

## Chapter 6a

# Using Xirrus Wi-Fi Inspector

### LEARNING OBJECTIVES

By the end of this chapter, you should be able to:

- Use Xirrus Wi-Fi Inspector with some facility.
- Interpret output from Wi-Fi Inspector in specific situations.
- Do a site survey.

### INTRODUCTION

Wi-Fi analysis programs listen to nearby access points (and sometimes wireless hosts) to determine such things as how strong their signals are, what types of security they use, what their SSIDs and BSSIDs are, and sometimes the directions of the individual access points.

There are many Wi-Fi analysis programs for mobile devices. Many have “stumbler” in their names in homage to one of the first examples, NetStumbler. This chapter looks at *Wi-Fi Inspector* from Xirrus, which runs on Microsoft Windows and which is available as a free download from Xirrus. A comparable Windows Widget that always remains on the desktop is also available from Xirrus.

### THE FOUR WINDOWS

Figure 6a-1 shows the ribbon menu and four tiled windows that appear when you bring up Wi-Fi Inspector. This view shows all information in a single window. This is the default. It is also what you see if you click on Show All in the Layout ribbon.

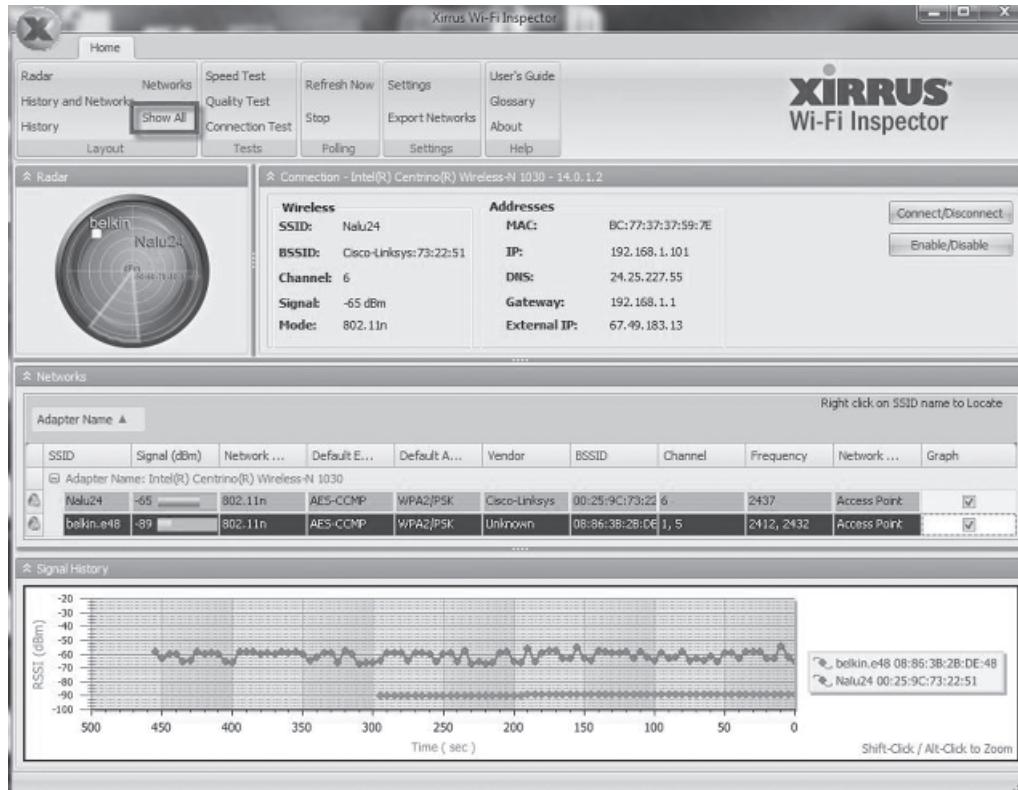


FIGURE 6A-1 Four Windows in Wi-Fi Inspector

## The Radar Window (Read the Fine Print)

The most obvious window is the radar window, which shows all access points in the vicinity. The access points are spread out across the two-dimensional picture.

**Relative Direction (Meaningless)** It appears that the radar window shows the relative directions of the access points, much as an air traffic radar display shows the directions of nearby aircraft. Actually, it does not. The access points are merely spread out for readability. Direction is meaningless. In this sense, the radar window is misleading. However, it looks cool.

**Distance from the Center (Signal Strength)** What does distance from the center mean? It looks like it means physical distance, as it would on a physical radar screen. Rather, it means *signal strength*. Access points that are shown closest to the center are the *strongest*, and access points that are the farthest from the center are the *weakest*.

**Measuring Signal Strength** Signal strength gives the RSSI (relative signal strength indicator) for the access point. Smaller negative numbers are better. For example,  $-60$  dBm is a very strong signal, while  $-87$  dBm is a very weak signal. In Figure 6a-1, Nalu24 has a signal strength of  $-65$ , which is quite good. Belkin has a signal strength of  $-89$ , which is terrible.

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*For signal strength, smaller negative numbers are better.  
(It's a double negative.)*

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**Expanding the Radar Window** The radar window in its normal small form can only display four access points. Under the Layout section of the menu, selecting Radar in the Layout Group will maximize the radar window. This allows up to ten access point names to be seen. By the way, “network” and “SSID” are synonyms.

Figure 6a-2 shows the expanded radar window. There are only two nearby access points, so there is no need for a large radar window. However, it certainly is easier to read the relative indicated signal strength.



**FIGURE 6A-2** Expanded Radar Window

## Connection Window

The connection window (in the upper right in Figure 6a-1) shows information about the access point to which the computer running Wi-Fi Inspector is currently connected (Nalu24). It shows the SSID (the network name, in this case, Nalu24), the BSSID (the access point's MAC address, in this case, Cisco-Linksys:73:22:51<sup>1</sup>), the channel (6), the signal strength (-65 dBm), and the network mode (802.11n).

In the middle is information about the user's PC. It shows the user's MAC address and configuration information, including the user's IP address, the IP address of the destination server, the IP address of the default gateway (router), and the network's external IP address given to it by the ISP. (This is a home network.) This information does not tell the user about nearby access points, but it can be very useful in assessing connection problems.

On the right is a Connect/Disconnect button. Clicking this button shows a list of potential networks and allows the user's computer to disconnect from the current access point and pick another to connect to. The user can also turn off the computer's wireless adapter.

## The Networks Window

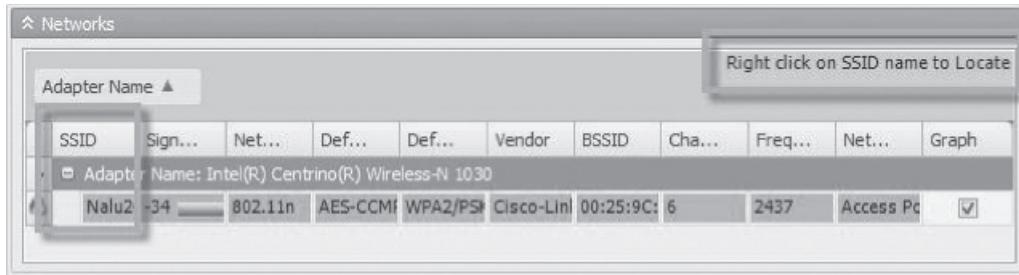
The networks window shows detailed information about each of the nearby access points. This is what the user goes to when he or she wants detailed information. The row for the access point to which the user is currently connected is shown in orange highlighted. Wi-Fi Inspector updates the information in the networks window frequently. As Figure 6a-3 shows, the information in this window is detailed.

- SSID. The network name.
- Signal Level in either dBm or percentage. Remember that smaller negative dBm numbers indicate higher strength. Next to the number is a colored bar.
- Green is for signals of -70 dBm and above (-60 dBm, etc.).



FIGURE 6A-3 Networks Window

<sup>1</sup> The first two octets in a MAC address identify the company making the network adapter in the access point. Wi-Fi Inspector converts this information into a humanly readable name.



**FIGURE 6A-4** Locating an Access Point

- Yellow is for signals between  $-71$  dBm and  $-80$  dBm.
- Orange is for signals between  $-81$  dBm and  $-90$  dBm.
- Red is for  $-91$  dBm and below.
- Network Mode. 802.11g, 802.11n, etc.
- Default Encryption. None, WEP, TKIP (in WPA), or AES (802.11i).
- Default Authentication. Open (none), WPA/PSK, WPA2/PSK, WPA/802.1X, or WPA2/802.1X.
- Vendor. The name of the device manufacturer.
- BSSID. The access point's MAC address.
- Channel. The channel number.
- Frequency. The center frequency of the channel.
- Network Type. Access point or ad hoc (no access point).
- Graph. This is a checkbox that tells Wi-Fi Inspector to graph the signal level over time (checked) or not to do so (unchecked). In the figure, both are checked, so both will be graphed.

In the figure, the access points are listed in terms of declining signal strength. However, the networks table can be sorted by any column heading. The user merely clicks on the column heading.

Figure 6a-4 zooms in on the networks window. In the upper right, there are instructions to “Right click on SSID name to Locate.” In the section on the radar window, we saw that the window does not give the physical locations of access points. The Locate function under networks addresses this lack of physical location in a limited but interesting way. If you right click on an SSID name such as Nalu24, your computer begins beeping. If you are far away, it will beep slowly. As you approach it, the beeping speed will be increased. Essentially, you are using the network analysis version of a Geiger counter.

## Signal History

In the networks window, we saw that the user can check or uncheck whether graphing should be done. The Signal History window shows these graphs. The graphs in Figure 6a-5 show that the signal strength for Nalu24 is uniformly excellent, while the signal strength for Belkin is uniformly poor. Major fluctuations would indicate serious problems.



FIGURE 6A-5 Signal History

## Other Groups on the Ribbon

The Layout group on the ribbon is the most-used feature of the Xirrus Wi-Fi Inspector.

**Help Group** The Help group provides a user's guide to explain the program's detailed functionality. There is also a helpful glossary of terms.

**Settings Group** The Settings group allows the user to adjust many settings, for example, expressing RSSI in percentage terms instead of in terms of dBm.

**Tests Group** The windows in Wi-Fi Inspector provide information visually. The Tests group allows the user to conduct more detailed tests. These tests are good for troubleshooting.

## TESTS

As just noted, the Tests group actively tests the quality of your service. The Tests group performs three important tests.

### Connection Test

The connection test shows how well you are connected to the outside world and to critical internal devices. Figure 6a-6 shows the results of a connection test. It shows that Wi-Fi Inspector uses ping to test latency to your DNS server, default gateway (router), and a host on the Internet (Internet Reachable). It also does a DNS lookup, in this case for `www.google.com`.

The test shows that the user has low latency for the default router and an Internet host. It also shows that the DNS lookup was successful. In color, these are shown in green, with the word *Pass*. However, there is relatively high latency to the user's DNS server (152 ms). This is indicated by a yellow bar with the text *Warning: high latency*. However, the latency is not very high. This connection looks good.

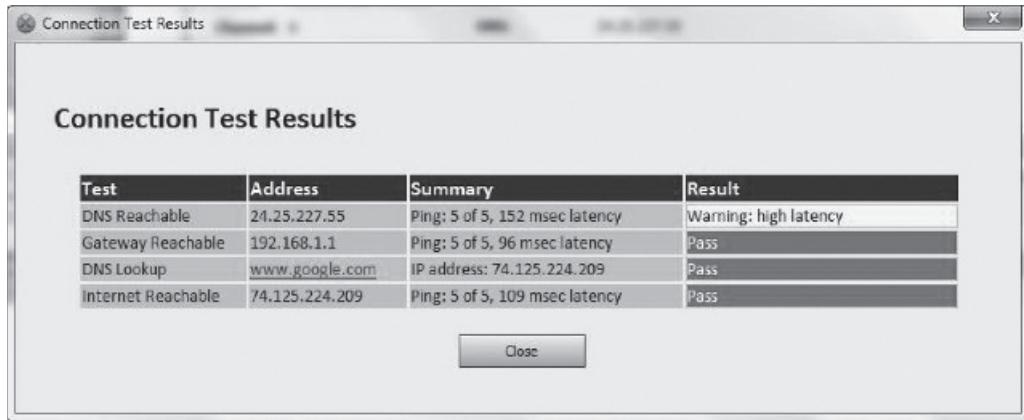


FIGURE 6A-6 Connection Test

### Speed Test

The speed test takes the user to speedtest.net. Figure 6a-7 shows a test in which there was a download speed of 14 Mbps and an upload speed of just under 1 Mbps. These are reasonable numbers.

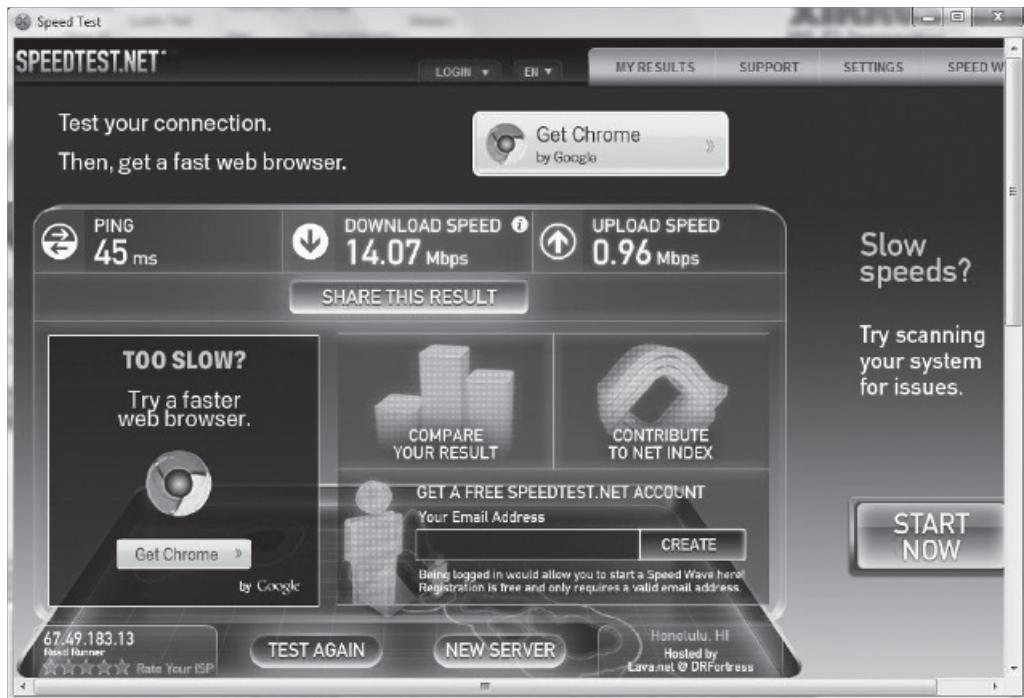


FIGURE 6A-7 Speed Test in Wi-Fi Inspector

## Quality Test

Figure 6a-8 shows results from the quality test, which takes you to pingtest.net. The results give the user's quality level a B. However, the box on the left notes that the connection should be fine for anything but gaming.

- The ping (latency) averaged 84 ms, which is a little high for games. The server is less than 50 miles away. Connecting to a more distant server would increase latency.
- Jitter, which is variation in latency from packet to packet is 24 ms. This can affect voice and video, for which jitter can result in jittery voice or video. Again, the number is fairly good.
- There was zero packet loss. The connection appears to be reliable.
- There is a MOS score of 4.33. This is a traditional subjective indicator of voice call quality. A MOS score of 5 indicates toll-call quality on the telephone system. A MOS of 4.33 is quite good.

One caveat is that pingtest.net is a bit “grabby.” It tries to sell you its tools and is slightly aggressive. In addition, the site uses Java, which you may have to download. You may also have to give a firewall exception to this Java program.



FIGURE 6A-8 Quality Test

## ACTIVITIES

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### Questions

1. Why is the radar window's image of a radar scope misleading?
2. How would you locate an access point despite the limitations of the radar window?  
This will take one to four paragraphs.
3. There is a value of  $-44$  dBm for signal strength. How good is this?
4. How can you sort the networks window?
5. What information does the Connection Test give you?
6. What information does the Speed Test give you?
7. What information does the Quality Test give you?

### Activity

Select a building. Go to at least ten locations. At each location, record the information in the networks window. Also, do a connection and speed test. Write a brief report what you learned about Wi-Fi service in the building, referring to the data you collected.