GO MBW 510
Installation Guide

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FCC Compliance Status

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 antennas. Any changes or modifications not expressly approved by GO Networks could void the user's authority to operate the equipment.

The 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 MBW (Mobile Broadband Wireless) 500 series complements GO Networks MBW 2000 series and 1000 series products by offering femto cell Wi-Fi coverage. This product is ideal for providing fill-in coverage in conjunction with micro and pico level coverage that the MBW 2000 series and MBW 1000 series offer.

The MBW 500 series comprises the MBW 510 Femto Cellular-Mesh Wi-Fi Base Station with an omni-directional, multi-radio, weather-proof design. This design has been optimized for streetlight or utility pole Wi-Fi applications. The MBW 510 is equipped with one 802.11b/g access radio for femto cell access and coverage with a separate 802.11a radio for high-performance mesh networking. Together with the MBW 2000 series and/or MBW 1000 series, the GO Networks' solutions provide a high-performing, cost-effective Wi-Fi solution.

Key Product Features

- Cost-effective femto cellular-mesh Wi-Fi base station
- Designed for simple, fast and economical deployment
- Dual-radio design
    - 802.11b/g access
    - 802.11a for mesh networking
- Multiple virtual APs with multiple BSSIDs
- Advanced automatic mesh
- Designed for streetlight, wall, or pole deployment
- Support for all standard security scheme

Organization of this Document

The GO MBW 510 Installation Guide for the Femto Cellular-Mesh Wi-Fi Base Station offers information and instructions for quickly installing and configuring the MBW 510. The instructions and information are presented in one volume as follows:

Introduction	Contains introductory information about the MBW 510.
GO MBW 510	Presents a general description and overview of the MBW 510 including content and safety procedures.
Installation Process	Describes the installation process for the MBW 510.
Appendix A	Lists the acronyms that appear in the manual.
Appendix B	Details the wiring specifications.

MBW 510 Package Components

The MBW 510 package items are listed in Table 1:

DESCRIPTION	REV	QTY
Poll/Wall Mounting Kit Assembly	1.0	1
Connectors Kit for MBW 510 Package	1.0	1
MBW 510 unit	1.0	1
MBW 510 Access Antenna 2.4GHz 4dBi Gain, Omni		1
802.11a 5Ghz 6dBi Omni Antenna (Backhaul)		1

Table 1: MBW 510 Package Contents

Deployments of gateway devices connected by wire to an indoor switch/router would include installation of a lightning protector. A lightning protector is not supplied as part of the standard package. It can be ordered from GO Networks as an accessory.

Specific installation may require different Power/Ethernet connections. See Cable Connections for more details.

MBW 510 Safety Information

RF Exposure

The MBW 510, an outdoor access point, is compliant with 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 antennas should be installed to provide a separation distance of at least 3 feet (1 meter) from humans.

MBW 510 Lightning Protector

A lightning protector is required when the MBW 510 unit is installed in an outdoor location and the Ethernet cable connects to an indoor network device.

The purpose of the lightning protection is to protect people and equipment located indoors from lightning that might strike the MBW 510 or its outdoor cables. Therefore, the lightning protector 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 outdoors, as long as the cables that go from the lightning protector to the indoors are well protected from lightning between the box and the building entrance.

Verify that you have shared grounding. GO Networks offers a lightning protector that can be ordered separately.

Information de sécurité pour MBW 510

Exposition aux fréquences RF

Le point d'accès extérieur MBW 510 est compatible avec la norme CFR 47 section 1.1307 concernant l'exposition aux appareils émetteurs de fréquences radio RF définis par le Bulletin 65 de l'OET. Les antennes doivent être installées à une distance minimum d'un mètre de personnes humaines.

Paratonnerre pour MBW 510

Un paratonnerre est nécessaire lorsque le point d'accès MBW 510 est installe à l'extérieur et lié à un network intérieur par un câble Ethernet.

La fonction du paratonnerre est de protéger les personnes et équipement situés en intérieur des éclairs qui pourraient frapper le MBW 510 ou son câble extérieur. Par conséquent, le paratonnerre doit être installé en intérieur le plus près possible du point où le câble de liaison pénètre le bâtiment.

Le paratonnerre peut aussi être installé en extérieur à la condition que les câbles a l'intérieur du bâtiment soient protégés des éclairs entre le point d'accès et l'entrée du bâtiment

Vérifier que la prise de terre est partagée. GO Networks met a disposition à la vente un paratonnerre.

Installation Process

Installing the Femto Cellular-Mesh Wi-Fi Base Station involves the following steps:

1. Performing a Site Survey
2. Assembling and Mounting
3. Mounting the MBW 510 unit
4. Connecting the Antennas
5. Connecting the cables
6. Powering up the unit and configuring the software
7. Performing a Post-installation Testing Procedure 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 identify each access point's position and the assignment of its radio channels. Therefore, a site survey becomes an essential first step before physically deploying the MBW 510.

Installation of the access points requires a backhaul to interface the corporate network or Internet. This backhaul connection can be a mesh configuration, an Ethernet-wired connection, or a third-party solution. When using any method other then a wired connection, keep in mind the MBW 510 has to have a good reception on its backhaul side so it will not limit the access-channel performance.

Conclude the site survey with a detailed plan of the MBW system deployment. The system deployment plan should include MBW 510 mounting points and the routes for the power and backhaul cables.

Note: When mounting the MBW 510 on a pole (or wall mount), the pole should be able to support four times the weight of the MBW 510, as well as the wind loading created by the MBW 510.

Since the mounting structure itself is a potential source of interference, the cell should be mounted with at least 4 feet of clearance between the antennas and the mounting structure.

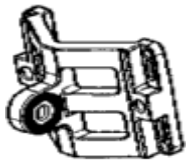
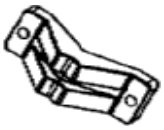
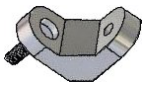
Assembling and Mounting

The universal mount is used to attach and secure the MBW 510 to a wall, a streetlight arm, or a variety of poles.

The MBW 510 mounting consists of the following stages and should be performed in the following order:

1. Connect the MBW 510 unit to the brackets using the 'L' adaptor.
2. Secure the mounting brackets to a streetlight arm, wall, or pole.
3. Assemble the MBW 510 unit to the bracket.
4. Ground the MBW 510 unit.
5. Align the MBW 510 unit.
6. Mount the Antenna to the MBW 510 unit.

Table 2 lists the universal mount parts:

Item No.	Description	Qty	Picture
A	Wall/Poll Bracket	1	
B	Clamping Bracket	1	
C	MBW 510 'L' Adapter Wall/Poll Mount	1	
D	Hex Bolt M8x70	2	
E	Hex Bolt M8 x25	1	
F	Hex Bolt M8x40	1	
G	Flat Washer M8	3	

Item No.	Description	Qty	Picture
H	Spring Washer M8	4	
I	Nut M8	1	

Table 2: Mounting Kit Part List

Hardware and Connectors Installation Tools

The following tools are required to mount the MBW 510 on a pole.

Description	Picture
Combination Wrench (13 mm)	 13 mm
Level	

Table 3: Mounting Tools and Equipment

Note: All hardware and tools used for assembling and mounting the MBW 510 are Metric.

To assemble the 'L' adaptor [C] to the MBW 510 unit:

- Attach the 'L' adapter to the MBW 510 using an M8 x25 hex bolt [E], a spring washer [H], and a flat washer [G], as illustrated in Figure 1.

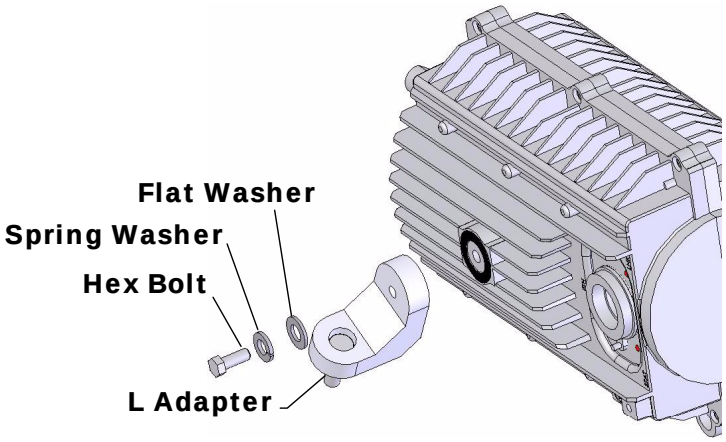


Figure 1: Mount 'L' Assembly

Mounting Brackets

To secure the mounting brackets:

1. Select an optimal mounting location on the pole. Select the highest mounting location with minimal obstacles to the antennas for optimal performance.

   NOTE: When mounting the MBW 510 on a pole, it should be placed on a pole that can support four times the weight of the MBW 510, as well as the wind loading created by the MBW 510.

2. Installation of the mounting brackets to a streetlight arm or a pole differs according to the width of the pole, as illustrated in Figure 2.

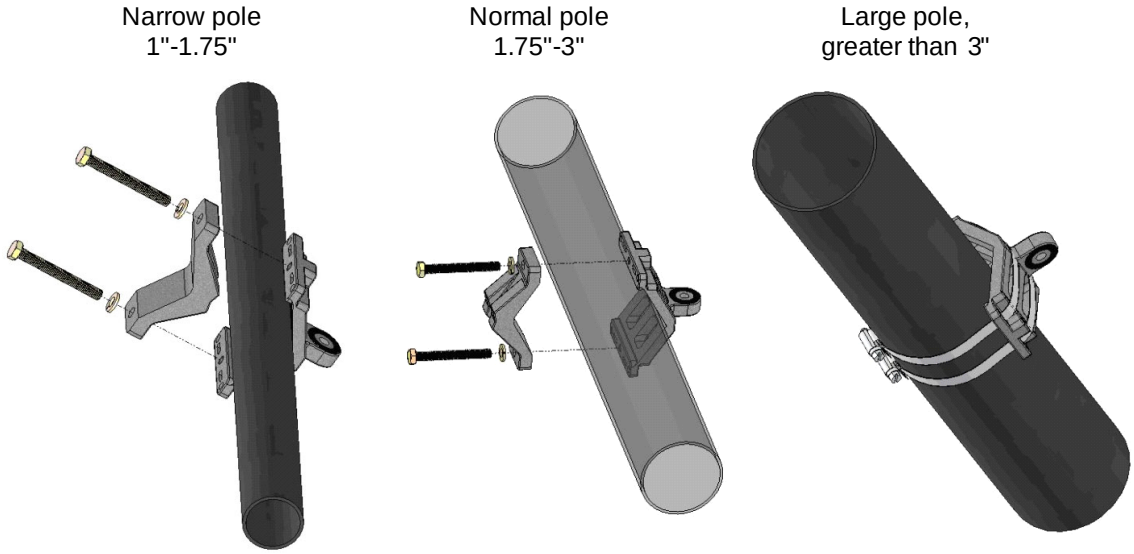


Figure 2: Pole Bracket Assembly

3. For narrow poles (1”–1.75” diameter):
    a) Place the two brackets, [A] and [B], around the pole at the approximate height where you wish to place the unit. When placing the clamping bracket [B], the small notch side should be in contact with the pole.
    b) Use two M8x70 hex bolts [D] and spring washers, insert them through both brackets and tighten them around the pole so that the two brackets are securely fastened.
4. For normal poles (1.75”–3” diameter):
    a) Place the two brackets, [A] and [B], around the pole at the approximate height where you wish to place the unit. When placing the clamping bracket [B], the large notch side should be in contact with the pole.
    b) Use two M8x70 hex bolts [D] and spring washers [H], insert them through both brackets and tighten them around the pole so that the two brackets are securely fastened.
5. For poles larger than 3” in diameter:
    a) The wall/poll bracket [A] and two 0.5" (13mm) wide stainless steel hose clamps (not supplied with mounting kit) are used. The hose clamps must be the appropriate size to fit around the pole and bracket.
    b) Open the each hose clamp by rotating the screw on the clamp counterclockwise. There may be additional resistance just before the clamp is completely open. This is normal and you should continue rotating the screws until the clamps are open.
    c) Insert the band of each clamp through both slots and over the bracket [A].
    d) Place the bracket [A] and hose clamps around the pole at the approximate height where you wish to place the unit.
    e) Close each clamp by reinserting the band under the screw and rotate the screw clockwise.
    f) Position the bracket in the appropriate location and tighten the clamps around the pole so that the bracket is securely fastened.

6. For wall mounting:

   a) Fasten the wall/poll bracket [A] to the wall using four 3/16" (5mm) bolts, as shown in Figure 3. Use the appropriate bolts and fasteners, which is dependent on the material of the wall. Wall-mounting bolts and fasteners are not supplied with the mounting kit.

   b) Place the wall/poll bracket [A] at the appropriate location where you wish to place the unit. Using the four holes at the corners of the bracket, mark the location where the fasteners need to be installed.

   c) Install the four fasteners in the wall.

   d) Insert the four bolts through the bracket and securely fasten the bracket to the wall.

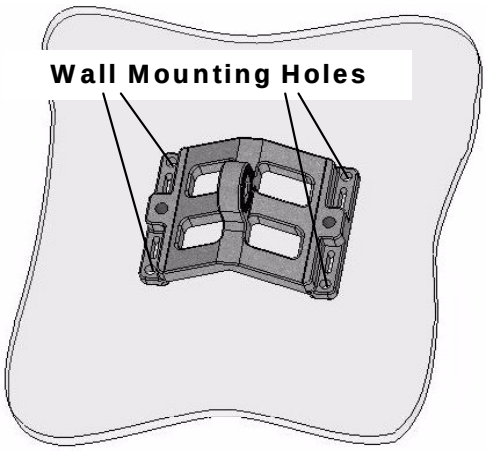


Figure 3: Bracket Wall Mounting

Mounting the MBW 510

To mount the MBW 510 unit:

1. After assembling the brackets, mount the MBW 510 unit on to the bracket as shown in Figure 4. Use a flat washer [G], a spring washer [H] and a nut [I].

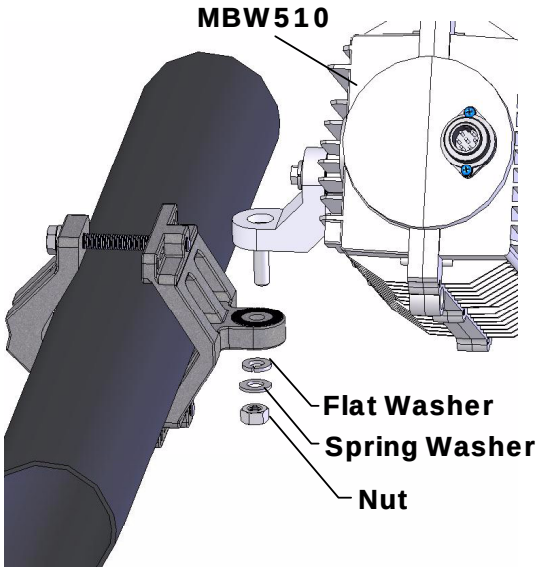


Figure 4: MBW 510 Unit Mounting

2. Once the MBW 510 unit is mounted, release the bolts slightly and align the MBW 510 unit horizontally using the level, as shown in Figure 5. When the unit is perfectly aligned, firmly close all bolts, applying 120 inch-lbs of torque.

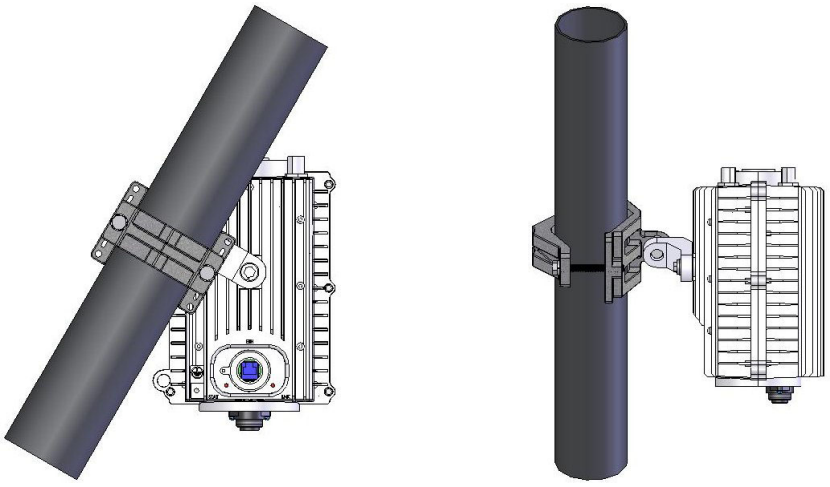


Figure 5: Aligning the MBW 510

Mounting the Antenna

The MBW 510 includes two antennas. One Wi-Fi antenna is used for user access, which operate on the 2.4 GHz band, marked A2. One antenna is used for the mesh networking connections, which operate on the 5 GHz band, marked B2.

To mount the antennas on the MBW 510:

1. Attach the 2.4 GHz band antenna to terminal A2 and screw the antenna into place by hand. Rotate the antenna at its metallic base. The antenna should rotate easily. Tighten the antenna by hand only. Do not apply excessive force by using any tool, as this may damage the unit.

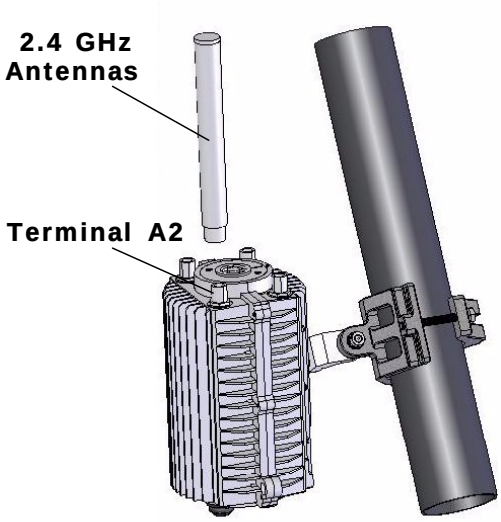


Figure 6: 2.4 GHz Band Antennas Installation

2. Attach the 5 GHz band antenna to terminal B2. Tighten the antenna by hand at its metallic base. The antenna should rotate easily. Do not apply excessive force by using any tool, as this may damage the unit.

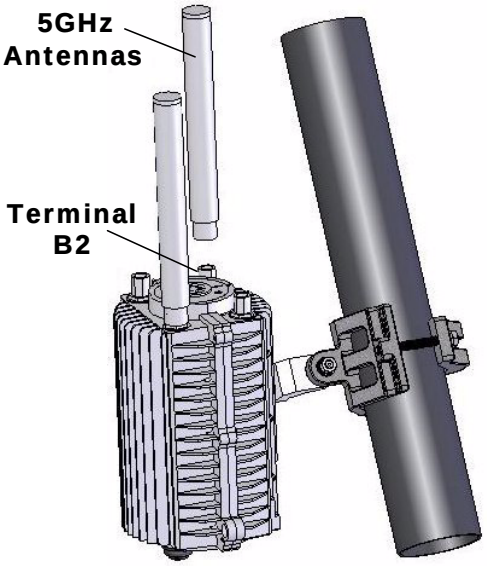


Figure 7: 5 GHz Band Antennas Installation

Cable Connections

When the MBW 510 is properly aligned, the connecters are located at the bottom of the unit.

Cable requirements are often unique to the location and deployment topology of each installation. As a result of this limitation, the Ethernet and grounding cables are not included in the installation kit.

The following cables are required to install the MBW 510 unit and should be connected in the following order:

- **Grounding Cable –** Provides the necessary electrical safety functions.
- **Ethernet Cable –** Required only for MBW 510 units connected to a wired network.
- **Power Cable –** Supplies AC power to the MBW 510 unit. The supplied AC power cable is designed to connect directly to a photocell power adapter.

Table 4 lists the MBW 510 Connectors Kit parts:

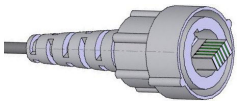
Item No.	Description	Qty	Picture
A	Solderless Ring Terminal	1	
B	Sealed RJ45 connector	1	

Table 4: Mounting Kit Part List

Cable Installation Tools

The following special tools are required to install and connect cables related to the MBW 510.

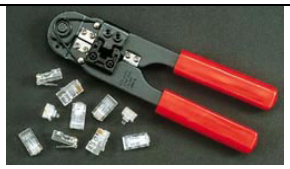
Description	Picture
Slotted Screwdriver 1/8” (3mm) wide	
Terminal Crimp Tool	
RJ45 Crimp Tool	 HT-210A
Volt Meter	

Table 5: Cable Installation Tools and Equipment

Grounding Cable

Connect a grounding wire to the grounding screw at the bottom of the MBW 510 unit. A 10 AWG grounding cable is required to ground the MBW 510 unit.

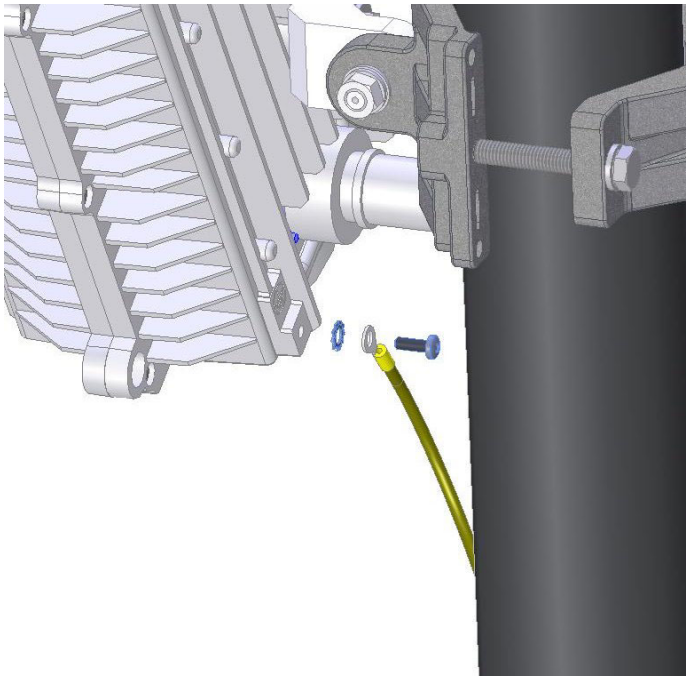


Figure 8: Grounding Connection

To ground the MBW 510 unit:

1. Crimp the solderless ring terminal [A] contained in the MBW 510 Connectors Kit to the grounding cable.
2. Attach the solderless ring terminal [A] to the bottom of the MBW 510 unit using the grounding screw.
3. Connect the other end of the grounding cable to a proper ground.

Note: Connect the 10 AWG grounding cable before connecting any other cables. When removing the MBW 510, the grounding cable should be the last cable removed.

Noter: *Connecter la prise de terre 10 AWG avant de connecter tout autre câble. Pendant la désinstallation du MBW 510, la prise de terre doit être le dernier câble retiré.*

Ethernet Connection

Ethernet connection is used for wired backhaul connection or an interface to a third party wireless backhaul solution. Use outdoor rated CAT5 shielded cables or better. The outer diameter of the Ethernet cable should be 4.8 – 7 mm. When using CAT5 shielded cables the cable can be up to 100 meters.

Following is a diagram explaining how the Ethernet cable should be assembled prior to connecting it to the MBW 510 unit:

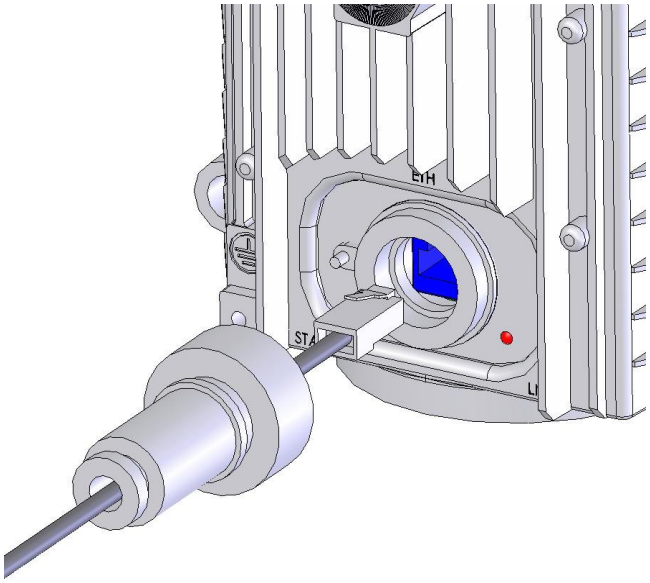


Figure 9: Ethernet Cable Connector

Power Connection

The MBW 510 unit can be connected to an AC power source by one of several methods. It can be connected directly to a power source or by using an adapter to connect to the streetlight photocell (photo-control). The MBW 510 unit can support input voltage of 100 to 240 VAC (50 to 60 Hz).

Note: Connect the grounding cable before connecting any other cables. When removing the MBW 510, the grounding cable should be the last cable removed.

Noter: *Connecter la prise de terre 10 AWG avant de connecter tout autre câble. Pendant la désinstallation du MBW 510, la prise de terre doit être le dernier câble retiré.*

To connect the AC power to the MBW 510 via the streetlight photocell:

1. Check the input voltage to the streetlight photocell. The voltage must be between 100 to 240 VAC. If yes, continue with this procedure. Otherwise, use a different method for the power connection.
2. Remove the streetlight photocell. Turn the photocell counterclockwise and lift the photocell out of the socket.
3. Insert the Auxiliary Power Adapter in the socket of the photocell. Note that one prong is larger than the other two. Align the larger prong on the adapter with the larger slot in the socket. Insert the Auxiliary Power Adapter into the socket and rotate the adapter clockwise.
4. Insert the photocell into the Auxiliary Power Adapter. Align the larger prong on the photocell with the larger slot in the socket on top of the adapter. Insert the photocell into the socket and rotate the photocell clockwise.
5. Connect the Auxiliary Power Adapter cable to the power connector socket on the MBW 510.
6. After connecting the power, verify that the Power (PWR) LED is lit.
7. Check the photocell. Cover the photocell and verify that the streetlight operates.

Computer Connection

Figure 10 illustrates the Ethernet cable connections used to connect the MBW 510 to a notebook computer. This connection is typically used for the initial configuration. For more information regarding the configuration, see the *GO MBW Configuration Guide*. For more information regarding the Ethernet cable, see *Appendix B: Wiring Specifications.*

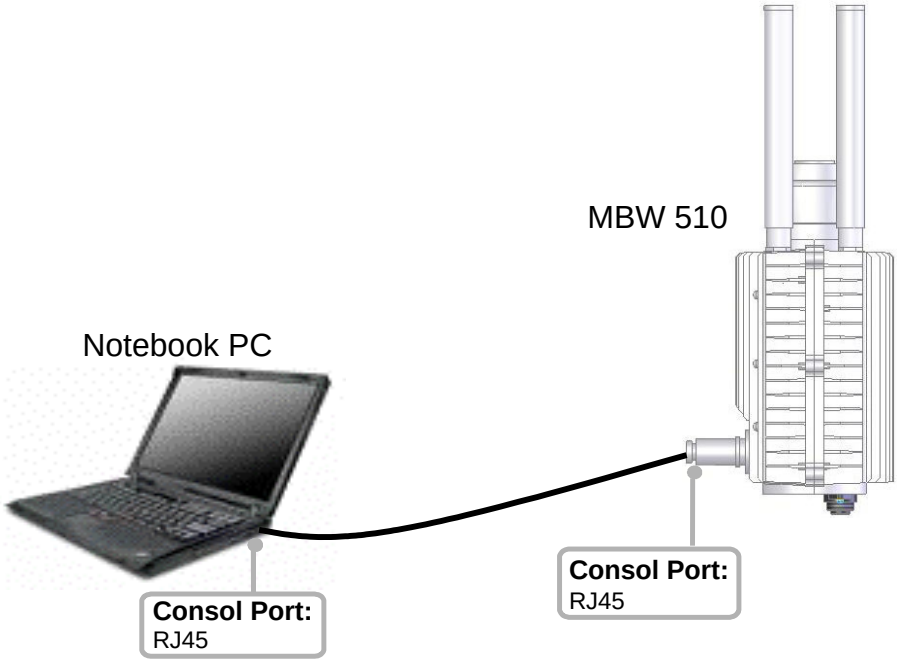


Figure 10: Connect and Access the MBW 510

Power Up and Software Configuration

The MBW 510 unit is normally mounted on a streetlight (pole or wall) where it is inconvenient to configure. Therefore, it is recommended that wireless communication be established to the unit prior to installation, so that the unit can later be configured and monitored from the ground. To verify communications when installing the MBW 510 unit, the Mesh-Gateways must be installed and powered up first.

The LEDs on the MBW 510 unit indicate the status of communications between the MBW 510 unit and the network. See Table 6 for more information on the LED indicators.

When powering up a Mesh-Node, the BH LED should be lit to verify that the MBW 510 unit's wireless communication is connected. MBW 510 boot time is about 2.5 minutes. The BH LED indicator will light up after the boot is completed.

LED	Function
PWR	**Green** – There is power to the unit. **Unlit** – There is no power to the unit.
ETH	**Green** – When the LED is on, there is a communication connection. When the LED is flashing, traffic is flowing though the MBW 510 unit. **Unlit** – There is no communication connection.

Table 6: MBW 510 LED Indicators

Appendix A: List of Acronyms

Acronym	Explanation
802.11	A family of specifications related to wireless networking, including: 802.11a, 802.11b, and 802.11g.
AP	Access Point. The hub of a wireless network. Wireless clients connect to the access point, and traffic between two clients must travel through the access point. Access points are often abbreviated to AP
BH	Backhaul
BSSID	Broadcast Service Set Identifier
CPE	Customer Premises Equipment.
DHCP	Dynamic Host Configuration Protocol. A protocol which enables a server to automatically assign an IP address to clients so that the clients do not have to configure the IP addresses manually.
EAP	Extensible Authentication Protocol. A standard form of generic messaging used in 802.1X.
ESSID	EGOed Service Set Identifier
MBW	Mobile Broadband Wireless
PMK	Pairwise Master Key
SSID	Service Set Identifier, a set of characters that give a unique name to a WLAN.
TKIP	Temporal Key Integrity Protocol
VLAN	Virtual Local Access Network
WDS	Wireless Distribution System

Acronym	Explanation
WEP	Wired Equivalent Privacy. An encryption system created to prevent eavesdropping on wireless network traffic.
WLP	Pico Cellular-Mesh Wi-Fi Base Station (MBW 1100)
WLS	Micro Cellular-Mesh Wi-Fi Sector Base Station (MBW 2100)
WMG	Wireless Media Gateway of the GO Networks MBW solution. GO Media dedicated CPE.
WNC	Wireless Network Controller of the GO Networks MBW solution.
WPA	Wi-Fi Protected Access. A modern encryption system created to prevent eavesdropping on wireless network traffic. It is considered more secure than WEP.
WPA-EAP	WPA-Extensible Authentication Protocol
WPA-PSK	WPA-Pre-shared key

Appendix B: Wiring Specifications

	RJ-45-to-RJ-45 Straight Cable	
Signal	**RJ-45 Pin**	**RJ-45 Pin**
Tx +	1	1
Tx -	2	2
Rx +	3	3
No connection	4	4
No connection	5	5
Rx -	6	6
No connection	7	7
No connection	8	8

Table 7: Computer Port Signaling and Cabling with a RJ-45 Adapter for the MBW 510 Unit