VIAVI

WiFi Advisor
WFED-300AC Wireless LAN Analyzer

User's Guide

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This product was tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment has been SAR-evaluated for use in hand. SAR measurements are based on a 10 mm spacing from the body and that compliance is achieved at that distance. Keep the device away from your body to meet the distance requirement.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The authority to operate this product is conditioned by the requirements that no modifications be made to the equipment unless the changes or modifications are expressly approved by Viavi.

Industry Canada Requirements

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with Industry Canada radiation exposure limits set forth for an uncontrolled environment.

Cet équipement est conforme à l'exposition aux rayonnements Industry Canada limites établies pour un environnement non contrôlé.

(i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

(ii) This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment has been SAR-evaluated for use in hand. SAR measurements are based on a 10mm spacing from the body and that compliance is achieved at that distance. Keep the device away from your body to meet the distance requirement.

(iii) This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

(i) l'appareil pour fonctionner dans la bande 5150-5250 MHz est réservé à une utilisation en intérieur afin de réduire les risques d'interférences nuisibles à la co-canal avec les systèmes mobiles par satellite;
(ii) Cet équipement est conforme aux limites IC d'exposition aux radiations définies pour un environnement non contrôlé. Cet équipement a été SAR-évalué pour une utilisation dans la main. Des mesures SAR sont basés sur un espacement 10 mm à partir du corps et qui est obtenue conformément à cette distance. Gardez l'appareil loin de votre corps pour répondre à l'exigence de la distance.
(iii) Cet appareil est conforme avec Industrie Canada exempts de licence standard RSS (s). Son fonctionnement est soumis aux deux conditions suivantes: (1) ce dispositif ne doit pas causer d'interférences et (2) cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

CE

R&TTE Directive Compliance. This product is in compliance with essential requirements and other relevant provisions of Directive 1999/5/EC.

EMC Directive Compliance

This product was tested and conforms to the EMC Directive, 89/336/EEC as amended by 92/31/EEC and 93/68/EEC for electro-magnetic compatibility. A copy of the Declaration of Conformity is provided in printed form with the instrument.

Low Voltage Directive Compliance

This product was tested and conforms to the Low Voltage Directive, 73/23/EEC as amended by 93/68/EEC. Conformity with this directive is based upon compliance with the harmonized safety standard, EN61010-1:2010.

WEEE and Battery Directive Compliance

Viavi has established processes in compliance with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC, and the Battery Directive, 2006/66/EC.

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations. In the European Union, all equipment and batteries purchased from Viavi after 2005-08-13 can be returned for disposal at the end of its useful life. Viavi will ensure that all waste equipment and batteries returned are reused, recycled, or disposed of in an environmentally friendly manner, and in compliance with all applicable national and international waste legislation.

It is the responsibility of the equipment owner to return equipment and batteries to Viavi for appropriate disposal. If the equipment or battery was imported by a reseller whose name or logo is marked on the equipment or battery, then the owner should return the equipment or battery directly to the reseller. Instructions for returning waste equipment and batteries to Viavi can be found in the Environmental section of Viavi's web site at www.viavisolutions.com. If you have questions concerning disposal of your equipment or batteries, contact Viavi's WEEE Program Management team.

Contents

About This Guide

This prefix explains how to use this manual. Topics discussed include the following:

- "Purpose and scope" on page x
- "Assumptions" on page x
- "Safety and compliance information" on page x
- "Conventions" on page x

Purpose and scope

The purpose of this guide is to help you successfully use the WFED-300AC features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the WFED-300AC.

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the WiFi Advisor effectively and efficiently. We are assuming that you have basic computer and iPad experience and are familiar with basic telecommunication and WiFi concepts and terminology.

Safety and compliance information

Safety and compliance information for the instrument are provided in printed form and ship with your instrument. Refer to 22073762, *WiFi Advisor Safety Information*.

Conventions

This guide uses typographical and symbols conventions as described in the following tables.

Table 1   Text formatting and other typographical conventions

Item(s)	Example(s)
Buttons, keys, menu options, tabs, or fields that you press, click, or type information into.	Press the **On** button. Press the **Enter** key. Click the **Properties** tab. Type the name of the probe in the **Probe Name** field.
References to guides, books, and other publications appear in *this typeface*.	Refer to *Newton's Telecom Dictionary.*

Table 2   Symbol conventions

	This symbol indicates a note that includes important supplemental information or tips related to the main text.
	This symbol represents a general hazard. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See Table 3 for more information.
	This symbol represents an alert. It indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.
	This symbol represents hazardous voltages. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See Table 3 for more information.

Table 2   Symbol conventions (Continued)

 This symbol, located on the equipment, battery, or the packaging indicates that the equipment or battery must not be disposed of in a land-fill site or as municipal waste, and should be disposed of according to your national regulations.

Table 3   Safety definitions

Term	Definition
DANGER	Indicates a potentially hazardous situation that, if not avoided, *will* result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol. See Table 2 for more information.
WARNING	Indicates a potentially hazardous situation that, if not avoided, *could* result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol. See Table 2 for more information.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury and/or damage to equipment. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. See Table 2 for more information. When applied to software actions, indicates a situation that, if not avoided, could result in loss of data or a disruption of software operation.
ALERT	Indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.

WiFi Advisor Overview

This chapter provides a general description of theWFED-300AC WiFi Advisor. Topics discussed in this chapter include the following:

About the Wireless LAN Analyzer

The Wireless LAN Analyzer provides a complete, multi-dimensional map of real WiFi performance, highlighting margin and resiliency of WiFi connections at multiple locations within a site (versus a simple signal strength icon). It includes intuitive tools to quickly optimize and troubleshoot the in-home WiFi network. After the test, it provides valuable performance information to the end-user to help reduce unnecessary trouble calls and repeats.

Architecture

The system architecture of the Wireless LAN Analyzer solution includes the following:

1   The WiFi Advisor test device. Each WiFi Advisor contains an 802.11 radio, spectrum analyzer, and a network processor. The device is responsible for performing tests requested by the iOS WiFi Advisor iOS Application.

> **NOTE:**
> At least one WFED-300AC test device is required for single-ended troubleshooting; two WFED-300AC test devices are required for Site Assessment testing.

2   The WiFi Advisor iOS Application. This software runs on an Apple iPad (iPad 2 or newer, with iOS 7.x.x or newer).

The application allows the user to set up WiFi tests, communicates test setups to the WFED-300AC WiFi Advisor test device(s) over Bluetooth, manages test execution, displays test results, and enables administration of job or work ticket related information.

About the WiFi Advisor

The WiFi Advisor, shown in Figure 1, is a portable WiFi analysis solution that efficiently optimizes and troubleshoots 802.11 WiFi networks, provides a whole-home view of real WiFi performance / margin, and generates valuable information that can be given to the end user.

Figure 1   The WiFi Advisor

Features and capabilities

- Flexible
    - Battery powered WFED, configurable as Station or AP
    - Configurable radio from 802.11b/g to 802.11ac 3x3
    - WiFi and Ethernet test interfaces
- WiFi Advisor hardware
    - 802.11a/b/g/n/ac, 3x3 (Broadcom 43460 chipset)
    - Built-in Spectrum Analyzer

- – User configurable as either Test Station or Test AP
- – Powerful network processor
- – WiFi and Ethernet test interfaces
- – Battery powered

Quick tour

This section describes the buttons, indicators, and connectors for the WiFi Advisor WFED-300AC.

Top view

The top view is shown in Figure 2.

Figure 2   WiFi Advisor top view

Power

The power button is the green button on the top of the instrument. Press and hold the button to power up or power down the instrument.

When the unit is powered up, the LED just above the button indicates the battery status.

- Solid green indicates the battery has greater than 10% charge or that the power adapter is plugged in
- Solid red indicates low battery, under 10% charge
- Flashing red indicates the battery is too low to start
- Flashing amber indicates shutting down
- Solid amber indicates the instrument "cannot talk to the battery" so it doesn't know the charge level

Bluetooth

The Bluetooth button is the blue button on the top of the instrument. Press and hold the button for five seconds to make the WiFi Advisor ready to pair.

The LED located below the button indicates the Bluetooth status.

- Off indicates that there is no Bluetooth connection or no connection being attempted.
- Slow blinking blue (a short *on* every few seconds) indicates the instrument is trying to connect over Bluetooth
- Quickly blinking blue (50% blink) indicates pairing mode
- Blinking blue (on but short *off* every few seconds) indicates the instrument is connected to the iPad but not registered or not currently in use
- Solid blue indicates the instrument is connected to the iPad and is being used by the iPad

Status

The Status LED indicates the status of the test.

- Blinking amber indicates a test is in progress at that location
- Solid green indicates the test is complete at that location and the test passed
- Solid red indicates the test is complete at that location and the test failed

Front view

The front view is shown in Figure 3.

Figure 3   WiFi Advisor front view

USB 2.0 device

USB 2.0 host   10/100/1000 Ethernet

USB

There are two USB connectors. They are used to connect host devices to the WiFi Advisor and as an alternative path for firmware download.

- The standard USB connector is a master/host interface.
- The mini-USB is a device/slave interface.

Ethernet

An RJ-45 connector used to connect to a 10/100/1000 electrical Ethernet network. The two LEDs indicate connection and link activity.

Back view

The back view is shown in Figure 4.

Figure 4   WiFi Advisor back view

Battery charge LED

DC Power input

DC Power input

The DC Power input, located on the back of the instrument, is used to connect the AC adapter.

Battery charge LED

The LED located next to the power input indicates that the adapter is connected. Red indicates the battery is charging; green indicates fully charged.

About the WiFi Advisor application

The WiFi Advisor iPad host application communicates with the WiFi Advisor instrument to run tests and manage devices. The application allows the user to set up WiFi tests, communicates test setups to the WFED-300AC WiFi Advisor test device(s) over Bluetooth, manages test execution, displays test results, and enables administration of job or work ticket related information.

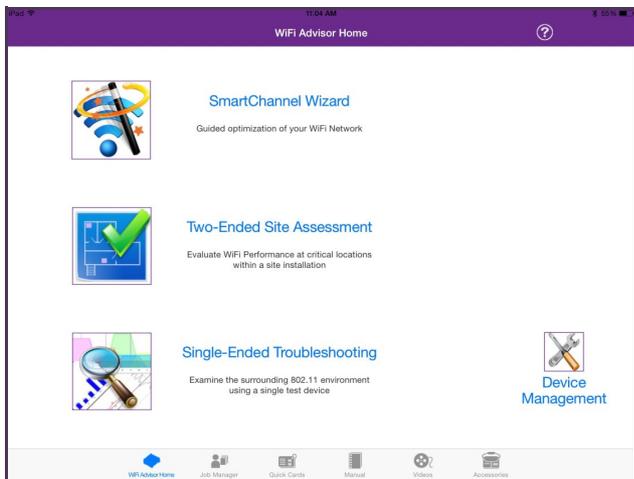The icon for the WiFi Advisor is shown in Figure 5. To launch the application, tap the icon.

Figure 5   WiFi Advisor iPad application icon

The Home screen appears, as shown in Figure 6.

Figure 6 WiFi Advisor application Home screen

The application provides the following functions:

- **WiFi Advisor Home** – The main application that includes four selections:
    - SmartChannel Wizard – A guided optimization of your WiFi Network
    - Two-Ended Site Assessment
    (Evaluate WiFi performance at critical locations within a site installation) see "Assessing WiFi performance throughout a site" in Chapter 3 "Testing".

– Single-Ended Troubleshooting
(examine the surrounding 802.11 environment using a single test device) see "WiFi Troubleshooting using a single ended application" in Chapter 3 "Testing".

– Device Management
(used to register devices, view device status, and manage firmware updates) see Chapter 2 "Managing Devices".

To launch an application, either touch the icon or touch the title (for example, touch the magnifying glass or touch "Single-Ended Troubleshooting").

• **Job Manager** – For viewing and uploading of completed job files and customer PDF reports. See "Managing jobs" on page 49.

• **Quick Cards** – The WiFi Advisor Quick Start Guide and other helpful material.

• **Manual** – The WiFi Advisor User's Guide

• **Videos** – Short videos describing "How-to" test with the WiFi Advisor

• **Accessories** – WiFi Advisor Accessory Guide

2

Managing Devices

This chapter describes the Device Management menu which is used to register devices, view device status, and manage firmware updates.

> **NOTE**
> The WiFi Advisor iOS application must be installed on your iPad

Topics discussed in this chapter include the following:

Connecting a WiFi Advisor for the first time

Before any testing can begin, each WiFi Advisor must be paired with the iPad.

Pairing devices

1   On the iPad, select the **Settings** icon.

2   Verify that **Bluetooth** is set to On.
     In the *Devices* section, the iPad detects and lists any devices within range.

3   Press and hold the blue button on the top of the WiFi Advisor for 5 seconds.

4   Verify that the blue LED on the WiFi Advisor is flashing slowly.

5   On the iPad, in the list of "My Devices", select the WiFi Advisor with the serial number of your WiFi Advisor.

6   Label your WiFi Advisor with the letter designator of your choice from the sheet of ID Labels provided.
     This label will be used during the registration process to provide a simple method to identify test devices for use in the iOS application

When pairing is complete, the status of the WiFi Advisor(s) indicates "Connected".

Registering and unregistering devices

After pairing the device(s) with the iPad, they must be registered with the WiFi Advisor application, especially if this is the first time using this WiFi Advisor with this iPad.

To register WiFi Advisor devices with the iPad

1   From the WiFi Advisor application, select **Device Management**.

2   In the Unregistered Devices area, select the WiFi Advisor with the serial number of your device.

3   Enter the label letter for the WiFi Advisor.

4   Repeat step 2 and step 3 for each WiFi Advisor.

The registered devices appear in the Device Manager screen.

To unregister WiFi Advisor devices with the iPad

1   From the WiFi Advisor application, select **Device Management**.

2   Select the WiFi Advisor with the label (or serial number) of your device and swipe to the left.
     A red **Delete** button appears.

3   Do one of the following:
     –   If you do not wish to unregister the device, swipe to the right.
     –   Tap the **Delete** button to unregister your device.

Changing the power off delay

The power off delay values associated with each registered WiFi Advisor are shown within the Registered Devices section of the Device Manager screen. These values define the amount of idle time that must transpire before the test device will automatically power down.

To change the power off delay for a WiFi Advisor

1 From the WiFi Advisor application, select **Device Management**.

2 Touch the **Power Off Delay** associated with that WiFi Advisor.

3 Select the power off delay.
   Disable means it will not automatically power down regardless of expired time.
   If you would like to dismiss the window without changing the current setting, touch outside of the window.

Updating the WiFi Advisor firmware

The firmware on the WiFi Advisor can be upgraded over Bluetooth using the iPad. The WiFi Advisor must be paired with the iPad and registered with the application.

To update firmware on a registered WiFi Advisor

1 In the WiFi Advisor application, select **Device Management**.
   The menu reports all registered WiFi Advisor devices and the current firmware for each.
   If there is a new version available, "Version x.x.x Available" appears in the upper right.

2   Find the WiFi Advisor you wish to update, and click on icon of the device with a down arrow.

A confirmation screen appears.

3   Select **Yes**.

The update begins. The status bar at the top indicates the update progress.

> **NOTE:**
> If you experience trouble, look at the number of Bluetooth devices in the area. Three to four devices is a practical limit, depending on the types of devices and profiles used. Some devices require more Bluetooth data, so they are more demanding than other devices. Data-intensive devices may reduce the total number of devices that can be active at the same time. If a Bluetooth device becomes slow to connect or does not perform reliably, reduce the total number of connected devices.

Updating the iPad application software

Updating the iPad host application software allows you to have the latest application, including new WiFi Advisor features and company-specific procedures or applications.

To update the host application software

1   To download the application, do one of the following:

a   If your company has an enterprise network, connect to your company enterprise network with the iPad. If there is a new version, your application icon will include a badge (a circle in the upper corner that indicates updates are available). Using the browser, go to the site/location where the application is kept, then download the new version.

b   Go to the Apple App Store.

2   As the process runs, the application icon has a circle inside that rotates.

3   When the update is finished, the rotating circle disappears and the icon has a "badge" (a blue dot in the upper left).

The host application software is updated.

Testing

3

This chapter provides task-based instructions for using the WiFi Advisor features. Topics discussed in this chapter are as follows:

Smart Channel Wizard

The SmartChannel Wizard provides a guided path to optimizing the WiFi environment.It assumes that the customer has installed and turned on their AP, and that they wish to optimize its network settings.
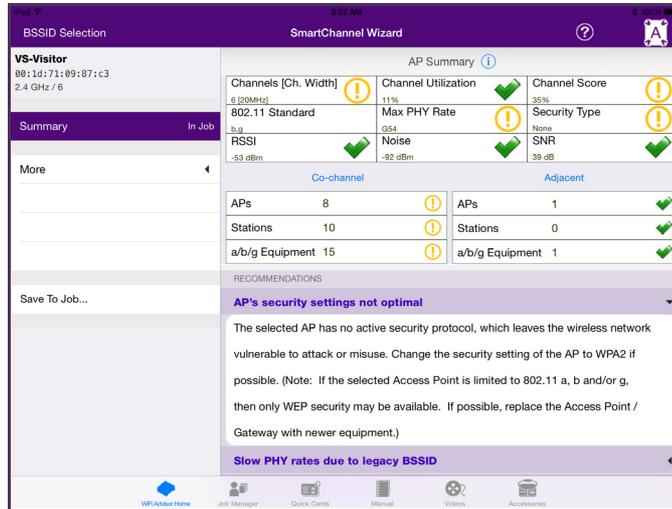
To run the wizard

1   From the WiFi Advisor application, select SmartChannel Wizard.

2   Choose a device.

3   Choose the BSSID that you are interested in analyzing.

The test starts.

The Summary screen (Figure 7) appears.

Figure 7 Example of SmartChannel Wizard Summary results screen

The summary screen provides the following

- BSSID and Channel health – the upper area with Channel Width, Channel Utilization, Noise, SNR, and so on.
- WiFi interference details – the middle area with Co-channel and Adjacent channel information
- Optimization tips – The Recommendations area at the bottom. If warnings are presented, a corresponding set of recommendations are provided to help improve the condition.

The More drop down in the left pane provides more detail regarding the Device(s), a Trend Graph, and a Spectral Graph.

The Device List (Figure 8) provides information such as

  – Which stations are connected to my RG?
  – Which stations that have the highest channel utilization?
  – Do my stations have weak signal?
  – Which stations are using old, legacy PHY rates / standards?
  – Which stations are "Top Talkers" (the list is sorted by utilization)

Figure 8   Example of SmartChannel Wizard Device List results
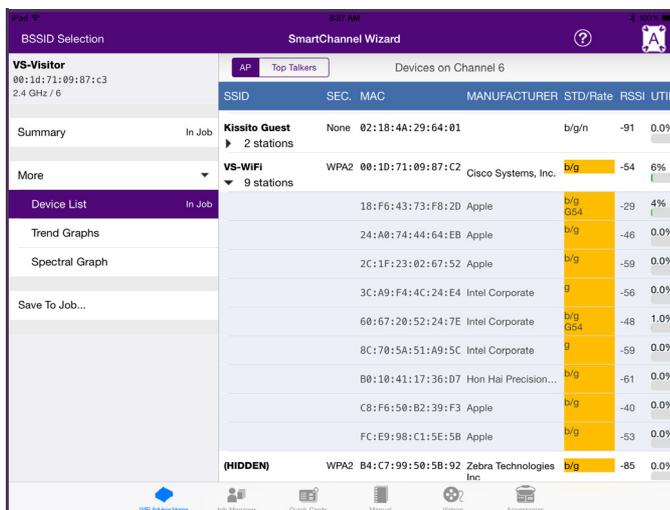
The Trend Graphs provide visibility into the key WiFi parameters as you move through a site.

Figure 9   Example of SmartChannel Wizard Trend Graphs
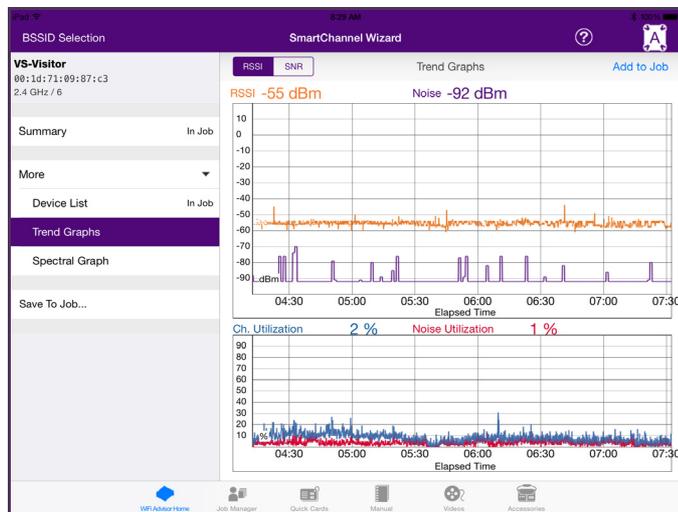
The utilization graph shows both the Channel Utilization (blue line) and the actual utilization due to noise (red line).

The Spectral Graph displays any spikes that may occur (which helps find the source of interference).

Figure 10   Example of SmartChannel Wizard Spectral Graph

Microwave signature

WiFi Troubleshooting using a single ended application

The single-ended troubleshooting test includes the following:

- Quick, visually intuitive assessment of critical WiFi network factors reduces troubleshooting time
- Spectral insight within the same tool allows identification and isolation of common, non-802.11 interference.

• Expert recommendations helps minimize the time spent to effectively optimize the network and reduces likelihood of repeat calls

Figure 11 Single ended test

The following procedure describes how to troubleshoot a single connection on a network.This test is typically run if the service is not working properly.

To troubleshoot a single connection

1 Bring the iPad and WiFi Advisor to the location experiencing problems.

2 Open the application on the iPad.

3 Select **Single-Ended Troubleshooting**.

4 Choose which WiFi Advisor device to use for the test.
If you have previously used a WiFi Advisor device with this iPad, it appears in the list of devices. If it does not appear, you may need to register the device with the iPad and pair to it. See "Connecting a WiFi Advisor for the first time" on page 13 and "Registering and unregistering devices" on page 14.

5 Select a result tab at the top: BSSID, Channel, or Spectral.

BSSID results

The BSSID results provide quick visibility into the wireless networks active in the current environment. The BSSID results report the RSSI per channel. Results are available for the 2.4GHz and 5GHz WiFi bands. Use the 2.4GHz/5GHz box in the upper left to select the band that you wish to view. A sample result is shown in Figure 12.

Figure 12 BSSID results
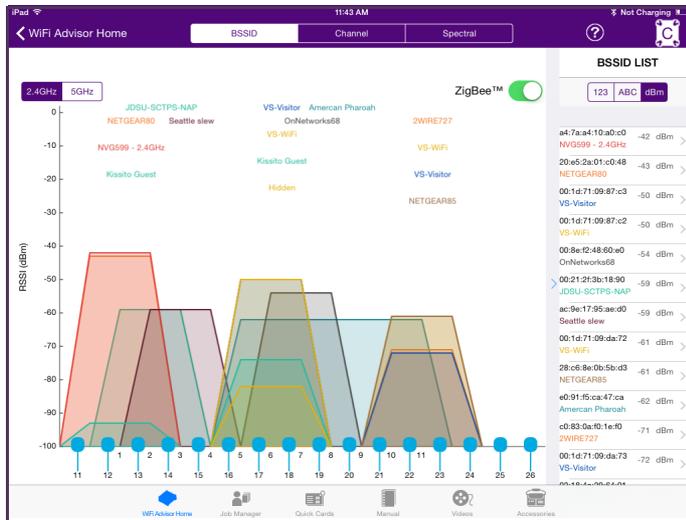
This provides a visual representation of overlap in the channels to help identify problem spots.

The graph area shows each visible BSSID by channel and signal strength. This view is useful for understanding an existing Access Point's channel configuration and signal strength. This helps determine which channel to select for a new access point.

The BSSID List view in the right pane provides a listing of all detected BSSIDs along with their channel setting, current signal strength, and MAC address. To change the order of the list, tap **123** to sort by channel, **ABC** to sort by name, or **dBm** to sort by signal strength. To view more details of a particular BSSID, touch the desired BSSID, either on the graph or select it from the BSSID list on the right.

Select one of the channels in the BSSID List in the right pane to view BSSID details. This includes details regarding Noise and SNR as well as general items like the MAC address and type of security.

The **ZigBee** toggle provides a mask of the ZigBee channels to easily compare WiFi activity relative to the Zigbee channel positions.

From the BSSID Details menu, touch **Trend Graphs**. Trend graphs show RSSI, Noise, and Channel Utilization over time for the selected BSSID. A sample graph is shown in Figure 13.

Figure 13   Trend Graphs
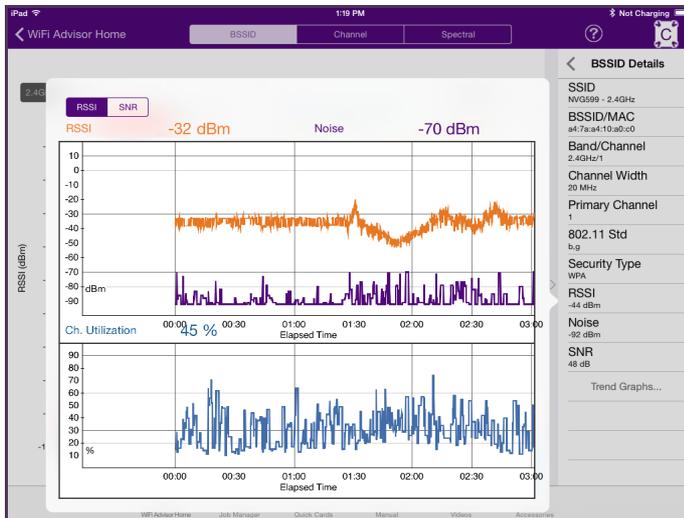
Channel view

The Channel view, shown in Figure 14, shows utilization and noise per 802.11 channel in addition to co-channel or adjacent channel interference. You can view the best channels per band, best channels per channel width, or overall channel score. This allows you to select the best channels available in the current environment.

Figure 14   Channel results
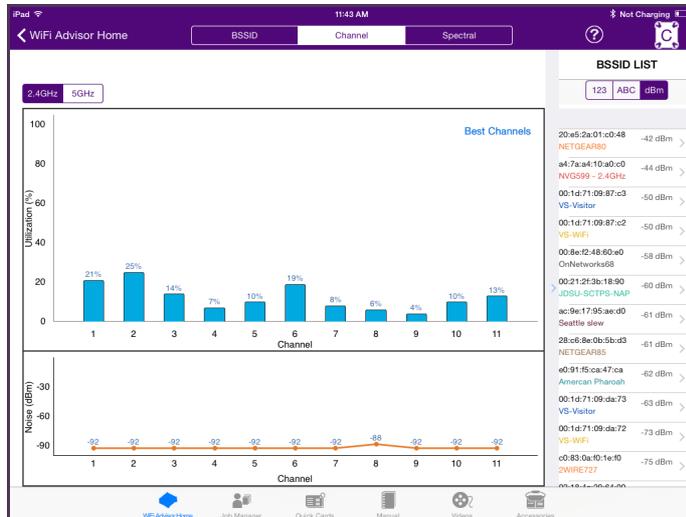
The **Utilization** graph in the top pane shows the channel utilization for all channels in the selected band. Touching a bar within the graph highlights the bar for that channel (the blue bar will turn green) and the "BSSID List" changes to the Channel Summary which includes values associated with that particular channel.

The **Noise** graph in the bottom pane displays the noise per channel.

Touching the band toggle switch in the upper left of the graph toggles between 2.4GHz band and 5GHz band views.

As in the BSSID view, the BSSID List view in the right pane provides a listing of all detected BSSIDs along with their channel setting, current signal strength, and MAC address. To change the order of the list, tap **123** to sort by channel, **ABC** to sort by name, or **dBm** to sort by signal strength.

Touching a specific BSSID from the BSSID list configures the Utilization bar graph to the channel associated with that particular BSSID and the "BSSID List" changes to the Channel Details view in the right hand pane. Touching a specific bar in the Utilization graph changes the **BSSID List** view to **Channel Details** for that particular channel. The details include the channel score, the channel utilization, noise, the BSSIDs resident in the channel, and the BSSIDs that are overlapping (adjacent to) that channel.

Touching **Best Channels** in the top right area of the Utilization graph displays a table that identifies the current top 3 best channels based on channel width for the band being viewed. Touching anywhere on the screen closes the table.

If the channel view shows utilization in the wrong channels, the likely issue is that a high energy 802.11 transmitter is very close to the WiFi Advisor. In Figure 15 a high energy 802.11ac transmitter is using channels 149, 153, 157, and 161. The channel view should show utilization in these channels only.

Figure 15   Example utilization when close to high energy transmitter


Move the WiFi Advisor away from the high energy transmitter and test again.

Spectral results

The Spectral results, shown in Figure 16, provide a real-time spectral analyzer configurable by 802.11 band, channel, and channel width. It is helpful for finding signals that interfere with 802.11 networks by showing both 802.11 and non-802.11 RF signals within a given channel of interest.

Figure 16   Spectral results
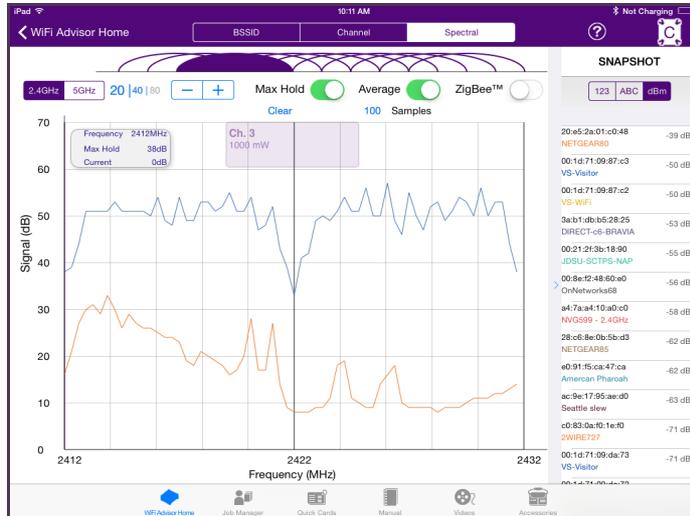
The Spectral results screen has 3 main areas:

- The spectral graph area, where the real-time spectral data is displayed

- The controls area, where the user can configure the spectrum analyzer ranges and modes

- The right pane which includes either a snapshot of BSSIDs or specific channel information

Navigating the Spectral result screen

As in the BSSID and Channel views, the BSSID List view in the right pane provides a listing of all detected BSSIDs along with their channel setting, current signal strength, and MAC address. To change the order of the list, tap **123** to sort by channel, **ABC** to sort by name, or **dBm** to sort by signal strength. The BSSID list is not continuously updated while spectral data is being displayed and is therefore labeled as SNAPSHOT as it represents a list of BSSIDs gathered over a finite period of time prior to turning on the Spectral Analyzer.

> **NOTE**
> The BSSID View and Channel View must be run first in order for the BSSID and Channel Snapshots to populate in Spectral.

Touching a specific BSSID configures the Spectrum Analyzer to analyze the channel(s) associated with the BSSID. The BSSID Snapshot in the right pane changes to the Channel Details for that particular channel. This includes the channel score, the channel utilization, noise, the BSSIDs resident in the channel, and the BSSIDs that are overlapping (adjacent to) that channel.
NOTE: This data is a snapshot. Live data may vary slightly.

The Spectrum Analyzer controls, located across the top of the graph, consist of the following:

1   Band toggle switch – selects 2.4GHz or 5GHz bands for analysis.

2   Channel bandwidth selector – selects the width of the spectrum analyzer:

–   20MHz

–   40Hz, or

–   80MHz (5GHz band only)

3   Channel up (+) or down (-) – touch to increment or decrement the 802.11 channel(s) being analyzed (displayed in the gray box near the center)

4   Max Hold – turns the spectral graph's Max Hold trace on or off. When Max Hold is on, a blue line appears above the standard spectral line that represents the peak value (in dBm) seen at each frequency point.

5   Clear – located under Max Hold, it resets the Max Hold trace and restarts the measurement.

6   Average – allows averaging of the real-time trace when on.

7   Number of Samples – located under Average, select the number of samples to be used for averaging of the real-time trace.

8   ZigBee – displays the ZigBee channels, to easily compare WiFI Access point spectral activity relative to the Zigbee channels. (2.4GHz only)

9   World view – located above the graph, it shows all channels, Changing the channel bandwidth changes how channels are represented in the world view.

To insert a vertical cursor within the real-time spectral plot, touch the graph where the cursor position is desired. The cursor readout box in the upper left reports the frequency at that position, in addition to the real-time and max hold signal levels at that frequency. The cursor can be moved by tapping anywhere on the graph within the channel width.

# Troubleshooting Spectral measurements

The following are some common interferences that could show up in a spectral measurement.

Microwave ovens can interfere with an 802.11 signal. They are most prevalent in channels 10 and 11. If possible, it is a good idea to look at the spectral response while the microwave is running to determine it's impact.

Bluetooth devices appear as spikes and appear to "roll" through the spectral view. They are fast moving and you may only see them occasionally. The systems are designed to be inter-operable, but Bluetooth will impact throughput.

Channels can "bleed over" into adjacent channels. The width of the signal (due to RF considerations) can affect nearby channels, as shown in Figure 17. This bleed over is treated as noise.

Figure 17   Spectral view of channel overlap


SSID 2 experiences interference from SSID 1 and SSID 3
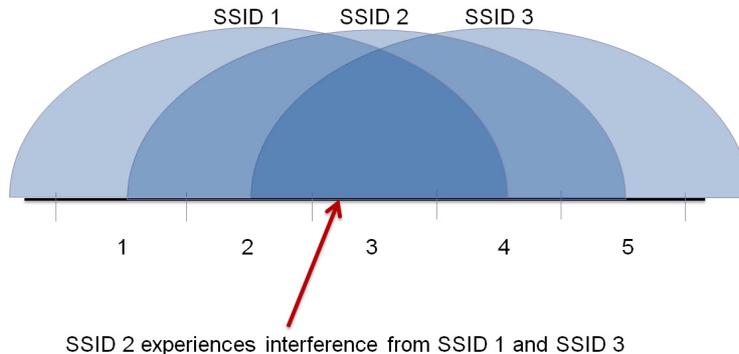
Assessing WiFi performance throughout a site

The general procedure for a Site Assessment test is:

1 Either place one WiFi Advisor in close proximity to where the Wireless Access Point (or Residential Gateway) will be installed or connect one WiFi Advisor *to* the Access Point.

2 Take a second WiFi Advisor along with your iPad to the location where WiFi performance is to be assessed. The test thoroughly evaluates WiFi performance between the two locations.

3 Move to the next location of interest and repeat the test to the Access Point.

4 Continue until all locations of interest have been performance tested.

5 If desired, the test results are saved to the active job or work ticket or associated with a new job. (See the "Managing jobs" section for more details regarding work flow with job / tickets).

Figure 18 Site Assessment test
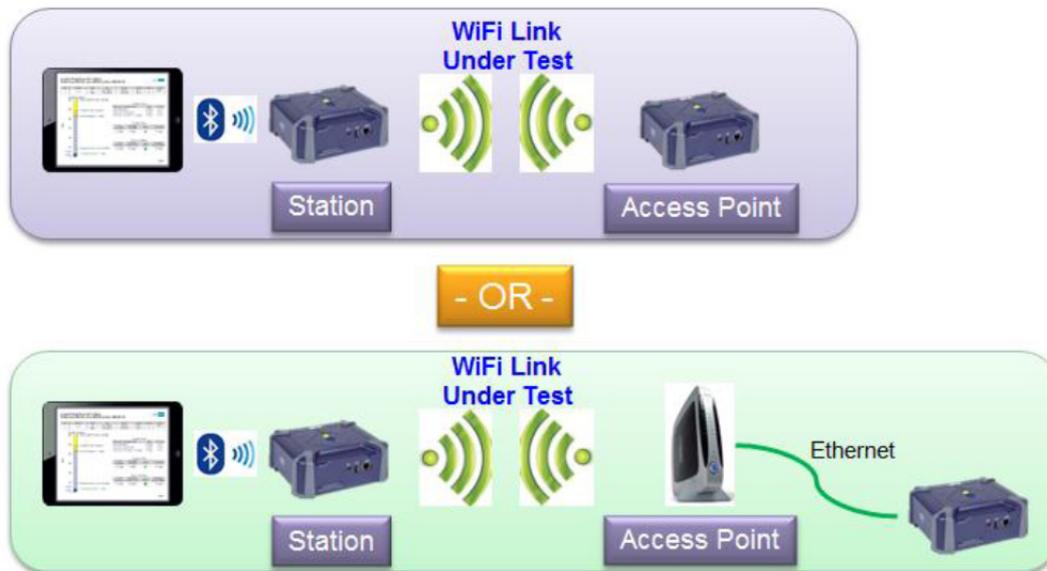
The two-ended site assessment test includes the following features:

• Innovative TrueMargin™ performance test which thoroughly and simultaneously evaluates the physical layer, the 802.11 transport layer and the packet layer.

- BSSID / AP view snapshot for each test location
- Spectral snapshots at both ends of the wireless link
- Best Channel recommendations for 2.4G / 5G for the given test profile
- Ability to evaluate WiFi performance at multiple locations within the home
- WiFi Network Optimization recommendations

Getting started

In order to get started with site assessment test, you must have two registered WiFi Advisors connected over Bluetooth.

To get started

1   Launch the **WiFi Advisor** application.
2   Select **Two-Ended Site Assessment**.

Specifying settings

During Site Assessment test, up to five individual test profiles are configured that are repeated at each location. The test profiles run sequentially at each location, and always in the same order. During Site Assessment, multiple test profiles may be configured as part of a test sequence. This sequence will be repeated at each location, and always executed in the same order. A Site Assessment configuration with multiple profiles will allow any profile to be enabled or disabled for the test session. Once defined, the profile On/Off settings will apply to all locations tested in that session.

(Note that the concept of Primary / Secondary profiles present in earlier releases of the WiFi Advisor application has been replaced by the ability to independently enable / disable any profile in the test configuration.)

Step 1: Selecting devices

The first setting to specify is selecting which device is the access point and which is the station.

To select devices

1   From the Site Assessment page, select **Devices**.

All registered devices are shown.

If not shown, you may need to pair with the device and then register it. See "Connecting a WiFi Advisor for the first time" on page 13 and "Registering and unregistering devices" on page 14.

2   Specify which device will function as the wireless access point (AP). This can be a WiFi Advisor or the customer's AP.

–   **WiFi Advisor as AP** - the WiFi Advisor *acts as* the access point. This is typically performed before or during installation.

–   **Through Customer AP** - the WiFi Advisor *is connected to* the access point over Ethernet. This is typically troubleshooting after installation.

If "Customer Access Point" is selected, the "WiFi Network" appears in the Settings pane.

a   Choose the WiFi network to test.

b   Enter the password for that network.

A Site Assessment-capable Viavi device (such as a second WiFi Advisor) should then be connected to the Ethernet port of the Access Point.

3   Specify which device will function as a Station.

The Access Point device generally stays in one location (the desired location for the actual Access Point / Residential Gateway) and the Station device typically travels from test location to test location.

Step 2: Specifying the Broadband Service Rate

This setting specifies the broadband service rate that the customer is receiving from their internet provider. If not specified (left blank), the setting is ignored.

To specify the Broadband Service Rate

1   From the Site Assessment page, select **Broadband Service**.

2   Enter the rate in MBit/s.

Step 3: Specifying the configuration

The configuration page specifies the profile(s). Multiple test profiles may be configured as part of a test sequence. The sequence is repeated at each location and always executed in the same order. A Site Assessment configuration with multiple profiles will allow any profile to be enabled or disabled for the test session. Once defined, the profile On/Off settings will apply to all locations tested in that session.

To specify a configuration

1   From the Site Assessment page, select **Configuration**.

2   Do one of the following:

   a   Select the predefined configuration that matches your needs or matches the equipment you are installing. Proceed to .

   Individual profiles within a test configuration sequence can be enabled / disabled (use theslide button. Profile selections remain as configured for the duration of the Site Assessment test (once they are configured, they can't be changed from one location to the next).

b   If no predefined configuration matches your needs, touch either **Add Configuration for WiFi Advisor as AP** or **Add Configuration for Through Customer AP**. The Edit Configuration page appears. Specify the equipment, test profiles, and other settings as needed.

i   Specify a name for the configuration.

ii Choose a profile. Do one of the following:

Select an existing profile. Proceed to .

If you wish to change a profile, either touch the small arrow on the right edge or touch **Edit**.

To specify a new profile, touch **Add Profile**.

At the bottom, a graphical representation of the network appears.

Figure 19   WiFi Advisor as AP profile
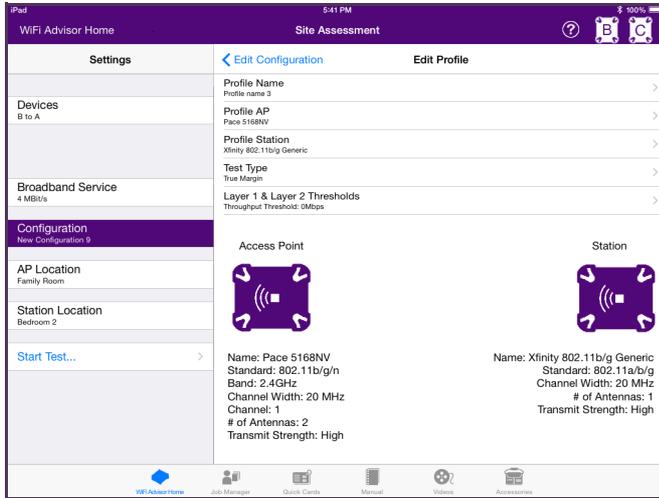
Figure 20 Through the customer AP profile
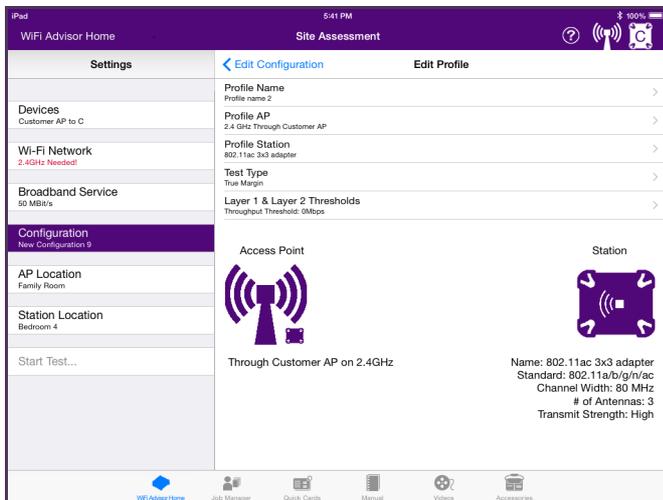
3   Touch **Profile Name** and then enter a name for the profile.

4   Touch **Profile AP** and then do one of the following:

  –   Select from the predefined devices that is operating as the access point.

   When a WiFi Advisor Test Device is being used as the Access Point, select "Recommend Channels" to populate the Channel Settings with the best channels as determined by the WiFi Analyzer's built in Channel Analysis Engine. If you do not wish to use the channels recommended by the Channel Analysis Engine, select "Recommend Channels" to set the channel to the desired value(s).

When "Customer Access Point" has been selected as the Access Point, select "Recommend Channels" to display a pop-up box that provides information and notifications relevant to the selected WiFi network and test configuration.

– If no predefined configuration matches your needs, touch **Add AP Device**, specify a name for the device and settings for the device, such as standard, band, channel width, number of antennas, and other configuration items.

5 Touch **Profile Station** and then do one of the following:

– Select from the predefined devices that is operating as the station.

– If no predefined configuration matches your needs, touch **Add Station Device**, specify a name for the device and then specify settings for the device, such as standard, channel width, number of antennas, and other configuration items.

6 Touch **Layer 1 & 2 Thresholds**.

a Specify the **Layer 1 Thresholds** for RSSI, Noise, count of BSSID's on a Channel, and count of BSSID's with Overlapping Channels.

b Specify the Tx Failures, Retransmits, PHY rate, and Service Threshold for the **802.11 Thresholds**.

c Touch the back arrow to return to the new configuration page.

7 If you wish to specify another profile, touch **Add Profile** and specify settings as described in step ii through step 4 above,

8 If you wish to include the additional profile, move the button to enable it (green indicates enabled).

9 Touch the back arrow to return to the Select Configuration page.

The new configuration is saved and can be selected for future tests.

To delete a user configuration

User-specified configurations can be deleted. Factory-specified configurations cannot be deleted. To delete a configuration, touch and hold the configuration until it is highlighted, and then swipe to the left. A Delete button appears. Tap the **Delete** button.

Step 4: Specifying the AP and Station Location

These settings specify the room where each WiFi Advisor is located.

To specify the AP and Station location

1   From the Site Assessment page, select **AP Location**.

2   Select the room where the Access Point is located. If the location you desire is not listed, select **Add Location**.

3   From the Site Assessment page, select **Station Location**.

4   Select the room where the Station is located. If the location you desire is not listed, select **Add Location**.

Assessing an installation site

Two-ended site assessment uses two WiFi Advisors to test connectivity and assess an installation site. The following procedure describes how to assess an installation site.

To assess an installation site

1   Bring an iPad and two WiFi Advisors to the site.

2   Open the WiFi Advisor application on the iPad.

3   Select **Two-Ended Site Assessment**.
     The Settings page appears.

4   If needed, specify the settings as described in "Specifying settings".

5   Select **Start Test...** to initiate the Site Assessment test.

After the first location is tested, a green check mark or red "X" (a Go/No Go result) appears next to the access point and station.
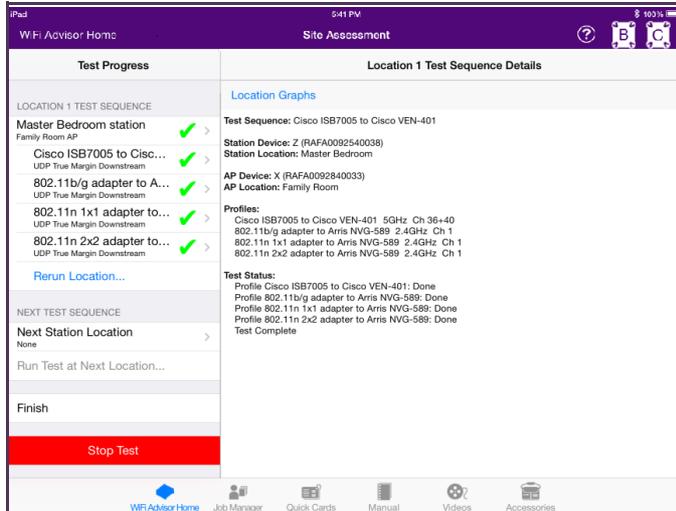
6   Do one of the following:

–   If you have another station, select **Next Station Location**. If not, go to . The other station must be another WiFi Advisor that is registered with the application.

–   Select **Rerun Location** to repeat the test. The rerun results overwrite the previous test results.

–   Only press Stop Test if you wish to cancel the test and discard the results.

7   Interpret the results

While the Site Assessment test is in progress, results for any completed profile test can be viewed by touching the completed profile in the Test Progress pane.

When a profile name is selected, the Site Assessment Results screen appears. This screen displays results for both the AP-to-Station direction and Station-to-AP direction. The menu has several result views:

– **Summary** – shows a summary of the throughput and throughput margin tests for the selected profile. This view includes the TrueMargin™ result to help understand the resiliency of the WiFi link under test.

– **Details** – shows the detailed statistics for the selected test profile in tabular form.

– **Histograms** – provides histograms of per-packet PHY rate and retransmission retries.

– **Trend Graphs** – time correlated view of critical test measurements and results.

– **Spectral** – snapshots for the channel used in the test profile. Shown at both AP and Station.

An example of the Summary Results is shown in Figure 21.

Figure 21 Example of Site Assessment Summary Results
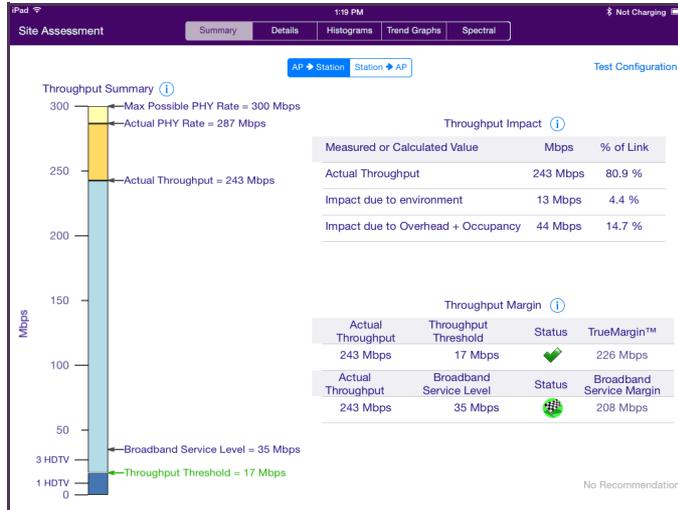
To return to the Site Assessment test, touch Site Assessment in the upper left.

> – View the **Location** Results
>
> At the beginning of each location test, a BSSID graph is captured at both the Station and the AP, for both 2.4GHz and 5GHz bands. These location graphs apply to all profile tests at the location and are viewable by pressing the Location name in the Test Progress bar (the left pane) and then pressing "Location Graphs" at the top left of the Test Sequence Details. To return to the Site Assessment test, press "Site Assessment" in the upper left of the screen.

8   When finished testing, select **Finish**. The Finish Test window opens.

9   Enter the Customer Address. This appears in the closeout report.

10   To finish the closeout, save the results to a current job or a new job. See"Managing jobs" on page 49

The table below shows the recommended minimum distance between WiFi equipment and household appliances to reduce interference.

Table 4   Recommended WiFi distance

Household Appliance	Recommended Minimum Distance (in feet and meters)
Microwave ovens	30 feet / 9 meters
Baby monitor - Analog	20 feet / 6 meters
Baby monitor - Digital	40 feet / 12 meters
Cordless phone - Analog	20 feet / 6 meters
Cordless phone - Digital	30 feet / 9 meters
Bluetooth devices	20 feet / 6 meters

Table 4 is not an inclusive list. Some other interfering devices include alarm systems, wireless game pads, and garage openers.

Managing jobs

The Job Manager is used to associate test results from a test to a single job. If any jobs have been saved, they appear in the list. The Job Manager allows you to setup a new job, edit an active job, activate a job, export a job, or delete a job.

When test results are associated with a job, the jobs are stored on the iPad. The last 50 jobs are stored; if you have more than 50 jobs, the oldest job is deleted automatically. Viavi recommends that jobs be exported to your external database before they are automatically deleted.

Creating a new job in Job Manager

Within the Job Manager application, you can create a new job.

To create a new job

1   From the main Job Manager screen, touch **New**.

2   In the Add Job screen, enter the job-related information such as Circuit ID, Work Ticket, and Tech ID. Touch **Use Current Location** if your iPad is equipped with GPS (Geo Tag) and you wish to capture the current GPS coordinates with your job data.

3   Touch **Accept** to create the new job.

The new job will be visible in the main Job Manager screen as the currently active job. New jobs are void of results, but once *activated*, results from a Site Assessment test can be associated with the job. The page icon with a "0" at the right side indicates that no results have yet been saved to this job. The job is now ready to accept results from the Site Assessment test as the Active Job.

Saving to a new job in the Site Assessment test

Within the *Site Assessment test* application, you can save results to a new job.

To save results to a new job

1   After running the test, select **Save to New Job**.

2   Go to the Job Manager and select the new job. The job details appear.

3   Touch **Edit** to add the job-related information such as Circuit ID, Work Ticket, and Tech ID. Touch **Use Current Location** if your iPad is equipped with GPS (Geo Tag) and you wish to capture the current GPS coordinates with your job data.

The new job will be visible in the main Job Manager screen as the currently active job.

Activating or deactivating jobs

There can be only one active job at any point in time. Any stored job can be activated or deactivated. If a job already has results associated with it, activating the job and saving new results to it will replace the old results with the new.

To activate or deactivate a job

1   From the main Job Manager screen, touch **Manage**.
     Active jobs are listed.
     Note that the available options are dependent on which jobs have been selected for action by checking the job's corresponding check box on the left side of the screen.

2   Choose the desired job by selecting the box next to the job.

3   Touch either **Activate** or **Deactivate**.

Viewing job results

After running tests, you can view the job details.

To view job results

1   From the main Job Manager screen, touch the job that you are interested in viewing.

The results can be viewed in several ways.

–   Details – shows results gathered in the Site Assessment Test in text format

–   SmartChannel – shows a PDF report containing the results and data gathered from the SmartChannel Wizard. This report can be emailed by touching "Send PDF" in top right of the screen.

–   Detailed Report – shows all results gathered in the Site Assessment Test, including the graphs, in PDF. This report can be emailed by touching "Send PDF" in top right of the screen.

–   Customer Report – shows the end-user facing PDF report. This report can be emailed by selecting **Send PDF** in the top right of the screen. An example of this report is shown in Figure 22 and Figure 23.

–   Map – displays the map view based on the GPS location saved with the job-related data.

Figure 22   Customer Report example

Figure 23   Customer Report example
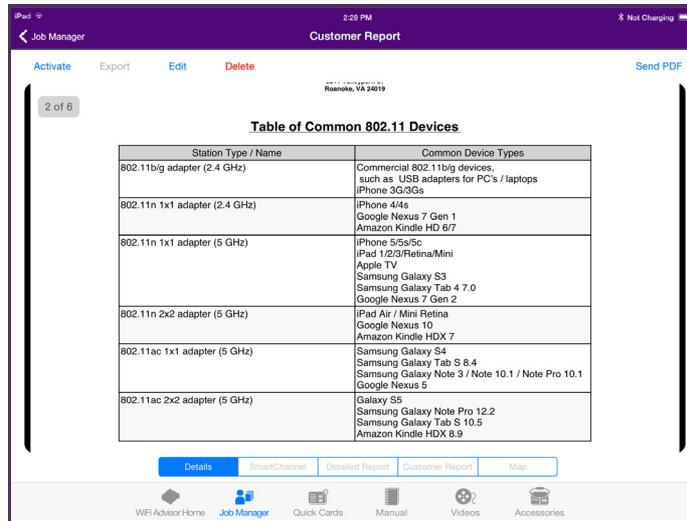
Exporting jobs

Jobs can be exported from the iPad to an external database using either FTP or HTTPS (if available).

To export a job

1   From the main Job Manager screen, touch **Manage**.
    Active jobs are listed.

2   Choose the desired job by selecting the box next to the job.

3   Touch **Export**.

4   Touch the information icon (small "*i*" within a circle) at the bottom left corner of the Job Manager screen

5   The **Edit FTP Settings** menu appears.
    If your version of software has both FTP and HTTPS export capability, touching the HTTPS button will exchange the *Edit FTP Settings* dialogue with the *Edit HTTPS Settings* dialogue.

6   Enter the URL, user name and password, and other information required to point the WiFi Advisor iOS application to your FTP or HTTPS site or database.

7   If any jobs have been exported, **Export History** appears in the lower right. Use the history to view previously exported jobs.

Deleting jobs

Jobs can be selectively deleted from the iPad.

To delete a job

1   From the main Job Manager screen, touch **Manage**.
     Active jobs are listed.

2   Choose the desired job by selecting the box next to the job

3   Touch **Delete**.

Troubleshooting

If you require technical assistance, call 1-844-GO-VIAVI. For the latest TAC information, go to http://www.viavisolutions.com/en/services-and-support/support/technical-assistance.

Table 5 and Table 6 provide some typical issues and resolutions.

Table 5   Typical WiFi related problems

Problem	Action
Signal strength and coverage problems – Attenuation with distance and materials in the home – 5GHz has shorter reach than 2.4GHz	Look for -35 to -70 dBm RSSI and $\geq$20 dB SNR

Table 5 Typical WiFi related problems (Continued)

Problem	Action

802.11 interference sources
   – Co-channel interference (forces your AP to share the channel)
   – Adjacent channel interference (looks like noise to your AP)
	Look for $\leq$ 4 co-channel interferers and $\leq$ 3 adjacent channel

Non 802.11 Interference sources – Microwaves, AV transmitters, cordless phones, baby monitors, etc.	Observe spectrum for interferers in the channel of interest

High channel utilization
   – The more APs in the channel, the higher potential utilization
   – High utilization, low noise = high 802.11 traffic on the channel
   – High utilization, high noise = potential non-802.11 interferer
	Look for <35% utilization + low noise

802.11 a/b/g devices on your network
   – Slow a/b/g PHY rates occupy the channel longer than modern PHY rates for the same amount of information transfer.
   – Old security types (WEP/WEPA1) limit connection to lower 802.11 rates
	Detect and advise replacement of old gear

Table 6 Trouble with the WiFi Advisor

Problem	Action
Cannot connect the mobile application to the WiFi Advisor	Check that Bluetooth is ON (enabled) on your iPad. Make sure that the iPad and WiFi Advisor are within reasonable Bluetooth range of each other (ideally 0 to 20 feet)
The WiFi Advisor is unresponsive (locked-up)	Press and hold the power button for 5 seconds.

Maintenance and Specifications

This chapter describes how to maintain your unit. Topics discussed in this chapter include the following:

- "Charging the battery" on page 58
- "Replacing the battery pack" on page 59
- "Cleaning the instrument" on page 60
- "Getting Technical Assistance" on page 60
- "Specifications" on page 60

Charging the battery

When the Battery LED lights red, the battery pack should be charged or replaced.

> **NOTE:**
> You can test a circuit and recharge the battery at the same time. If you do not want to interrupt the current test, you may leave the power on and connect the AC power adapter.

To charge the battery

1   Connect one end of the AC adapter to the connector on the back of the WiFi Advisor.

2   Connect the other end of the AC adapter to an AC power supply.

> **WARNING: ELECTRICAL SHOCK**
> Electrical shock may result in serious injury or death. Be sure the AC Adapter is connected to the correct voltage mains. Do not use outdoors or in wet locations. Use only the AC Adapter supplied with the test set.

3   Let the WiFi Advisor charge for 5 hours for a fast charge; for maximum capacity, allow the WiFi Advisor to (trickle) charge overnight.

The charging time will be the same whether the power is on or off.

The **Battery** LED is amber when the unit is fast charging. The WiFi Advisor will trickle charge at other times when the charger is connected and the Battery LED is green.

After the Battery LED turns green (fast charge is complete), allow the unit to trickle charge overnight for maximum performance.

Charging the battery pack is complete.

Replacing the battery pack

The battery compartment is located on the bottom of the unit.

The following procedure describes how to replace the battery pack.

Before replacing the battery pack, verify that the replacement battery pack is Viavi part number 21108524.

To replace the battery pack

1   Turn the power off.

⚠️ **CAUTION: INSTRUMENT DAMAGE**
Failure to turn the power off before removing the battery pack from the WiFi Advisor could damage internal components and/or corrupt the software. Always power down the unit before removing the battery pack.

2   Pull the two tabs to release the door.

3   Unplug the battery pack wiring.

4   Remove the old battery pack.

5   Insert the new battery pack, with the label facing up and aligning the wiring toward the connector.

6   Connect the new battery pack to the wiring.

7   Replace the battery compartment door.

Replacing the battery pack is complete.

Cleaning the instrument

The instrument itself does not require any specialized cleaning. An occasional wipe with a damp cloth is sufficient.

▷ **NOTE:**
When cleaning the instrument, Viavi recommends a damp cloth and water only. Cleaning with chemicals could cause damage to the plastic case, buttons, or removal of markings.

Getting Technical Assistance

If you require technical assistance, call 1-844-GO-VIAVI. For the latest TAC information, go to http://www.viavisolutions.com/en/services-and-support/support/technical-assistance.

Specifications

This section provides specifications for the WiFi Advisor.

Table 7   Physical specifications

Parameter	Specification
Height	6.1" / 155 mm
Width	7" / 178 mm
Depth	2.6" / 66 mm
Weight	1 lb. / 0.45 kg, with battery

Table 8   Operating and storage environment

Parameter	Specification
Operating Temperature	32° to 104° F (0° to +40° C)
Storage Temperature	-22° to 140° C (-30° to 60° C)
Humidity	10%-90% RH non-condensing
Vibration	3-Axis Vibration
Shock	±3 half-sinusoidal shock, 3-Axis Shock

Glossary

A

AP — Access Point. The 802.11 device which allows wireless devices to connect to a wired network (in general)

Adjacent channel interference — neighboring channels "bleed over" into other channels due to the width and spacing of the channel plan (see Figure 17 for an example).

B

BSSID — Basic service set identifier. An identifier that represents a single 802.11 cell (similar to a MAC address)

C

Client — Client – device with connects to an access point, does not function as an AP (but can operate as a wired to wireless "adapter")

Co-channel interference — multiple APs sharing the same channel, sometimes called co-channel occupancy. The larger the number of APs sharing a channel, the more likely you are to experience throughput restrictions.

CPE — Customer Premise Equipment

D

DSSS — Digital Sequence Spread Spectrum. A type of Modulation.

M

MIMO — Multiple Input, Multiple Output antenna – simultaneous (and smart; each antenna can choose RF signals) transmit and receive (referenced as "mxn antennas" such as 2x2 or 3x3)

Modulation — RF (analog) delivery mechanism of digital data (FM is a type of modulation)

MTTO — Mean Time To Optimize

MTTR — Mean Time To Repair

Non 802.11 interference — RF emitters that overlap the 802.11 bands (such as microwaves, baby monitors, and garage door openers)

O

OFDM — Orthogonal Frequency Division Multiplexing

P

Phy — The physical layer transmission rate selected by the radios on a per-packet basis. Determined by equipment standard, number of streams, and SNR.

R

Retransmission retries — For packets requiring retransmission, this is the number of retries required to successfully retransmit the packet

RF — Radio Frequency. RF energy can cause interference

RSSI — Received Signal Strength Indication

S

SNR — Signal to Noise Ratio

Spectral — A spectrum analyzer is used to measure signal amplitude (strength) as it varies by signal frequency. The frequency appears on the horizontal axis, and the amplitude is displayed on the vertical axis.

A spectrum analyzer can be used to determine whether or not a wireless transmitter is working according to federally defined standards for purity of emissions. Output signals at frequencies other than the intended communications frequency appear as vertical lines (blips) on the display. A spectrum analyzer can also be used to determine, by direct observation, the bandwidth of a digital or analog signal.

SSID — Service Set Identifier. The network that we are connected to (or attempting to connect to).

Z

ZigBee — ZigBee is a open global wireless standard to enable simple and smart objects to work together, improving comfort and efficiency in everyday life.

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