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### How to Get Help

AIRAYA offers several customer support options to assist you with difficulties you might experience with your WirelessGRID wireless bridge:

#### Worldwide Web Support

The AIRAYA web site ([www.airaya.com](http://www.airaya.com)) provides quick and easy answers to common technical questions. You'll find a complete *Knowledgebase*, a variety of technical documents, product manuals and literature, and other helpful information. Most materials can be found in the support area.

#### Contacting AIRAYA

Contact your AIRAYA distributor or dealer before you call AIRAYA. They are familiar with your needs and will generally be able to provide you with the fastest and most comprehensive support. If they are unavailable or unable to answer your questions, then contact AIRAYA directly by one of the methods listed below.

Before contacting our technical support team, please create a copy of the "Current Settings" tab using your web browser and the instructions in the product manual. If you are not able to run the web-based configuration utility, then write down any error messages you see on-screen and call the appropriate support number list below.

#### AIRAYA Contact Information

<b>Phone</b>	(866) 224-7292 (U.S.) (408) 776-9583 (international)
<b>Fax</b>	(408) 776-9583
<b>E-mail</b>	<a href="mailto:support@airaya.com">support@airaya.com</a>
<b>Web site</b>	<a href="http://www.airaya.com">www.airaya.com</a>
<b>Skype</b>	<a href="#">airaya_support</a>

This WirelessGRID bench test guide is designed to provide a new AIRAYA installer with insight and understanding of how to setup, test and verify the functionality of a WirelessGRID link before performing a field installation. Utilities for testing network communication, configuring bridges, aligning antennas, and measuring throughput are discussed. Answers to common questions and troubleshooting tips are noted throughout the document for your convenience.

While performing a bench test, antenna alignment is not critical as antennas are close together and the signal strength (RSSI) utilities will always show a strong signal. As in all field installations, bench tests should be performed with antennas correctly polarized, either vertically or horizontally, and pointing at each other, at a distance of no less than 15 feet apart. Each integrated radio or outdoor antenna has a polarity arrow sticker on it. An Up or Down arrow = vertical polarization. A Left and Right pointing arrow = horizontal polarization. Both arrows should be pointing in the same direction.

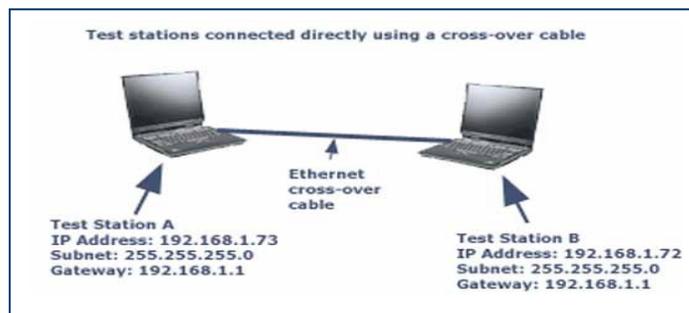
To obtain optimal throughput and link reliability, signal strength readings should be above 18 for all bench tests. Very high signal strength values (RSSI above 50) are common in bench tests and will not damage radios; however, measured TCP/IP throughput results may be lower.

### Bench test Procedure

#### Step 1. Setup a wired Ethernet network between test stations

1. Configure 2 test stations so that their network IP addresses are in the same range and can communicate with each other via Ethernet. If you are not familiar with IP addresses, please contact AIRAYA for the name of a qualified network installer in your area.
2. Verify your test network setup by using an Ethernet crossover cable directly connected between the two test stations, or by connecting the 2 stations using a switch, hub or router using straight-through Ethernet cables.

To verify your wired network setup is working properly, run a continuous ping between test stations A and B. To do this, open a DOS or CMD window on test station A, then type the following at the command prompt: `ping 192.168.1.72 -t` and on station B, type `ping 192.168.1.73 -t` Note: `-t` runs a continuous ping.



If you receive ping responses from both test stations, the network IP configuration and physical wiring is working properly between the 2 test stations using Ethernet. If you cannot ping both test stations, check your Ethernet cable connections and test station network settings to verify they are configured properly.

#### NOTE

If ping does not work between 2 wired test stations, it will not work between 2 test stations connected by a WirelessGRID link.

**When ping works properly with wired test stations, go to Step 2.**

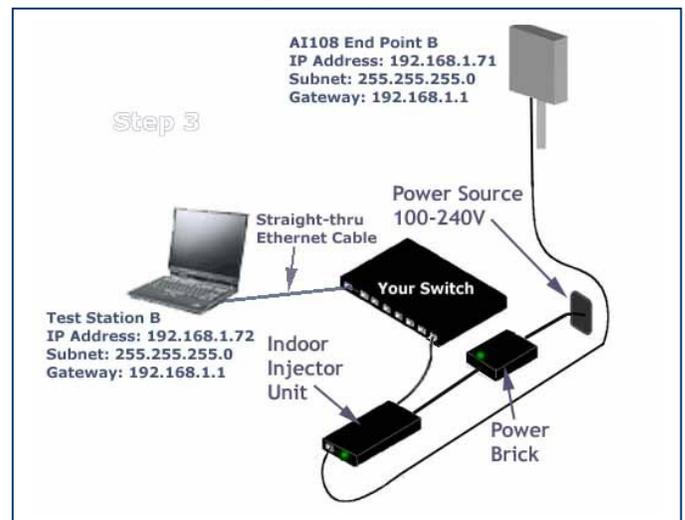
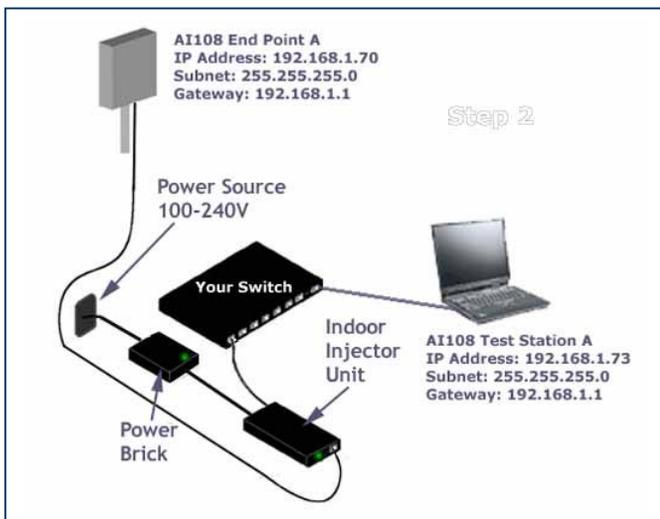
### Step 2. Setup wired Ethernet network connections to WirelessGRID bridges

Connect directly using crossover cables, or through network switches or routers using straight-thru Ethernet cables.

#### NOTE

WirelessGRID products shipped as complete kits have one bridge factory-configured with IP address 192.168.1.70, and one bridge factory-configured with IP address 192.168.1.71. Both bridges have a default subnet mask of 255.255.255.0  
100 Mbps full duplex ports are best from connecting bridges to wired Ethernet networks.

### Example IP Configuration of test stations and outdoor bridges with default configuration parameters:



1. Start a continuous ping from test Station A to bridge end point A. To start a continuous ping using the factory default IP settings of the bridge, type the following into a DOS or CMD window on test station A:  
  
`Ping 192.168.1.70 -t` (leave this ping window running so you can see ping results easily)
2. If there is no response, try IP address 192.168.1.71, or cycle the power on bridge end point A.

#### Note

Check that the Ethernet link light is on at test station A if connected directly to bridge A with cross-over cable, or on the switch/router port that bridge A is plugged into if connected with a straight-through Ethernet cable.

If the Ethernet link light is on and you cannot ping bridge A, then re-check IP address and subnet mask settings for test station A.

After ~30 seconds, you should see ping responses from 192.168.1.70 (bridge A). If you see ping responses on test station A, you have an IP network connection between test station A and bridge A.

If you can ping bridge A, you can open the HTTP configuration utility and network management system (NMS) using a web browser. You will not be able to ping across the link to bridge B until WirelessGRID bridge list authorization entries are made in both bridges. (See step 3)

3. Setup the Ethernet network connection between bridge B and test station B using the same procedure described above, then verify that the test station B to bridge B setup is correct.

**After verifying that both bridges and their respective test stations can communicate via Ethernet, go to step 3.**

#### NOTE

When doing a multipoint bench test, it is easiest to setup the base station as bridge A, and the first subscriber unit as bridge B using the procedure above. To test additional subscriber units, repeat step 3, substituting a new subscriber unit (with a different IP address) one at a time. This will help to simplify diagnostics and reduce confusion.

### Step 3. Setup bridge software configuration for WirelessGRID link

After verifying that both bridges and their respective test stations can communicate via Ethernet, you will need to setup and verify bridge configuration so they will be able to communicate over the radio link. The configuration given here will be a minimal configuration for test purposes; for more detailed configuration information, please refer to the product manual.

#### NOTE

Factory default administrative User Name and Password are **Airaya** with an uppercase **A**

As a security measure, the WirelessGRID http configuration utility and network management systems (NMS) will timeout if left open with no activity for 3 or more minutes. You will need to re-login to again access the utility.

1. On each test station, open an **http** session by entering the bridge IP address into the address field of your web browser. The correct format is: <http://192.168.1.70>, or whatever the bridge's IP address has been set to.
2. Login using the default Administrator name and password. Each test station should now be displaying the "Current Settings" screen.
3. Record the IP address and MAC address of each bridge. You can also enter a Unique Name under the Admin *Setup* tab to help in identifying bridges. It is common to use this field to enter 32-character location identifiers.

Bridge	IP Address	MAC Address	Unique Name
A			
B			
C			
D			
E			
F			

4. Under **WirelessGRID Bridge List**, on bridge A, click "Add New," and enter bridge B's MAC address in the "Bridge MAC Address" box, using the xx:xx:xx:xx:xx:xx format. Click "Add New."
5. On bridge B, use the same procedure above to add bridge A's MAC address.
6. On the "Security" tab, make sure both ACL Authentication and encryption are disabled.
7. On each bridge, click on the "Reboot" button on either the Network Settings or Radio Settings tab to enable new WirelessGRID Bridge List settings.
8. On each bridge, reopen the http interface and verify that entries were correctly saved by reviewing the "Current Settings" screen.

**After verifying that both bridges have the proper WirelessGRID Bridge List settings, go to step 4.**

### Step 4. Test network connectivity across a WirelessGRID link

After verifying that both bridges and their respective test stations can communicate via Ethernet, and confirming new WirelessGRID bridge list entries were saved, the following ping tests should be done.

#### NOTE

After rebooting bridges, the radio link should be established within one minute. If TPC and DFS are enabled, this process may take up to two minutes.

To verify network connectivity across a WirelessGRID link, you should use test station A to do the following:

Ping 192.168.1.70 -t to ping bridge A

Ping 192.168.1.71 -t to ping bridge B across the wireless radio link

Ping 192.168.1.72 -t to ping test station B across the wireless link

**If all ping tests are successful, then you have a properly configured WirelessGRID link. Go to Step 5.**

#### Troubleshooting tips for pinging across a link:

If you do not get a ping across the two end points from test station A to test station B;

You may have a power problem

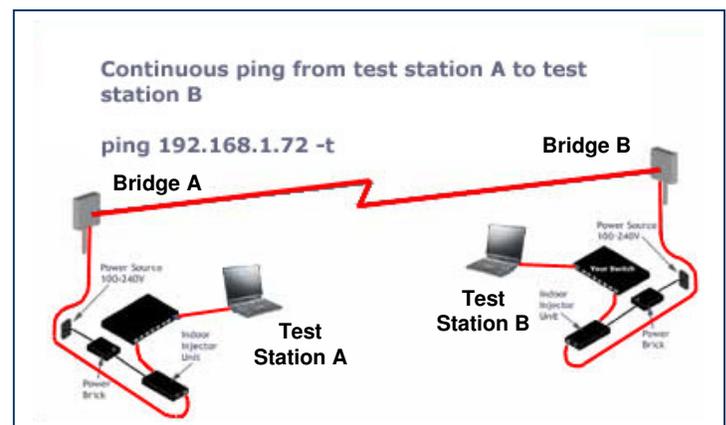
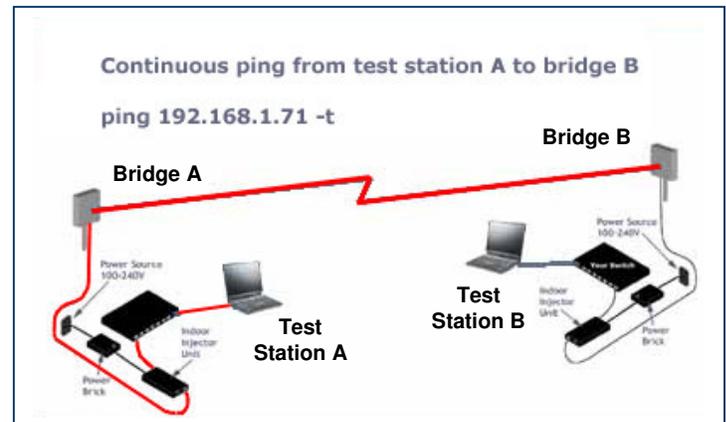
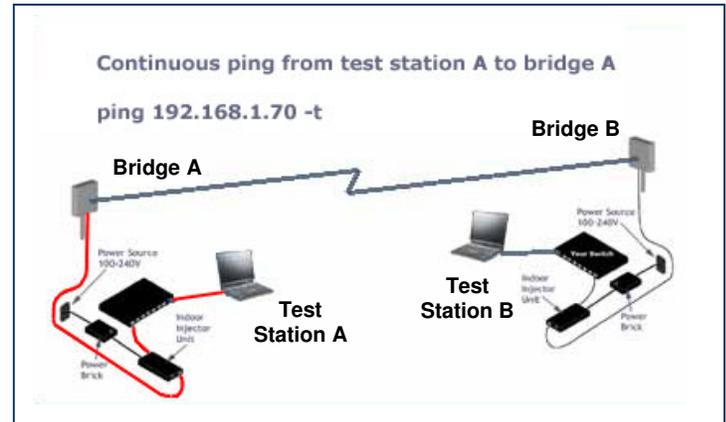
- Verify that each bridge is connected to a power source with the proper input voltage.

You may have an Ethernet network cable problem at one end

- Verify all physical connections. You should have an Ethernet link light on the switch, router, or computer connected to each bridge.

You may have an http configuration error

- Verify the configurations of both bridges using the http NMS. Bridge A should have an entry in its WirelessGRID Bridge List for the MAC address of the bridge B, and bridge B should have an entry in its WirelessGRID Bridge List for the MAC address of the bridge A - without correct MAC addresses (bridge authorization) in each side of the link, the bridges will not communicate or let traffic pass.



#### NOTE

When doing a **Multipoint bench test**, it is best to setup the base station as bridge A, and the first subscriber unit as bridge B using the procedure in Step 3. To test additional subscriber units, use this procedure for each new subscriber unit, repeating the ping test for bridge B one at a time. Use different IP addresses for each new subscriber units. (E.g. Ping 192.168.1.74 -t for subscriber two, and so on) This will simplify diagnostics. Once all subscriber units (SU) respond to this test and you have verified that each subscriber has a different IP address, you can power up all SU's and each one should be ping-able.

### Step 4a. Check throughput of WirelessGRID link (optional)

To check the throughput of a WirelessGRID link, use an FTP program or some other type of throughput measuring utility to check the speed of your link. If you don't know what program to use to test link throughput, AIRAYA can provide you with a traffic generating program and shareware throughput monitoring utility at no charge. A link to these utilities can be found on the main page of the AIRAYA support section of website. [http://www.airaya.com/products/productdb/product\\_support.asp](http://www.airaya.com/products/productdb/product_support.asp)

If you are planning to do meaningful throughput tests, you will need a minimum of 2 test stations with at least 1.6GHz processors and Windows XP, 2000, or the Linux operating system. Windows 95, 98, ME TCP/IP stacks limit TCP throughput and cannot be used to accurately test throughput on an AIRAYA WirelessGRID link.

AIRAYA's internal bench test results can be found at the following web address:  
[http://www.airaya.com/products/wirelessgrid\\_testdata.html](http://www.airaya.com/products/wirelessgrid_testdata.html)

#### NOTE

If you use 10 Mbps Ethernet to communicate with a WirelessGRID bridge, you **will not** get maximum throughput, and packet errors may occur between the bridge and your 10 Mbps Ethernet device. AIRAYA recommends 100 Mbps Ethernet switches or routers to maximize throughput. Throughput tests will not work if Step 4 above has not been finished successfully.

### Step 5. Running the exclusive real-time WirelessGRID signal strength monitor

In this document, we discuss only the use of the WirelessGRID's exclusive real-time signal strength monitor. At anytime and from any location in your network, this monitoring tool can be used to check signal quality between any two WirelessGRID bridges in the network.

Additional information on our web-based Signal Strength Indicator and RSSi Graph, and detailed physical antenna adjustment instructions can also be found in the product manual.

#### NOTE

When field deploying a new WirelessGRID link or multipoint system, it is important to use the antenna alignment utility, combined with the physical antenna alignment process, to optimize the received signal strength between bridges. This applies to both point-to-point links and entire multipoint or mesh networks. The longer the path between two locations, the more important these tools are in optimizing signal strength and data throughput, and maximizing link reliability. This tool should always be run at BOTH ends of a point-to-point link to ensure both antennas are properly aligned.

Optimal RSSi values for field deployments range between 18 and 40. Values seen in bench tests can be as high as 75. The difference between such figures is normal, due to factors such as expected loss of signal strength along the wireless path, antenna alignment differences, environmental issues, and other variables.

With steps 1 through 4 completed, and a ping session running to verify you're connected to bridge A, open a Telnet session from test station A to bridge A using the following steps.

1. Open a Telnet session to the bridge A, IP address, port 3000 (see example below).



2. At the Telnet prompt, enter the User Name and press Enter.
3. Enter the Password and press Enter.
4. Enter the Remote MAC Address of bridge B and press Enter.

When you've entered the remote MAC address of bridge B and pressed Enter, you should see receive signal strength values (displayed in dBm) streaming across the Telnet screen (see figure below). These values indicate the RSSi (signal strength) of the RF packets sent from bridge B.

```
Telnet 192.168.1.70 3000
login: Airaya
password: Airaya
Remote MAC address: 00:11:F8:2a:3b:b2

18 19 20 17 18 20 19 20 19 17 19 19 19 19 20 19 19 19 20 18      avg: 19
20 19 20 20 20 18 18 17 20 18 19 20 19 19 17 21 19 19 20 18      avg: 19
19 21 19 19 20 20 20 20 21 20 21 20 19 19 18 19 19 19 19 19      avg: 20
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19 21 19 19 19 20 20 20 19 20 21 20 18 19 20 20 17 17 18 20      avg: 19
20 20 19 18 19 19 19 19 18 18 19 20 19 19 18 20 20 20 20 19      avg: 19
18 19 18 20 20 20 17
```

**NOTE**  
If you see very few or no values streaming across the screen, there is probably no traffic going across the radio link. You can generate traffic by opening additional ping windows or FTP file transfers on your test stations if you do not have a traffic-generating program.

The first 20 values displayed on each line represent individual RSSi values; the 21st represents the average of the first 20 values (e.g.: avg: 19). Focus on obtaining the highest average values.

The key to achieving optimal throughput and reliable radio communication is to obtain the highest possible average RSSi values for bridges at BOTH ends of a link. This means you need to run this utility from both ends of a link to ensure signal strength is good in both directions.

Now that you are familiar with operation of two stations, and if you are testing a multipoint installation, you can add subscriber units to your test, one at a time. Be sure to add ONLY the BSU MAC address to each subscriber units' WirelessGRID bridge list, and add all subscriber MAC address to the base station's WirelessGRID bridge list.

### Step 6. Field deployment of WirelessGRID bridges

It is a good idea for you to become familiar with the product before installing it for the first time. AIRAYA recommends you perform a bench test before deploying any units to the field.

The bench test and verification process can also be performed in the field, but it is generally much easier to configure the units on the bench before setting them up in the field.

Changes in field-deployed bridges include but are not limited to the following:

1. IP Addresses to match your network
2. Change the administrative user name and password to prevent un-authorized access the administrative interfaces
3. Location-specific unique names entries to help in identifying units in the field
4. Encryption enabled if you want your data encrypted as it travels across your new WirelessGRID system.

Comments or questions on this guide should be sent via email to [support@airaya.com](mailto:support@airaya.com)

### Appendix A. Multipoint Bridge Configuration Log

Bridge	IP Address	MAC Address	Unique Name
1 (BSU)			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
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