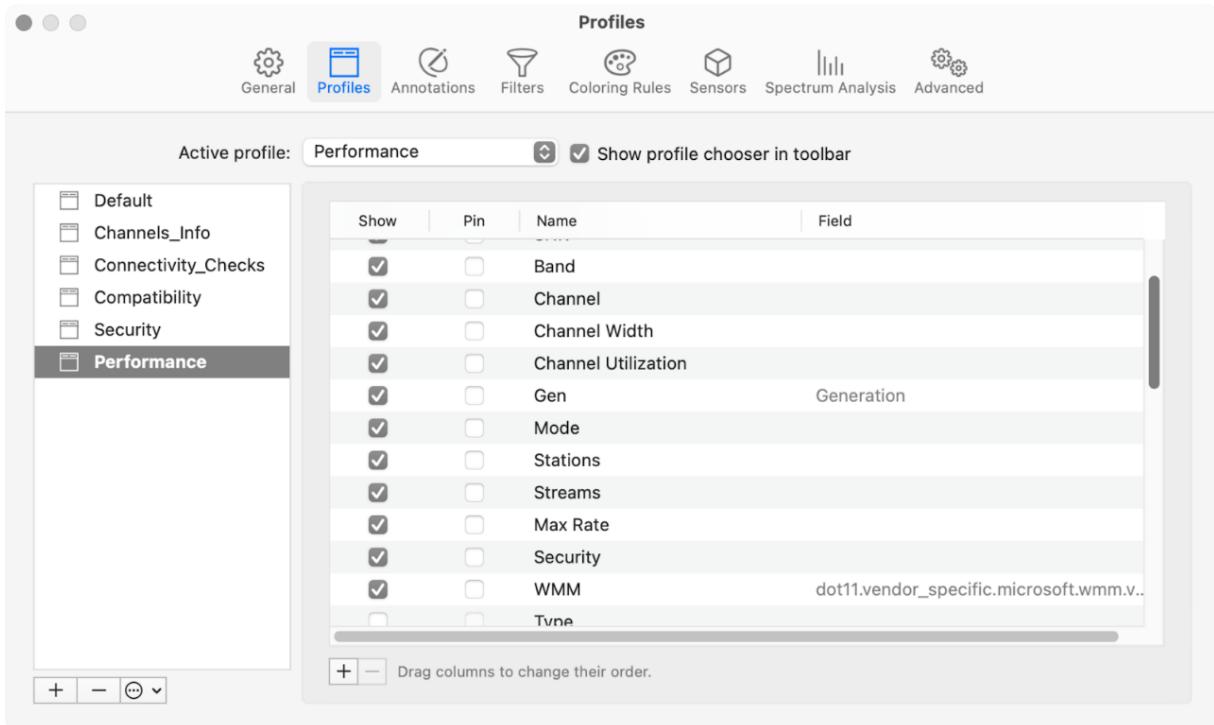


Figure 14-15 - Performance Profile (2/2)

Performance		Network Na...	Signal	SNR	Band	Ch...	Channel Wi...	Channel Utili...	Gen	Mode	Stations	Streams
A8:F7:D9:1A:96:91	CORP	corp	-53 dBm	43 dB	5 GHz	48	20 MHz	36%	6	a/n/ac/ax	1	4
A8:F7:D9:1A:96:92	CO...GUE	co...gue	-53 dBm	43 dB	5 GHz	48	20 MHz	36%	6	a/n/ac/ax	0	4
A8:F7:D9:1A:96:93	CO...AYS	co...ays	-53 dBm	43 dB	5 GHz	48	20 MHz	36%	6	a/n/ac/ax	2	4
A8:F7:D9:1A:96:94	Tes...iFi	tes...ifi	-53 dBm	43 dB	5 GHz	48	20 MHz	36%	6	a/n/ac/ax	4	4
A8:F7:D9:1A:96:95	_BTWi-fi	_btwi-fi	-53 dBm	43 dB	5 GHz	48	20 MHz	36%	6	a/n/ac/ax	0	4
A8:F7:D9:1A:83:A1	CORP	corp	-56 dBm	40 dB	5 GHz	36	20 MHz	10%	6	a/n/ac/ax	1	4
A8:F7:D9:1A:83:A2	CO...GUE	co...gue	-56 dBm	40 dB	5 GHz	36	20 MHz	10%	6	a/n/ac/ax	0	4
A8:F7:D9:1A:83:A3	CO...AYS	co...ays	-56 dBm	40 dB	5 GHz	36	20 MHz	10%	6	a/n/ac/ax	1	4
A8:F7:D9:1A:83:A4	Tes...iFi	tes...ifi	-56 dBm	40 dB	5 GHz	36	20 MHz	10%	6	a/n/ac/ax	2	4
A8:F7:D9:1A:83:A5	_BTWi-fi	_btwi-fi	-56 dBm	40 dB	5 GHz	36	20 MHz	10%	6	a/n/ac/ax	0	4
A8:F7:D9:1A:83:C3	Tes...iFi	tes...ifi	-56 dBm	40 dB	2.4 GHz	1	20 MHz	50%	6	g/n/ax	2	2
A8:F7:D9:1A:83:C1	CORP	corp	-58 dBm	38 dB	2.4 GHz	1	20 MHz	50%	6	g/n/ax	1	2
A8:F7:D9:1A:83:C2	CO...GUE	co...gue	-58 dBm	38 dB	2.4 GHz	1	20 MHz	50%	6	g/n/ax	0	2
A8:F7:D9:1A:83:C4	_BTWi-fi	_btwi-fi	-58 dBm	38 dB	2.4 GHz	1	20 MHz	50%	6	g/n/ax	0	2
A8:F7:D9:1A:90:B1	CORP	corp	-58 dBm	38 dB	2.4 GHz	1	20 MHz	62%	6	g/n/ax	1	2
A8:F7:D9:1A:96:B3	Tes...iFi	tes...ifi	-58 dBm	38 dB	2.4 GHz	6	20 MHz	49%	6	g/n/ax	0	2
A8:F7:D9:1A:8A:21	CORP	corp	-59 dBm	37 dB	2.4 GHz	1	20 MHz	60%	6	g/n/ax	0	2
A8:F7:D9:1A:8A:22	CO...GUE	co...gue	-59 dBm	37 dB	2.4 GHz	1	20 MHz	60%	6	g/n/ax	0	2
A8:F7:D9:1A:8A:23	Tes...iFi	tes...ifi	-59 dBm	37 dB	2.4 GHz	1	20 MHz	60%	6	g/n/ax	1	2
A8:F7:D9:1A:8A:24	_BTWi-fi	_btwi-fi	-59 dBm	37 dB	2.4 GHz	1	20 MHz	60%	6	g/n/ax	0	2
A8:F7:D9:1A:90:91	CORP	corp	-59 dBm	37 dB	5 GHz	36	20 MHz	14%	6	a/n/ac/ax	0	4
AR:F7:D9:1A:90:92	CO...GUE	co...gue	-59 dBm									

Networks Found: 100, Displayed: 100 (100%)

Figure 14-16 - Performance profile example (1/2)

WiFi Explorer Pro 3: The Definitive User Guide

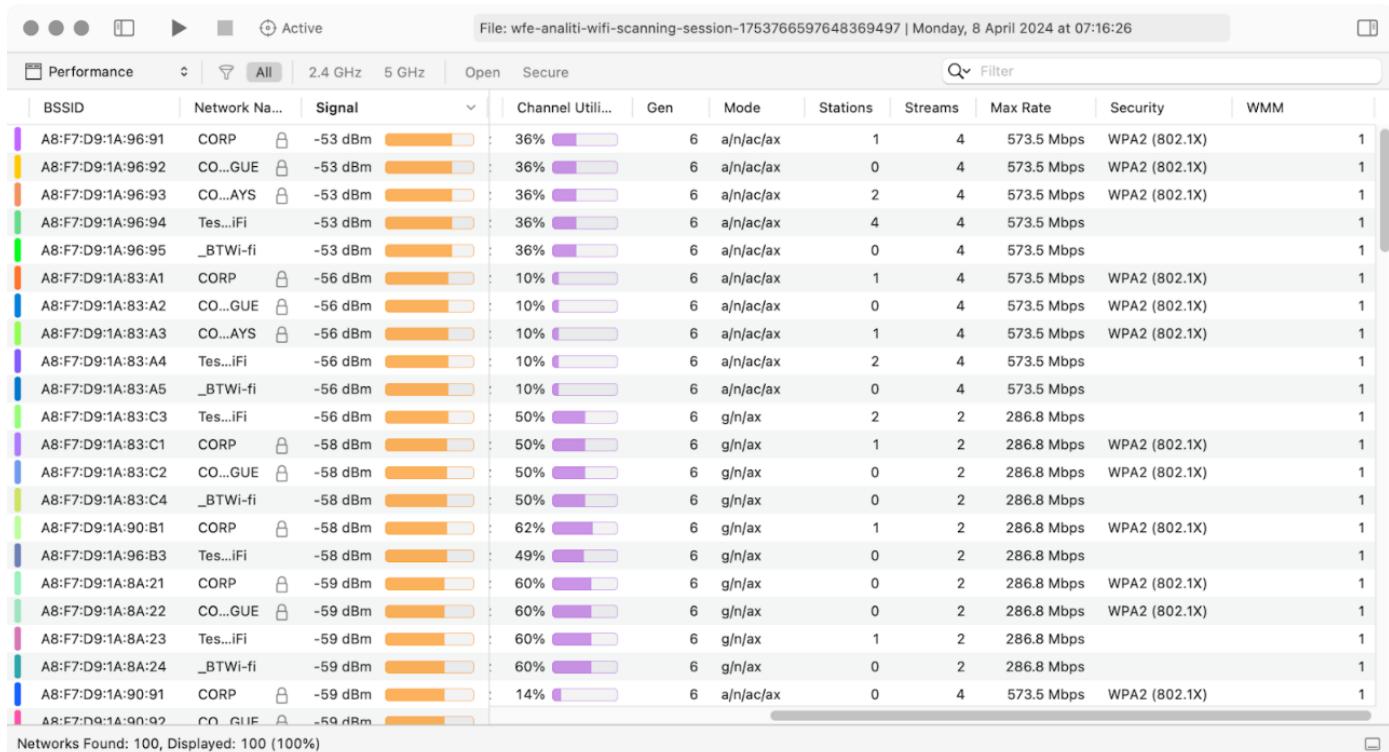


Figure 14-17 - Performance profile example (2/2)

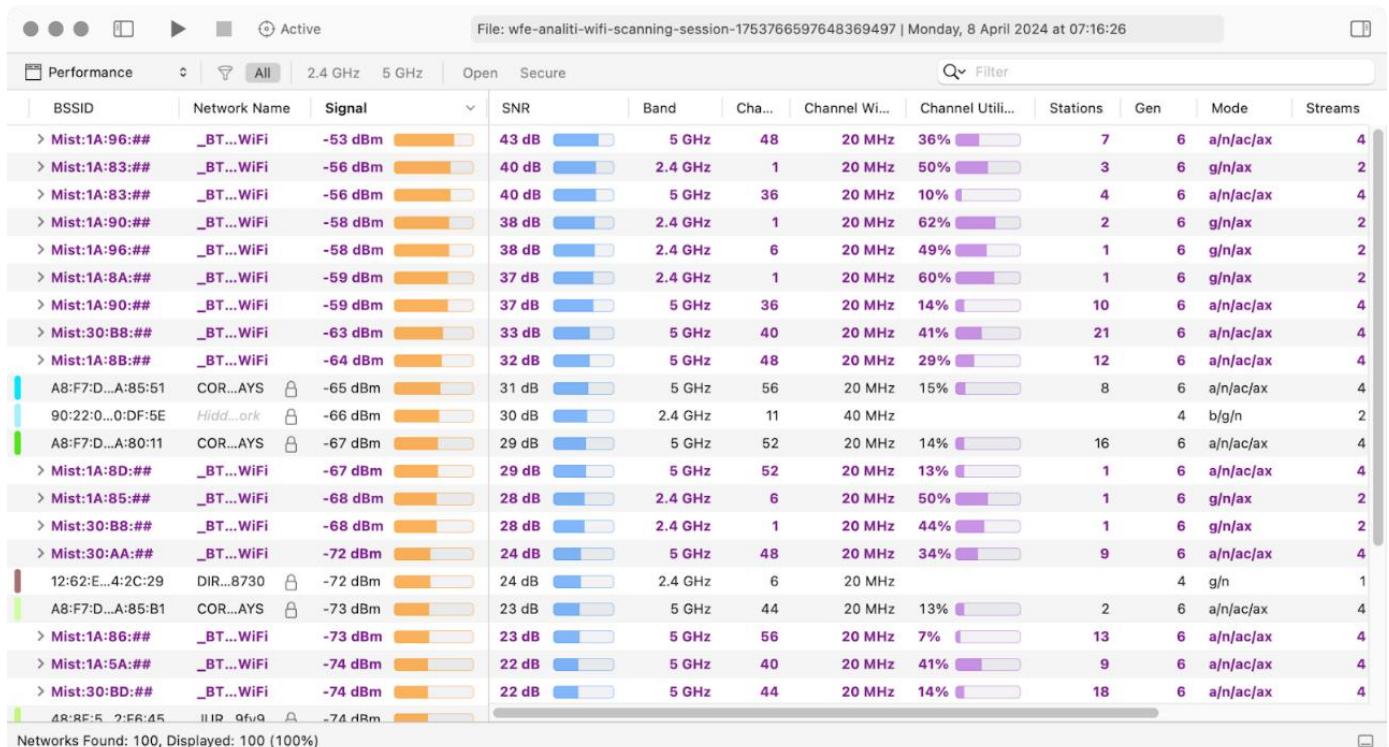


Figure 14-18 - Performance profile example - consolidated, per radio view

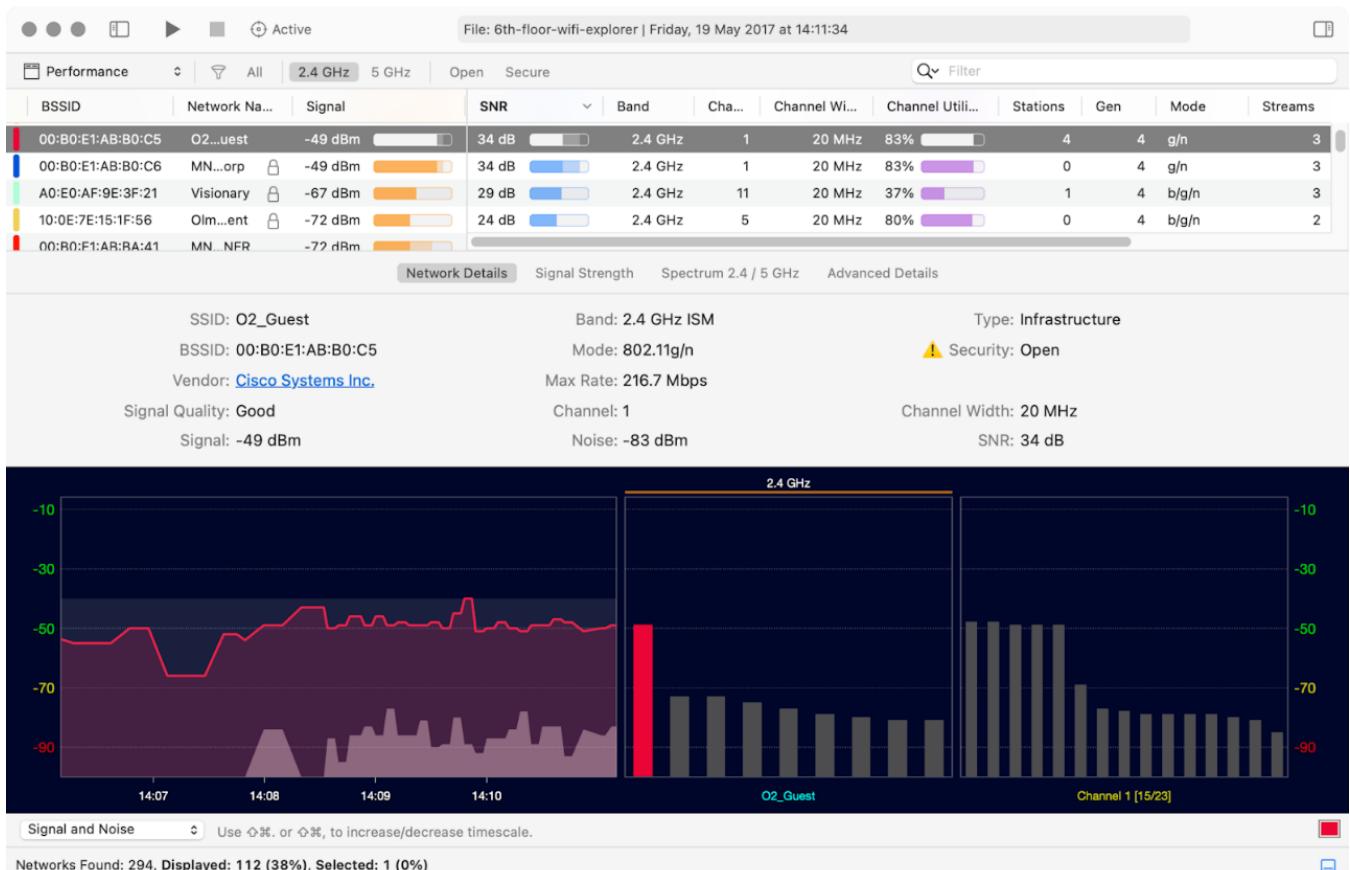


Figure 14-19 - Network Details view for an SSID under investigation

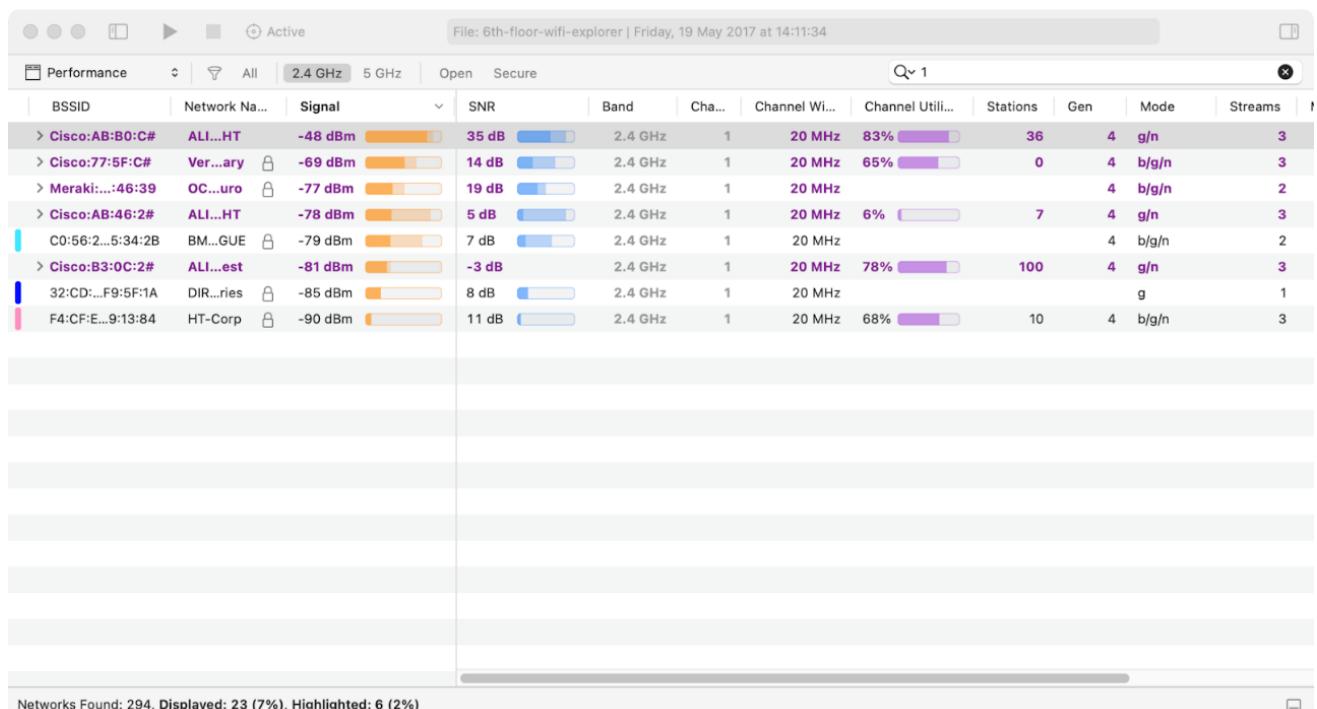


Figure 14-20 - Consolidated view using View > Organize Networks By Access Point Radio

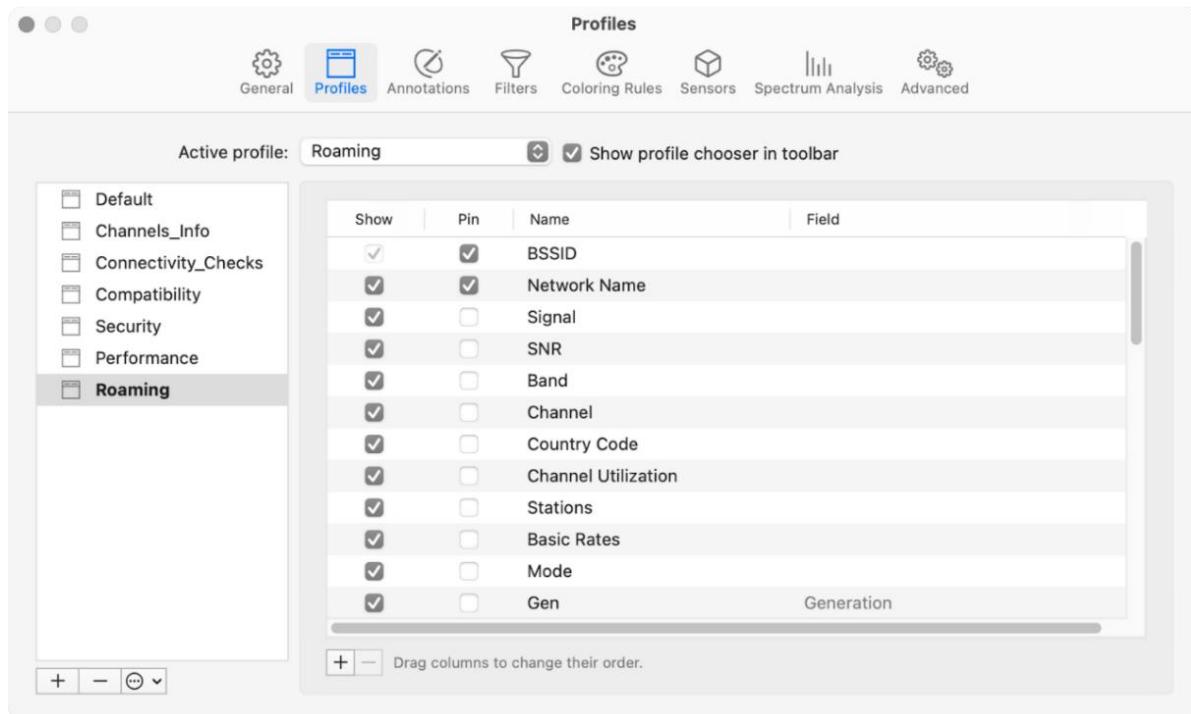


Figure 14-21 - Roaming profile (1/2)

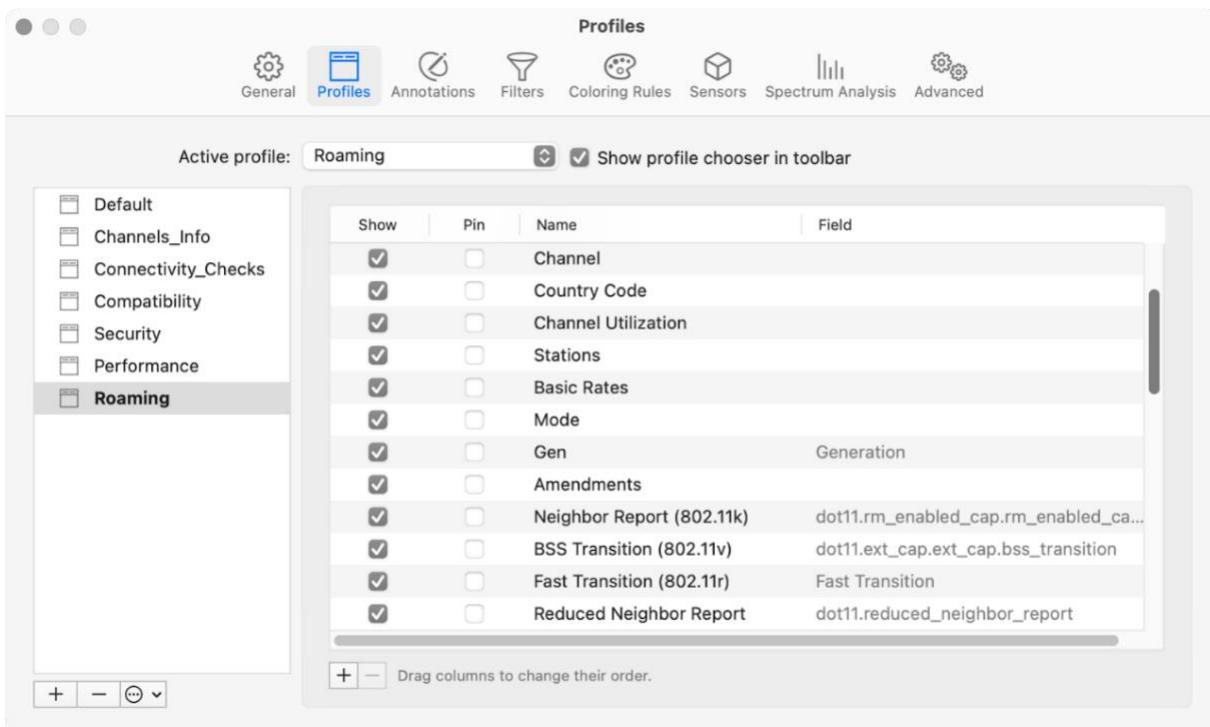


Figure 14-22 - Roaming profile (2/2)

File: wfe-analiti-wifi-scanning-session-1753766597648369497 | Monday, 8 April 2024 at 07:16:26

Roaming		Network Name	Signal	SNR	Band	Channel	Country Code	Channel Utilization	Stations	Basic Rates	Mode	Ge
A8:F7:D9:1A:96:91	CORP	🔒	-53 dBm	43 dB	5 GHz	48	GB	36% <div style="width: 36%; background-color: #d8b4fe;"></div>	1	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:83:A1	CORP	🔒	-56 dBm	40 dB	5 GHz	36	GB	10% <div style="width: 10%; background-color: #d8b4fe;"></div>	1	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:90:91	CORP	🔒	-59 dBm	37 dB	5 GHz	36	GB	14% <div style="width: 14%; background-color: #d8b4fe;"></div>	0	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:8B:21	CORP	🔒	-64 dBm	32 dB	5 GHz	48	GB	29% <div style="width: 29%; background-color: #d8b4fe;"></div>	0	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:30:8B:71	CORP	🔒	-65 dBm	31 dB	5 GHz	40	GB	41% <div style="width: 41%; background-color: #d8b4fe;"></div>	1	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:8D:C1	CORP	🔒	-69 dBm	27 dB	5 GHz	52	GB	13% <div style="width: 13%; background-color: #d8b4fe;"></div>	0	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:30:AA:91	CORP	🔒	-72 dBm	24 dB	5 GHz	48	GB	34% <div style="width: 34%; background-color: #d8b4fe;"></div>	0	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:5A:F1	CORP	🔒	-74 dBm	22 dB	5 GHz	40	GB	41% <div style="width: 41%; background-color: #d8b4fe;"></div>	0	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:86:D1	CORP	🔒	-74 dBm	22 dB	5 GHz	56	GB	7% <div style="width: 7%; background-color: #d8b4fe;"></div>	1	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:90:F1	CORP	🔒	-75 dBm	21 dB	5 GHz	36	GB	14% <div style="width: 14%; background-color: #d8b4fe;"></div>	0	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:30:BC:01	CORP	🔒	-77 dBm	19 dB	5 GHz	52	GB	13% <div style="width: 13%; background-color: #d8b4fe;"></div>	0	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:64:21	CORP	🔒	-83 dBm	13 dB	5 GHz	44	GB	28% <div style="width: 28%; background-color: #d8b4fe;"></div>	1	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:81:91	CORP	🔒	-85 dBm	11 dB	5 GHz	52	GB	20% <div style="width: 20%; background-color: #d8b4fe;"></div>	19	12, 24 Mbps	a/n/ac/ax	
Networks Found: 100, Displayed: 13 (13%)												

Figure 14-23 - Networks table with Roaming profile applied (1/2)

File: wfe-analiti-wifi-scanning-session-1753766597648369497 | Monday, 8 April 2024 at 07:16:26

Roaming		Network Name	Mode	Gen	Amendments	Neighbor Report (802.11k)	BSS Transition (802.11v)	Fast Transition (802.11r)	Reduced Neighbor Report
A8:F7:D9:1A:96:91	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:83:A1	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:90:91	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:8B:21	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:30:8B:71	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:8D:C1	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:30:AA:91	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:5A:F1	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:86:D1	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:90:F1	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:30:BC:01	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:64:21	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
A8:F7:D9:1A:81:91	CORP	🔒	a/n/ac/ax	6	d/e/h/i/k/r/v	Enabled	Supported	OTD	
Networks Found: 100, Displayed: 13 (13%)									

Figure 14-24 - Networks table with Roaming profile applied (2/2)

WiFi Explorer Pro 3: The Definitive User Guide

File: wfe-analiti-wifi-scanning-session-1753766597648369497 | Monday, 8 April 2024 at 07:16:26

Roaming		All	2.4 GHz	5 GHz	Open	Secure	Filter				
BSSID	Network Name	Signal	SNR	Band	Channel	Country Code	Channel Utilization	Stations	Basic Rates	Mode	Ge
> Mist:1A:96:##	_BT...coWiFi	-53 dBm	43 dB	5 GHz	48	GB	36% <div style="width: 36%; background-color: #d8b4fe;"></div>	7	12, 24 Mbps	a/n/ac/ax	
> Mist:1A:83:##	_BT...coWiFi	-56 dBm	40 dB	5 GHz	36	GB	10% <div style="width: 10%; background-color: #d8b4fe;"></div>	4	12, 24 Mbps	a/n/ac/ax	
> Mist:1A:90:##	_BT...coWiFi	-59 dBm	37 dB	5 GHz	36	GB	14% <div style="width: 14%; background-color: #d8b4fe;"></div>	10	12, 24 Mbps	a/n/ac/ax	
> Mist:30:B8:##	_BT...coWiFi	-63 dBm	33 dB	5 GHz	40	GB	41% <div style="width: 41%; background-color: #d8b4fe;"></div>	21	12, 24 Mbps	a/n/ac/ax	
> Mist:1A:8B:##	_BT...coWiFi	-64 dBm	32 dB	5 GHz	48	GB	29% <div style="width: 29%; background-color: #d8b4fe;"></div>	12	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:85:51	CORP_SAYS	-65 dBm	31 dB	5 GHz	56	GB	15% <div style="width: 15%; background-color: #d8b4fe;"></div>	8	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:80:11	CORP_SAYS	-67 dBm	29 dB	5 GHz	52	GB	14% <div style="width: 14%; background-color: #d8b4fe;"></div>	16	12, 24 Mbps	a/n/ac/ax	
> Mist:1A:8D:##	_BT...coWiFi	-67 dBm	29 dB	5 GHz	52	GB	13% <div style="width: 13%; background-color: #d8b4fe;"></div>	1	12, 24 Mbps	a/n/ac/ax	
> Mist:30:AA:##	_BT...coWiFi	-72 dBm	24 dB	5 GHz	48	GB	34% <div style="width: 34%; background-color: #d8b4fe;"></div>	9	12, 24 Mbps	a/n/ac/ax	
A8:F7:D9:1A:85:B1	CORP_SAYS	-73 dBm	23 dB	5 GHz	44	GB	13% <div style="width: 13%; background-color: #d8b4fe;"></div>	2	12, 24 Mbps	a/n/ac/ax	
> Mist:1A:86:##	_BT...coWiFi	-73 dBm	23 dB	5 GHz	56	GB	7% <div style="width: 7%; background-color: #d8b4fe;"></div>	13	12, 24 Mbps	a/n/ac/ax	
48:8F:5A:42:F6:45	JURA...b9fy9	-74 dBm	22 dB	5 GHz	44				6 Mbps	a/n/ac	
> Mist:1A:5A:##	_BT...coWiFi	-74 dBm	22 dB	5 GHz	40	GB	41% <div style="width: 41%; background-color: #d8b4fe;"></div>	9	12, 24 Mbps	a/n/ac/ax	
> Mist:30:BD:##	_BT...coWiFi	-74 dBm	22 dB	5 GHz	44	GB	14% <div style="width: 14%; background-color: #d8b4fe;"></div>	18	12, 24 Mbps	a/n/ac/ax	
> Mist:30:BC:##	_BT...coWiFi	-75 dBm	21 dB	5 GHz	52	GB	13% <div style="width: 13%; background-color: #d8b4fe;"></div>	6	12, 24 Mbps	a/n/ac/ax	
> Mist:1A:64:##	_BT...coWiFi	-83 dBm	13 dB	5 GHz	44	GB	28% <div style="width: 28%; background-color: #d8b4fe;"></div>	13	12, 24 Mbps	a/n/ac/ax	
> Mist:1A:81:##	CORP...SAYS	-85 dBm	11 dB	5 GHz	52	GB	20% <div style="width: 20%; background-color: #d8b4fe;"></div>	19	12, 24 Mbps	a/n/ac/ax	
Networks Found: 100, Displayed: 70 (70%)											

Figure 14-25 - Networks table organized by AP radio with Roaming profile applied

Chapter 15 - Data Export & Reporting

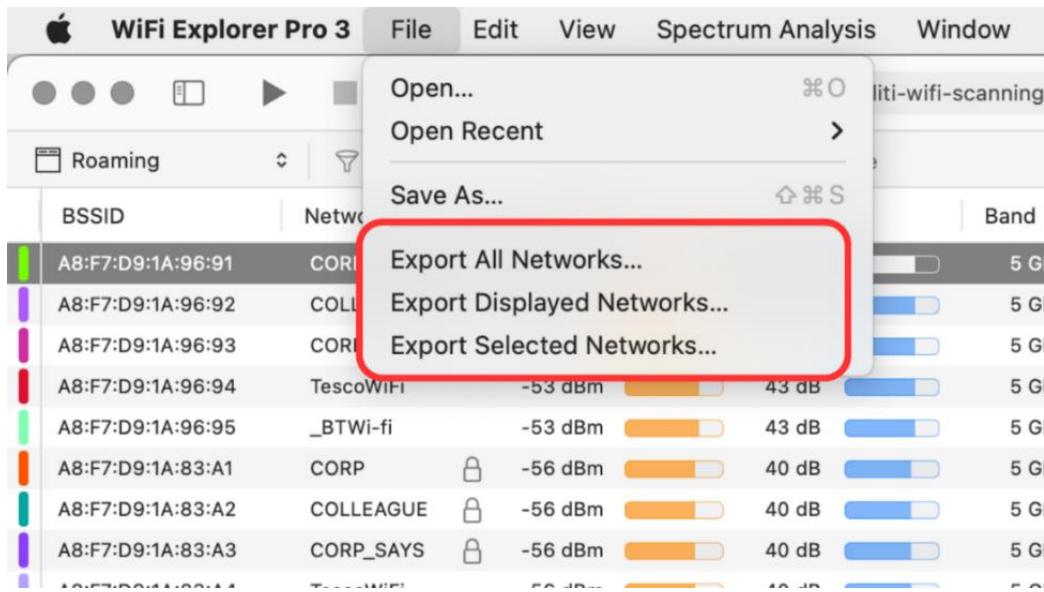


Figure 15-1: Export options available via the menu bar

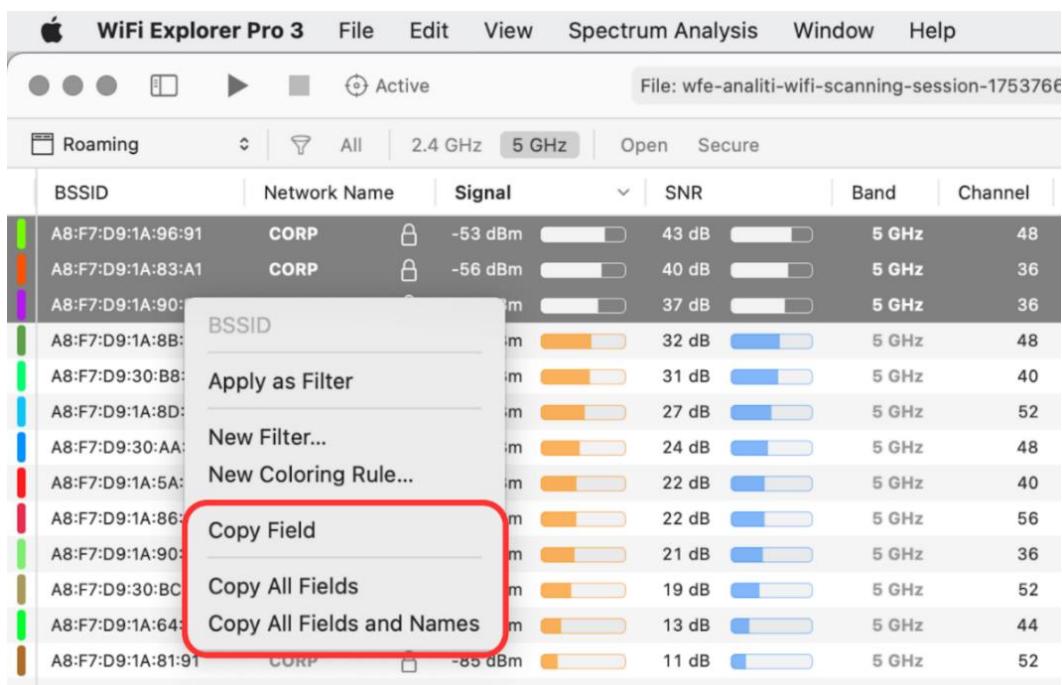


Figure 15-2: Copy options available via right-click

WiFi Explorer Pro 3: The Definitive User Guide

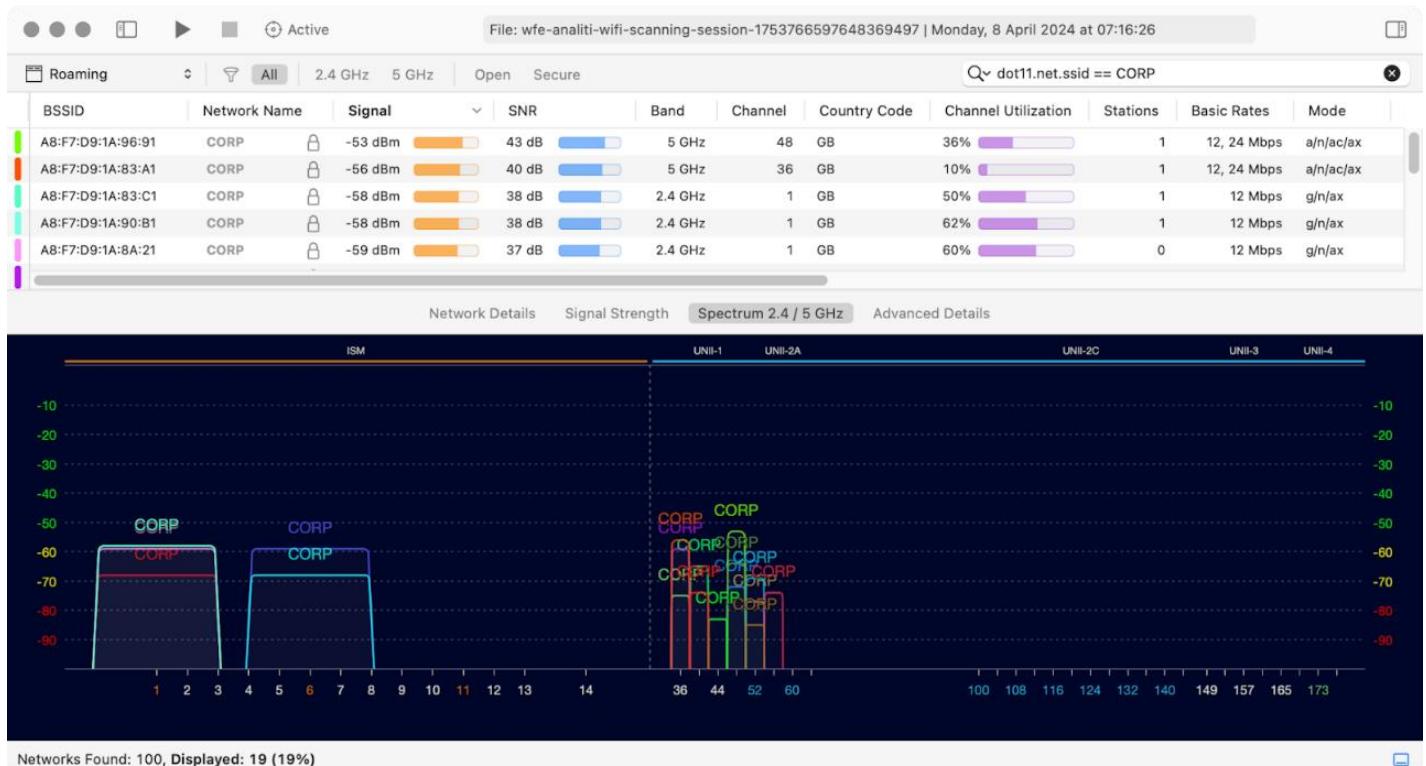


Figure 15-3: Spectrum 2.4/5 GHz panel used for drag and drop



Figure 15-4: Resulting image from panel image drag and drop

The screenshot shows a Wi-Fi scanning session interface. At the top, there's a header bar with tabs for 'Roaming' and 'All'. Below it is a table of networks with columns for BSSID, Network Name, Signal, SNR, Band, Channel, Country Code, Channel Utilization, Stations, Basic Rates, and Mode. A red box highlights the first row for 'CORP'.

Below the table, there are tabs for 'Network Details', 'Signal Strength', 'Spectrum 2.4 / 5 GHz', and 'Advanced Details'. The 'Advanced Details' tab is selected. It shows a list of information elements (ID, Length, Information Element) and their details. An entry for 'Mobility Domain' (Element ID: 54, Length: 3 bytes) has a context menu open over it, also highlighted with a red box. The menu options include 'dot11.mobility_domain', 'Apply as Column', 'Apply as Filter', 'New Filter...', 'New Coloring Rule...', 'Copy Element' (which is selected), 'Copy All Elements', 'Expand Item', and 'Expand All Items'. The menu is titled 'dot11.mobility_domain'.

Figure 15-5: Information Element data copy

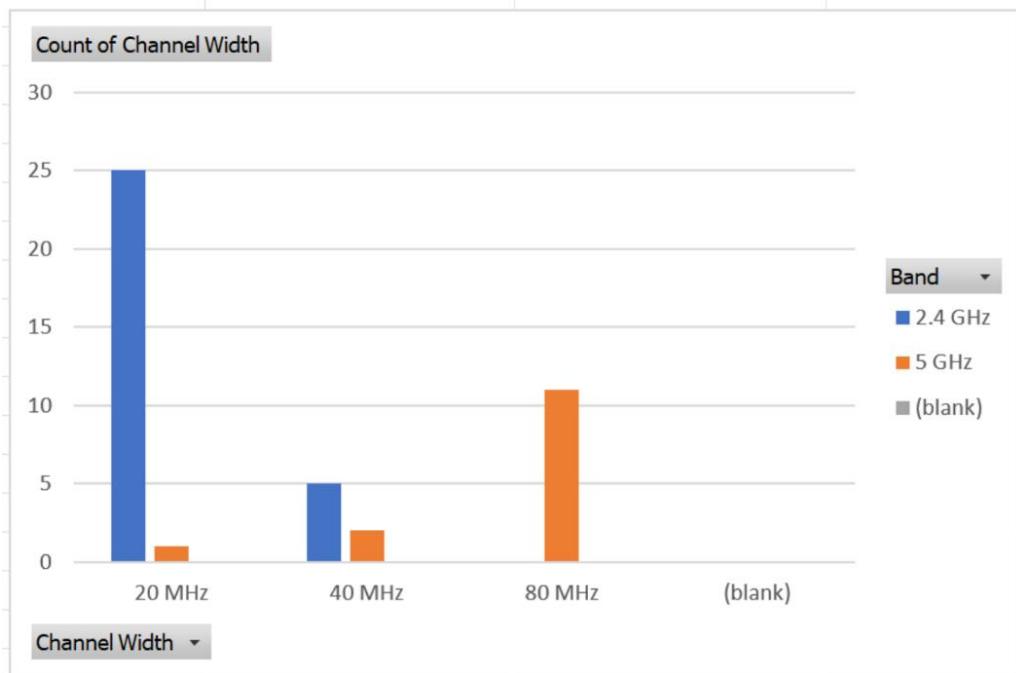


Figure 15-6 - Sample report created from CSV data using Excel

Chapter 16 - RF Environment Auditing

No images in this chapter.

Chapter 17 - Raspberry Pi Sensor



Figure 17-1 - microSD reader (USB-A) with microSD card

Install Raspberry Pi OS using Raspberry Pi Imager

Raspberry Pi Imager is the quick and easy way to install Raspberry Pi OS and other operating systems to a microSD card, ready to use with your Raspberry Pi.

Download and install Raspberry Pi Imager to a computer with an SD card reader. Put the SD card you'll use with your Raspberry Pi into the reader and run Raspberry Pi Imager.

[Download for macOS](#)

[Download for Windows](#)

[Download for Ubuntu for x86](#)

To install on **Raspberry Pi OS**, type
`sudo apt install rpi-imager`
in a Terminal window.

The screenshot shows the Raspberry Pi Imager software interface. It has a red header bar with the title "Raspberry Pi Imager v1.8.1" and the Raspberry Pi logo. Below the header, there are three tabs: "Raspberry Pi Device", "Operating System", and "Storage". Under each tab, there is a "CHOOSE" button. At the bottom right of the main window is a large "NEXT" button.

Figure 17-2 - Screenshot of Raspberry Pi Imager download page

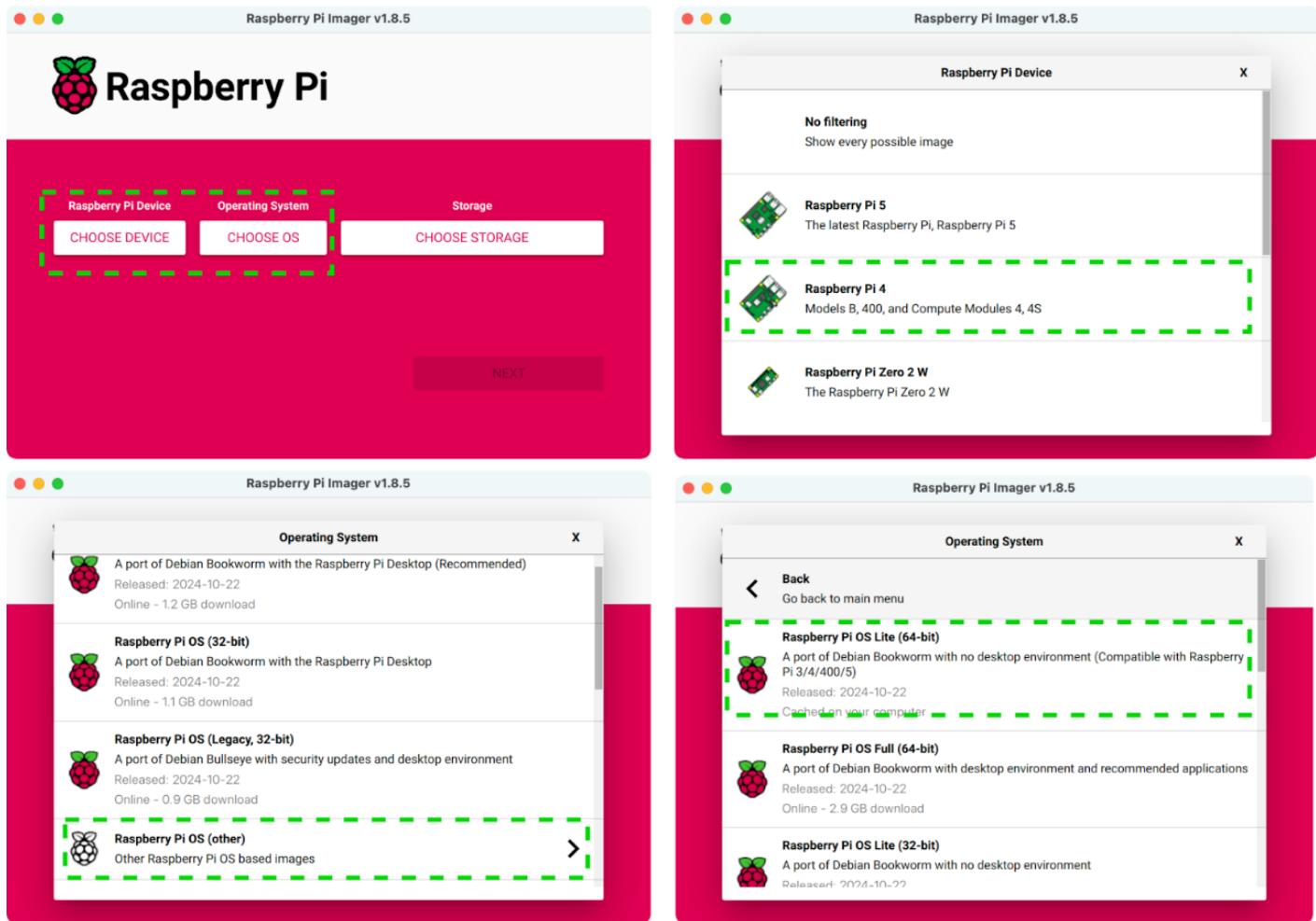


Figure 17-3 - Choose device & OS screenshots

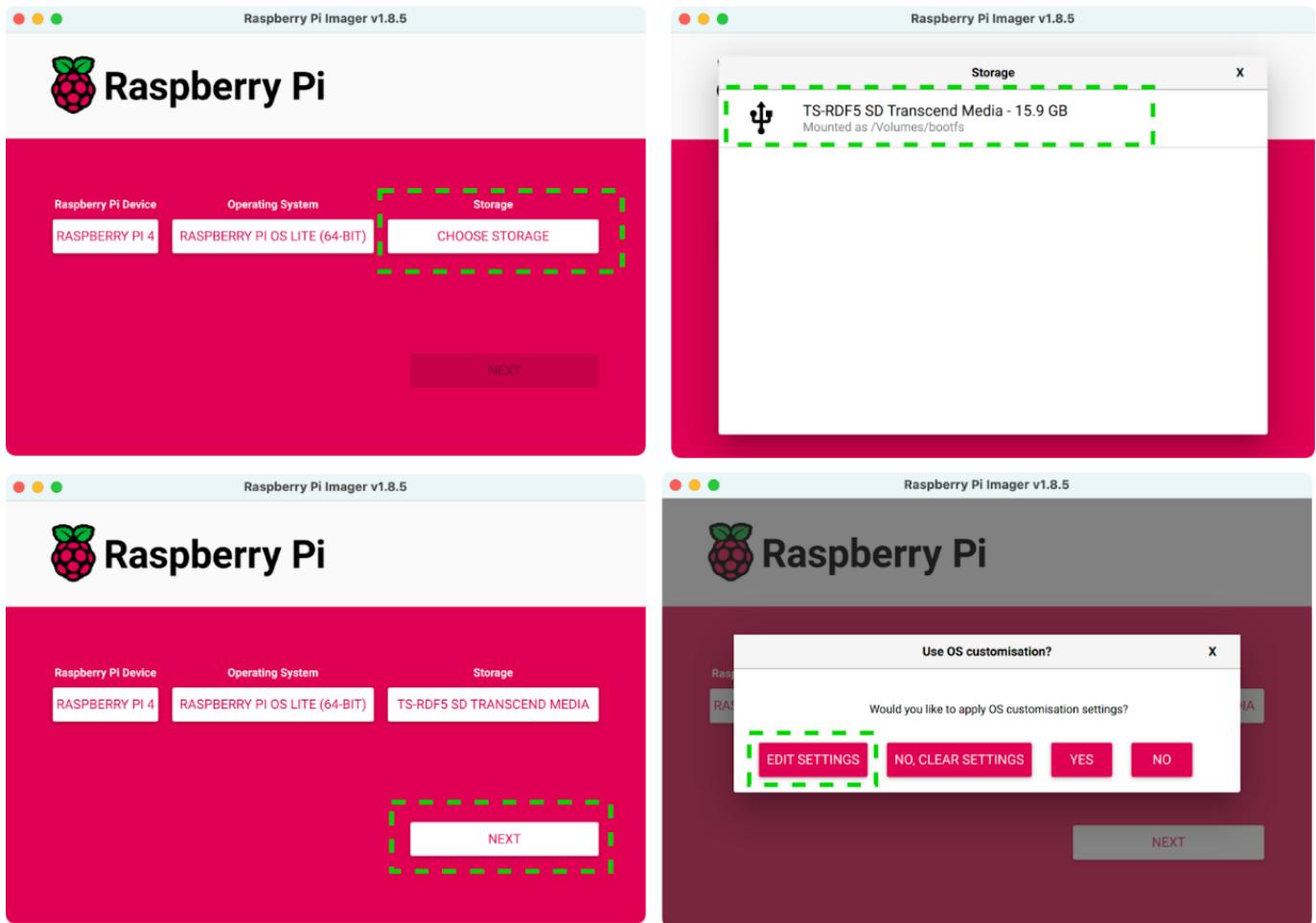


Figure 17-4 - Choose storage & edit setting screenshots

WiFi Explorer Pro 3: The Definitive User Guide

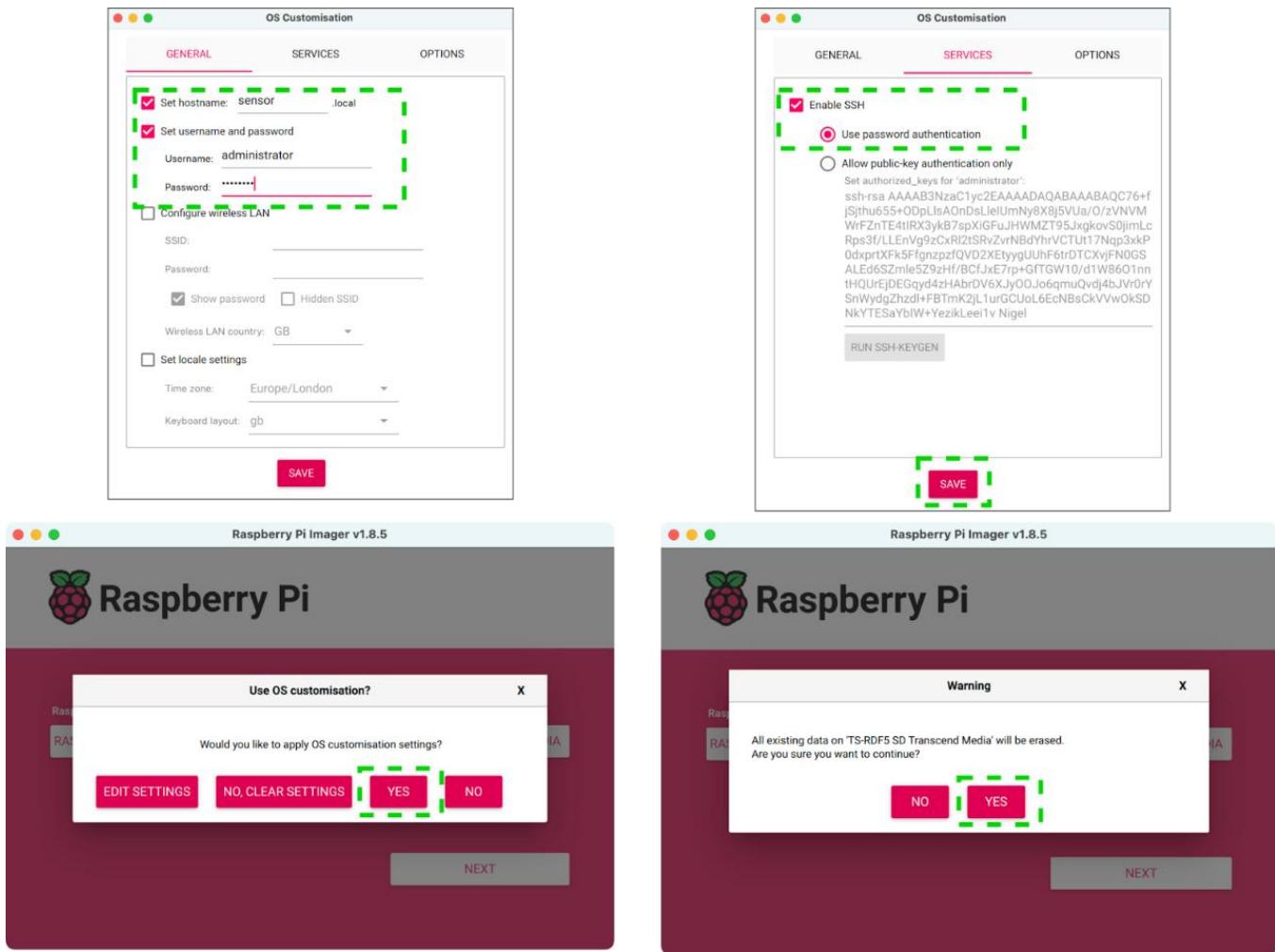


Figure 17-5 - Edit settings & apply customization screenshots

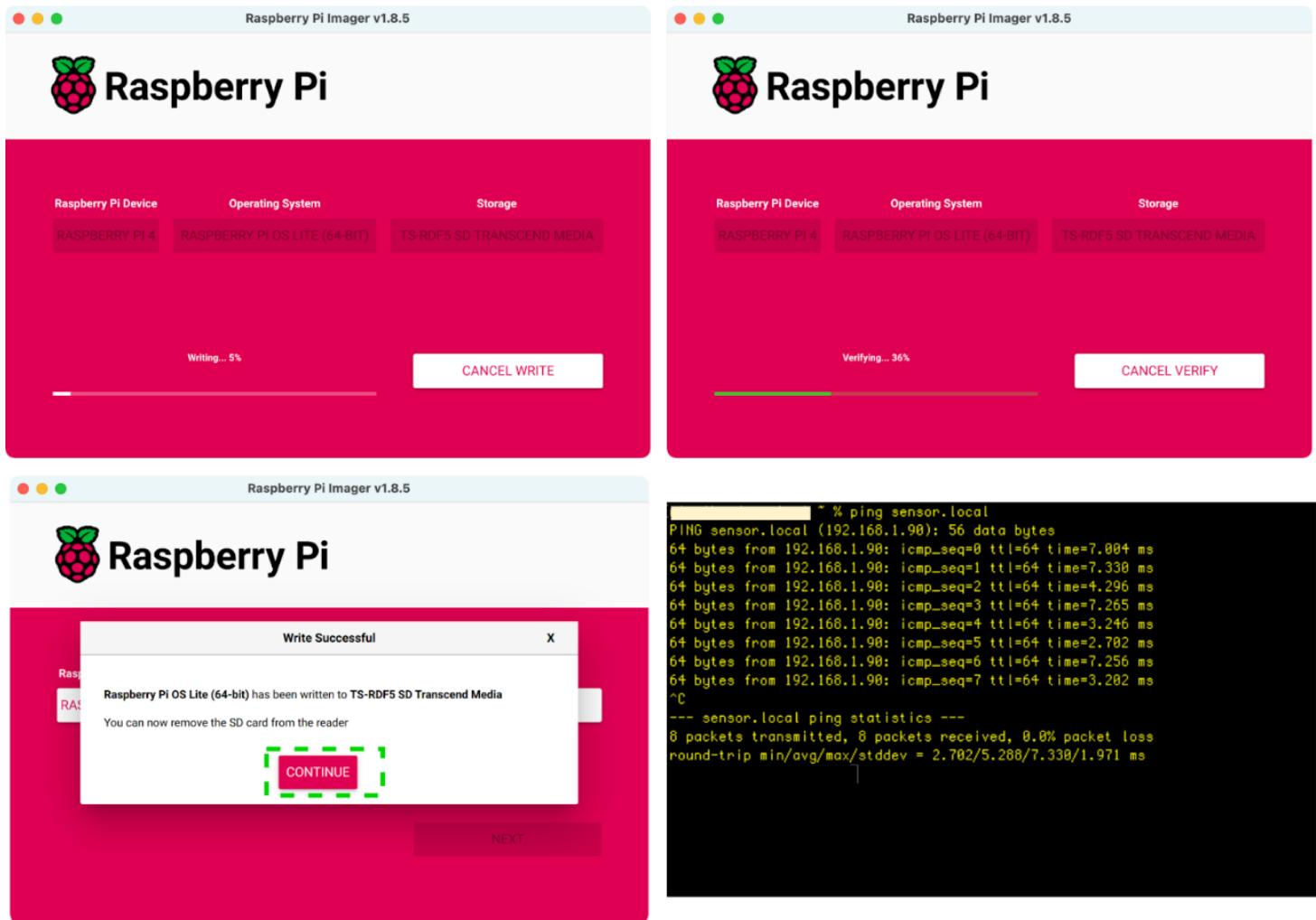


Figure 17-6 - micro SD write and RPi ping screenshots

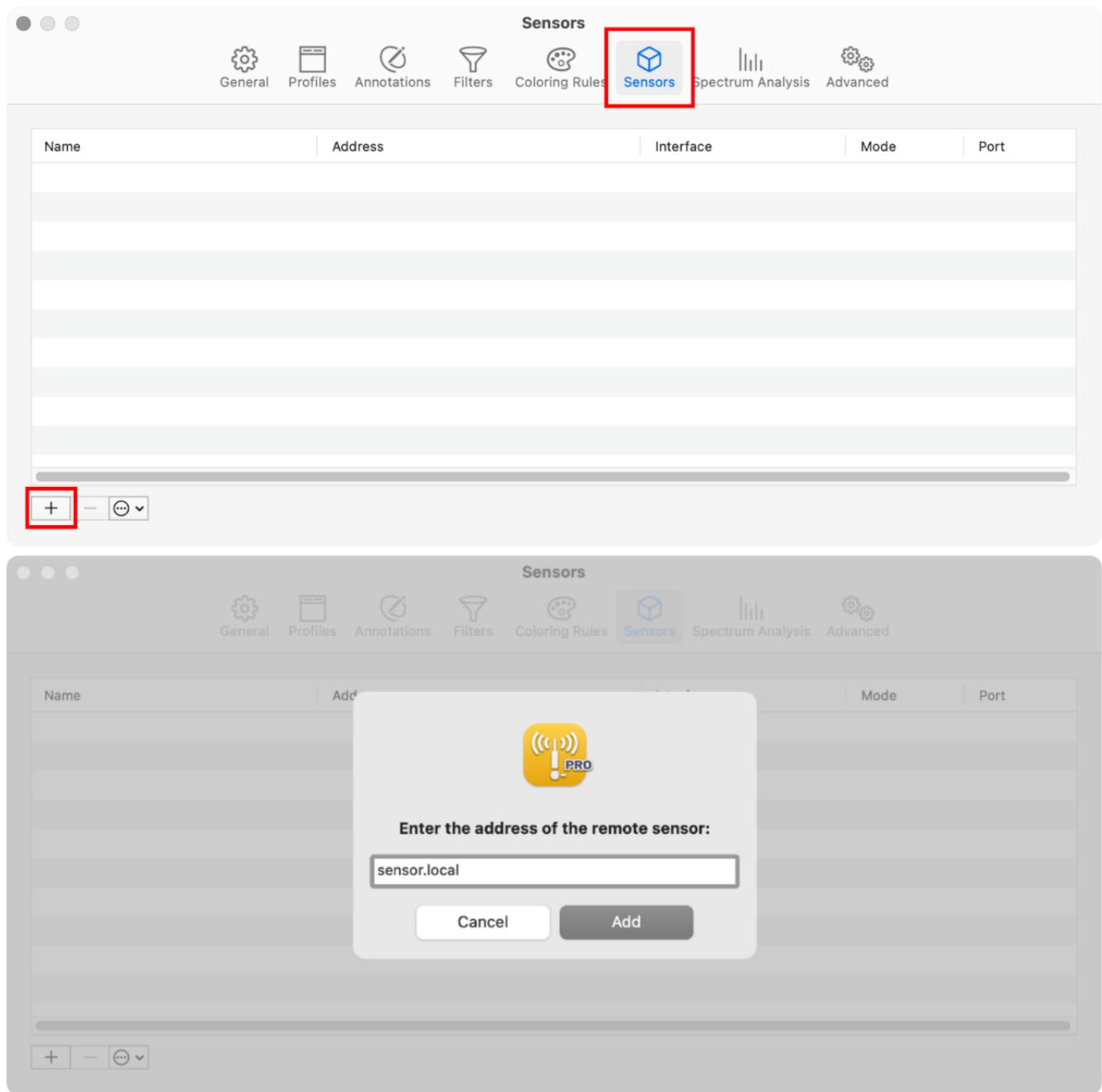


Figure 17-7 - Add a sensor in *WFE Pro 3 > Settings > Sensors* and enter the RPi address

The screenshot shows the Sensors application interface with two configurations listed in the table.

Name	Address	Interface	Mode	Port
New sensor	sensor.local	Auto	Auto	22
RPi Sensor	sensor.local	Auto	Auto	22

The application has a top navigation bar with tabs: General, Profiles, Annotations, Filters, Coloring Rules, Sensors (selected), Spectrum Analysis, and Advanced. Below the table are standard window controls (+, -, ⊞, ▾).

Figure 17-8 - Update sensor name once added to sensor list

WiFi Explorer Pro 3: The Definitive User Guide

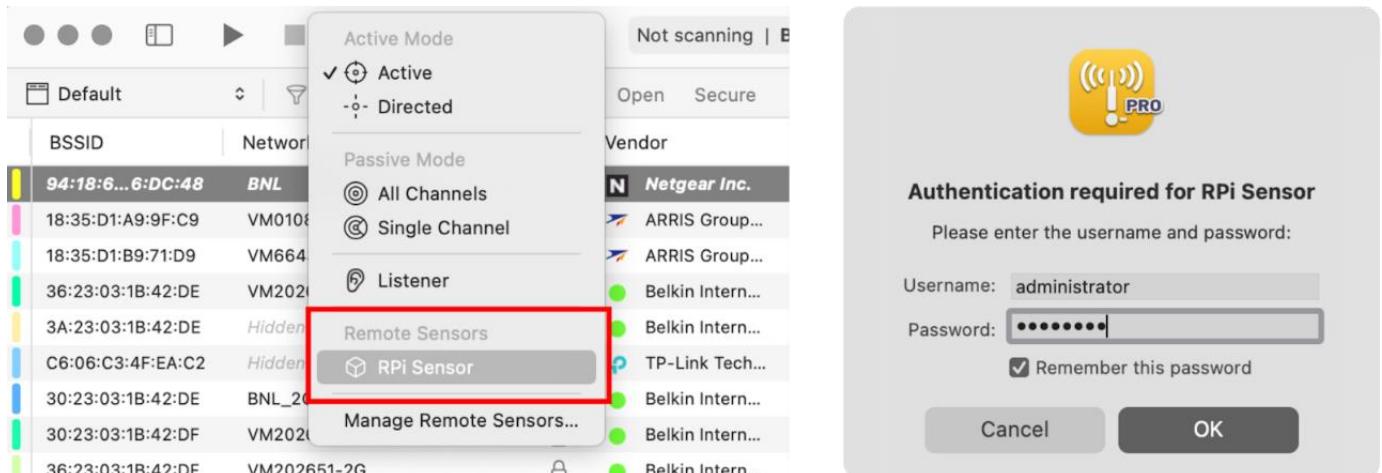


Figure 17-9 - Select the RPi sensor in the scan mode selector and enter the sensor credentials

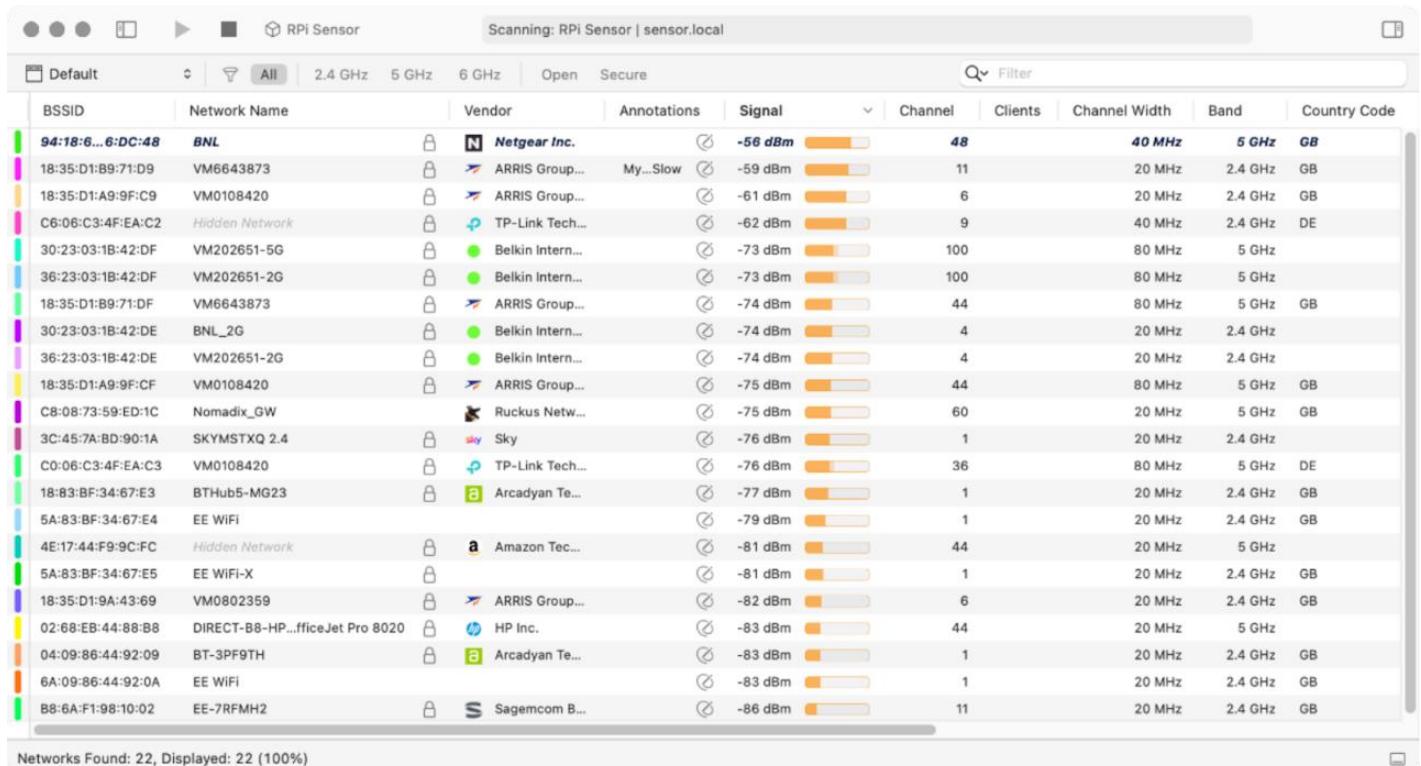


Figure 17-10 - Observe the RPi sensor scan results after a few seconds