

Application Note: WLAN Troubleshooting Using AirCheck G2 Wireless Tester

AirCheck™ G2 Troubleshooting Capabilities

AirCheck G2 Wireless Tester is a powerful troubleshooting tool that can help you identify and resolve many Wi-Fi related problems.

The following guide steps you through three of the most common scenarios:

1. Unable to Connect
2. Network is Slow
3. Detecting Security Risks in General

To understand how best to use AirCheck G2 for troubleshooting, it is important to understand what specific functions AirCheck G2 has that will assist you. These include:

- Viewing a complete list of available wireless networks in both 2.4 and 5 GHz bands along with details about them.
- Obtaining a list of access points.
- Connecting to an access point (even secure ones), obtaining an IP address, and verifying IP-level communications.
- Measuring signal and interference levels in every channel.
- Measuring signal and interference levels for the channel used by a particular access point.
- Determining whether a channel is congested.
- Displaying whether interference in a channel permits or blocks WLAN operation.

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Scenario 1 - Unable to Connect

1. Look to see if network is available.

- Select Home/Networks to review list of visible SSIDs (Figure 1).
- Select individual networks for additional information.
- Make sure the desired AP is in the list. If not, restart the AP. If it still does not show up, it may be misconfigured (e.g., wrong SSID), defective, or not powered.
- If the AP is not powered, you can use the Ethernet Test from the Home screen to determine if Power over Ethernet voltage is available on the twisted pair network cabling.
- Make sure that there is sufficient signal-to-noise ratio (SNR) for the AP. 10 dB SNR is usually the practical minimum, 20 dB will provide solid connectivity, 30 dB and higher is excellent. You obtain higher throughputs with higher SNR.
- If the SNR is too low, the AP may be too far away or something may be blocking the signal.

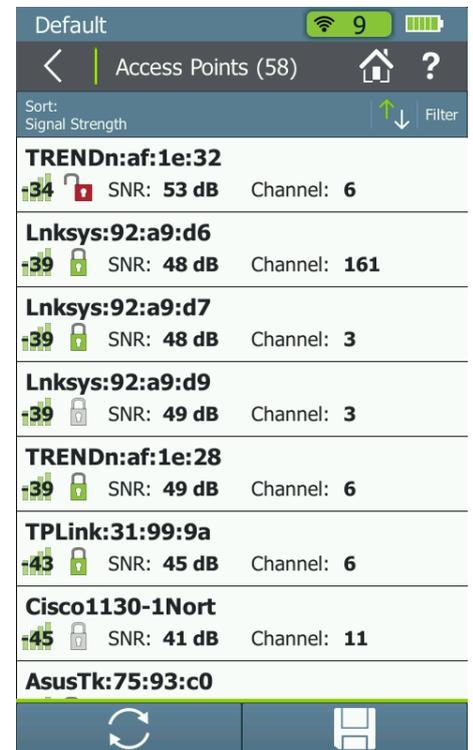


Figure 1

2. Check access point configuration

- Select Home/Networks/SSID/Access Point or Home/Access Points.
- Access Point Details allows you to verify that the access point is supporting the correct 802.11 mode (802.11a/b/g/n/ac) and correct security (Open, WEP, WPA, WPA2, etc). Make sure that the client device matches these settings. Note that 802.11 will not support previous mode unless operating in a legacy-support mode. For example, Figure 2 shows an access point that is 802.11ac capable.
- If an SSID's name is not visible, the AP may have been configured to not broadcast it. AirCheck G2 will display an AP that does not broadcast its SSID as [Hidden]. Clients can still connect to the AP, but they must be configured with the hidden SSID's name value.
- If an AP is using medium access control (MAC) address filtering, make sure that all client device MAC addresses are included. You usually configure the AP with a wireless management utility or web page that lets you manage your AP. In Windows, you can obtain the MAC of the client PC address by going to the Command Prompt and typing: ipconfig/all
- Check the AP's supported rates. If lower rates are turned off, legacy clients may not be able to connect. This may be intentional to ensure higher performance for other clients.

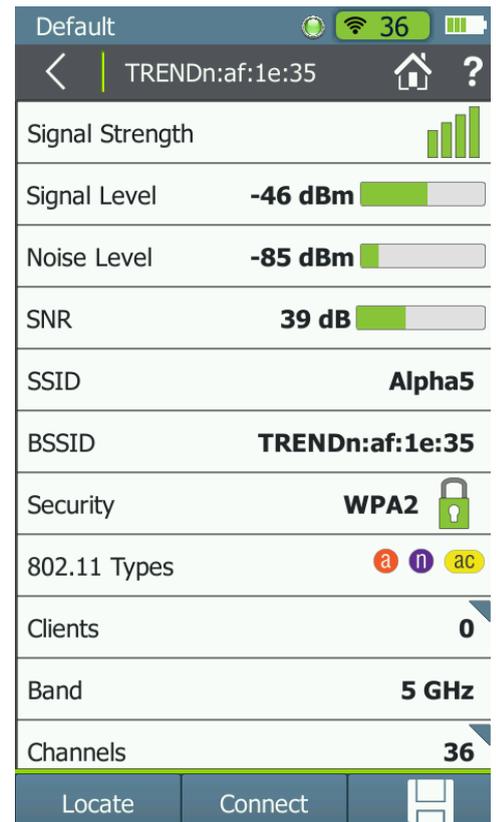


Figure 2

3. Exclude interference issues

- Select the Home/Channels screen to review interference in each channel (Figure 3). The blue portion of the bars shows the amount of 802.11 signals on the channel and the gray portion shows the amount of interference on the channel.
- Select the desired channel and view details to monitor the channel over time (Figure 4).
- If you are seeing a high percentage of interference, you should attempt to locate and eliminate the cause of interference. Common sources of interference at 2.4 GHz include microwave ovens, Bluetooth® devices, ZigBee devices, video cameras, cordless phones, game controllers, and many more.
- Excessive interference may suggest that you consider using a different channel, or even another band (e.g., 5 GHz band instead of 2.4 GHz band) to reduce the effect of interference on the channel.
- If interference is from other access points, consider reducing AP transmit power so coverage areas do not overlap.

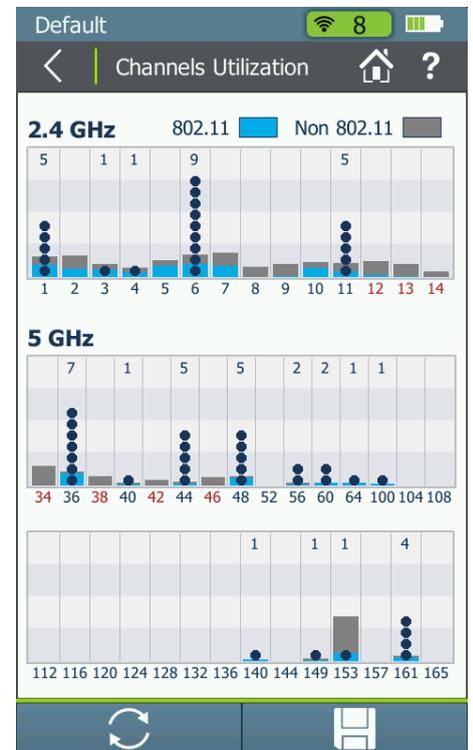


Figure 3

4. Connect to the access point

- Select either Home/Networks/(desired network)/Connect or Home/Access Points/(desired AP)/Connect.
- In the first case above, you will be connecting to a specific network by SSID name. In the second case, you'll be connecting via the specified AP.
- The connect test will indicate: whether a connection to the AP is possible, including authentication, assignment of IP address and whether a PING message can be sent and received. (Some of these items are configurable in AirCheck's profile.)
- After the connection test is complete, the F1 button provides additional test options. For network tests, it will do a roaming test that will connect to different APs as you walk around. For AP connection tests, it will do a range test that will show you the range of that AP as you walk around.
- The Log (F2) provides details about the connection attempt that may assist further with troubleshooting.
- Failure to connect may be due to incorrect security settings. For example a connection will fail if the access point is filtering MAC addresses and the AirCheck MAC address is not in the list of approved MAC addresses.

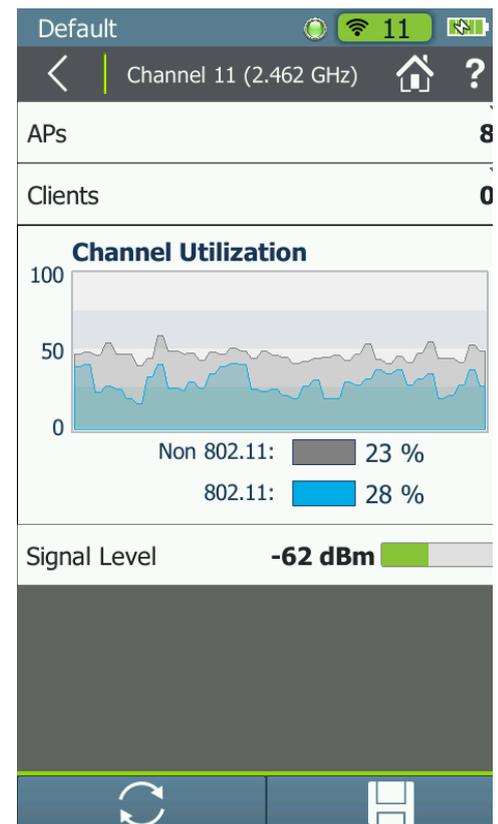


Figure 4

Client issues

The following is a list of steps that can be used to resolve client issues:

- AirCheck G2: Select Clients to quickly drill into client details to see signal level, AP MAC and name, channel, SSID, type and determine the channels and frequencies on which the client is probing (Figure 5).
- Access Point: Look at the AP status screen (usually accessible via a browser on a computer on the network or a management utility) to see if the AP has assigned the client device an IP address. PC: Restart client system and try again.
- PC: Verify that WLAN is active. (Windows typically provides a system tray icon for the WLAN utility.) Click on WLAN system icon, or equivalent in other systems, to see WLAN status. Confirm that client is connected to correct network. (With multiple local networks, user may have connected to the wrong SSID.)
- PC: Confirm that client has correct networking settings, including file/printer sharing settings.
- PC: Confirm that client device has correct security settings.
- PC: In Windows, you can perform a "Repair Connection" to reinitialize the networking software. This sometimes will clear up issues.
- PC: Ensure that client-side firewall is not blocking communications.

Other networking issues

If clients and access points are functioning correctly, but network connectivity is still not available, some other networking element may be responsible, such as a firewall. You can use AirCheck G2 to ping devices on the local wireless network or on the Internet to verify that they can be reached. (See Figure 6). AirCheck G2 will automatically provide the addresses of the gateway and DHCP server for testing – other addresses, including URLs, can be loaded through AirCheck G2 Manager and will appear on the test screen.

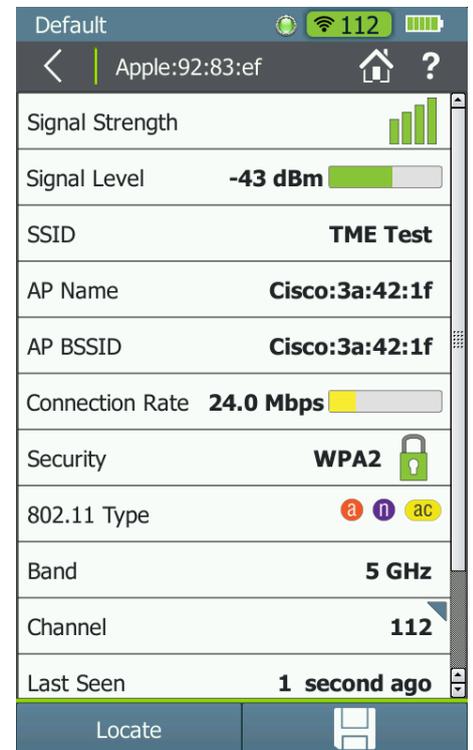


Figure 5

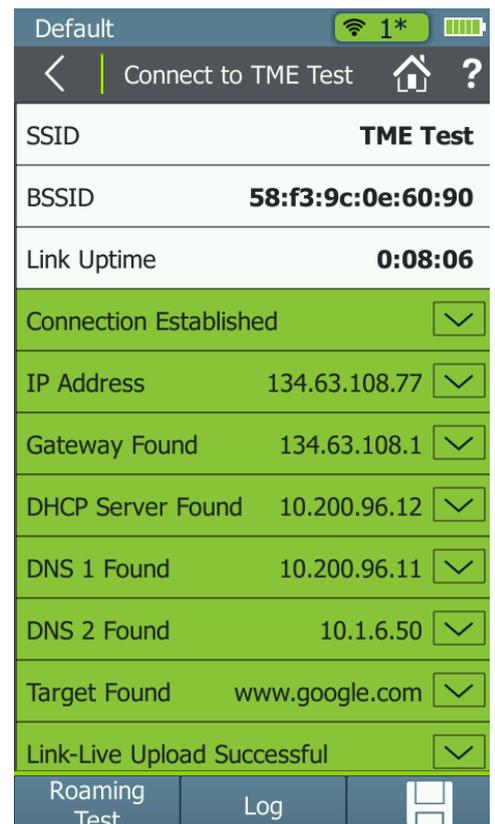


Figure 6

Scenario 2 – Network is Slow

There are multiple possible causes for slow networks including weak signal, interference, overloading/congestion, and mixed-network operation.

Weak signal

- Select Home/Networks/SSID/Access Point or Home/Access Points.
- Check signal levels of access points. Review graphical display of signal strength or select Access Point for numerical signal strength and signal-to-noise (SNR) information. 10 dB SNR is usually practical minimum, 20 dB will provide solid connectivity, 30 dB and higher is excellent. You obtain higher throughputs with higher SNR.
- If SNR is too low, consider: moving station closer; moving access point; increasing access point power level; removing obstructions; installing another access point; using a channel with less interference; moving to 2.4 GHz band if using 5 GHz band; replacing with 802.11n which has longer range; using a repeater.

Interference

- Select Home/Channels screen to review interference in each channel.
- Select Home/Networks/SSID/Channel to monitor activity used by the access point in question. This will display how much of the channel utilization over time is signal versus noise.
- Attempt to locate and eliminate the cause of interference. Common sources at 2.4 GHz include microwave ovens, Bluetooth® devices, ZigBee devices, video cameras, cordless phones, game controllers, and many more.
- If interference is from other access points, consider reducing AP transmit power so coverage areas do not overlap.

Congested network

- Select Home/Channels to review channel activity.
- A dot indicates an access point. Multiple access points on the same channel is not desirable, but acceptable (and sometimes unavoidable) if overall usage on that channel is relatively low (e.g., less than 50%).
- Highlight Channel/Select for graphical view.
- If a channel is overloaded but other channels are available, reconfigure access point to use a less-congested channel.

Mixed network

A network configured with a mix of 802.11b and 802.11g access points operates slower than a network with 802.11g only access points. Similarly, 802.11n runs more slowly if it has to provide backwards compatibility for 802.11b and g.

- Select Home/Networks/SSID/Access Point or Home/Access Points.
- Review modes in use in each channel. Figure 7 shows an example of an AP supporting both 802.11g and b.
- If you determine that there is no need to support the older technologies, you can reconfigure the AP to no longer support them.
- Check for the AP's supported rates. If lower rates like 1 and 2 Mbps are enabled, it will slow down performance.

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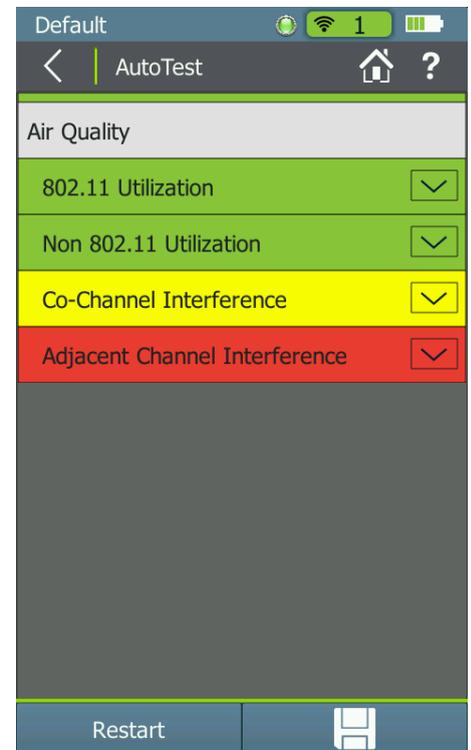


Figure 7

Scenario 3: Detecting Security Risks in General

Encryption

- Select Home/Networks.
- Review security icons next to networks (see figure 1). The green open lock icon indicates an unsecured network, while a yellow lock icon indicates WEP or Cisco LEAP security which is less secure than other protocols. The red locked icon indicates more secure protocols such as WPA or WPA2.

Running AutoTests in AirCheck G2

- AirCheck G2 performs essential Wi-Fi tests and a pass/fail indication of the wireless environment and identifies common problems — for any level of technician's expertise (Figure 7).
- Air Quality — Checks for Wi-Fi and non-Wi-Fi utilization by channel, plus co-channel interference and adjacent channel interference (Figure 8).
- When viewing Interference and Adjacent Channel Interference, the number of APs reported on a channel to view the actual APs that were counted.
- Network Quality — Connect to a specific network to verify coverage, interference, security and ability to connect to specified networks (Figure 9). Also see the retry rate of the connection, which is an important key performance indicator.

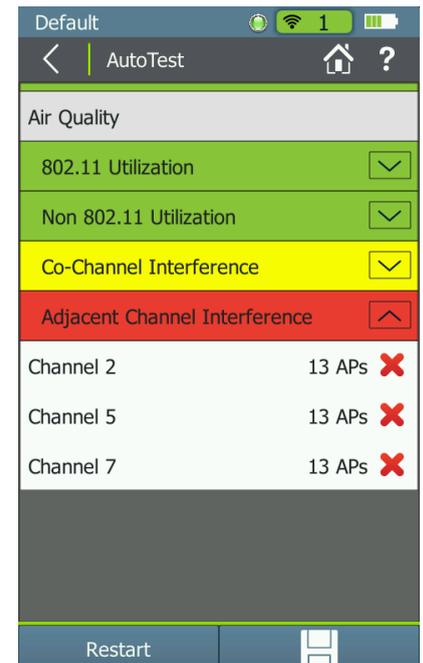


Figure 8

Other Troubleshooting Hints

This lists some other common issues that affect WLAN operation.

1. Stations and access points should have the most recent version of firmware.
2. If you lose passwords stored in an access point, you may need to restore the AP to its factory default settings, though this will require additional configuration steps.

If the steps above don't solve the problems, it's likely a more complex or subtle issue that will require more sophisticated tools. AirCheck G2 can help with this through its ability to save the troubleshooting session information. This can provide valuable details to others who might need to help solve the problem. As many wireless problems can be intermittent in nature, it also allows you to capture the problem for later analysis. By comparing results from the sessions before and after taking action, you can also validate that the actions you took really solved the problem. Finally, the saved session information provides a useful baseline if problems should occur in the future.

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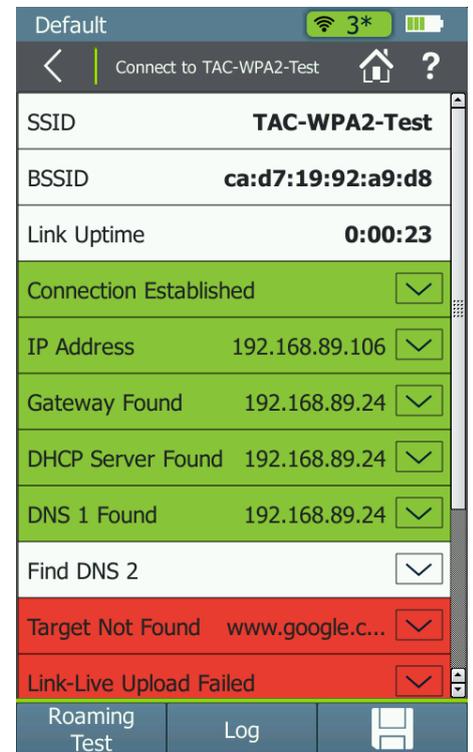


Figure 9