Wireless Interactive
Communications Inc

ORION

900 MHz OFDM
Users Manual

August 2006, Version1.04

Notice : The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, no change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio technician for help.

Changes or modifications not expressly approved in writing by Wireless Interactive Comm. Inc. may void the user's authority to operate this equipment. Wireless Interactive Comm. Inc. can not accept any financial or other responsibilities that may be the result of your use of this information, including direct, indirect, special, or consequential damages. Refer to warranty documents for product warranty coverage and specifics.

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About This Manual

This manual includes install, configuration and trouble-shooting for the Orion-900, 900MHz ISM band radio.

Technical Support

If you have difficulty resolving a problem while installing or using this wireless product, Please contact your supplier for support.

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

Table of Contents

Symbols

This publication uses the following symbols to convey instructions and information:

	This symbol means **reader take note.** Notes contain helpful suggestions or references to materials not contained in this manual.

	This symbol means **reader be aware.** In this situation an action could result in equipment damage or loss of data.

	This warning symbol means **danger.** You are in a situation that could cause bodily injury. Before you install any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Chapter 1   Introduction

The Orion-900, 900MHz OFDM radio is a cost-effective point-to-point / point-to-multipoint, and multipoint-to-multipoint solution for ISM band wireless backhaul deployment equipped with an Ethernet interface.

This radio is one of the first OFDM radios, utilizing 16/64QAM modulation. Although line of sight installations are always recommended, OFDM technology makes the system 'more forgiving' than non-OFDM radios.

This radio is incorporated with Time Division Duplex (TDD) technology that operates on a single channel. This Ethernet product is primarily designed to provide a standard Ethernet interface in a wireless link between distant sites.

1-1   Features and Benefits

- Provides for easy installation and high performance wireless bridging of up to 50Km

- With an effective data rate up to 5.5Mbps, 11Mbps, and 22Mbps, it is one of the fastest and most efficient Ethernet radios in the industry.

- OFDM Technology.

- Channel size/bandwidth flexibility allows the user to select channel size at 5, 10, or 20 MHz for optimal performance.

- Versatile Quality of Service / Time-Division Multiplexing technique. TDM technology can avoid Ethernet packet collision and send packets with more stability and efficiency so to improve the quality of voice and data transmission.

- nx64 selectable user data rates allow for better Quality of Service(QoS).

- WEP 64 bit / 128 bit / 152 bit, WPA-PSK and WPA2-PSK as well as MAC access for added security.

- Easy to use Web-based configuration utility. is fully manageable both locally and remotely. In addition, built-in SNMP support lets the operator, whether ISP or enterprise, expand the network infrastructure with ease.

- IP-68 rated weatherproof housing.

- Multipoint-to-multipoint use allowing every radio installed to not only provide access, but also be used as a repeater for other locations.

- External N-connector allows operators to select the optimum antenna.

Chapter 2   Hardware Installation

Do not work on the system or connect or disconnect cables during periods of lightning activity.

This equipment must be grounded. Never remove the ground conductor or operate the equipment in the absence of a suitable installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain whether suitable grounding is available.

Ultimate disposal of this product should be handled according to all national laws and regulations.

Do not deploy the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (e.g. U.S.:NFPA 70, National Electrical Code, Article 810, in Canada: Canadian Electrical Code, Section 54).

Only trained and qualified personnel should be allowed to install, replace, or service this equipment or your risk voiding your warranty.

To meet regulatory restrictions, the radio and the external antenna must be professionally installed. The network administrator or other IT professional responsible for installing and configuring the unit must be a suitable professional installer. Following installation, access to the unit should be password protected by the network administrator to maintain regulatory compliance.

The *Orion-900,* 900MHz ISM band radio and POE injector can be damaged by incorrect power installation. Read and carefully follow the installation instructions before connecing the system to its power source.

Follow the guidelines in this chapter to ensure correct operation and safe use of the radio.

2-1 Product Kit

Before installation, make sure that you have the following items:

◆   **Wireless Outdoor Bridge**……………………………….……x 1

◆   **Power over Ethernet**……………………………………….x 1

◆   **Power Adapter**………………………………………….…x 1

◆   **Power Cord**………………………………………………..x 1

- ◆ **Mounting kit**.………………………………………………....x 1
- ◆ **Product CD**.………………………………………….…x 1
- ◆ **Quick Installation Guide**.………………………….…………x 1

**NOTE:** If any of the above items are missing or damaged, please contact your supplier for support.

2-2 System Requirements

Before installing the 900MHz ISM band radio, please ensure that you are in access of the following:

- A 10/100 Mbps Local Area Network device such as a hub or switch or cross-over cable when connecting POE directly to a computer
- Category 5 UTP or STP networking cable. (From the PC to POE)
- Category 5 SSTP or SFTP networking cable. (From the radio to POE)
- A Web browser for configuration: Microsoft IE 5.0 or later, or Netscape Navigator 5.0 or later version.
- 110/220V power source

2-3 Mechanical Description

Outdoor Unit (ODU)
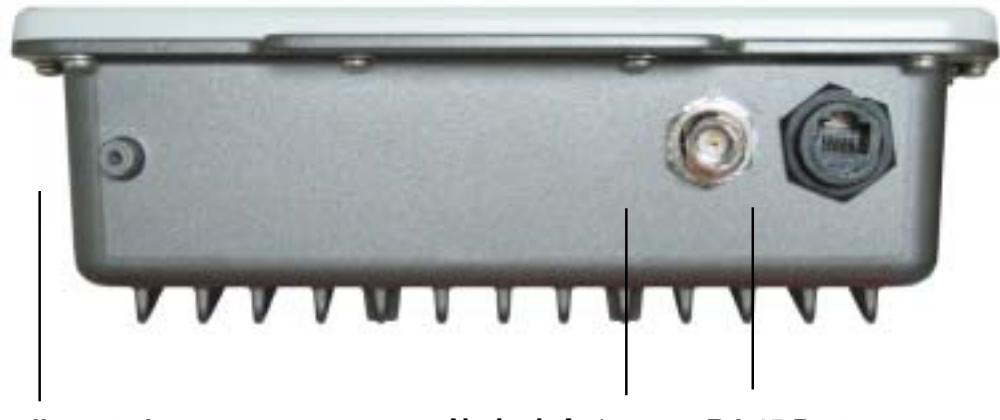
Grounding stud   **N- Jack Antenna** **RJ-45 Port**
                     Connector

Orion-900, 900MHz ISM band radio

1	RJ-45 Port	Use SFTP CAT5 cable with a weatherproof connector to connect to the "TO ODU" side of poe injector.
2	N-jack antenna connector	Attach N-male connector to this port which will lead to the antenna of choice. Shorter RF cable length results in less cable attenuation (a.k.a. cable loss).
3	Grounding stud	Connect to the ground conductor with ground wire.

Power Over Ethernet (POE)

DC Input

LED Indicator (Power)

To Ethernet

To Radio

Power Over Ethernet Injector (POE)

1	**TO ETHERNET**	This RJ-45 port is used to connect to the 10/100 Base-T compliant device such as switch, router or PC.
2	**TO ODU**	This RJ-45 port is used to connect to the ODU and provides power to the radio.
3	DC INPUT	Connect to the power adaptor for DC input.
4	**LED INDICATOR**	When lit, indicates that power is being applied.

Refer to *Hardware Installation Figure* on next page.

⚠️ Note: Improperly connecting into these RJ45 ports can result in damage to your computer network and/or radio.

2-4

Hardware Installation

The Orion-900, 900MHz ISM band radio is a radio device, so it is susceptible to common causes of interference that can reduce throughput and range. Follow these basic guidelines to ensure the best possible performance:

9

- If there is any other 900MHz RF device deployed in the area, try to set the channel to one that does not overlap the interferer. If you are not able to determine what channel the interferer is on, randomly select a channel until the channel with the best signal strength is locked in.

- A clear line-of-sight path can guarantee the best performance. Ensure proper antenna height and no obstructions. Although the Orion-900 can be forgiving under certain circumstances, it is always recommend that. clear line of sight is achieved.
  [**See Radio Horizon Graph; Chapter 3, page 14**]

OUTDOOR

INDOOR

TCP / IP Based Device

Omni Antenna

900MHz licensed radio

10/ 100 Base T

10/ 100 Base T

Router / Switch (Optional)

AC Outlet 110V~240V

Power adaptor

POE
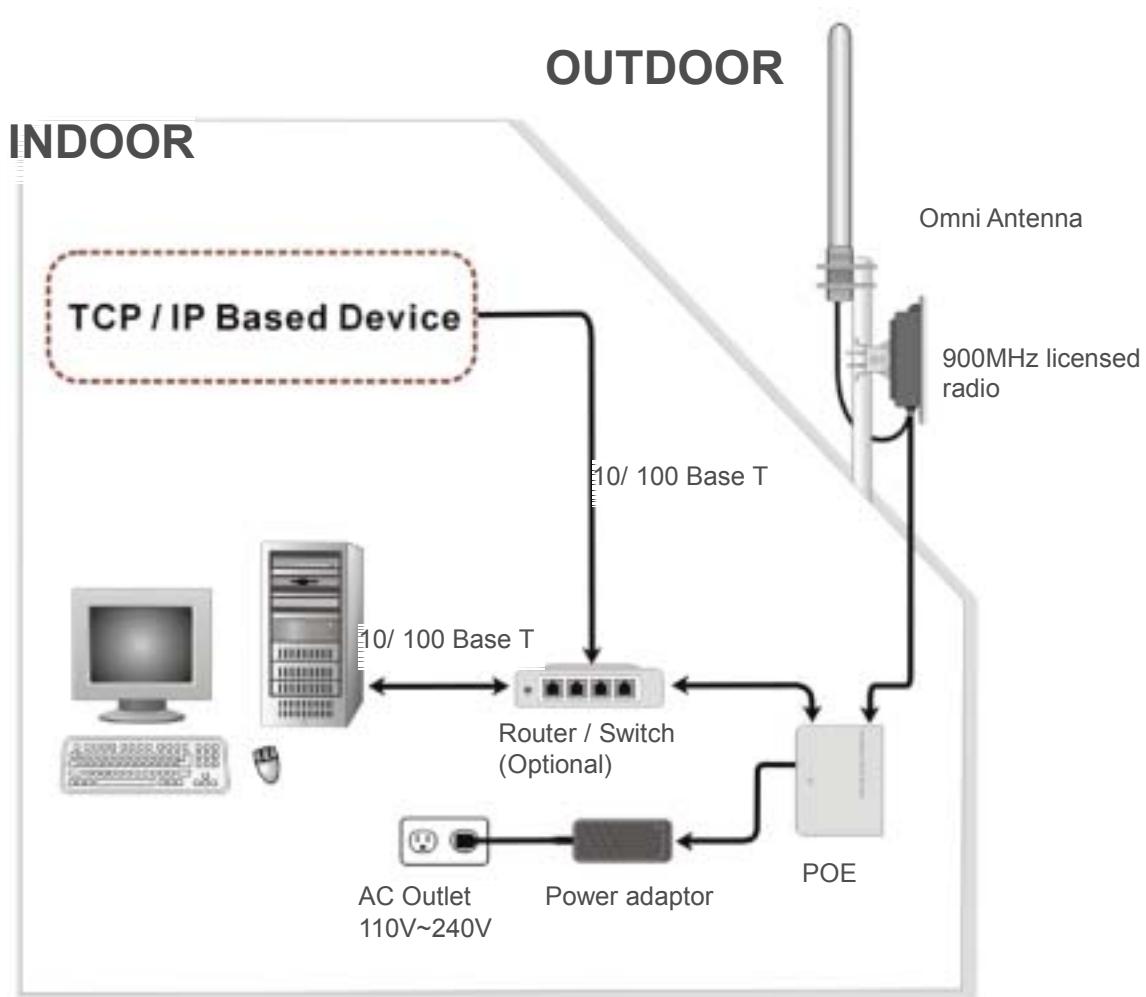
Hardware Installation Figure

Configure and test the Orion-900, 900MHz ISM band radio indoors first before installing and mounting antennas.

The Power Over Ethernet Injector is not a waterproof unit, and should not be exposed outdoors without protection or you may void your warranty.

Chapter 3 Configuration

3-1 Start-up and Log in

In order to configure your wireless bridge, you must ensure that your computer that is either plugged into the switch or direct to the bridge is programmed correctly via your network settings. When using a computer to connect direction to the radio, ensure a cross-over cable is used from the computer to the POE.

When the Orion-900 radio is powered up, expect a 40-50 second delay before you can access it with your computer.

Using Windows XP

1. Click on the **Start** button and select **Control Panel**, then click on **Network and Internet Connections.** Then click on **Network Connections**. Your network connections window will appear.

2. Double-click on **Local Area Connection**. The **Local Area Connection Status** window appears. Click on Properties and then double-click on **Internet Protocol (TCP/IP)**.

3. At this point write down your displayed network settings, as at your discretion, you may want to set them back to these after configuring your radio.

4. Check each of the tabs and enter/verify the following settings:

IP Address: any IP address within 192.168.1.2 to 192.168.1.254.
Do not use 192.168.1.1

Subnet Mask: 255.255.255.0

Default gateway: leave blank

DNS Fields: leave all blank

5. Click OK.

6. Click OK at the **Local Area Connection Properties** window.

7. Click Close. Your computer now has the IP address you specified.

NOTE: THE ABOVE STEPS ARE REQUIRED TO ACCESS THE RADIOS FROM ANY COMPUTER WITHIN YOUR SUBNET MASK. IF YOU DECIDE TO CHANGE THE IP ADDRESS OF THE RADIO MANUALLY, THEN TO ACCESS IT, YOU MUST CHANGE YOUR COMPUTERS IP ADDRESS. FOR EXAMPLE, IF YOU CHANGE THE IP OF THE RADIO TO 192.168.100.1, THEN YOUR COMPUTERS IP ADDRESS MUST BE 192.168.100.2 TO 192.168.100.254.

1. Type the IP address **http://192.168.1.1** in the address bar of your browser (Internet Explorer for example).

2. The main page will appear.

3. Enter the system name (the default setting is "**admin**") and password (the default setting is "**password**").

4. Click on the "**Login now**" button.

After you have logged-in to the main page, the **About, Basic Setup, Wireless Setup, Tools, Status,** and **Management** buttons will be shown. The main menu provides links to the all areas of the web configuration interface.

About

The About screen describes the product information. Information of the radio includes:
Wireless bridge Name, MAC Address, and **Firmware Version**.

Basic Setup

The **Wireless bridge Name** is used to give a name to your Wireless bridge. This will enable you to manage your Wireless bridge more easily if you have multiple radios on your network (note: this is not the SSID of the radio).

Ethernet Data Rate: you can choose the Ethernet data rate you require. It is best to leave it at automatic.
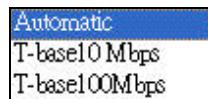
Spanning tree protocol (STP): You may Enable or Disable the Spanning Tree Protocol used in this Wireless bridge.

IP Address: Type the IP address you prefer to set to your Wireless bridge. (Default: 192.168.1.1). It can be left alone, but it is recommended that it is change to a similar (non-used) IP address within your network. This may make it easier to access so to avoid having to change your computers local network settings each time you want to access the radio.

IP Subnet Mask: The Wireless Bridge's Subnet Mask must be the same as your Ethernet network.

Default Gateway: This may be changed to that of your network (your routers IP address for instance). Please see your network administrator.

Primary DNS Server: The Wireless Bridge will use this value for the primary Domain Name Server. It may or may not need to be changed. Please see your network administrator.

Secondary DNS Server: The Wireless Bridge will use this value for primary Domain Name Server. It may or may not need to be changed. Please see your network administrator.

Time: While you are connected to the Internet, it will automatically synchronize the current time with the Time Server that you have set.

Time Server: the time off of your Time Server.

Time Server Port: the port of your Time Server.

Time Zone: You may select the appropriate local time zone for your radio from a list of all available time zones. Default: GMT.

```
(GMT-12:00) International Date Line West
(GMT-11:00) Midway Island, Samoa
(GMT-10:00) Hawaii
(GMT-09:00) Alaska
(GMT-08:00) Pacific Time (US & Canada); Tijuana
(GMT-07:00) Arizona
(GMT-07:00) Chihuahua, La Paz, Mazatlan
(GMT-07:00) Mountain Time (US & Canada)
(GMT-06:00) Central America
(GMT-06:00) Central Time (US & Canada)
(GMT-06:00) Guadalajara, Mexico City, Monterrey
(GMT-06:00) Saskatchewan
(GMT-05:00) Bogota, Lima, Quito
(GMT-05:00) Eastern Time (US & Canada)
(GMT-05:00) Indiana (East)
(GMT-04:00) Atlantic Time (Canada)
(GMT-04:00) Caracas, La Paz
(GMT-04:00) Santiago
(GMT-03:30) Newfoundland
(GMT-03:00) Brasilia
(GMT-03:00) Buenos Aires, Georgetown
(GMT-03:00) Greenland
(GMT-02:00) Mid-Atlantic
(GMT-01:00) Azores
(GMT-01:00) Cape Verde Is.
(GMT) Casablanca, Monrovia
(GMT) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London
(GMT+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
(GMT+01:00) Belgrade, Bratislava, Budapest, Ljubljana, Prague
(GMT+01:00) Brussels, Copenhagen, Madrid, Paris
```

Note: If you complete the settings, please click on "Apply" for changes to take effect.

3-2 Wireless Setup

Wireless Setup / Radio Settings
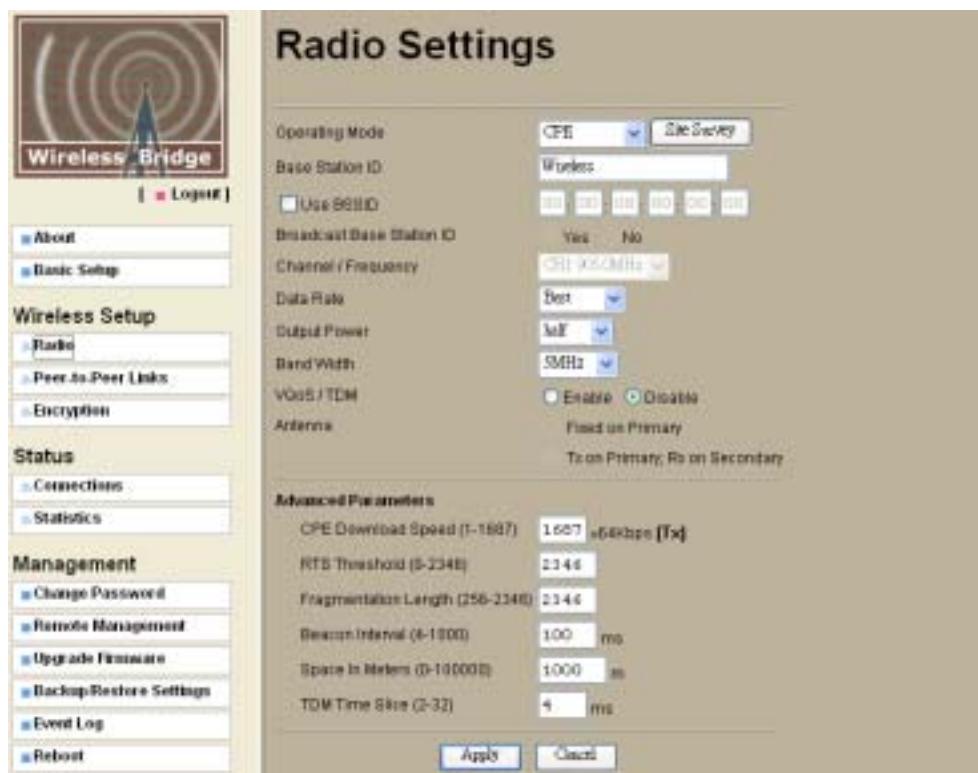
Operating mode: There are 3 operating modes that can be selected in this field. In a point to point environment where there are only two radios, **Peer to Peer** is recommended because it works more efficiently, but one radio as a **base station** and the other as a **CPE** works as well. In peer to peer mode, you are unable to determine signal strength. Therefore, if you decide to program the radio in peer to peer mode, set them up initially in **base station** and **CPE** mode, so that you are able to determine signal strength. Then conduct a site survey, to better align your antennas. The site survey screen refreshes itself every few seconds. You may need to make slight adjustments until you find the best signal. Once you have found your 'sweet-spot', and the antennas are aligned, then you may change the radios back to **peer to peer** mode.
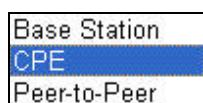
Site Survey: Site survey only works in CPE mode, which can scan for Base stations. See above recommendation (Operating mode). <u>The systems is optimized when the signal strength is higher that -70 dBm. A lower signal of -71dBm or lower may cause the link to fail.</u>
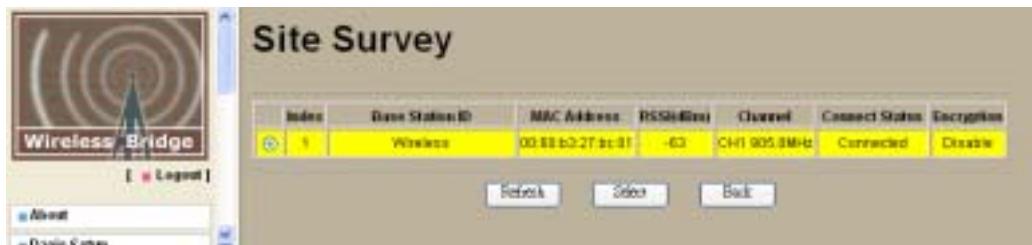
Base Station ID: Commonly called SSID, this station ID works only in Base station to CPE mode. In peer to peer mode, it is not required as the two radios are already 'locked-in' to each other. Ensure that both the base station and the CPE <u>have the identical station ID</u>. Otherwise they will not be able to identify each other. Note that blank spaces within the ID should not be used

BSSID: Basic Service Set Identifier, only works in CPE mode. You can use this in addition to the station ID by adding the mac address of the base station. This adds an extra layer of security to your system.

Broadcast Base Station ID: You can decide to broadcast the Base station ID or not to outside or current users. There is no security risk here and merely a user preference.

Channel / Frequency: Select the appropriate channel/frequency from the list provided. There are 5 non-overlapping channels to select from. If you have done a site survey, you will be able to determine which channel is best to use. If you have not, then you should try several channels to determine the best signal. The channel you select is the center frequency. If you have chosen a 5 MHz bandwidth (see below), then you are transmitting 2.5 MHz below and 2.5 MHz above the selected channel. If you have chosen 10 MHz, then you are transmitting 5 MHz below and above the selected channel.

Output Power: Set the transmit output power of the radio. The options are full, half, quarter, eighth and min. Decrease the transmit power if necessary. The default is "full".

Bandwidth: Set the Bandwidth of the radio. The options are 20MHz / 10MHz / 5MHz. Different bandwidth selections have different throughputs. Below is the list.

Bandwidth	Throughput
5MHz	5.5Mbps
10MHz	10Mbps
20MHz	20Mbps

SEE OUTPUT POWER AND SPECIFICATION CHART FOR THE ABOVE SETTINGS.
Bandwidth, output power and channel selection are all affected during the programming process. Please review this important chart.

VQOS / TDM: Versatile Quality of Service / Time-Division Multiplexing technique. TDM technology can avoid packet collisions and send the packets much more efficiently allowing for higher effective throughput rates.

Advanced Parameters

CPE Download Speed: You can set fractional data rates (nx64 Kbps). This function is only available in CPE to Base station mode. This function allows the administrator to control the amount of data rate each user is receiving.

RTS Threshold: RTS Threshold is a mechanism implemented to prevent the "Hidden Node" problem. If the size of the packet transmitted is larger than the value you set, the RTS will be enabled. When the RTS is activated, the wireless bridge will use a (RTS/CTS) mechanism for data transmission. The setting range is 0-2346. Typically it is not changed and should only be changed by the administrator.

Fragmentation Length: The fragmentation mechanism is used for improving the efficiency when there is high traffic within the wireless network. If you transmit large files in a wireless network, you can enable the Fragmentation Threshold and specify the packet size. This specifies what the maximum size a data packet will be before splitting and creating a new packet. The setting range is 256-2346. For example: If you set the value as 256, it means the packet will be fragmented into "256" bytes while transmitting. Typically it is not changed and should only be changed by the administrator.

Beacon Interval: This value indicates the frequency interval of the beacon. A beacon is a packet broadcast by the outdoor radio to keep the network synchronized. A beacon includes the wireless LAN service area, the outdoor radio address, the Broadcast destination addresses, a time stamp, Delivery Traffic Indicator Maps, and the Traffic Indicator Message (TIM). Typically it is not changed and should only be changed by the administrator.

Space in Meters: This is used for extending ACK time-out destination. The setting range is 0 - 100,000m.

Please set the value in this field according to the true distance, the value you set will affect the performance of the throughput. Our default value is 1,000m.

Time Slice: set the time slice of the VQOS / TDM. This function will allow a certain amount of time (in ms) that data will transmit to each user before it moves to the next user. This is a repetitive cycle.

Wireless Setup / Peer-to-Peer Links
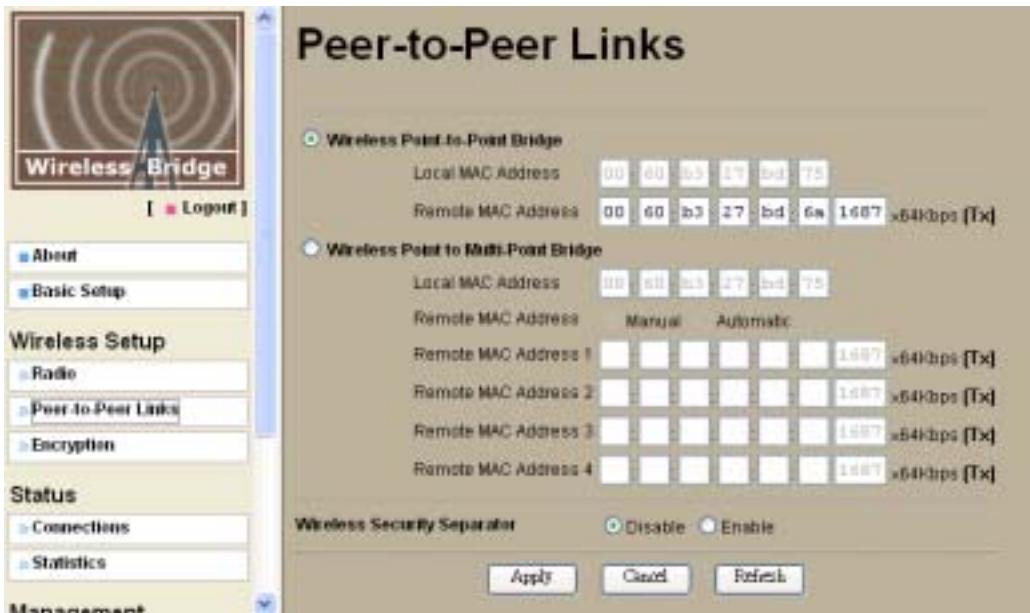
Configure a Wireless Point-to-Point Bridge

To activate the Point-to-Point Bridge mode do the following:

1. Configure radios 1 and 2 in Point-to-Point Bridge mode.

2. Enter the MAC address of radio2 into the "Remote MAC Address" field of radio1.

3. Enter the MAC address of radio1 into the "Remote MAC Address" field of radio2.

After you complete these settings, click "Apply" for changes to take effect.

Configure a Wireless Point to Multi-Point Bridge

There are two options under this setting:

I. Point to Multi-point Bridge:

Assuming radio1 is the base station, and all other radios are clients.

To activate the Point to Multi-Point Bridge mode, do the following:

1. Configure all radios in Point-to Multi-Point Bridge mode.

2. Within radio 1, add the MAC address of all other radios in each segment.

3. Within radio 2, add the MAC address's of radios 1 and 3.

4. Within radio 3, and the MAC address's of radios 1 and 2.

Only 4 remote addresses may be entered. However, each of these remotes may then act as repeater stations for another 4 remotes, etc.

II. Multi-point to multi-point Bridge:

To activate the Multi-Point to Multi-Point Bridge mode follow the exact steps as above.

However, in this case you would enter the MAC address's of other radios within your network. For instance, within radio 3, you may enter the MAC address of radios 2, 4, and 5. This function allows you to expand your network while still providing service to each location. When programming your radio in this manner, ensure that you have not broken your wireless link with the originating base station. For example, in this scenario, if radio 2 is linked to radio 1 (base station), then there is no need for radio 3 to connect to radio 1. It only requires that it is connected to radio 2.

After you complete the settings, please click on "Apply" for changes to take effect.

Under Point-to Multi-Point Bridge mode, you can extend this multi-point bridge by adding additional Wireless bridges for each additional LAN Segment.

Throughput control: you can set the throughput to n*64Kbps in each MAC Address.

Enable Wireless Client Security Separator
Enable this function to let associated clients be able to separate from each other when security is required. The default setting is Disable.

If you complete the settings, please click on "Apply" for changes to take effect.

Wireless Setup / Encryption Settings

To prevent unauthorized radios from accessing data transmitted over the link, the Encryption Settings window offers WEP features, making your data transmission over air more secure and allows you to specify Encryption Key(s) if you enable encryption for the Wireless bridge. There are three types of encryption that could be selected: **64 bits WEP, 128 bits WEP and 152 bits WEP**. Also you can select WPA-PSK (for TKIP) and WPA2-PSK (for AES) for the advance security. Note that AES may not work with all computers given it is a fairly new security protocol.

Open System
Shared Key
WPA-PSK
WPA2-PSK

None
64 bits WEP
128 bits WEP
152 bits WEP
TKIP
AES

WEP Passphrase

There are three methods for creating WEP data encryption:

> 64 bits WEP: Enter 10 hexadecimal digits (between 0-9, a-f and A-F).

> 128 bits WEP: Enter 26 hexadecimal digits (between 0-9, a-f and A-F).

> 152 bits WEP: Enter 32 hexadecimal digits (between 0-9, a-f and A-F).

> The WEP key must be set up exactly the same on the Wireless bridges as they are on the wireless clients. If you set "0011223344" for the Wireless bridge, the same WEP key "0011223344" must be assigned to other client stations. WEP keys are not required when using WPA-PSK (for TKIP) and WPA2-PSK (for AES).

3-3 Status

The connections page provides the below information within the different settings.

| Mode	Information
Base Station Mode	CPE ID, MAC Address, IP Address and Status
CPE Mode	SSID, Channel, Wireless Status and Signal level

Connections Page in Base Station mode

**Connections Page in CPE mode**

Statistics

The Statistics screen provides various Ethernet and Wireless TX/RX packet statistics on the Wireless bridge. Click the Refresh button to update the statistics on this screen.

3-4 Management

Management / Change Password

This option allows you to change the Wireless Bridge's password.
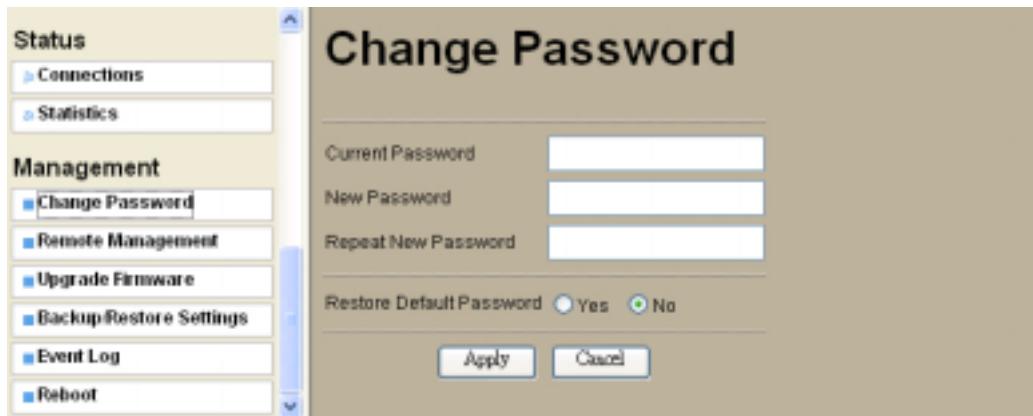
To change the password of the Wireless Bridge, do the following:

1. To change the current password, choose the "Change Password" option from the "Management" section in the Wireless Bridge's left page. Key in the default password "password" in the "Current Password" filed.

2. Changing password for the Wireless bridge is as easy as typing the password into the New Password field. Then, type it again into the Retype New Field to confirm. Click the "Apply" button to save the setting.

After you change the password, please take note of your new password. Otherwise, you will not able to access the Wireless bridge setup.

Management / Remote Management
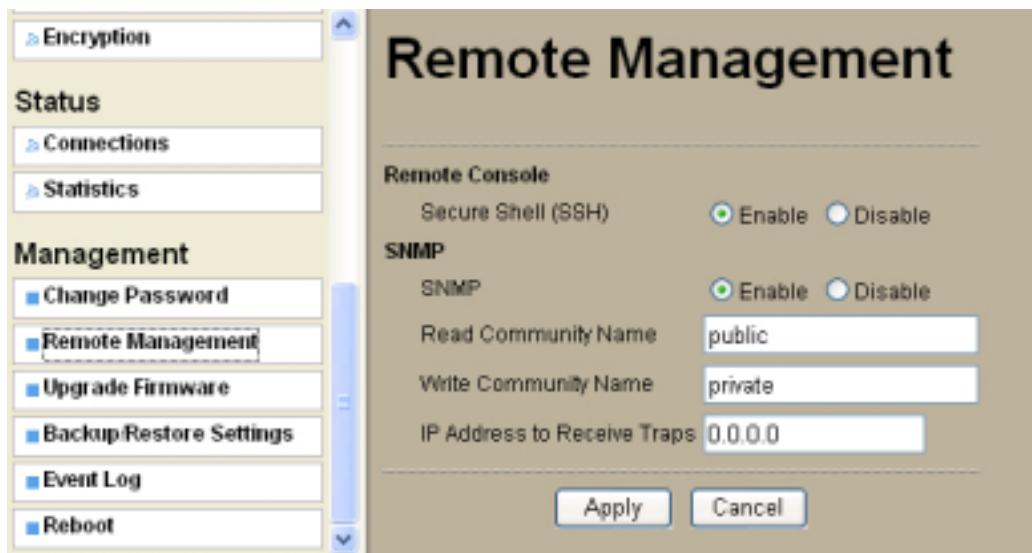
Remote Console

Secure Shell (SSH): If Secure Shell is enabled, the Wireless bridge will only allow remote access via Secure Telnet.

SNMP

Enable SNMP to allow the SNMP network management software to manage the Wireless bridge via the SNMPv2 protocol.

Read Community Name: Allow the SNMP manager to read the MIB objects of the Wireless bridge. The default setting is "public".

Write Community Name: Allow the SNMP manager to write the MIB objects of the Wireless bridge. The default setting is "private".

IP Address to Receive Traps: The IP address of the SNMP manager to receive traps sent from the Wireless bridge.

Click "**Apply**" if you make any changes.

Management / Upgrade Firmware

The Upgrade Firmware menu will display the Upgrade Firmware window so that you could update the latest firmware on the Wireless Bridge.

Please make sure that you have or have downloaded the latest and correct firmware before upgrading.

To upgrade the latest firmware, complete the following:

- Using a browser to access the main page of the Wireless bridge:
  1. Select "Upgrade Firmware" from the Management section.
  2. Input the exact file path and name, or select the file by clicking the Browse button. Then press the Upload button to upgrade the firmware.
  3. Please wait a few seconds.
- If the upload fails, please repeat steps 1~3 again.

Do not power off the unit when it is being upgraded. Once upgraded, the system will reboot. This may take 1-2 minutes before you can access the management software again.

Management / Backup / Restore Settings
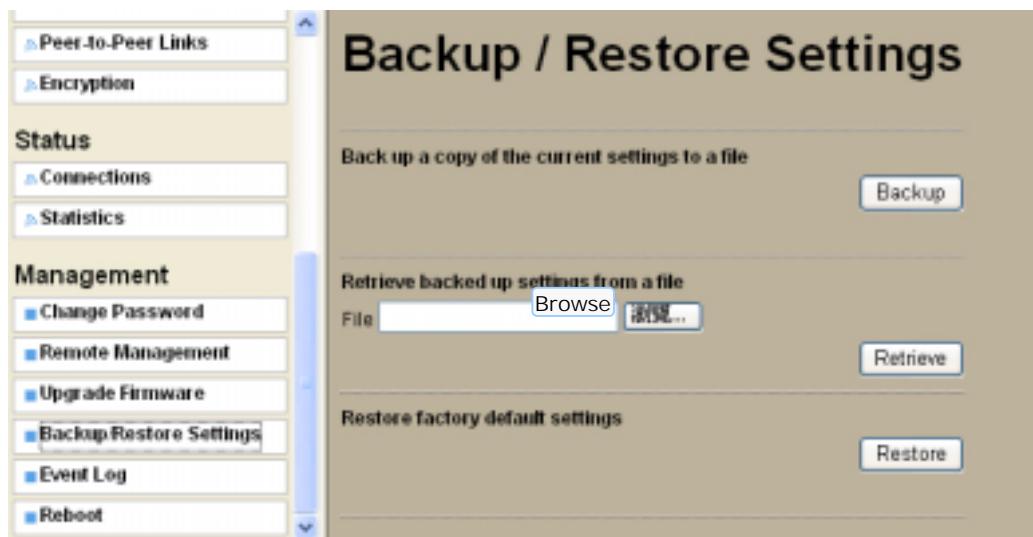
The current system settings can be saved into a file as a backup by clicking "**Backup**". The saved file can be loaded back on the radio by clicking "**Browse**". When you have selected the settings file, click "**Retrieve**" to begin the process. Furthermore, you may click "**Restore**" to restore back to factory default settings.

Management / Event Log
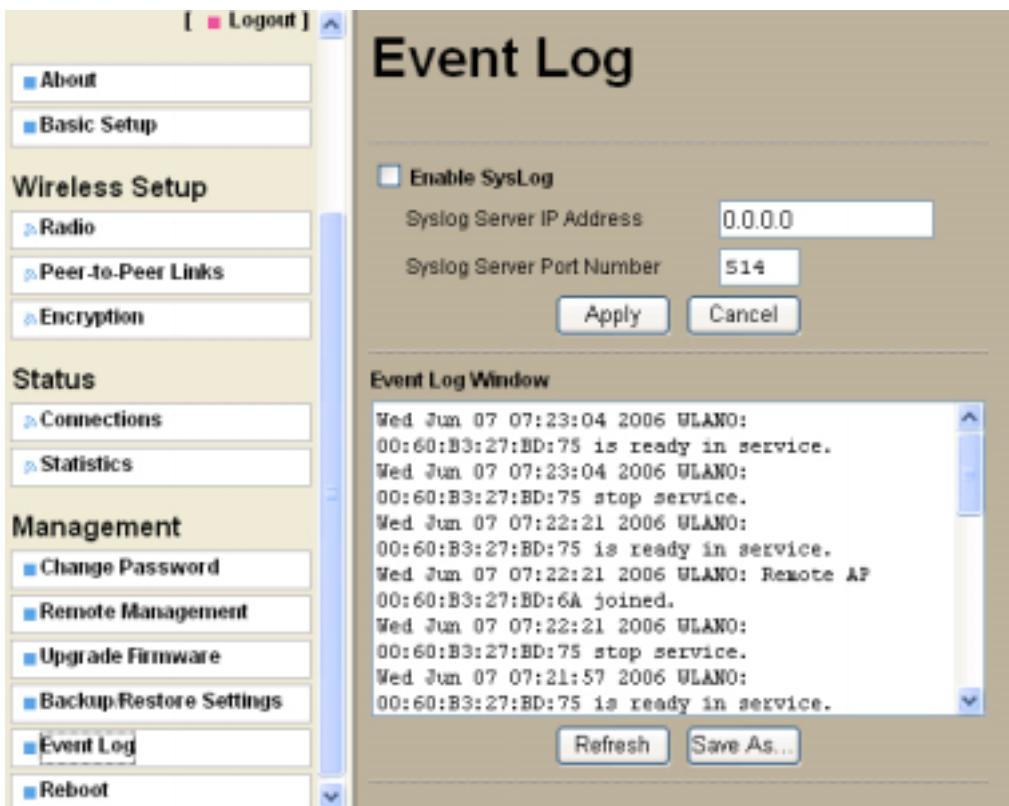
Enable SysLog if you have a Syslog Server on your network environment. If enabled, you need to input the Syslog Server IP Address (default is 0.0.0.0) and the port number your Syslog Server is configured to use. The default port number is 514. The Event Log Window lists Wireless bridge events. Click on "Refresh" to update the network events or "Save As…" to save the event into a file on your computer. Click "Apply" if you made any changes.

Management / Reboot
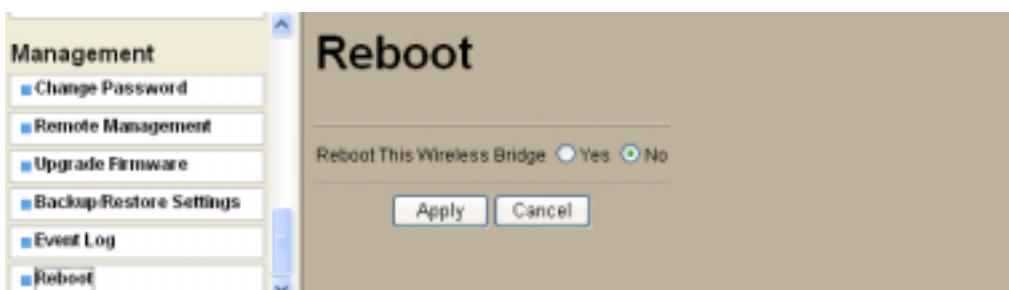
The Reboot screen enables you to reboot your Wireless bridge. If any changes are made and you want them to take effect, you need to reboot the Wireless bridge. Select the "Yes" check box and click "Apply". It will take you about 50 seconds to go through reboot. The Web-browser will not be accessible until the Wireless bridge has finished its reboot process.

Appendix A Frequency table

CHANNEL	FREQUENCY (MHZ)
1	905.0
2	910.0
3	915.0
4	920.0
5	925.0

Appendix B Troubleshooting

This appendix helps you isolate and troubleshoot the Orion-900, 900MHz ISM band radio. Before you start troubleshooting, it is important that you have checked the details in the product user manual first.

In some cases, rebooting the unit resolves any issues. If the below does not help resolve your troubleshooting issue, then please consult the manufacturer.

General

To successfully use the radios, engineers must be able to troubleshoot the system effectively. This section will show you how a 900MHz ISM band radio could be analyzed in the case of "no link". The four main reasons that a link may not work are listed below:

- Configuration
- Path issues (non line-of-sight, distance, obstacles, RF reflection, interference)
- Improper antenna and radio installation
- RF cable that is improperly connectorized or installed
- Networking improperly configured and/or conflicting IP addresses

After verifying the correct configuration (hardware and networking), ensure that the hardware is properly installed. It is recommended that with a tester, you test the Cat5 cable as well as the RF cable. Cat5 cable leading from the POE to the radio should not exceed 150-200 feet. Cat5 cable quality varies from manufacturer to manufacturer and although Cat5 cable can carry data up to 300 feet, it may not be able to carry power effectively to the radio, which may affect the ability to access the radio and/or RF transmitter.

- Check whether the software version at both sides is the most current
- Check for any reported alarm messages in the Event Log
- Ensure that the output power, frequency, and data rates are equal at both ends of the link.
- Ensure that the 'Space in Meters' advanced parameter is properly set. For example, if your link is 10Km, then the value entered should be 10000. If it is 20Km, then it should be set to 20000.

ANALYZING THE SPECTRUM

The best way to discover if there is a source of interference is to use a spectrum analyzer. By turning the antenna 360 degrees, you can find out which direction the interference is coming from. It will also show the frequencies and the level of signal that is detected.

AVOIDING INTERFERENCE

When a source of interference is identified and when the level and frequencies are known, the next step is to avoid the interference as best as possible. Some of the following actions can be attempted:

- Change the RF channel to the one away from the source of interference.

- Change the polarization of the antenna.

In many cases, interference can not be avoided. Alternative ways of handling this issue is to attempt to increase your signal strength. You can do so by decreasing your data rate. Decreasing the data rate will increase the output power of the radio as well as decrease the receiver sensitivity.
[See Appendix C: Output Power and Specification Chart]

Connection Issues

RADIO DOES NOT BOOT

When the Radio does not Boot, do the following steps to check your whole system:

1. Ensure that the power supply is properly working and correctly connected.

2. Ensure that all cables are in good condition and properly connected.

3. Check the power source.

4. Ensure that you are waiting at least 45 seconds before attempting to enter web interface.

CANNOT USE THE WEB INTERFACE

If the radio boots, but the user can't access it using the Web site:

1. Open a command prompt window and enter `ping <ip address unit>` (for example: `ping 192.168.1.1`). If there is no response from the radio, make sure that the IP address is correct. If there is response, the Ethernet connection is working properly, so move on to the next step.

2. Make sure that you are using one of the following Web browsers:

   - Microsoft Internet Explorer version 5.0 or later

   - Netscape version 5.0 or later.

3. Ensure that you are not using a proxy server for the connection with your Web browser.

If you are unable to ping or enter the web interface, check your physical computer network settings and follow the steps described in this manual under 'Start-up and log-in. Double-check the physical network connections, including the cables and the connectors. If your computer is connected directly to the POE, ensure it is a cross-over cable to the POE and a straight cable from the POE to the radio.

Appendix C Output Power and Spec. Chart

When radio channel bandwidth is set at 20 MHz*

Modulation	Sensitivity (BER 1E10-6)	Data Rate	Effective Data Rate	Output power				
				Full	Half	Quarter	Eighth	Min
64QAM	-73dBm	54 Mbps	22 Mbps	26dBm	23dBm	20dBm	17dBm	8dBm
64QAM	-75dBm	48 Mbps	20 Mbps	26dBm	23dBm	20dBm	17dBm	8dBm
16QAM	-79dBm	36 Mbps	18 Mbps	27dBm	24dBm	21dBm	18dBm	8dBm
16QAM	-83dBm	24 Mbps	12 Mbps	27dBm	24dBm	21dBm	18dBm	8dBm
BPSK	-89dBm	18 Mbps	9 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
BPSK	-92dBm	12 Mbps	6 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
QPSK	-95dBm	9 Mbps	4.5 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
QPSK	-98dBm	6 Mbps	3 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm

When radio channel bandwidth is set at 10 MHz*

Modulation	Sensitivity (BER 1E10-6)	Data Rate	Effective Data Rate	Output power				
				Full	Half	Quarter	Eighth	Min
64QAM	-73dBm	54 Mbps	11 Mbps	26dBm	23dBm	20dBm	17dBm	8dBm
64QAM	-75dBm	48 Mbps	10 Mbps	26dBm	23dBm	20dBm	17dBm	8dBm
16QAM	-79dBm	36 Mbps	9 Mbps	27dBm	24dBm	21dBm	18dBm	8dBm
16QAM	-83dBm	24 Mbps	6 Mbps	27dBm	24dBm	21dBm	18dBm	8dBm
BPSK	-89dBm	18 Mbps	4.5 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
BPSK	-92dBm	12 Mbps	3 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
QPSK	-95dBm	9 Mbps	2.3 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
QPSK	-98dBm	6 Mbps	1.5 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm

When radio channel bandwidth is set at 5 MHz*

Modulation	Sensitivity (BER 1E10-6)	Data Rate	Effective Data Rate	Output power				
				Full	Half	Quarter	Eighth	Min
64QAM	-73dBm	54 Mbps	5.5Mbps	26dBm	23dBm	20dBm	17dBm	8dBm
64QAM	-75dBm	48 Mbps	5 Mbps	26dBm	23dBm	20dBm	17dBm	8dBm
16QAM	-79dBm	36 Mbps	4.5Mbps	27dBm	24dBm	21dBm	18dBm	8dBm
16QAM	-83dBm	24 Mbps	3 Mbps	27dBm	24dBm	21dBm	18dBm	8dBm
BPSK	-89dBm	18 Mbps	2.3 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
BPSK	-92dBm	12 Mbps	1.5 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
QPSK	-95dBm	9 Mbps	1.2 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm
QPSK	-98dBm	6 Mbps	0.8 Mbps	29dBm	26dBm	23dBm	20dBm	8dBm

* Tolerance of +/- 1 dBm

Appendix D Antenna Specification

Electrical Specifications						
Model	Frequency Range	Factory Tuned Frequency	Gain	Bandwidth @1.5:1 VSWR	Vertical Beamwidth @1/2 Power	Maximum Power
MFB9153	902-928MHz	915MHz	3dB	20MHz	40°	150 Watts
MFB9155	902-928MHz	915MHz	5dB	20MHz	22°	150 Watts
MFB9153RPC	902-928MHz	915MHz	3dB	20MHz	40°	150 Watts
MFB9153STRPC	902-928MHz	915MHz	3dB	20MHz	40°	150 Watts

Mechanical Specifications					
Model	Wind Survival	Lateral Thrust @ Rated Wind	Bending Moment @ Rated Wind	Height	Weight
MFB9153	100mph	4.3lbs	4.7ft-lbs	23"(590.5mm)	1.251bs(0.56kg)
MFB9155	100mph	8.0lbs	14.2ft-lbs	48"(1219.2mm)	1.751bs(0.56kg)
MFB9153RPC	100mph	4.3lbs	4.7ft-lbs	23"(590.5mm)	1.251bs(0.56kg)
MFB9153STRPC	100mph	4.3lbs	4.7ft-lbs	23"(590.5mm)	1.251bs(0.56kg)