



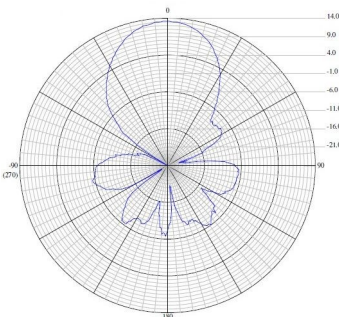
## **EZ-Go<sup>®</sup> +**

*High Performance Outdoor 802.11 Bridge/Router*

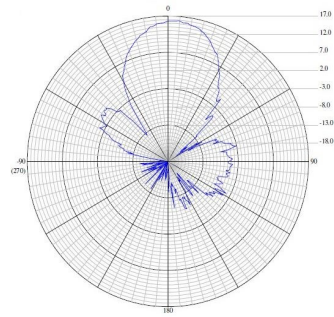


- Achieve up to 100 Mbit/sec data thrupt
- Long Distance operation with good line of sight
- Best security available (WPA)
- Field Proven Wireless Technology

### **Antenna Patterns**



2.4GHz



5GHz



## **DANGER! Avoid Powerlines! You Can Be Killed!**

When following the instructions in this guide to install the EZGO® take extreme care to avoid contact with overhead power lines, lights and power circuits. Contact with power lines, lights or power circuits may be fatal. We recommend to install EZGO® no closer than 20 feet to any power lines.

**Safety:** For your own protection, follow these safety rules.

- **Perform as many functions as possible on the ground**
- **Do not attempt to install the antenna on a rainy, windy or snowy day or if there is ice or snow accumulation at the install site or if the site is wet.**
- **Make sure there are no people, pets, etc. below when you are working on a roof or ladder.**
- **Watch out for any power lines which may be overhead, underground or behind walls., keeping safely clear of them with the antenna, ladders or any tools.**
- **See appendix for FCC RF exposure guidelines**



**Recommended Tools:** Pliers , Screws and screwdriver if mounting to a wall. **NOTE:** You should be familiar with using tools such as these before attempting installation of EZ-Go®. You should be comfortable with working on a ladder.



**GROUNDING:** Local building and electrical codes require that the antenna be properly grounded. Improper installation may seriously damage the equipment or building, as well as cause injury or death to you. Run a ground wire 10AWG or bigger from mounting bracket of antenna to a good earth ground (Cold water pipe or metal stake in ground).

**Note:** We highly recommend connecting the EZ-GO® power supply to a surge protected outlet or an Uninterruptable Power Supply system. We also recommend using shielded and grounded CAT5 cable between the antenna and the power supply. This will help prevent damage from lightning and electrical surges caused by lightning.

## **Qwik Install**

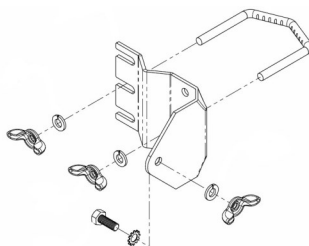
**STEP 1:** Choose a mounting location with good line of sight to the remote location. The supplied bracket can be mounted to a wall or to an existing pole up to 2" diameter. If only short distances are needed, the antenna can be mounted inside a building.



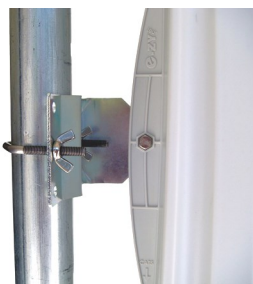
**TECH TIP:** *Microwaves travel in straight lines and they lose strength quickly when going thru buildings and trees. If there are objects in the microwave path, then useable distance will be reduced. If the target unit is less than 1 mile away then you won't have to worry too much about a couple obstructions but if over 1 mile and there are some obstructions in the microwave path, then the performance will be reduced.*

**STEP 2: Mount the Bracket**

To mount to a wall: The supplied u-bolt is not used and the bracket is screwed directly to a wall using customer supplied screws. To mount to a pole: Use the supplied U-Bolt and wing nuts. Make sure to use a lock washer at each wing nut. Tighten wing nuts evenly by hand. Use pliers if additional tightness is needed.



**STEP 3: Mount the antenna housing to the bracket.** Put the hex head bolt thru the housing back fin. Put the star lock washer so it is between plastic housing and metal bracket. Install wing nut with lock washer. Adjust desired tilt angle and tighten wing nut. Use pliers if additional tightness is needed.



**TECH TIP:** *Because of the specially designed wide beamwidth antenna, pointing is not critical and simply pointing in the general direction of the receiving antenna will yield great results.*

**STEP 4: Remove the antenna bottom cover by using a coin or house key or screwdriver to push in one of the side snaps and then remove the cover.**



**STEP 5: Route a CAT5 cable through the bottom cover and plug into the RJ45 Jack inside the unit. Keep the black gasket material in the bottom of the cover to help keep out dust and insects.**



**STEP 6: Route CAT5 cable from the EZ-Go® into the building. Always create a strain relief near the antenna so the cable is not pulling directly on the antenna. Use the CAT5 strain relief hook feature built into the housing back fin. The Ethernet spec allows for a maximum cable length of 100 meters or about 328 feet.**

**STEP 7: Connect a CAT5 cable from your computer or switch or**

router to the LAN connector on the wall plug POE inserter power supply. Connect the CAT5 cable from the antenna to the POE connector on the wall plug POE power supply. Plug the wall plug POE power supply into a surge protected AC power source to power up the EZ-Go®



## Software Settings

1. There is an HTML management system built into every EZ-Go® unit which is accessed thru a standard web browser. The unit can communicate thru the CAT5 Ethernet cable connection or thru the wireless connection, so you can manage remote units from a single location. **NOTE:** *The device will usually go into a 1 minute reboot cycle when clicking on SAVE & APPLY. During this time it will be unresponsive.*

2. **IP ADDRESS:** Default IP address for the EZ-Go® is 192.168.1.6. To access the EZ-Go® your computer IP address must be on the same subnet ie; 192.168.1.xxx. The EZ-Go® ships with DHCP client enabled so if the unit has access to your network it will get its IP address automatically from your network. To find the units IP address use the Discovery Tool.

**TECH TIP:** Download the EZ Discovery Tool from <http://ez-bridge.com/support/support.htm> . This tool will assist you in finding the EZ-Go® on the network and allow you to change the IP address or set it as a DHCP client. Just select the unit, click on IP DETAILS, make selections and save changes directly to the device.

3. **SECURITY:** The following security changes are recommended :

a. **PASSWORD:** Change the user name and password by going to SYSTEM | SETTINGS and setting the user name and password. *The default is no user name or password for ease of system setup*

b. **ENCRYPTION:** Set an encryption type and key. We recommend WPA2 because it is most secure, but if this install is as a client the encryption type and key must match the Access Point.

6. **SITE SURVEY:** The site survey is a very useful tool to determine what wireless devices are within range of your EZ-Go<sup>®</sup> and could be a source of interference that could cause degraded performance. Go to WIRELESS and then click on SITE SURVEY. The list will show all wireless devices including channel #, MAC Address and relative signal strength of all the devices within the range of the EZ-Go<sup>®</sup>

7. **FACTORY DEFAULTS:** If at any time the system stops working because of changes made to the settings, you can get back to the original settings by resetting to factory defaults. Go to SYSTEM | SAVE/RELOAD SETTINGS, then Perform Reset. Any customized settings will be lost once this process is initiated.

If you cannot access the web page on the unit you can do a manual reset. Remove bottom cover of unit. Power up the unit, wait 2 mins, press and hold the black reset button for 15secs, release and wait 2 mins for reboot.

8. **UPGRADE FIRMWARE:** For the latest firmware point your browser to <http://ez-bridge.com/support/support.htm> Download the latest firmware to your PC. Select SYSTEM | FIRMWARE UPGRADE from the menu and then browse for the new file.

9. **EXPANDING THE NETWORK:** You can add EZ-Go<sup>®</sup> Network Expansion units to an EZ-Bridge installation to link 3 or more buildings together. We suggest maximum of 6 buildings for best performance. To add an EZ-Go<sup>®</sup> unit to the existing EZ-Bridge network, you set the operating mode of the remote units to Client (WDS) and then do a Site Survey and find the EZ-Bridge Access Point and click JOIN NETWORK. Security settings on client must match security settings of AP. On the AP the Access Control must be disabled or the wireless MAC address of the client must be included in the Access Control table.

## *Advanced Features*

The EZ-Bridge™ can operate as Access Point, Access Point (WDS), Client, and Client (WDS). Go to WIRELESS | BASIC SETTINGS to change wireless mode. Go to TCP/IP | OPERATIONAL MODE to change network operation mode from AP Bridge (default) or Client Bridge to Wan Gateway (Router).

Since documentation for these advanced modes is too extensive to cover here please retrieve the documentation online at <http://ez-bridge.com/support/support.htm>

# TECH CORNER

## ***Additional Information you may find useful***

**1.TROUBLESHOOTING –Link Down–** If a link goes down the first thing to do is run the discovery tool from both sides of the network. The discovery tool should be able to discover both units from each side of the link. If it can see the local unit but not the remote then the wireless link is down or the remote unit is down. Run the discovery tool on the remote side. If it can see the remote unit then the wireless link is down. Reset both units to factory defaults and power cycle them. If it cannot see the remote unit from the remote side, bring the power supply and POE Inserter cable from the working side and see if that fixes the problem. Also check your cables.

**2. TROUBLESHOOTING—Poor Performance–** If you are seeing poor performance, power cycle both units then after about 2 minutes check the signal strength on the status page of the web based control panel. If signal strength is between  $-80$  and  $-90$ dBm the signal level is abnormally low and could be because the antennas have lost their physical alignment. Check the alignment. Antennas are more sensitive to vertical tilt than horizontal. Next, make sure there haven't been any changes to line of site like new trees or buildings or vehicles. Line of site issues can usually be helped by moving the antenna to a new location with better line of site. If signal level is good (between  $-35$  and  $-79$ dBm) try changing the wireless channel on both units. You should also do a site survey on both units to see what channels are already being used. Select a channel that is not already used or one that has a very low signal strength. Always change the channel on the remote unit first and local unit second.

**3.RAIN, SNOW, ICE –** The frequencies being used by the EZ-Go<sup>®</sup> will not be affected by heavy rain or falling snow. You should not see any performance degradation due to inclement weather. If snow or ice collects on the front of the antenna, you may see some reduced performance assuming you are shooting a long distance ( $>2$ miles) and the ice or snow buildup is greater than 1" thick on the surface of the antenna. For this reason, we suggest mounting under an eave of a house if feasible for your particular situation.

**4.SUN AND HEAT–** The EZ-Go<sup>®</sup> is constructed of all UV protected materials so it will survive for many years in the most extreme of solar environments (ie; an Arizona rooftop during the summer). The unit has been tested and qualified for constant operation at over 158deg F ambient temperature. Even though the EZ-Go<sup>®</sup> is designed for long term survivability in extreme environments, we would still recommend that the unit be mounted in a more protected location, like under a roof eave, if possible. Of course if line of sight is better with the antenna mounted

# Technical Specifications

Note: Subject to Change Without Notice

	2.4GHz	5GHz
<b>Standards</b>	802.11g/n	802.11a/n
<b>Certifications</b>	FCC / CE	
<b>Radio Specifications</b>		
<b>Operating Frequency</b>	2400 to 2497MHz	4900 to 6000MHz
<b>Available Transmit Power</b>	10 to 316mW	10 to 316mW
<b>Receive Sensitivity</b>	802.11g -75dBm 802.11n -90dBm	802.11a -75dBm 802.11n -90dBm
<b>Security</b>	64/128bit WEP, WPA, WPA2	
<b>Remote Configuration</b>	By IP Address; thru Wireless or Ethernet	
<b>Antenna Specifications</b>		
<b>Antenna Gain</b>	14 dBi	16 dBi
<b>Antenna Beamwidth (H /V)</b>	35 deg	27 deg
<b>Antenna Front to Back</b>	>20dB	>22dB
<b>Polarization</b>	MIMO	MIMO
<b>POE Specification</b>		
<b>Power Over Ethernet</b>	INPUT: 100 – 240VAC @ 50 – 60Hz OUTPUT: 24VDC @ 0.5A Average Power Consumption 4W	
<b>Mechanical Specifications</b>		
<b>Color</b>	White	
<b>Dimensions (L x W x H)</b>	12.4" x 7.3" x 2.5" (314 x 187x 65mm)	
<b>System Weight</b>	7 lb (3 kg)	
<b>Ethernet Connector</b>	RJ45	
<b>Mount</b>	Pole (up to 2" dia) or Wall	
<b>Environmental Specifications</b>		
<b>Operating Temperature</b>	-22 to 158 Deg F (-30 to +70 Deg C)	
<b>Humidity</b>	0 to 100% RH	
<b>Wind Loading (125MPH survivability)</b>	100MPH / 23lbs; 125MPH / 35lbs	

in a non-protected environment then we would recommend the better line of sight mounting location.

5.**LIGHTNING** – Lightning is the single worst enemy of outdoor electronics equipment. No electronics will survive a direct strike but there are close proximity strikes that can cause huge electrical fields to be generated which can damage electronic equipment. We have taken special care in the design of the EZ-Go® unit to ensure proper grounding of the electronics inside the enclosure to prevent damage from electrical storms. Make sure that the POE Power Supply is plugged into a surge protected outlet such as a surge protected power strip or UPS inside the house.

5.**PAINTING** – The EZ-Go® unit can be painted to match a particular house color. Only non metallic enamel or latex paints should be used. If a paint with metal content is used, it will block the microwaves and cause reduced performance.

## *Status Screen Tour*

- A. **Name** -This is the HostName which can be customized by user on SYSTEM | SETTINGS page. This setting is useful for identifying the different unit locations like Bldg1 and Bldg2. The HostName will show on the browser tab so you can tell the units apart if you have multiple tabs open.
- B. **Model** - This shows the model. Restricted.
- C. **Firmware & Kernel Version** – Shows firmware version loaded to the unit. Restricted.
- D. **Local Time**—Set by user on SYSTEM | TIME page.
- E. **Memory** - Shows total available memory and total free memory. If free memory showing near zero, need to power cycle unit to clear memory.
- F. **SSID** - Shows wireless name of access point. Go to WIRELESS | BASIC SETTINGS and change ESSID field.
- G. **Mode** - Shows the wireless mode setting. Go to WIRELESS | BASIC SETTINGS to change.
- H. **Channel** - Displays the wireless channel being used. Go To WIRELESS | BASIC SETTINGS to modify. Both units must be set to same channel.
- I. **Bit Rate** - Displays link speed setting
- J. **Wireless MAC Address** - Displays the wireless MAC Address. This is the MAC address that would be used for wireless access control.
- K. **BSSID** - Shows MAC Address of remote unit.
- L. **Encryption** – Shows security encryption setting. Go to WIRELESS | SECURITY SETTINGS to modify.



Uptime: 3d 11h 41m 3s

### Status

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System

Router Name	EZ2
Router Model	WP1531
Firmware Version	1.0000
Kernel Version	3.3.8
Local Time	Mon Feb 23 06:46:55 2015

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Memory

Total Available	35232 KB / 61788 KB (57%)
Free	8 KB / 61788 KB (2%)

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Wireless

<b>QCA9531 802.11bgn Radio</b>		
SSID: <b>wyaf01</b>	Mode: Master	Encryption: None
Channel: 5 (2.432 GHz)	Bitrate: 65 Mbps	ACK Timeout: 344
BSSID: 04:F0:21:FF:00:02		DFS Status: Disabled

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Network

<b>Network</b>		<b>Status</b>
		Uptime: 3d 11h 40m 37s
		MAC Address: 04:F0:21:FF:00:00
		Protocol: static
<b>LAN</b>		RX: 59.84 MB (633040 Pkts.)
		TX: 24.02 MB (145452 Pkts.)
		IPv4: 192.168.1.23.24
		eth0: down
		eth1: up

Associated Stations

- M. **ACK Timeout** - This displays the ACK compensation for distance. This setting is automatically set by the units.
- N. **RSSI** - This shows the receive signal strength. On AP side click on Associated Clients to see Signal Strength.
- O. **TX-CCQ** - This shows transmit client connection quality as a %. You should expect over 80%. If less, there may be a problem with interference or reflections. On AP side click on Associated Clients to see TX-CCQ.
- P. **RX and TX Rate** - This is the transmit and receive rate of the unit. You should expect to see over 200Mb/s. On AP side click on Associated Clients to see TX/RX Rate.
- Q. **Uptime** - This shows elapsed time since the last reset
- R. **LAN MAC Address** - This displays the units LAN MAC Address
- S. **Prototcol** - This displays the IP setting of the unit, if DHCP (Automatic IP) or Static IP. Go to TCP/IP | LAN SETUP to change.
- T. **Tx and Rx** - Total data transmitted and received since last reset.
- U. **IPV4** - IP address of the unit. Type this address in a browser to access the unit control panel.
- V. **Eth0 and Eth1** - The unit has two Ethernet ports so another unit can be connected to the wireless bridge and the user can conserve on switch ports. The Ethernet ports are not PoE output ports, only PoE input and data. There is a DC connector that will support up to 10W output for powering a second unit.

## Advanced Software Tech Notes

1. **Management | Logs | External System Log Server** - An external server can be setup at the IP specified to received log entries. Pro-

- grams such as TFTP32 contain syslog servers that can be used.
2. **Management | DDNS** - This setting updates the dynamic IP to a domain name to allow external control of the unit over the internet. This was tested with DynDNS service.
  3. **Management | SNMP** - SNMP allows external query of the unit through an SNMP server. This was tested with FreeSNMP and the included OID's. Following is a link describing how to add custom OID's: <http://qlr81.free.fr/pages/openwrt-snmp-old.htm>
  4. **TCIP | Operational Mode** :
    - Client Bridge** - Used when bridging from the WLAN to a connected device such as a laptop or PC connected directly to the Ethernet Port of the LT+
    - WAN Gateway** - is when the LT+ acts as a router and ETH1 is the WAN interface
    - WLAN Gateway** - is when LT+ acts as a router and WLAN is the WAN interface.

### Explanation of LED's



#### LED'S:

- A: **Power** The Power LED will light green when the device is connected to a power source.
- B: **Ethernet** The Ethernet LED will light steady green when an active Ethernet connection is made and flash when there is activity.

**NOTE:** In the Web UI, you can modify the wireless signal strength threshold values for each LED Under "System" > "Leds". The default values are shown below:

#### SIGNAL STRENGTH:

- 1: LED will light **RED** when the wireless signal strength is above -85dBm
- 2: LED will light **AMBER** when the wireless signal strength is above -75dBm
- 3: LED will light **GREEN** when the wireless signal strength is above -65dBm
- 4: LED will light **GREEN** when the wireless signal strength is above -55dBm

#### SIGNAL STRENGTH DECODER:

<b>RED</b>	<b>AMBER</b>	<b>GREEN</b>	<b>GREEN</b>	= Excellent Signal Strength
<b>RED</b>	<b>AMBER</b>	<b>GREEN</b>	<b>OFF</b>	= Good Signal Strength]
<b>RED</b>	<b>AMBER</b>	<b>OFF</b>	<b>OFF</b>	= Okay Signal Strength
<b>RED</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	= Poor Signal Strength

## Appendix:

### **Federal Communication Commission Interference Statement**

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 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/TV technician for help.
- FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

### **IMPORTANT NOTE:**

#### **FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

### **Limited Warranty**

All Tycon Systems products are supplied with a limited 12 month warranty which covers material and workmanship defects. This warranty does not cover the following:

- Parts requiring replacement due to improper installation, misuse, poor site conditions, faulty power, etc.
- Lightning damage.

- Physical damage to the external & internal parts.
- Products that have been opened, altered, or defaced.
- Water damage for units that were not sealed or mounted according to user manual.
- Units that were not properly grounded.
- Usage other than in accordance with instructions and the normal intended use.

Do not return any products until you receive a Return Material Authorization (RMA) number. Products received without a valid RMA number will be rejected and returned to sender.

## **Warranty Repairs**

All returns must have a valid RMA number written clearly on the outside of the box. Without an RMA number the shipment will be refused. For customers located in United States and Canada, customer pays all shipping charges incurred to ship the product to Tycon Systems. Tycon Systems pays shipping charges to return the product to the original purchaser. For all other countries, the original purchaser shall pay all shipping, broker fees, duties and taxes incurred in shipping products to and from Tycon Systems. Provided the goods have not been modified or repair attempted by someone other than Tycon Systems, at the option of Tycon Systems, products may be returned either as repaired or replaced. If it is determined that there is no fault found (NFF) on a unit within warranty, the customer will be charged \$75 USD for testing time. For products out of warranty, the standard NFF charge is \$200. This charge will be at the discretion of Tycon Systems. The RMA number is valid for 14 days from date of issue. The product must be received by the repair depot within these 14-days or the shipment may be refused.

## **Shipping and Damage Claims**

All shipping damage claims are the purchaser's responsibility. Inspect each shipment upon delivery and IMMEDIATELY report all damage, to the carrier. There may be time limits and inspections may be required.

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