GO Metro Broadband Wireless

Getting Started Guide

Trademarks and Licensing Agreement

GO Networks Inc.
1943 Landings Drive • Mountain View, CA 94043 • USA
Tel +1.650.962.2000 • Fax +1.650.962.2010
Email support@gonetworks.com

Version 1.03

The following information is for FCC compliance:

This device complies with part 15 of the FCC Rules. Operation is subject to the following 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.

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment, this equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However there is no guarantee that interference will not occur.

To meet regulatory restrictions, the outdoor access point must be professionally installed.

The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency when using its internal antennas. Any changes or modifications not expressly approved by Go Networks could void the user's authority to operate the equipment.

The (internal) antennas used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Table of Contents

Introduction

GO Networks' Metro Broadband Wireless (MBW) Solution. The MBW is the industry's first broadband wireless access (BWA) system engineered from the ground up to address the fundamental challenges of metro scale 802.11 access.

The MBW was designed to enable service providers to offer software and hardware redundancy in large-scale, high-interference environments while providing a WiFi and 802.11 standards compliant solution using standard end-user equipment.

The GO broadband wireless access solution integrates smoothly and transparently between client-based devices such as laptops, handsets, PDAs, CPEs, etc. and the transport layer which sends data to the Internet and beyond. At the same time, session-specific information is relayed to the RADIUS server to enable billing, reporting, and statistics.

GO-MBW can be deployed in one of two ways:

- Full solution including both access points, known as WLAN Sector Base Stations (WLS) and one or more network controllers, known as Wireless Network Controllers (WNC).
- Standalone access points featuring the WLAN Sector Base Stations operating with third party network controllers.

The GO Metro Broadband Wireless solution's *Getting Started Guide* documents both of these deployments, and also offers information and instructions for quickly installing and configuring both the WLS and the WNC units. The *Getting Started Guide* also includes a troubleshooting section, offering detailed instructions on a variety of communication, authentication or connection problems that might occur.

GO Wireless Network Controller (WNC)

The Wireless Network Controller (WNC) is a high-performance server/controller that provides functionality such as:

- Inter-base station optimization
- Fast roaming between base stations
- Access to controller functionality, including user authentication
- Quality-of-Service (QoS) provisioning per user or user profile
- Centralized interface for management and billing systems.

The Wireless Network Controller connects between the operator backbone/Internet traffic and signaling and the WLAN access (typically a WLAN Sector Base Station). All traffic passes through the Wireless Network Controller either on its way to the Internet or from the Internet to the station (via the local WLAN Sector Base Station)

Wireless Network Controller offers global spectrum management and is carries central responsibility for dynamically managing the network for optimal system performance. In addition, the Wireless Network Controller is responsible for determining whether a station should "roam" to another WLAN Sector Base Station in the system.

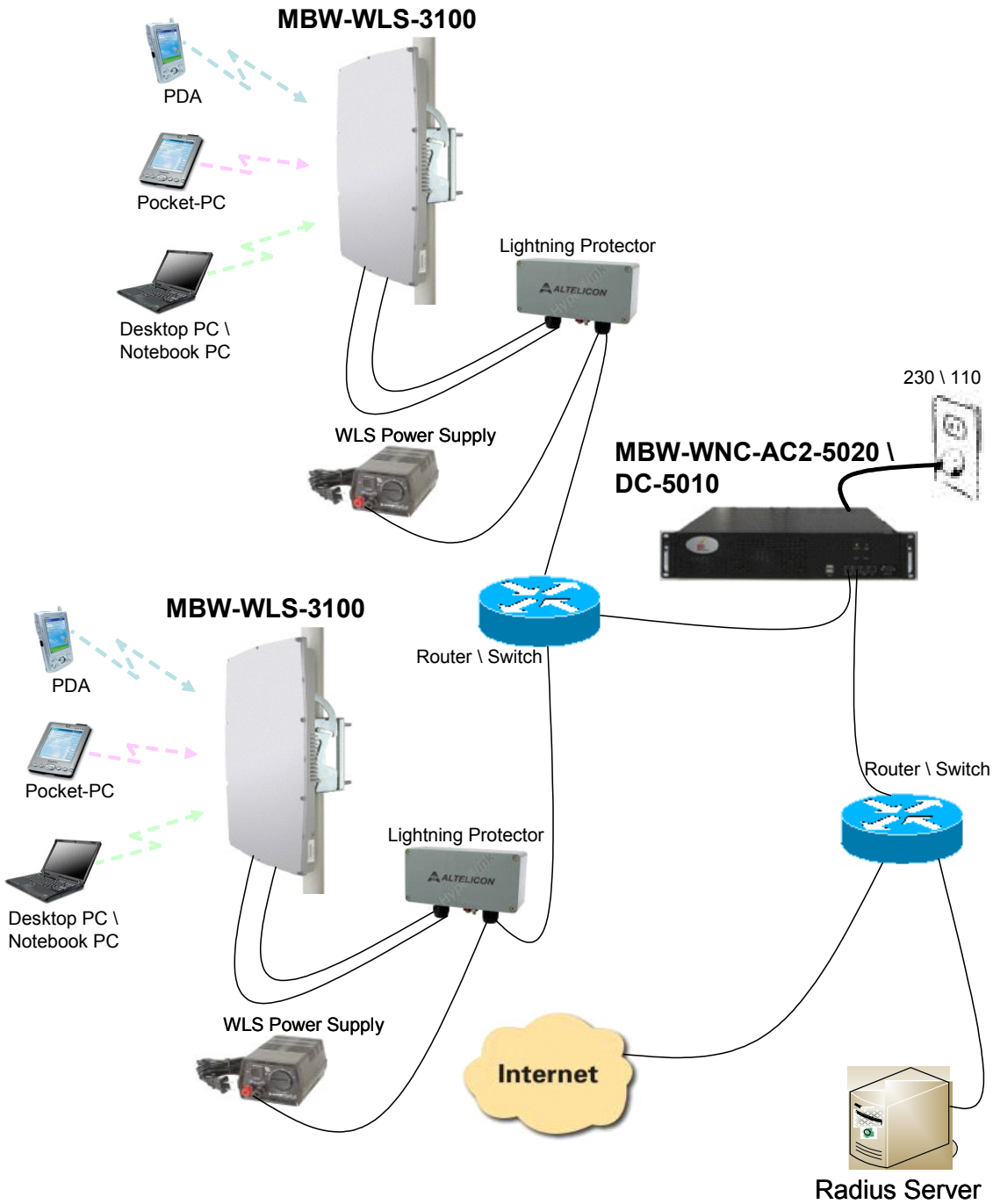
Deployment Options

The Wireless Network Controller can be deployed in one of the following ways:

- **In-line Traffic:** Provides global spectrum management and load balancing of stations between WLAN Sector Base Stations and between channels within the WLAN Sector Base Stations. All Internet-bound traffic is routed through the WNC.
- **Non In-line Traffic:** Global Spectrum management and users' load balancing between WLAN Sector Base Stations/Channels.

The deployment process involves first indoor components of the system, followed by the outdoor installation of the WLS unit on a pole or rooftop wall. Installation and configuration of both the WNC and the WLS are detailed in the following sections.

In-line Traffic Configuration



In the in-line traffic configuration, all traffic is routed through the WNC, enabling both global and local spectrum management and accounting services through the Radius server.

To deploy the system in this configuration:

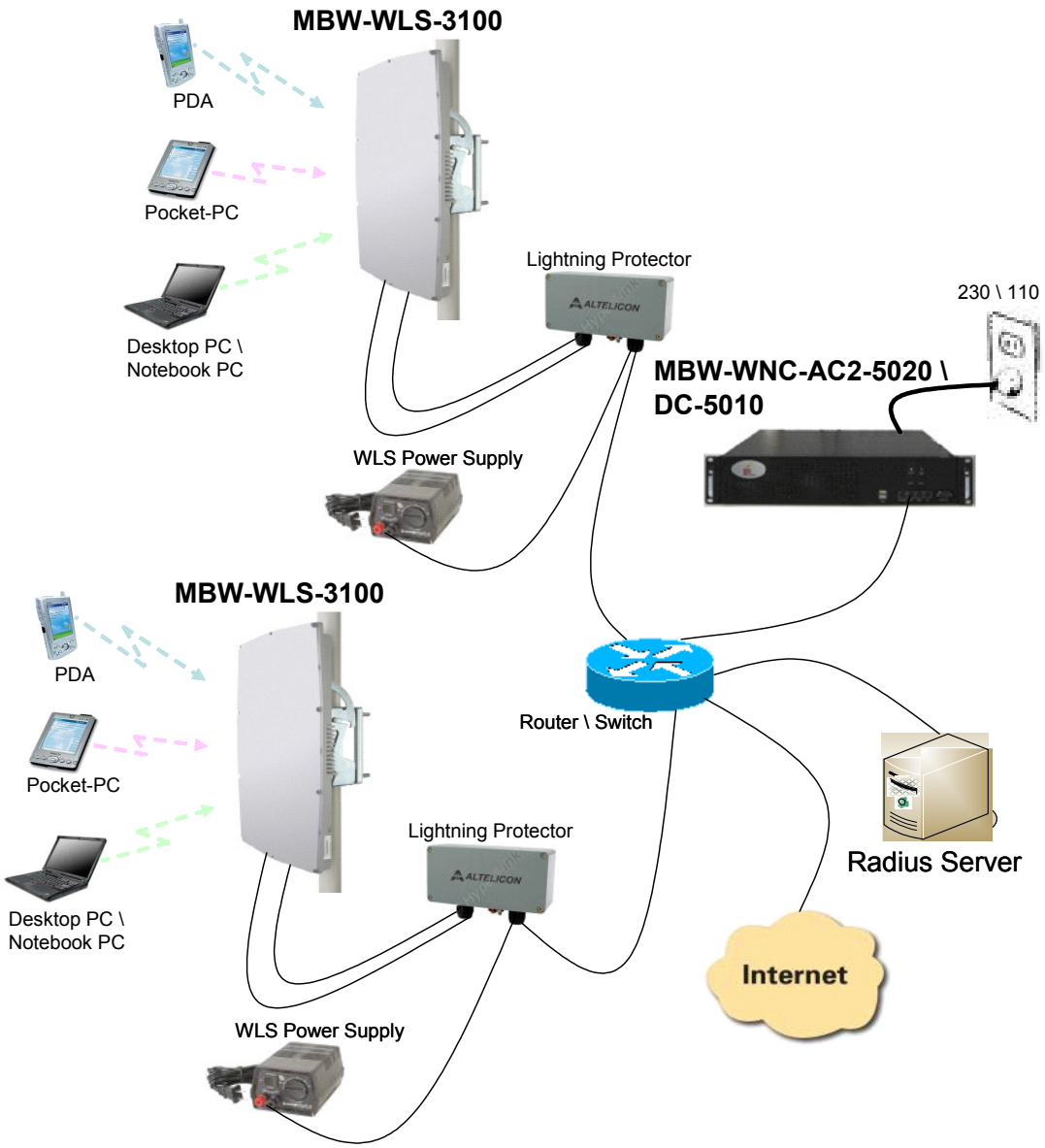
1. Connect all indoor components. These include
   - Lightning protector
   - WLS power supply
   - WNC unit
2. Install the WLS unit.
3. After mounting the WLS unit (see the section on Installing the WLS), verify that client stations have connectivity to the Internet via the WLS unit.

Non In-line Traffic Configuration

In the non in-line traffic configuration, all traffic is routed directly to the router/switch. The WNC can be added to the configuration to provide global spectrum management.

To deploy the system in this configuration:

1. Connect all indoor components. These include:
   - Lightning protector
   - WLS power supply
2. Install the WLS unit.
3. After mounting the WLS unit (see the section on Installing the WLS), verify that client stations have connectivity to the Internet via the WLS unit.


MBW-WLS-3100
PDA
Pocket-PC
Desktop PC \
Notebook PC
Lightning Protector
230 \ 110
MBW-WNC-AC2-5020 \
DC-5010
WLS Power Supply
MBW-WLS-3100
PDA
Pocket-PC
Desktop PC \
Notebook PC
Router \ Switch
Lightning Protector
Radius Server
Internet
WLS Power Supply

WNC Safety Information

Be careful when attempting to lift the equipment. This equipment is designed for installation in a suitable environment with free airflow. Do not block any air vents in the rear panel or on the sides. There are no air vents on the top or bottom of the unit. However, liquids of any type (water, coffee, etc.) should not be placed on or near the unit.

Electrical Safety

It is highly recommended that this equipment be connected to a suitable, uninterruptible power supply unit (UPS).

Before connecting main leads to the units, check that the power cords(s), plug(s) and distribution sockets are in good condition.

Take all necessary precautions when working with disassembled units while they are still under power.

Electro-Static Discharge Precautions (ESD)

Take all necessary precautions when handling printed circuit boards, as all parts in the server are prone to ESD damage.

Use wrist straps that are suitably earthed when removing any parts from the systems.

Redundant Power Supply

WNC units that run on AC power have the option of using a redundant power supply. This option is only available for AC.

CAUTION. When installing the unit, remember that there is a risk of electric shock.

If you only disconnect one power cord, the danger of hazardous voltage from the unit remains a possibility. Disconnect both power cords to remove the risk of hazardous voltage from the unit.

When both power supplies are installed (in AC only), it is recommended that you plug in both power supplies. When only one power supply is connected, the unit will beep continuously to indicate the absence of power in the second connection. This indicates either a faulty AC module, or the fact that one power supply has not been connected. To stop the warning beep, either connect the second power supply, thus creating a redundant power source, or disconnect the second power supply unit completely from the WNC unit.

Electricity Supply

AC Power Operated Unit

Before connecting the WNC unit to the electricity supply, review the information given on the apparatus rating plate and verify that:

- Your power supply is single phase A.C. (alternating current) of the stated frequency with neutral nominally at earth potential.
- Your supply voltage is 100-240 VAC or 115-240 VAC (refer to rating label).
- The current rating is within the capacity of your UPS outlet.
- Your plug or electricity supply circuit is fitted with a suitable branch circuit which is rated 125% of the unit rating or of the selected power cord.
- You should use molded cables when installing the WNC.

DC Power Operated Unit

- The WNC unit should be used in areas designated as "RESTRICTED ACCESS LOCATIONS" with limited traffic.
- Power supply cables should be 2 sets of 2x18 AWG copper wire: using UL Listed cable only.
- Use a UL-approved x A circuit breaker as disconnect device incorporated in the fixed Wiring (between centralized DC power system and power entry module).
- Verify that "ON" and "OFF" positions of the circuit breaker are clearly marked and that the circuit breaker is accessible.
- This equipment should be connected directly to the DC supply system grounding electrode conductor, to a bonding jumper from a grounded terminal bar, or to a bus to which the DC supply system-grounding electrode is connected.

WNC Installation Instructions

- The unit should be mounted in a standard 19-inch equipment rack positioned on a shelf.
- The two L brackets that are part of the unit should be connected to the 19-inch rack with screws.
- The intake and exhaust ports for cooling air are located on the front and rear and both sides of the chassis. Since there are no cooling ports on the top or bottom of the unit, multiple units can be stacked with little clearance requirements within a rack.

Cable Connections

In addition to the power supply connections, the WNC also features a control panel on the front which enables you to connect the Access interface, Net interface, and a Management interface (used during the initial configuration).

The MAC address on the sticker of the unit indicates the Access port. The High Availability interface is not supported in Release 1 of the WNC. In addition, there are two LEDs to indicate the Connection Status and Power Status of the unit.

If the Status light is red, the following procedure should be followed:

1. Check the physical connections to the unit to make sure all cables are securely and firmly connected.
2. Shut the unit down and restart. Wait 5 second before restarting.
3. Call technical support.

Micro-Switches

Reset	Press to reset unit.
Power	Press to turn unit on.

LED Indicators

Status	**Green**	Unit is operational.
	Red	A built-in test has failed.
Power On	**Green**	Unit is on.
	Unlit	There is no power connection.
	Blinking Green	Unit is powering up.

Status:
Green - Operational
Red - Problem

Power:
Solid green

Access Interface:
Blinking orange and green light indicates activity (data transfer rates of up 1Gbps).
The Access Interface connect to the Access Points.

Net Interface:
Blinking orange and green light indicates activity (data transfer rates of up 1Gbps).
The Net Interface connects to the Internet/Intranet.

Consol Port:
RS232

Management (MNG) Interface:
Blinking orange and green light indicates activity (data transfer rates of up 1Gbps).
The MNG Interface is for secure management.

High Availability (HA) Interface:
Blinking orange and green light indicates activity (data transfer rates of up 1Gbps).
The HA Interface is for backing up the Access Controller.

GO WLAN Sector Base Station (WLS)

The WLAN Sector Base Station (WLS) is a high-performance WLAN base station that supports the simultaneous use of two non-overlapping 802.11b/g channels within a 120° sector. The WLAN Sector Base Station provides a wireless access point through which WiFi mobile devices can connect to the Internet for voice, video, and data communication.

WLS Package Components

The WLS unit is shipped ready to install. The WLS unit is packaged with two connectors: an RJ45 connector with a water-proof cover and a power connector with a water-proof cover.

In addition, it is recommended that you also order a mounting kit (either wall mount or pole mount version). The contents of each kit, which is ordered separately, is detailed in the Installation Process section.

Finally, a typical deployment would include installation of a lightning protector, such as the optional one that GO Network can supply.

Because cable requirements are often unique to the location and deployment topology of each installation, power and Ethernet cables are not included in the installation kit. For more info on cable requirements and connections, see WLS Component and Cable Connections.

Deployment Options

The WLAN Sector Base Station can operate in one of two modes:

- **Comprehensive Mode (MBW-WLS-3100)**: the WLAN Sector Base Station can be configured to communicate with the GO Wireless Network Controller (WNC). It will continue to provide local spectrum management and load balancing capabilities, but will also be managed by the Wireless Network Controller, which will provide a more comprehensive global network spectrum management and load balance capabilities across additional WLAN Sector Base Stations to optimize performance for all stations.
- **Standalone (MBW-WLS-3200)**: the WLAN Sector Base Station can be configured to communicate with 3rd party standard Access Controllers. In this configuration, it will provide local spectrum management and load balancing capabilities.

The WLAN Sector Base Station can be mounted on either a pole or a wall to provide maximum exposure and is designed to operate either indoors or outdoors without any degradation of service.

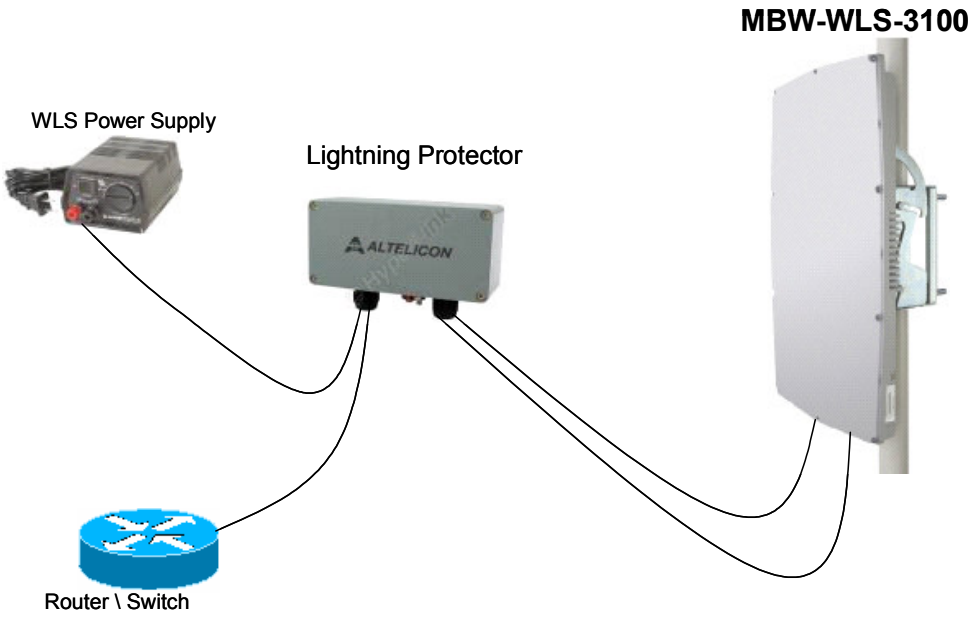
WLS Safety Information

RF Exposure

This outdoor access point product has been found to be compliant to the requirements set forth in CFR 47 section 1.1307 addressing RF Exposure from radio frequency devices as defined in OET Bulletin 65. The outdoor access point should be positioned more than 8 inches (20 cm) from your body or nearby person.

WLS Lightning Protector

When the WLS unit is installed in an outdoor location, all indoor components (Ethernet, power supply) should be connected through a lightning protector.



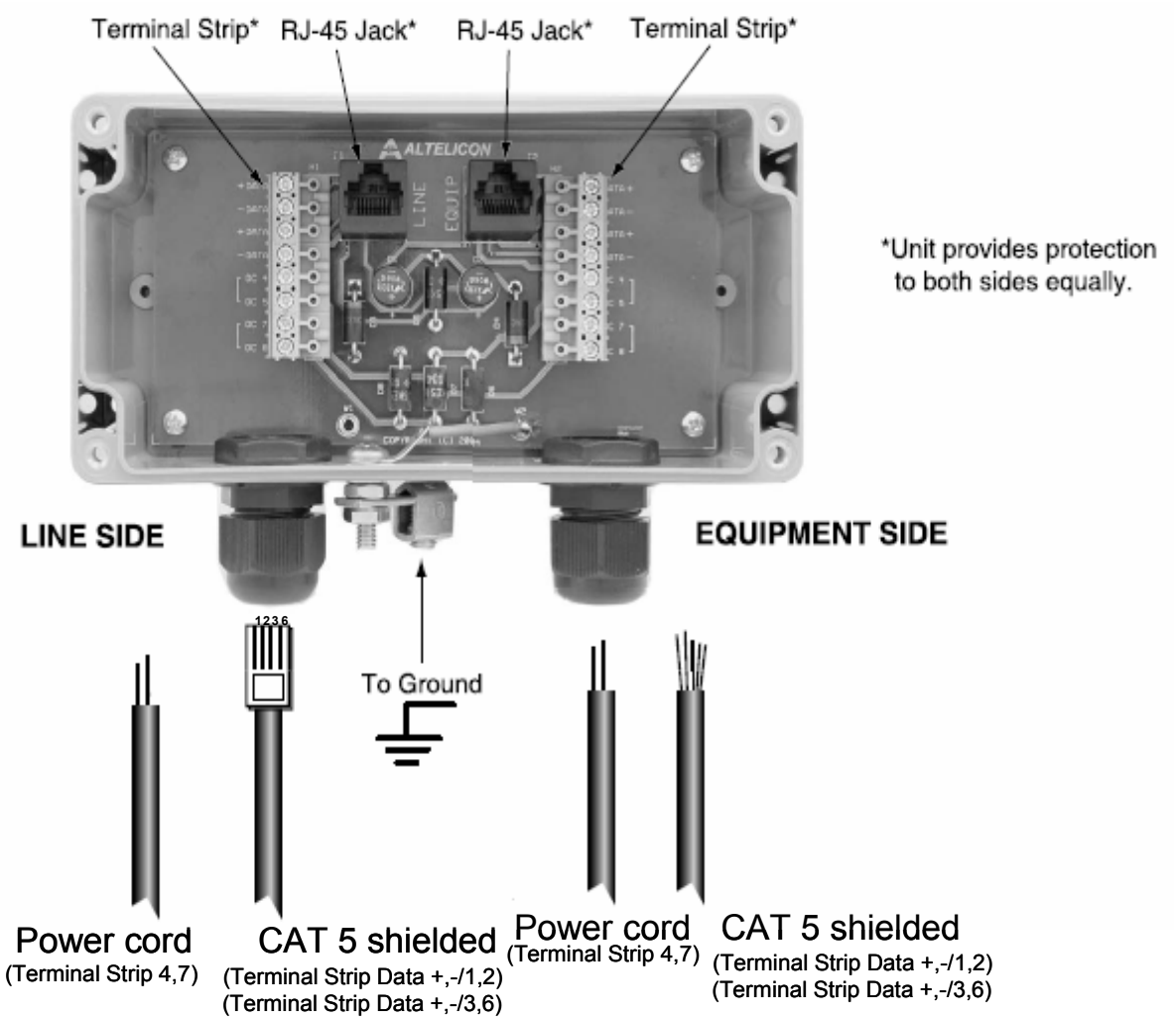
The purpose of the lightning protection is to protect people and equipment located indoors from lightning that might strike the WLS or its outdoor cables. Therefore, the lightning protector (3001) device should be installed indoors, as close as possible to the point where the cables enter the building. The lightning protector can also be installed outdoor, as long as the cables that go from it indoors are well protected from lightning between the box and the building entrance.

Note: **If the WLS is connected To a high current DC power line, a 4A slow blow fuse, suitable for up to 100VDC should be placed on the negative (-) wire.**

Noter: ***Si le WLS est connecte a une puissante alimentation CC, un fusible 4A Slow Blow pouvant soutenir jusqu'au 100VDC doit être place sur le câble négative (-).***

The WLS unit is connected to the WLS power supply via the lightning protector. It is highly recommended that you place the WLS power supply in an indoor location. Alternatively, if the WLS unit is not connected to the power supply, but to a fixed DC line (for example, in a cellular base station) that is effectively not limited in current, a circuit breaker must be placed between the DC source and the lightning protector. The circuit breaker is rated at 4 ampere, and is reliable for up to 100 VDC.

The WLS unit is also connected, again through the lightning protector, to the WNC unit, which offers connectivity to the Internet as well as global and local spectrum management.



Lightning Protector

Verify that you have a shared grounding as shown in the diagram above. GO Networks offers a lightning protector that can be ordered separately. Details of how the lightning protector is connected to the WLS unit (on the Equipment Side), and the router or switch (on the Line Side) are shown in the diagrams in the following sections.

WLS Component and Cable Connections

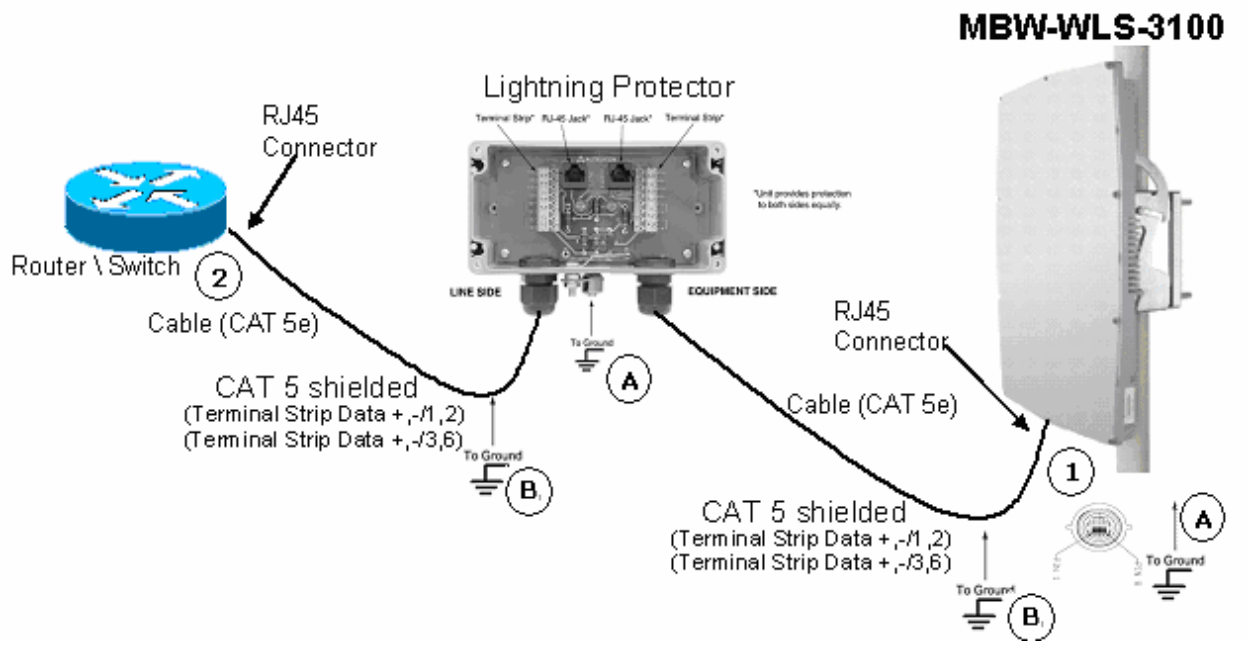
Because cable requirements are often unique to the location and deployment topology of each installation, power and Ethernet cables are not included in the installation kit. In order to install the WLS unit, the following cables should therefore be obtained:

- **Ethernet cable:** CAT5 shielded; maximum length: up to 100 meters.
- **Power cable:** Standard power cable with a maximum length of up to 120 meters, supporting up to 48V and able to withstand outdoor conditions.

Note: Regional regulations vary. Therefore it is recommended that you supply cables that meet local requirements and match the distances between the WLS installation location and the power supply or router.

Ethernet Connection

The following diagram illustrates how the WLS unit uses an Ethernet connection to the router/switch via the lightning protector.



Verify that you have a shared grounding as shown in the diagram above.

In the above diagram:

1 Indicates the connection that is made between the WLS and the lightning protector. In this case, an RJ45 connector (supplied with the unit) is used. A CAT5 shielded cable stretches between the WLS unit and the lightning protector.

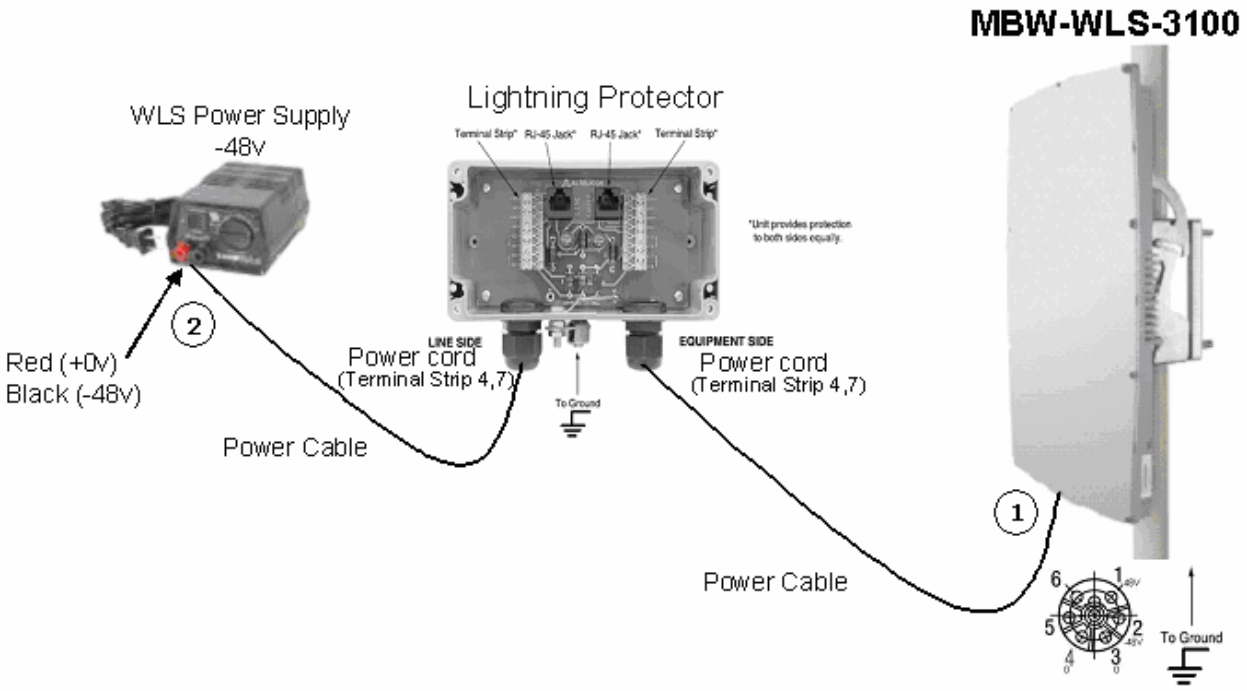
2 Indicates the CAT5 shielded cable and its connection to the Router/Switch, which is also accomplished with an RJ45 connector.

A Indicates shared grounding for the building.

B Indicates shared grounding for the cable.

Power Connection

The following diagram illustrates how the WLS unit should be connected to the power supply via a lightning protector.



Verify that you have shared grounding connected to both the lightning protector and the WLS unit.

In the above diagram:

1 Indicates the two sides of the power cable connection between the WLS unit and the lightning protector. The power connector is included in the WLS package. Use a screwdriver to connect the power cables from both the

power supply and from the WLS to the lightning protector via the terminal strips.

2 Indicates the connection from the lightning protector to the power supply.

Installation Process

Installing the WLAN Sector Base Station involves the following steps:

- Performing a site survey
- Infrastructure development
- Installation of hardware and connectors
- Power up and software configuration
- Brief testing process to verify connectivity and operation

Site Survey

Most wireless LANs include many access points installed in various locations in an overlapping radio-cell pattern. It is important to carefully position each access point's positioning and the assignment of its radio channels. Therefore, a site survey becomes an essential first step before physically deploying the GO MBW solution.

Installation of the access points requires a distribution system, such as Ethernet, to interface the access points to the corporate network or Internet. Part of the site survey should include a detailed understanding of changes that may need to be made to the site (selecting and/or installing poles, for example).

Recommended Site Requirements

It is highly recommended that the WLS unit(s) be mounted near the edge of the roof of a tall building (preferably the tallest building in the area). The WLS unit should be pointed in the direction of the area to be covered. To provide maximum coverage, multiple WLS units can be installed on the same rooftop. However it is important to leave some distance between each unit in order to prevent interference between the units themselves. When choosing the ideal location, it is also important to take into consideration the overall area topology.

For more information, please consult with your GO Networks representatives.

Infrastructure Development

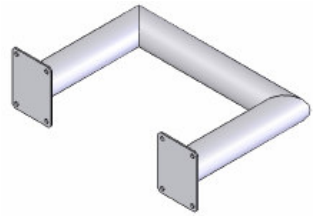
Infrastructure development is likely to vary depending on location. In general, this step would include preparing the locations where the WLS units will be installed. This may include laying cables and locating an electricity source close to where the WLS unit will be installed.

Hardware and Connectors Installation

There are two methods for mounting the WLS unit:

- On an outer wall (typically on a roof or high location to avoid interference from other buildings or trees).
- On a pole (again, on a roof or high location).

Wall Mount



GO Networks has an optional adapter that enables the WLS unit to be installed on a wall.

For more information, contact your local GO Networks representative.

Pole Mount

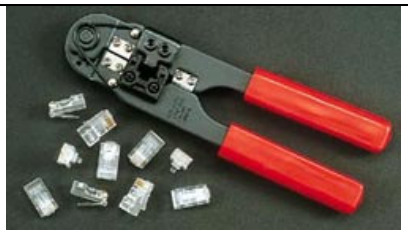
The contents of the Pole Mount kit includes:

Qty	Item
1	Installation Instructions for WLAN Sector Base Station Pole Mount
4	Hex Cap Screw f DIN933 M10x180 ST ST A2
4	Flat Washer ST ST M10
4	Spring lock wash ST ST M10
4	Hex Ribbed Flange Bolt M6X16 Steel Zinc Plated
6	Pan Head Phil. ST ST Screw M5x10
6	Washer Flat ST ST M5
6	Washer Spring ST ST M5
1	Turn Bracket
1	Post Bracket
1	Rear Post Bracket

NOTE: Unless otherwise indicated, all elements are stainless steel.

Tools and Equipment Required

To mount the WLS on the wall, you will need the following tools and equipment.

Power connector crimp tool	
Screw driver – Philips (size 2)	
Ratchet (10 mm. and 17 mm.)	 10 mm.  17 mm.
RJ45 crimp tool	 HT-210A
Console cable	

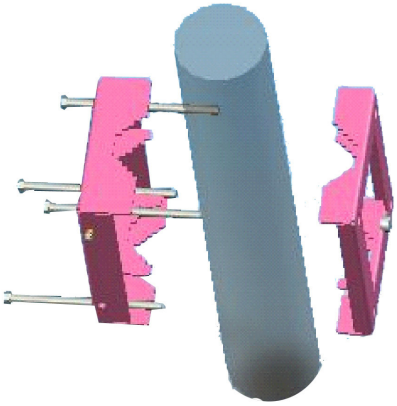
To mount the unit on a pole:

1. Select a convenient mounting location on the pole.

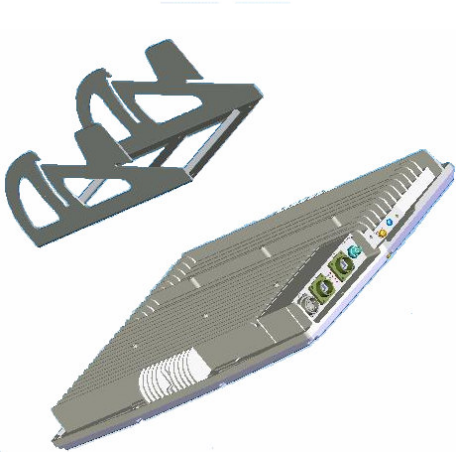
NOTE: **When mounting the WLS on a pole, it should be placed on a pole that can support four times the weight of the WLS (as in the wall mount), as well as the wind loading created by the WLS (maximum of about 470 kg for wind velocity of 200 km/h).**

Noter: ***En installant le WLS sur un pole, il doit être place sur un pole qui peut soutenir 4 fois le poids le poids du WLS (comme dans le pendage mural). Ainsi que la charge du vent crée par le WLS (un maximum de 470 kg pour une vélocité de vent égal a 200 km/h).***

2. Place the two brackets around the pole at the approximate height where you wish to place the unit.



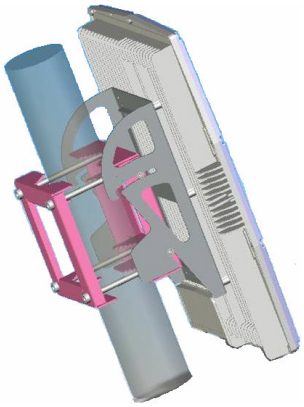
3. Insert the four screws through both brackets and tighten them around the pole so that the two brackets are securely fastened.
4. Attach the WLS unit to the mounting bracket with six screws. Tighten the screws so that the bracket and the WLS unit are securely connected. The connectors should be on the bottom of the unit when it is attached to the bracket.
5. Slide the WLS/mounting bracket onto the pole brackets. You can adjust the tilt of the bracket mount to enhance the coverage and bypass interference for the WLS unit.



NOTE: **Before completing the installation, you should connect the grounding and power cables. The grounding cable should be connected to the grounding screw.**

Noter: ***Le cable de la masse doit etre connecte au visse de la masse.***

The unit is now safely mounted to the wall. See the section on ***Cable Connections*** for information on how to connect and start the unit.



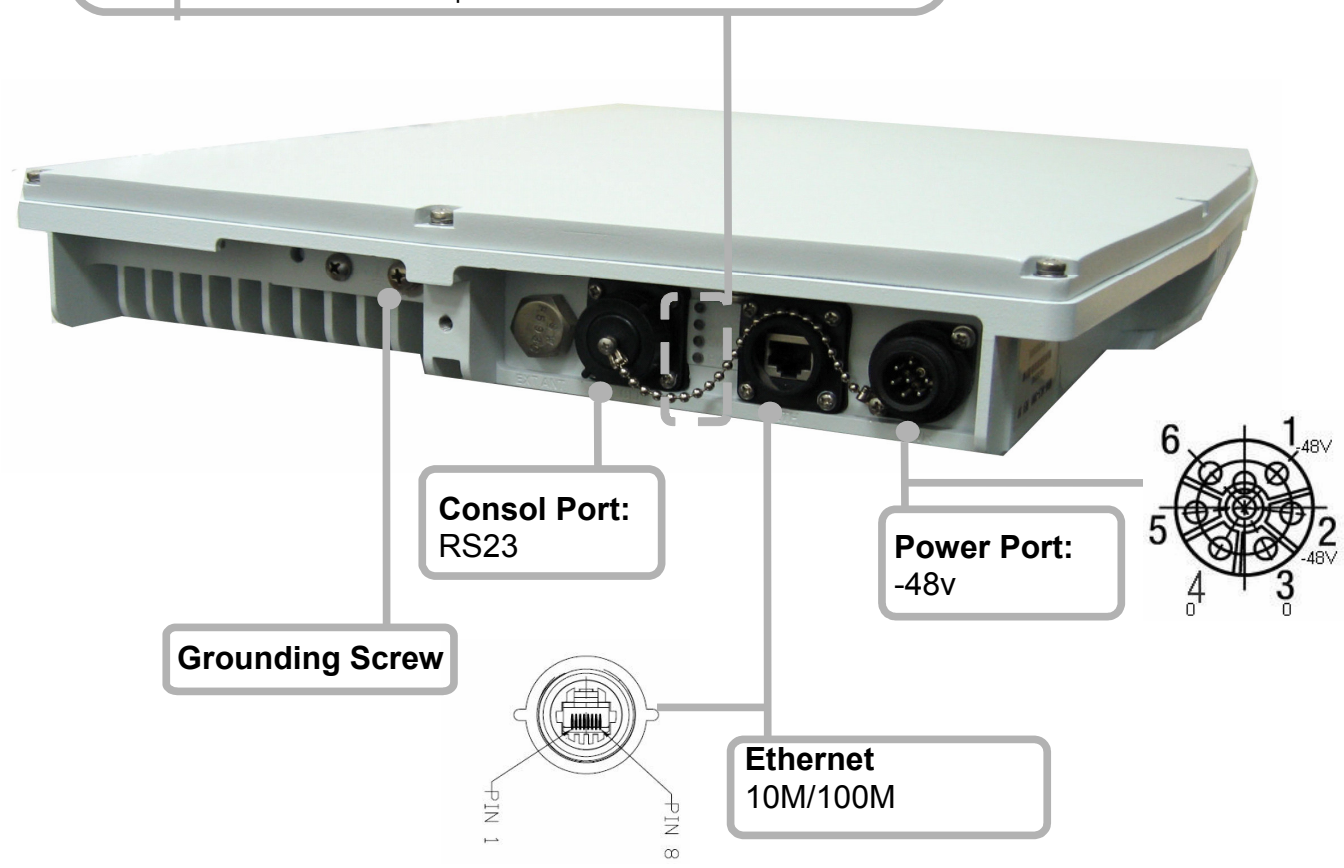
When the unit is correctly connected, the **Power LED** will be green, as will the **Status LED**. The **Activity LED** will be blinking green to indicate traffic is flowing through the WLS. See the section on LED Indicators for more information.

Cable Connections

The WLS unit connections are very simple and can be accomplished in only a few minutes. When mounted, the WLS should be installed with the connecters at the bottom of the unit. Before completing the installation, you should connect the power and grounding cables.

LED

Blank	Not used in current version.	
Activity	**Green**	Traffic is flowing through the WLS unit.
	Unlit:	No traffic is flowing.
Statu	**Green**	The WLS unit is operational.
	Red	The WLS -in tests have failed. Restart the unit. If the Status LED is still red, contact technical support.
Power	**Green**	There is power to the unit.
	Unlit:	There is no power to the unit.



Connection Panel on WLS

The order in which the cables should be connected is as follows:

- Grounding Cable
- Ethernet Cable
- Power Cable

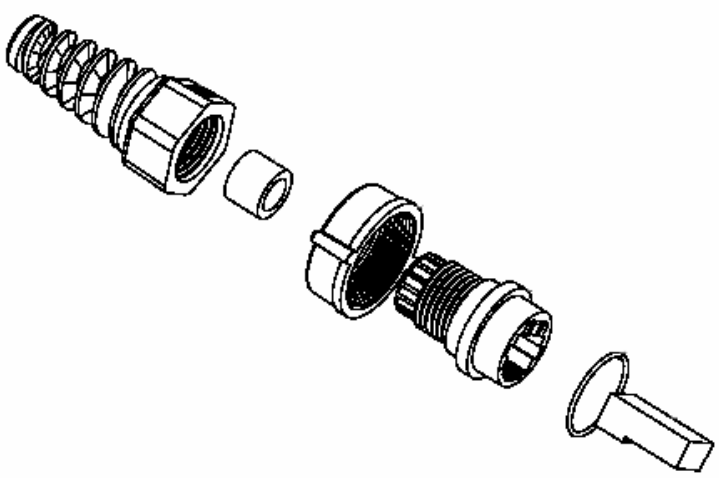
Grounding Cable

Note: **The grounding cable should be connected to the grounding screw. For the grounding cable, you should use a 1mm / 18awg. You should connect the grounding cables before any other connections.**

Noter: **Le câble de la masse doit être connecte au visse de la masse. Pour le câble de la masse vous devez utiliser un 1mm / 18awg. Vous devez connecter le câble de la masse avant tout autre connexion.**

Ethernet Cable Connection

Following is a diagram explaining how the Ethernet cable should be assembled prior to connecting it to the WLS unit:



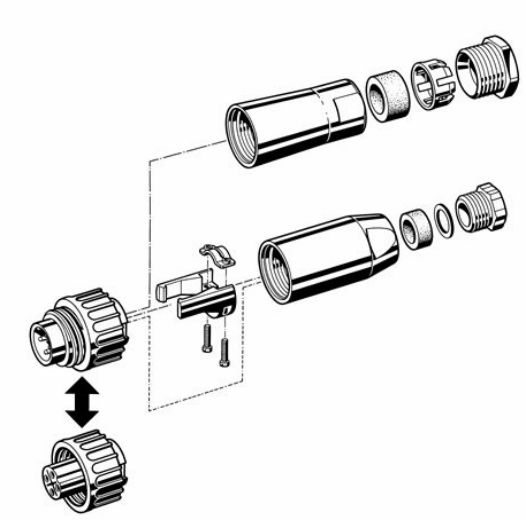
Ethernet Cable Connector

The Ethernet cable should be connected to an Ethernet switch, ADSL or cable modem, according to the site installation requirements. The outer diameter of the Ethernet cable should be 4.8 – 7 mm.

In an outdoor installation, the Ethernet cable should be connected to a lightning protector. The lightning protector is then connected to the Ethernet switch, ADSL or cable modem. GO MBW recommends the GO MBW WLAN Sector Base-Station-3001, (a weather-proof, point-of-entry, 10/100 Base-T CAT5 Lightning Protector), which can be ordered as an optional accessory of the GO-MBW package.

Power Cable Connection

Following is a diagram explaining how the power cable should be assembled prior to connecting it to the WLS unit:



Power Cable Connection

The power cable should be connected to a power supply unit. If there is already a -48V power supply on site the WLS can be connected to it without the power supply unit (PSU).

Depending on which cable you use, the following parameters should be applied:

- For 0.5mm 24awg with 2 tendon: each side can be up to 60m.
- For 1mm 18awg with 1 tendon: each side can be up to 120m.

Note: **The power cable should be at least 14mm in diameter (including insulation) and should be routed through a conduit of at least 20mm diameter.**

Noter: **Le câble d'alimentation doit être d'au moins 14mm de diamètre (isolation comprise), et doit être achemine a travers un conduit d'au moins 20 mm de diamètre.**

Power Up and Software Configuration

Configuration of the WNC unit is typically done once it is already installed. Because the WLS unit is mounted on a roof or similar location, configuration of the unit is typically done before mounting. Once the unit is mounted, it should be powered up and connectivity confirmed. For details on configuring both the WNC and the WLS, see the sections: Configuring the Wireless Network Controller and Configuring the WLAN Sector Base Station.

Post Installation Testing Procedure

The purpose of the post-installation testing procedure is to verify connectivity between the WLS and the WNC units to enable Internet services to client stations. Once the WNC has been installed, connectivity with the router/switch should be verified. This will enable the WNC to communicate with the Radius server as well as the WLS.

Once the WLS has been installed and configured, connectivity to the WNC should be verified. In addition, connectivity between the client stations and the WLS should be verified.

Configuring the WNC

Following is a brief overview of the main CLI commands that are used to configure the WNC. A configuration example follows the detailed list of configuration commands. These and other CLI commands are detailed in the *GO MBW CLI Reference Guide*.

Connect and Access the Wireless Network Controller (WNC)

In order to connect and access the Wireless Network Controller, you must first connect with console (9600 rate, bit 8, data bit 1, stop bit) or you can also access the WNC by using telnet application: (access the MNG interface using: ip address 192.168.0.1).

You can connect to the WNC using a laptop or standard computer. Using an Ethernet cross cable connected to your laptop, connect the Ethernet network interface of the laptop to the WNC's MNG interface.

You can then access the login screen and login with an authorized user name and password.

The factory default super user name is: super

The factory default password is: super

Once you login, you can then configure the WNC as follows:

Step1: Configure the Access Interface

The ACCESS interface is the gateway used to for the connection from the WLS to the WNC.

Define the static IP address and the subnet mask on the same network to which you connect the ACCESS interface by using the following parameter:

```
configure interface fastethernet ACCESS [IP] [netmask] [bcast]
```

Step 2: Configure the Net Interface

The NET interface is the gateway for outside Internet connection to the Intranet/Internet world.

Define the static IP address and the subnet mask on the same network to which you connect the NET interface. To accomplish this, use the following parameter at the boot level:

```
configure interface fastethernet NET [IP] [netmask] [bcast]
```

Step 3: Configure the Default Gateway

Define the default gateway IP address on the same networking on which you connect the NET interface. To accomplish this, use the following parameter:

```
configure ip default-gateway <ip address>
```

Step 4: Configure the DHCP Server

By default, the DHCP server is already defined. To create the IP range for the DHCP Server, use the following parameter at the boot level:

```
configure ip dhcp pool add [<name> <start-address> <end-address>
<pool-netmask> <lease-spec>]
```

Step 5: Configure the DNS

To be able to surf the Internet, you will need to configure at least one DNS relay list by using the following parameter at the boot level:

```
configure ip dns fwd-list <ip address list>
```

Additional DNS can be added to the list using a semi-colon separation. For example:
`configure ip dns fwd-list 192.168.1.1; 192.168.2.1`

Step 6: Configure the Radius Authentication Client Connectivity

Define the authentication Radius server IP address on the client in the WNC using the following parameter at the boot level:

```
configure radius-client auth-primary-server-ip <ip address>
```

Step 7: Configure the Radius Authentication Shared Key

Define the authentication secret password Radius server IP address on the client in the WNC, using the following parameter:

```
configure radius-client auth-primary-server-secret <string>
```

Step 8: Configure the Radius Authentication Port Connectivity

By default the port number of the authentication is 1812. To define the port number of the Radius server on the client in the WNC, use the following parameter at the boot level:

```
configure radius-client auth-primary-server-port <port-number>
```

Step 9: Configure the Radius Authentication Source IP Address

You should define the authentication source IP address of the client in the WNC by using the following parameter at the boot level:

```
configure radius-client auth-source-ip <IP address>
```

Step 10: Configure the Radius Accounting Client Connectivity

You should define the accounting Radius server IP address of the client in the WNC by using the following parameter at the boot level:

```
configure radius-client acct-primary-server-ip <IP address>
```

Step 11: Configure the Radius Accounting Shared Key

Define the accounting secret password Radius server IP address of the client in the WNC, by using the following parameter at the boot level:

```
configure radius-client acct-primary-server-secret <string>
```

Step 12: Configure the Radius Accounting Port Connectivity

By default, the port number of the accounting is 1813. To define a different port number for communication between the Radius server and the client in the WNC, use the following parameter at the boot level:

```
configure radius-client acct-primary-server-port <port-number>
```

Step 13: Configure the Radius Accounting Source IP Address

Define the accounting source IP address of the client in the WNC by using the following parameter at the boot level:

```
configure radius-client acct-source-ip <IP address>
```

Step 14: Update Radius Settings

To apply the Radius configuration changes and update the configuration changes you have made, use the following parameter at the boot level:

```
configure radius-client apply-radius-changes
```

Step 15: Save the Configuration

Once you have modified the existing configuration file, you should save it for future use. To do this, issue the following CLI command at the boot level:

```
copy running-config startup-config
```

WNC Configuration Example

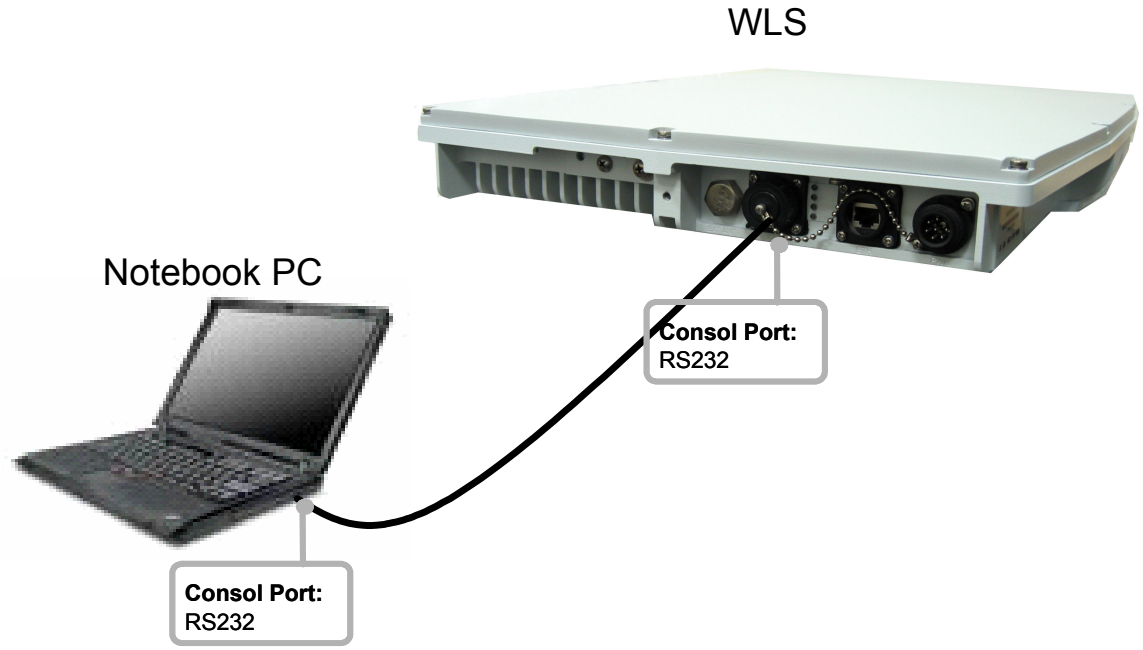
```
wnc > Configure interface fastethernet ACCESS 192.168.30.101
255.255.255.0 192.168.30.255

wnc > Configure interface fastethernet NET 192.168.31.101
255.255.255.0 192.168.31.255

wnc >  configure ip default-gateway 192.168.31.254

wnc > configure ip dhcp pool add users 192.168.30.1 192.168.30.100
255.255.255.0 5h

wnc > configure ip dns fwd-list 194.90.1.5

wnc > configure radius-client auth-primary-server-ip 192.168.31.99

wnc > configure radius-client auth-primary-server-secret 12345

wnc > configure radius-client auth-primary-server-port 1645

wnc > configure radius-client auth-source-ip 192.168.31.101

wnc > configure radius-client acct-primary-server-ip 192.168.31.99

wnc > configure radius-client acct-primary-server-secret 12345

wnc > configure radius-client acct-primary-server-port 1646

wnc > configure radius-client acct-source-ip 192.168.31.101

wnc > configure radius-client apply-radius-changes

wnc > copy running-config startup-config
```

Configuring the WLS

Following is a brief overview of the main CLI commands that are used to configure the WLS. A configuration example follows the detailed list of configuration commands. These and other CLI commands are detailed in the *GO MBW CLI Reference Guide*.

Connect and Access the WLS

You can connect to the WLS using a laptop or standard computer. Using an RS232 interface DB-9 cable, connect the COM port of the laptop to the WLS unit's consol port. For more information, see *Appendix A, Wiring Specifications*.

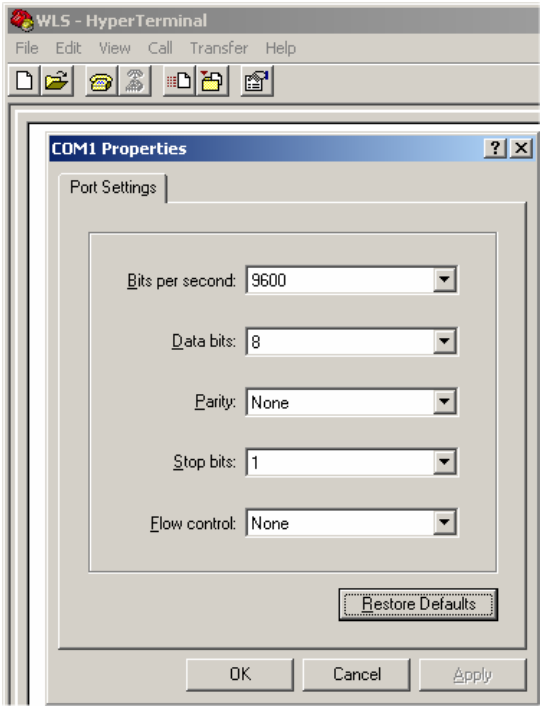


Once connected, you can then operate a terminal program, such as HyperTerminal, to configure the WLS unit to the following specifications:

- Baud rate = **9600**
- Data bits = **8**
- Parity = **none**
- Stop bits = **1**

To use HyperTerminal:

From the Start menu, select **All Programs > Accessories > Communications > HyperTerminal**. Once you have defined a new connection, right-click and select **Properties**. You should then set or verify the above values.



After the connection between the WLS and the laptop (or PC) is established, you will need to enter your user name and password. Your user name determines what authorization level you have and in turn determines whether you can view configuration and operation parameters, or implement changes. The default super user name is Super and the default password is Super. A new user and password name should be added, however this default name and password can be used for the initial configuration. The default system name for the unit is set to **WLS**.

Step 1: Configure the Fast Ethernet Interface

Define the static IP address and the subnet mask on the same network through which you connect to the WLS. You can use the CLI command: `configure interface FastEthernet 0 ip address <ip address>`, as shown below:

```
configure interface FastEthernet 0 ip address 192.168.30.102
255.255.255.0
```

The default is DHCP mode.

Step 2: Configure the Default Gateway

Define the default gateway by using configure mode (consult with your network administrator). You can use the CLI command `configure ip default-gateway <ip address> disable/enable`, as shown below:

```
configure ip default-gateway 192.168.30.254
```

Step 3: Configure the Dot11Radio interface

By default the channels are configured (ch1, ch6). You can define different configuration for each channel by using following CLI command:

```
configure interface dot11Radio 0 channel 1
```

Step 4: Configure the ESSID

ESSIDs are case sensitive and can contain up to 32 alphanumeric characters. They should not include spaces. By default, the ESSID is GoAP. You can change the default for each channel by use the following CLI command syntax:

```
configure interface dot11Radio [0|1] essid <ssid string>
```

Step 5: Set Radio Data Rates

By default the channels are defined for use in a mixed mode. You can select a rate per channel for one of two states: g or mixed (a combination of g and b). The following CLI command syntax is used:

```
configure interface dot11Radio [0|1] mode [g | mixed]
```

Optional Step: Set WEP Privacy Mode

By default the WEP privacy is disabled. To enable privacy encryption, you can use the following CLI syntax:

```
configure interface dot11Radio [0|1] wep enable open [40|128] hex
<index integer (1-4)> <key string>
```

Step 6: Enable the Radio Interface

By default, the WLS radio is disabled. You can, however, choose to enable it using the following CLI command syntax:

```
configure interface Dot11Radio [0|1] [disable | enable ]
```

Step 7: Save the Configuration

Once you have modified the existing configuration file, you should save it for future use. To do this, issue the following CLI command:

```
copy running-configure startup-configure
```

WLS Configuration Example

```
wls > configure interface FastEthernet 0 ip address 192.168.30.102
255.255.255.0
wls > configure ip default-gateway 192.168.30.254

wls > configure interface dot11Radio 0 channel 1
wls > configure interface dot11Radio 0 essid Test
wls > configure interface dot11Radio 0 mode mixed
wls > configure interface dot11Radio 0 enable

wls > configure interface dot11Radio 1 channel 6
wls > configure interface dot11Radio 1 essid Test
wls > configure interface dot11Radio 1 mode mixed
wls > configure interface dot11Radio 1 enable

wls > copy running-config startup-config
```

Upgrading the WLS Software

The following section describes how to update the WLS software. Periodically, new software upgrades are released in order to provide feature enhancements and maintenance. Following is one method you can use to update the software:

- Initiate the network download using a TFTP download server.

Note: **The WLS unit has two banks in the Flash memory (sw0,sw1). By default, the WLS will startup the software image from the sw1 bank.**

Initially, when you download the new software image, the older version is automatically transferred to sw0 bank, and the new software image is transferred to sw1 bank.

Upgrade Example

```
wls>

wls> import image from tftp [IP ADDRESS] [File Name]

wls> show messages software-download

Software download started.

Verifying server and path.

TFTP path OK.

Flash erase started.

Flash erase finished.

Download started from 192.168.30.103 gapsw-1.3.5.11995-Beta-28.02.2006@180244.img.

Download finished.

Verification started.

Verification passed.

Writing to environment.

Software download finished.
```

Note: **It is important to reload the system after upgrading the WLS software for the changes to be applied and the new software to become operational.**

You may need to copy a new image to the Flash memory whenever a new image or maintenance release becomes available.

To copy a new image into Flash memory (write to Flash memory):

- Use the import image from tftp command.
- The system is now ready to be reloaded. After reload, the system will operate with the new image.

Troubleshooting

Problem:

The Captive Portal does not appear on the client's screen.

Solution:

- Check the DNS Forward List to verify that the IP address of the ISP is included.
- If the DNS is not there, issue the following command:
  `configure ip dns fwd-list <ip address list>`
- Check the connectivity between the WNC and the ISP by issuing the following command: `ping <ip address>`. If you do not receive a ping response, check the routing table with your ISP.

Problem:

User authentication fails and client is unable to access the Internet.

Solution:

- Confirm that the user name and password are correctly defined on the Radius server.
- Check the Radius server's client configuration Use the following command to show the client configuration: `show radius server settings`.
- Check the connectivity between the WNC and the Radius server by pinging the Radius server.
- Check that the shared key on the WNC is the same as the shared key on the Radius server by reviewing the Radius server logs (review the section which lists failed actions and check whether the key is the same on both the WNC and Radius sides).

  Note: All changes to the WNC configuration related to the Radius server must be followed by applying and saving the changes using the command:
  `configure radius-client apply-radius-changes`

Problem:

System fails to recognize start or end of session for accounting purposes.

Solution:

- Check the WNC configuration and the Radius server configuration.
- Check connectivity with the Radius server.

- Check the port application used to communicate between the WNC and the Radius server.
- Check that the shared key on the WNC is the same as the shared key on the Radius server by reviewing the Radius server logs (review the section which lists failed actions and check whether the key is the same on both the WNC and Radius sides).

  Note: All changes to the WNC configuration related to the Radius server must be followed by applying and saving the changes using the command:
  `configure radius-client apply-radius-changes`

Problem:

The client doesn't see any ESSID options for selecting a wireless network.

Solution:

- Check whether the option for wireless communication is disabled (the default setting) on the WLS unit.
- Check the ESSID configuration and issue the following command, if needed:
  `configure interface dot11Radio essid <ssid string>`

Problem:

After installing the lightning protector, no communication between the WLS and the WNC is established.

Solution:

- Check cable connections between WNC and the lightning protector, the WLS and the lightning protector, and each of the power cables.

Problem:

A connection error is received, including: dropping packets, error bit packet, CRC error, or the WLC can't establish a link with the WNC.

Solution:

- Check the lengths of the cables: the Ethernet cable must be less than 100 meters in length)
- Check the grounding connection to confirm it is a continuous connection between the WLS and the WNC.
- Check the wiring on the RH45 connectors.
- Check the cables themselves to verify their physical integrity (that they are not cut or crushed or blocked in some other way).

Problem

A continuous beeping sound is heard after the WNC unit is plugged into the power source.

Solution:

When only one power supply is connected, the unit will beep continuously to indicate the absence of power in the second connection. This indicates either a faulty AC module, or the fact that one power supply has not been connected. To stop the warning beep, either connect the second power supply, thus creating a redundant power source, or disconnect the second power supply unit completely from the WNC unit.

Appendix A: Wiring Specifications

Table: Console Port Signaling and Cabling with a DB-9 Adapter for the WLS Unit

Console Port (DTE)	RJ-45-to-RJ-45 Straight Cable		RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-9 Pin**	**Signal**
No connection	1	1	8	CTS
No connection	2	2	6	DSR
No connection	3	3	5	GND
GND	4	4	5	GND
RxD	5	5	3	TxD
TxD	6	6	2	RxD
No connection	7	7	4	DTR
No connection	8	8	7	RTS

Table: Console Port RS232 DB-9 Pin for the WNC Unit

Console Port (DTE)	RS232-to-RS232 Straight Cable		Console Device
Signal	**DB-9 Pin**	**DB-9 Pin**	**Signal**
No connection	1	1	DCD
RxD	2	3	TxD
TxD	3	2	RxD
DTR	4	6	DSR
GRD	5	5	GRD
DSR	6	4	DTR
RTS	7	8	CTS
CTS	8	7	RTS

[1] RTS = Request To Send
[2] CTS = Clear To Send
[3] TxD = Transmit Data
[4] RxD = Receive Data
[5] GRD = Ground
[6] DTR = Data Terminal Ready