



iPerf Performance Tests with the AirCheck™ G2 Wi-Fi Tester

Application Note



The fastest, simplest, easiest way to validate your Wi-Fi network.

How to Survey Sites Quickly & Easily

INTRODUCTION

Testing Wi-Fi network performance in terms of speed and bandwidth is standard practice on both corporate and home environments.

A detailed report of speed and bandwidth analysis is necessary for the deployment of network dependent services. Also, sometimes you need to double check the speed of your network throughput while troubleshooting to make sure you have enough bandwidth to support user applications like Voice over W-Fi, Video Streaming, etc. All this requires a reliable network performance testing tool.

Typically, people will use various internet speed tests to verify performance. Still, this is a good way to disappoint yourself and all involved. Internet speed tests are never a guarantee and always rely on not only your internet bandwidth and availability (which can vary depending on usage and load from others), but most importantly the capabilities of the server being used for the speed test.

So, the most accurate way to verify the performance of your network is to use tools that can run locally. This allows you to properly test your environment without relying on someone else's server to verify that you have adequately designed, deployed, and optimized your Wi-Fi network to support the necessary bandwidth requirements for your users.

Which bring us to the AirCheck G2 Wi-Fi Tester from NetAlly, a handheld Wi-Fi network test tool that allows you to quickly and easily measure the real performance of your Wi-Fi network by providing the option to test against an iPerf3 server.

iPerf Server Installation and Setup

The AirCheck G2 Wi-Fi Tester will allow you to perform dual ended TCP and UDP performance tests against an iPerf3 server. iPerf3 is an opensource software tool for active measurements of the maximum achievable bandwidth on IP networks. It supports tuning of various parameters related to timing, buffers, and protocols (TCP, UDP), and it can now be used with the AirCheck G2 Wi-Fi Tester to run wireless network performance tests through one of the following options:

- **NetAlly Test Accessory** – This is a mobile plug and play iPerf3 server, and the easiest way run a performance test! Especially if you don't have permissions or time to configure a standalone iPerf3 server.
- **iPerf3 Server Software** – Standalone software version of the iPerf3 server that can be installed on any computer but requires manual configuration and setup.

Before you can start testing you will need to install and setup your NetAlly Test Accessory or iPerf3 Server Software using the instructions provided below.



The NetAlly Test Accessory simplifies iPerf server set up and configuration.

NetAlly Test Accessory

The NetAlly Test Accessory works together with the AirCheck G2 Wi-Fi Tester to run wireless network performance tests, and it is the easiest way to perform the tests you need. The NetAlly Test Accessory acts as an iPerf3 server for tests run by the AirCheck G2 Wi-Fi Tester and can be plugged into any Ethernet port on your network (to verify performance to a Remote site, plug the accessory on an ethernet port at the remote site).

The NetAlly Test Accessory operates with either Power over Ethernet (PoE) or AA batteries. If you are using batteries only, press and hold the power button for two seconds to turn on the unit. If PoE is available on your network connection, the unit starts up automatically.

As soon as you power on the NetAlly Test Accessory, all the LED symbols illuminate yellow while the unit starts up. Then, the accessory attempts to connect to your ethernet network using DHCP, lighting up each LED with the corresponding connection step. After its done, you are ready to start testing!



Power Button



LED Symbols



Ethernet Port

Note 1: For more details on the NetAlly Test Accessory LED behavior please refer to the User Guide.

Note 2: If you have an account on NetAlly's Link-Live cloud service you can claim the NetAlly Test Accessory to aid in discovery from your AirCheck G2 Wi-Fi Tester and to download software updates.

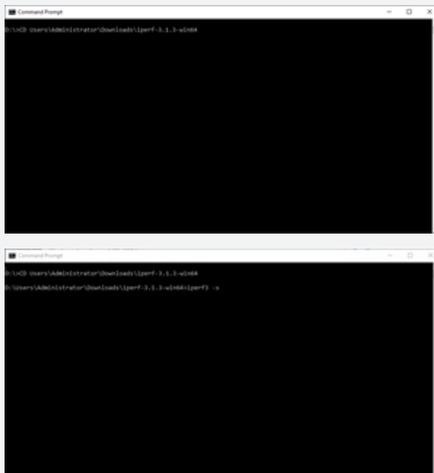
Note 3: If a static IP Address or Proxy Server is required you can use the Web Server Interface on your NetAlly Test Accessory to change the default configuration. For more details on how to access the Web Server Interface please refer to the User Guide.

iPerf3 Server Software

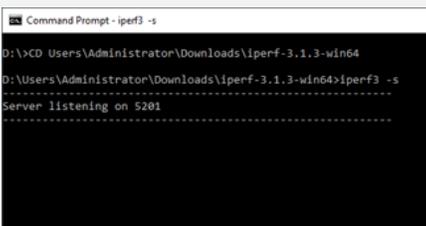
For those cases on which a NetAlly Test Accessory is not available, you have the option of using the software version of an iPerf3 server. This option will require for you to manually install and configure your own server, but it will provide the same test capabilities and accuracy as a NetAlly Test Accessory.

Use the following process to install and setup your own iPerf3 server:

- 1) Download a copy of the iPerf3 binary to your computer:
 - a. Use the following link to download the latest version of the software:
<https://iperf.fr/iperf-download.php>
 - b. iPerf3 is available for Windows, Android, iOS, MAC OS, and Linux. Select the one that applies to your environment.



Examples of the CD and iperf3 -s commands on the Windows Command Prompt



Example of iPerf3 Server running on the Windows Command Prompt

2) Install the iPerf3 binary on your device:

- a. The installation process will vary per operating system. Please refer to the iPerf3 user documentation for details on each operating system (<https://iperf.fr/iperf-doc.php>). For this Application Note we will be using the Windows version as an example.
 - i. Using Windows File Explorer find the .zip file that was downloaded on the previous step and double click on it to unzip the file.
 - ii. Copy the uncompressed files into a folder on your computer.
- b. If testing the performance of the local network, install the iPerf3 server software on a computer connected to the local network.
- c. If testing performance to a remote site, install the iPerf3 server software on a computer connected to the network on the remote site.

3) Run the iPerf3 binary on your computer:

- a. The process to run the iPerf3 binary will vary per operating system. Please refer to the iPerf3 user documentation for details on each operating system (<https://iperf.fr/iperf-doc.php>). For this Application Note we will be using the Windows version as an example.
 - i. Open a Windows Command Prompt.
 - ii. While on the Command Prompt window use the 'CD' command to navigate to the folder on which the iPerf3 binary was saved. For example:
 - CD Users\Administrator\Downloads\iperf-3.1.3-win64
 - iii. Type the command iperf3 -s and hit Enter on your keyboard. This will start the iPerf3 application on Server mode.
 - iv. Windows may ask if you want to allow the iPerf3 application to communicate through the firewall (will depend on the version of Windows being used). Allow this communication by selecting the appropriate option.
 - v. A message will show up on the Windows Command Prompt saying, Server listening on 5201. You are now ready to start testing!
- b. Even though it is possible to run the iPerf3 server binary from a computer on the wireless network this setup may not give you a true representation of your networks performance. It is recommended to run the iPerf3 server software from a computer on the wired ethernet network. This will provide visibility on not only how the wireless network is performing, but how the performance is affected by the wired backhaul.

Note 4: The iPerf3 Server software will use the IP address of the device on which it was installed. Please make a note of this information since the IP address of the iPerf3 Server will be required during the AirCheck G2 Wi-Fi Tester performance test setup.



AirCheck™ G2 designed for network professionals who need to validate that the WLAN or need resolve problems related to connectivity and performance.

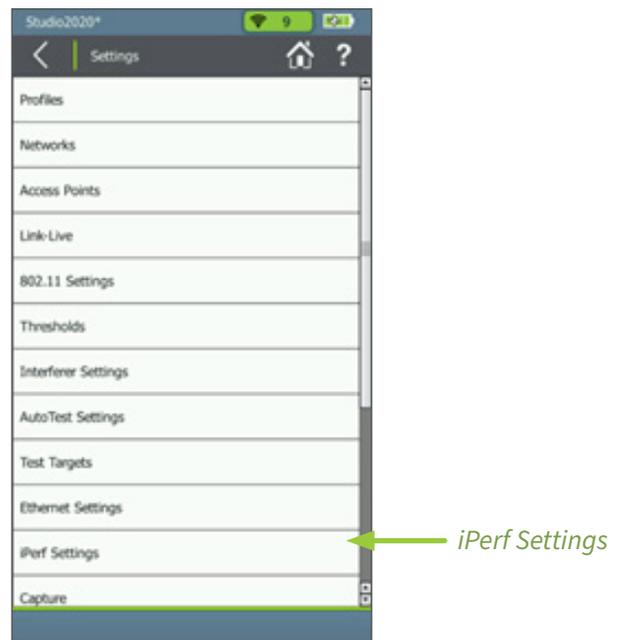
AirCheck G2 Setup

After the NetAlly Test Accessory or the iPerf3 Server is ready you have the option to change the setup on your AirCheck G2 Wi-Fi Tester before you start testing. To change the default performance test settings on your AirCheck G2 Wi-Fi Tester do as follows:

- 1) Press the Power button on your AirCheck G2 Wi-Fi Tester to turn on the unit.
- 2) After the unit finishes booting up use the touchscreen to select the Settings option.



- 3) Using the touchscreen, scroll through the options and select iPerf Settings.



- 4) You will now be given the option to change many of the settings related to the iPerf performance test that the AirCheck G2 Wi-Fi Tester can run against the NetAlly Test Accessory or an iPerf3 Server.
 - a. Protocol – Allows you to select between TCP or UDP tests.
 - i. TCP - Used to measure bandwidth. Use this option when you want to measure the throughput of your wireless network.
 - ii. UDP – Used to measure packet loss and jitter. Use this option when you want to troubleshoot problems with latency sensitive application like Voice over Wi-Fi.
 - b. Port – Used to change the port on which the test will be performed. The default port used is 5201. This is also the default port used by the NetAlly Test Accessory or the iPerf3 Server.
 - c. Test Duration – Shows the selected duration for the entire iPerf test run, with half of the time for the upload portion and half for the download portion of the test. The default value is 20 seconds, and it can be changed to 60 seconds or 120 seconds. A longer test will give a more accurate view of your average network performance.
 - d. Accessory Battery Type – This setting allows the AirCheck G2 Wi-Fi Tester to display the battery level status of your NetAlly Test Accessory accurately. The battery type options supported are Alkaline, Lithium, and NiHM.
 - e. Thresholds – This option is a shortcut to the Thresholds screen, and allows you to change the Pass/Fail thresholds for Target Speed, Loss Percentage, and Jitter. The default values are based on industry standards, but you can change them to match your local network requirements.
- 5) After making changes to the settings press the Apply button to save them.



iPerf Performance Test Settings



iPerf Test Thresholds

Running a Performance Test

Running a performance test on the AirCheck G2 Wi-Fi Tester is a very simple process. To run a test, do the following:

- 1) From the Home screen use the touchscreen to select the Networks or Access Points option. The Networks option will allow you to select an SSID you want to test. Meanwhile, the Access Points option will allow you to test a specific access point. For this Application Note we will use the Networks option as part of our example.



- 2) From the Networks screen use the touchscreen to select the SSID on which you want to run the performance test. If you decided to use the Access Points option, then you need to select an access point.



List of SSID's

- 3) After selecting the SSID or Access Point on which you want to run the performance test you will get to the details screen. This screen will provide details about the selected SSID or Access Point and will allow you to run a connection test. Using the touchscreen, press the Connect button.



SSID Details

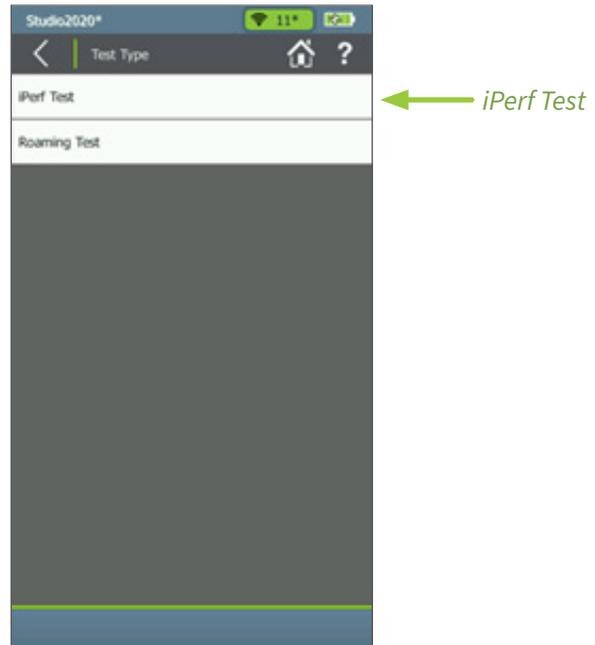
- 4) After the connection test is completed successfully you will be given the option to run other tests. Using the touchscreen, press the Tests button.
- 5) While on the Test Type screen, select the iPerf Test option.



Tests

Connection Test Results

- 6) Under the Select iPerf Server screen you will be given the option to select a NetAlly Test Accessory or iPerf3 Server against which you want to run the performance test. Using the touchscreen, select the server you want to use and then press the Start button to commence your test.

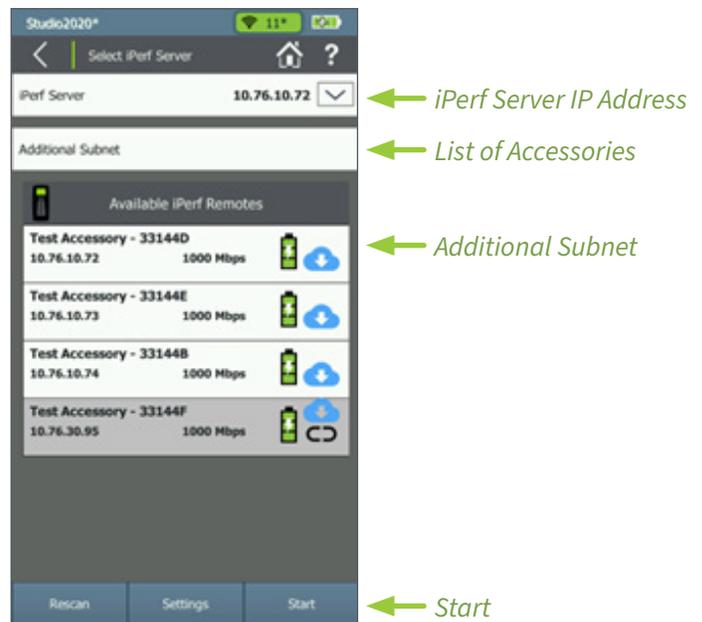


- a. If you are using a NetAlly Test Accessory to run your test, it will automatically show up under the Available iPerf Remotes list. If there is more than one NetAlly Test Accessory connected to the network, all of them will show up on the list.
 - i. After you select a NetAlly Test Accessory the IP address under the iPerf Server field will be updated automatically to reflect the address of the accessory.
 - ii. If a NetAlly Test Accessory had been used in the past to perform a test but its currently offline, it will be greyed out on the list.
 - iii. The following information will be available for each accessory:
 - Accessory Name, can be changed after claiming your accessory on Link-Live.
 - IP Address, as assigned by the DHCP server. A static IP address can be assigned through the accessories Web Server Interface too. Please refer to the NetAlly Test Accessory user guide for details.
 - Transmission speed of the ethernet port being used.
 - Battery level status for the NetAlly Test Accessory.
 - Link-Live status will be represented with a small Cloud icon. If the accessory has been claimed on Link-Live the Cloud icon will show up, else the Cloud icon will not be shown.
 - iv. The AirCheck G2 Wi-Fi Tester will use multiple methods to automatically detect a NetAlly Test Accessory:
 - Automatically search the Subnet being used by the access point on which the connection test was performed.

- Automatically access the IP address and Subnet information of the accessory through Link-Live. This option will only be available if both the AirCheck G2 Wi-Fi Tester and the NetAlly Test Accessory being used for the test have access to the internet and have been claimed under the same Link-Live account.
 - Manually provide the Subnet information for the network to which the accessory has been connected. This can be done by using the touchscreen to select the Additional Subnet field and then using the on-screen keyboard to type the Subnet information.
- b. If you are using an iPerf3 Server to run your test, you will need to specify the servers IP address manually. To do this use the touchscreen to select the iPerf Server field and then use the on-screen keyboard to type the servers IP address.

Reviewing your Test Results

After the performance test has been completed its time to review the results provided by the AirCheck G2 Wi-Fi Tester. Notice that the performance test results provided will vary depending on the Protocol (TCP, UDP) you selected while configuring the AirCheck G2 Wi-Fi Tester.



Note 5: For more information on how to access Link-Live and how to Claim a product please refer to the User Guide of the product in question.

Note 6: If you want to refresh the list of NetAlly Test Accessories under the Select iPerf Server screen, use the touchscreen to press the Rescan button.

Note 7: You can make last moment changes to the iPerf test configuration by pressing the Settings button.

TCP Test Results

While using the TCP protocol for your performance test you will get the following test results:

- 1) BSSID – MAC address of the wireless network you are connected to.
- 2) SSID – Name of the wireless network you are connected to.
- 3) iPerf Server Address – IP address of the NetAlly Test Accessory or iPerf3 Server used for the performance test.
- 4) Avg. Up Speed – Average upload throughput speed achieved during the test. This is used to determine the average upload speeds your wireless network is capable of.
- 5) Max Up Speed – Maximum upload throughput speed achieved during the test. This is used to determine the maximum upload speeds your wireless network is capable of.
- 6) Avg. Down Speed – Average download throughput speed achieved during the test. This is used to determine the average download speeds your wireless network is capable of.
- 7) Max Down Speed – Maximum download throughput speed achieved during the test. This is used to determine the maximum download speeds your wireless network is capable of.
- 8) PHY Data Rate – Physical Data Rate measured during the test.
- 9) Signal Level – Signal level for the BSSID you are connected to as measured during the test.
- 10) Noise Level - Noise level for the BSSID you are connected to as measured during the test.
- 11) SNR – Signal to Noise Ratio for the BSSID you are connected to as measured during the test.
- 12) Retry Rate – Frame Retry Rate for the BSSID you are connected as measured during the test.

Note 8: The “AirCheck G2 Wi-Fi Tester” can measure a “Max Speed” of up to approximately 300 Mbps. If you see an icon with an ‘i’ next to the Max Speed test results this means that the AirCheck G2 Wi-Fi Tester hardware may be limiting the maximum speed measurement. This is not an error; it just means that your “Max Speed” is higher than what the “AirCheck G2 Wi-Fi Tester” can measure.



The screenshot shows the iPerf app interface on a mobile device. The app is titled "iPerf" and displays the following test results:

BSSID	8e:dc:96:7d:52:9c
SSID	AllyGuest
iPerf Server Address	10.76.10.72
Avg. Up Speed	63.9 Mbps
Max Up Speed	93.6 Mbps
Avg. Down Speed	58.3 Mbps
Max Down Speed	72.9 Mbps
Upload Results to Link-Live	<input type="checkbox"/>
PHY Data Rate	216 Mbps
Signal Level	-22 dBm
Noise Level	-99 dBm
CINR	77.46

At the bottom of the screen, there is a "Start" button.

TCP Protocol Test Results

UDP Test Results

While using the UDP protocol for your performance test you will get the following test results:

- 1) BSSID – MAC address of the wireless network you are connected to.
- 2) SSID – Name of the wireless network you are connected to.
- 3) iPerf Server Address – IP address of the NetAlly Test Accessory or iPerf3 Server used for the performance test.
- 4) Upload Speed – Average Throughput measured during the upload test. By default, a target bandwidth of 5.0 Mbps will be used.
- 5) Upload Jitter – Average upload Jitter measured during the test.
- 6) Upload Loss – Percentage of frames lost during the upload test.
- 7) Download Speed – Average Throughput measured during the download test. By default, a target bandwidth of 5.0 Mbps will be used.
- 8) Download Jitter – Average download Jitter measured during the test.
- 9) Download Loss – Percentage of frames lost during the download test.
- 10) PHY Data Rate – Physical Data Rate measured during the test.
- 11) Signal Level – Signal level for the BSSID you are connected to as measured during the test.
- 12) Noise Level - Noise level for the BSSID you are connected to as measured during the test.
- 13) SNR – Signal to Noise Ratio for the BSSID you are connected to as measured during the test.
- 14) Retry Rate – Frame Retry Rate for the BSSID you are connected as measured during the test.

BSSID	8e:dc:96:7d:52:9c
SSID	AllyGuest
iPerf Server Address	10.76.10.72
Upload Speed	77.8 Mbps
Upload Jitter	1.1 msec
Upload Loss	19 %
Download Speed	65.1 Mbps
Download Jitter	0.6 msec
Download Loss	35 %
PHY Data Rate	216 Mbps
Signal Level	-33 dBm

UDP Protocol Test Results

Note 9: Jitter measures the time difference in packet arrival time. A high Jitter will not affect normal wireless transactions, but it will adversely affect Voice over Wi-Fi communications.

Conclusion

In conclusion, it is quick and easy to verify that your wireless network can support the bandwidth required for Voice over Wi-Fi, Video Streaming, Data Transfers and more. Just plug your NetAlly Test Accessory anywhere on your network, take your AirCheck G2 Wi-Fi Tester to the area on which you want to run your performance test, and in a matter of seconds you will be able to measure both your upload and download speeds. No need for complicated and time-consuming setups, and no need to depend on unreliable internet speed tests that could provide inaccurate bandwidth information. Testing, troubleshooting, and validating performance on your Wi-Fi network has never been easier!

References

You can find the documentation referenced on this Application Note through the following links:

- 1) [AirCheck G2 Wi-Fi Tester User Manual](#)
- 2) [NetAlly Test Accessory User Manual](#)
- 3) [iPerf3 Binary Downloads](#)
- 4) [iPerf3 User Guide](#)
- 5) [Link-Live Sign In](#)