
ZC-3635-5-23
Broadband Wireless Access ODU

Quick Installation Guide



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About the Installation Guide

This Installation Guide is intended to guide professional installer to install the wireless bridge. It includes procedures assisting you in avoiding unforeseen problems.

Conventions



-
- This indicates a warning or caution that you have to abide to avoid hazards.
-



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- This indicates an important note that you must pay attention to.
-

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.

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

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

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 100cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.

Professional Installation Required

1. Please seek assistance from a professional installer who is well trained in the RF installation and knowledgeable in the local regulations.
2. The ZC-3635-5-23 is distributed through distributor and system installer with professional technicians and will not be sold directly through retail store.
3. Product is for Point to Point operation only and cannot be use for Point to Multipoint operation.

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Chapter 1 Introduction

Introduction

The ZC-3635-5-23 Wireless Bridge is a high-performance outdoor-deployable wireless bridge that provides wireless connectivity among multiple network locations. Besides the built-in 23dBi plane antennas, it can cover over 50km if with an external antenna co-used, answering the demand of long distance backhaul with high throughput. Moreover, link aggregation combines multiple links into one to enhance transmission rate; and network backup ensures continuous transmission.

As a multi-function bridge, ZC-3635-5-23 supports Base Station, CPE and PTP modes; among which, LANs in different locations and buildings could easily be connected and access to broadband under PTP mode, realizing “Last Mile” Broadband.

With the high throughput and long-distance transmission, ZC-3635-5-23 is the ideal backhaul solution for Carriers, Service Providers and Enterprises!



Product Specification

Specifications	
CPU	IXP435 ,533MHz
System Memory	16MB Flash
	32MB SDRAM (64MB upgradable)
Power	Power over Ethernet (Output 20Watts ,48V /0.4A)
Operating Frequency	FCC : 5.725~5.850 GHz CE : 5.470~5.600 GHz, 5.650~5.725 GHz
RF Modulation	802.11a: OFDM (BPSK, QPSK, 16-QAm, 64QAM)
RF output power	24dBm (Max. of Avg.) at Radio for FCC (Band 4) 30 dBm EIRP for ETSI 301 893 (Band3)
Sensitivity	≤-92dBm @6Mbps ≤-73dBm @54Mbps
Channel Spacing	40/20/10/5 MHz
Regulation Compliance	FCC Part 15B
	FCC Part 15C
	ETSI 301 893
	EN301 489-1/17
	EN60950
Features	
Operation Mode	Base Station , CPE, PtP, P2MP
Security	WEP 64/128bits, WPA-PSK/WPA2-PSK, WPA/WPA-2
Radio Bandwidth Control	20MHz
Super A	Fast Frames, Burst, Compression
TDM Coordination	Traffic management
Intel® TDMA	For long distance transmission
Distance in Meters	Auto ACK-Time adjustment
Wireless Isolation	YES
Management Statistics	Wireless and Ethernet

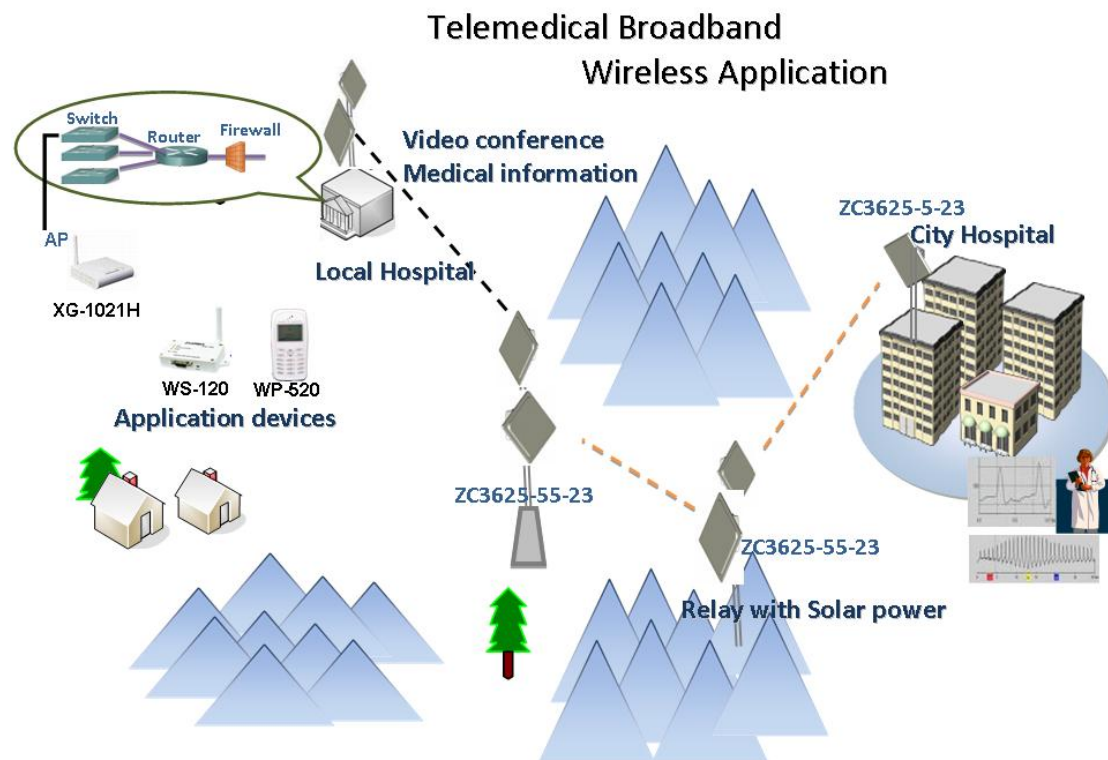
Link Test	Self-Wireless Connection test
Configuration & Management	Web-based Management (Secure SSL)
	Command Line Interface (SSH or RS-232 (9600))
	Windows-based Utility, SNMPv2
FW Upgrade	Web/Windows management tool
Antenna	
Gain	23dBi (Default for FCC)
Frequency Range	5400~5850 MHz
HPBW (horizontal)	10°
HPBW (vertical)	10°
Dimensions	320×320×18mm
Physical & Interface	
Ethernet	10/100 Base T x1 Auto-sense, Negotiation
RS-232	YES
USB	N/A
Buzzer	Signal Indication
Reset Pin	Reset system to factory default
Enclosure & Environment	
External Antenna Connector	N-Type
Enclosure	IP-67 (Die-Casting) Level 7 Waterproof Level 17 Beaufort Scale Vent design Antenna Flexibility
Mounting	Pole Mount (ADC-12 Aluminum alloy)
Temperature	-30 ~ 70 °C, (Operating)
PCBA Dimensions	160 × 135 mm
Weight	2.4 Kg
Humidity	10~95%, (Operating)

Typical Applications

This section describes the typical applications centering on ZC-3635-5-23.

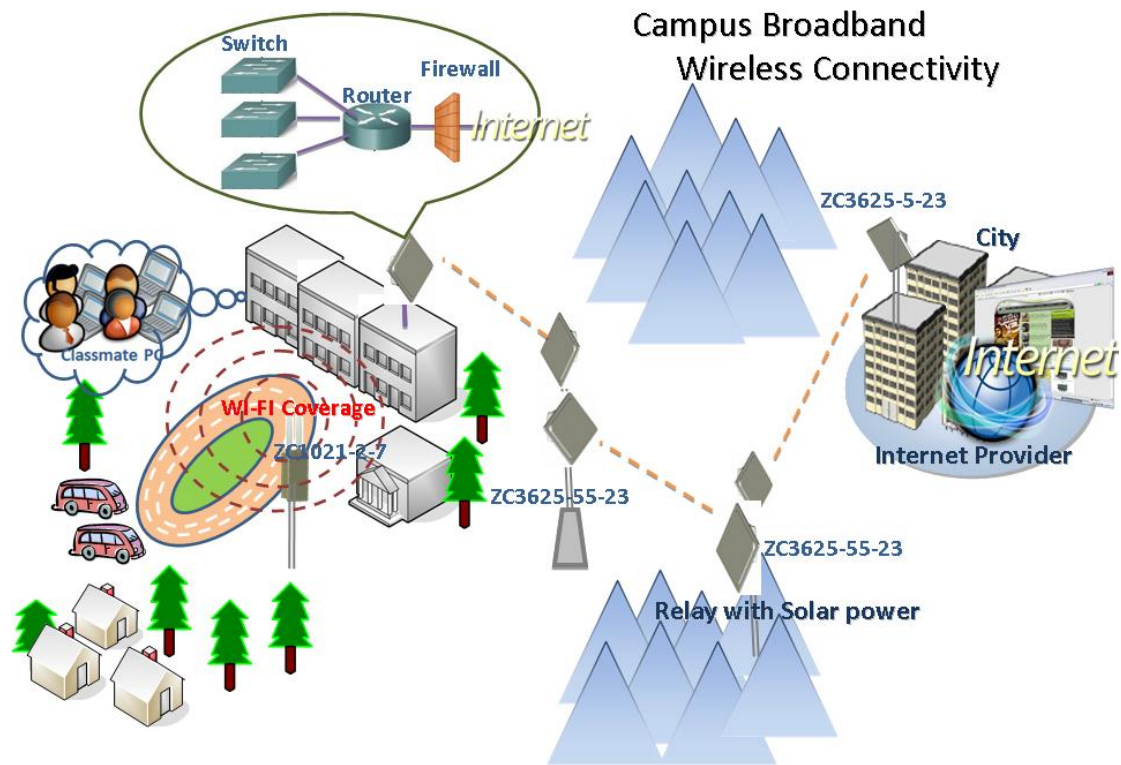
Tele-medical Broadband Wireless Application

ZC-3635-5-23 mainly plays as a relay with cost-effective solar power, sending medical treatment information between city hospital and local hospital in rural area via broadband wireless connectivity.



Campus Broadband Wireless Application

Campus in remote area can access to the Internet via broadband wireless connectivity established by ZC-3635-5-23 which plays as relay and CPE.



Chapter 2 Preparation before Installation

This chapter describes safety precautions and product information you have to know and check before installing ZC-3635-5-23.

Safety Precautions

For your safety and proper installation, please read and follow the instructions below:

- ONLY qualified service personnel should service or disassemble this device;
- When installing the device, note the followings:
 - Do NOT use a metal ladder;
 - Do NOT work on a wet or windy day;
 - Do NOT install, use or service the device during a thunderstorm, as this may cause a remote risk of electric shock from lightning;
 - Wear shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.
- Ground the device properly with grounding wire to protect against power surges;
- Use ONLY appropriate accessories for the device.

Product Packets

The product packets you have received should contain the following items, if any of them are not included or damaged, please contact your local vendor for support.

- ZC-3635-5-23 with integrated 23dBi antenna × 1
- Mounting Kit × 1
- PoE Injector & Power cord × 1
- Grounding Wire × 1
- Water Proof RJ-45 Connector Kit × 1
- Product CD × 1

 **Note:**

- Product CD contains Management Tool, Quick Installation Guide and User Manual!
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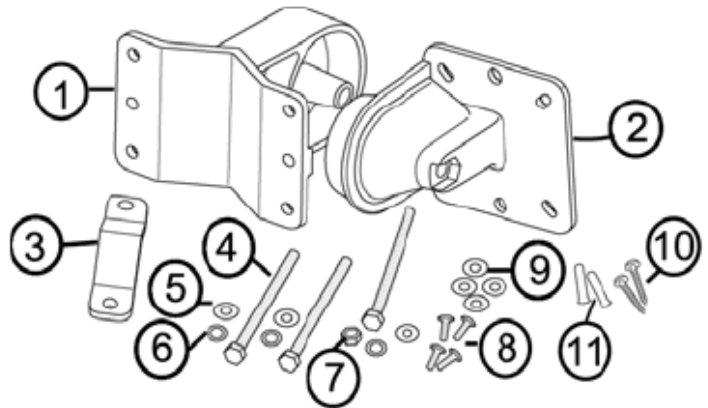
Mounting Kit

- **Wall/Pole Mounting Bracket**

1. T-Form Bracket ×1
2. Articulation Pole ×1
3. Pole Mount Bar ×1

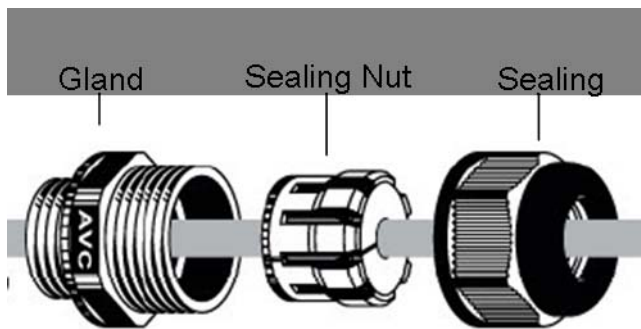
- **Fasteners**

4. M8×110 Screw ×3
5. M8 Washer ×3
6. M8 Spring Washer ×3
7. M8 Nut ×1
8. M5×12 Screw ×4
9. M5 Washer ×4
10. Wood Screw ×4
11. Wall/Gyprock Plug ×4



Waterproof RJ-45 Connector Kit

1. Gland ×1
2. Sealing Nut ×1
3. Sealing ×1



Site Planning

Prior to installation, develop a checklist that covers all aspects of the installation. A well-developed plan identifies potential problems early so that they can be solved timely.

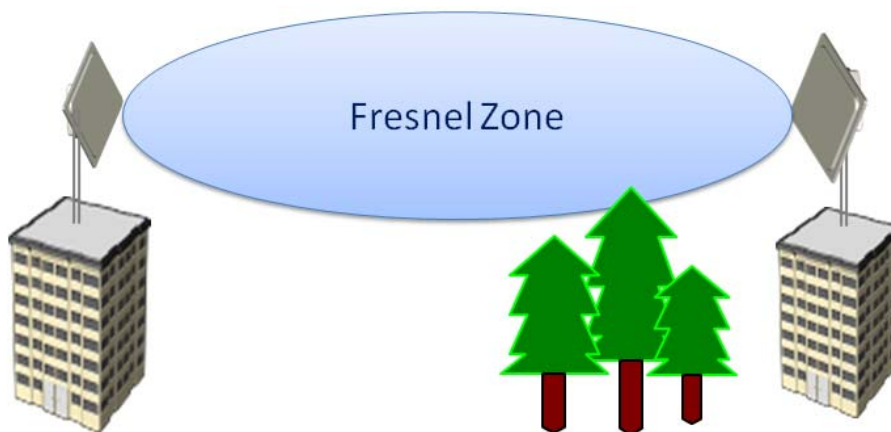
Choosing a Mounting Location

Choosing a good mounting location for the bridge is important because it affects the reliability of the wireless link and maximum data rates the bridge system can achieve. The most important considerations are distance between bridges and clearance from obstacles.

- **Signal path distance and clearance**

In an environment without obstacles in the signal path, the maximum distance between bridges depends primarily on the type of antennas and the free space loss between them. Make sure your proposed mounting site is within range of the remote antenna.

Another consideration when planning a wireless link is the Fresnel Zone, which occupies a series of concentric ellipsoid-shaped areas around the LoS path as below:



The Fresnel Zone is important to the wireless link as it defines an area around the LoS that can introduce RF signal interference if blocked. Objects in the Fresnel Zone such as trees and buildings can diffract or reflect the main signal away from the receiver, changing the RF LoS.

Antenna Polarization

The integrated antenna radiates and receives polarized radio signals. For the link to operate correctly, two antennas at each end of the link must always be set for the same polarization, either vertical or horizontal.

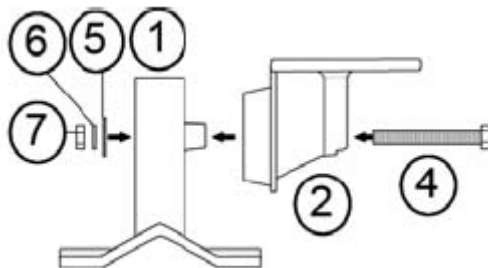
Professional Installation Required

Chapter 3 Hardware Installation

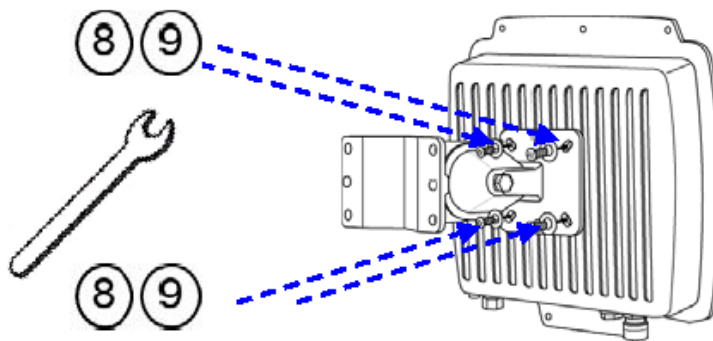
The ZC-3635-5-23 Wireless Bridge is shipped with mounting hardware that accommodates tower or mast installations. This chapter demonstrates the hardware installation procedures, which include Assemble the Hardware Mounting, Pole Mounting, Connect Up, Ground the Wire, Power On and Align the Antennas.

Assemble the Mounting Bracket

1. Assemble the main bracket by placing articulation pole to the T-form bracket via a M8×110 screw through the insertion axle and fix with the M8 washer, spring washer and M8 nut;

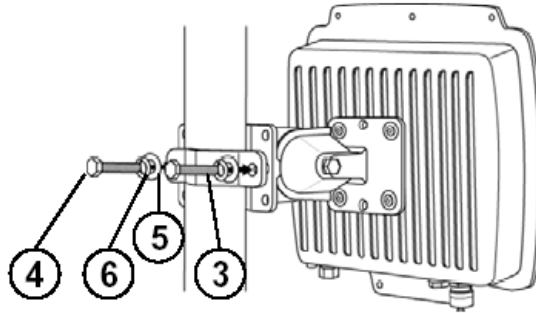


2. Place the main bracket into the seating and use a spanner to fasten the bracket to CPE main unit with M5×12 screws and M5 washers provided in hardware packets;

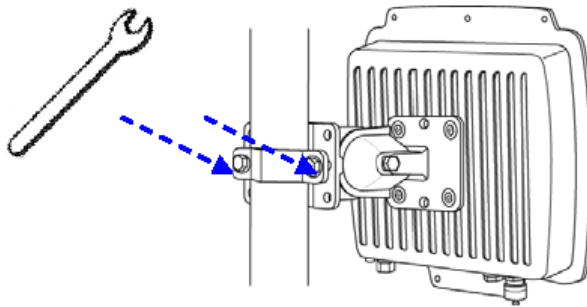


Pole Mounting

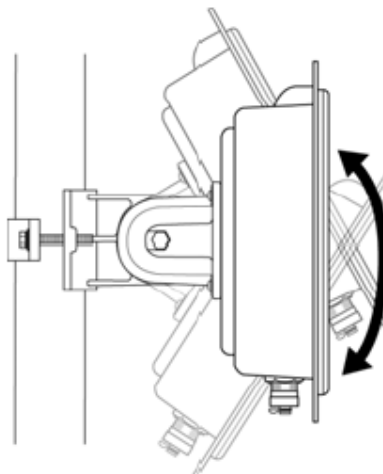
1. Install the main bracket and the pole mount bar over the top of the pole by securing the drill holes of the pole mount bar to the main bracket ones and insert two M8×110 screws, spring washers and washers through the drill holes and main bracket;



2. Fasten two M8×110 screws and washers through the drill holes and main bracket with a spanner;

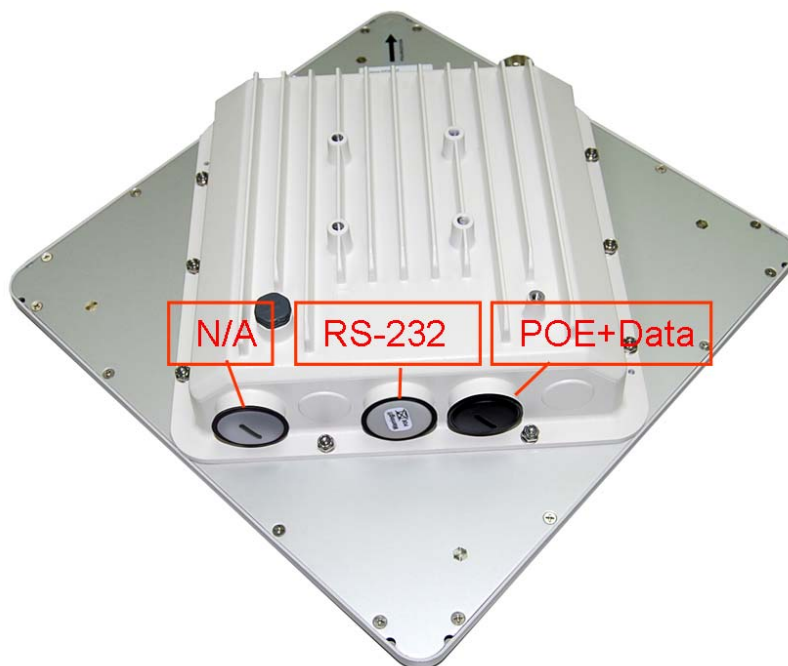


3. Adjust the antenna for appropriate tilt / vertical orientation.



Interface Definition

ZC-3635-5-23 currently provides two interfaces at the bottom, which are PoE & Data with a black plastic dummy cover and RS-232 with a white dummy cover. Among which, a black RJ45 waterproof connector will be provided for the PoE & Data interface.



RS-232

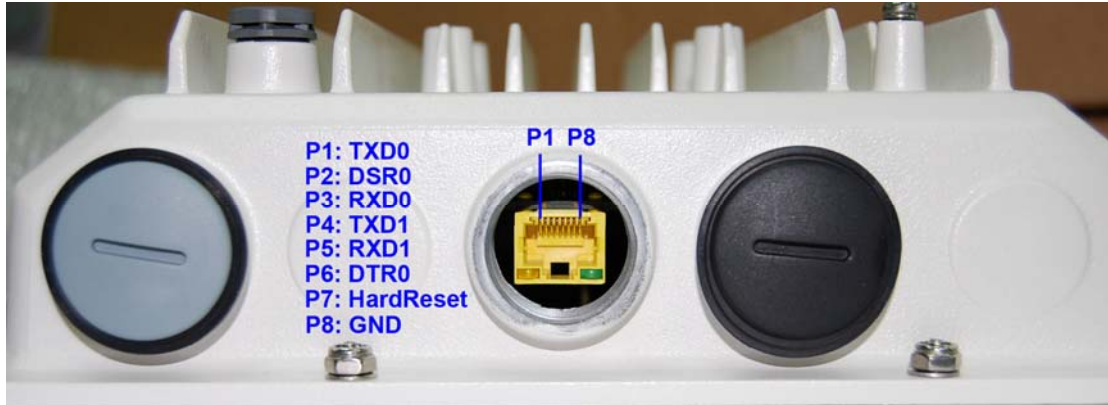
RS-232 is used for debugging purposes as well as for hard reset of the ZC-3635-5-23.

Below you may find the pin definition of the RS-232.

PIN Definition:

Pin Assignment	Name	Description
P1	TXD0	Data Transmit 0
P2	DSR0	Data Set Ready 0
P3	RXD0	Data Receive 0
P4	TXD1	Data Transmit 1
P5	RXD1	Data Receive 1
P6	DTR1	Data Terminal Ready
P7	Hard Reset	Hard reset the unit
P8	GND	Ground

To reset the device, short P7 (Hard Reset) to P8 (GND) for less than 1 second and the system will reset. If P7 (Hard Reset) is shorted to P8 (GND) for over 5 seconds, the ZC-3635-5-23 will be reset to the factory default settings.



Below are the views of RS-232 cover and RJ-45 port respectively, please note the label covered on and DO strictly follow the instructions to avoid damaging your equipment!



 **Warning:**

- Do NOT connect PoE cable to the RS-232 port; otherwise the port will burnout!
 - If RS-232 cable is used outdoor, please DO add a surge protector to protect the equipment circuit!
 - Strongly recommend to add a lightning arrester on the RS-232 port to prevent from lightning attack!
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Connect Up

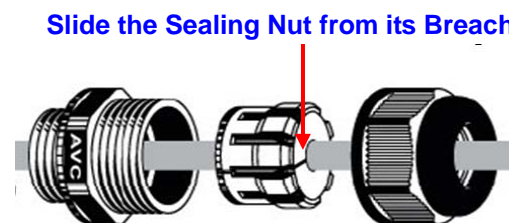
Before installing the Ethernet cable with a waterproof RJ-45 connector, it is recommended that the Cat-5 RJ-45 coaxial cable be used for the ZC-3635-5-23 to power injector connections.

1. To connect to the hole labeled **PoE+Data**, open the black cover in advance by using a coin or a slotted screwdriver and then screw in the body of the gland and tighten.



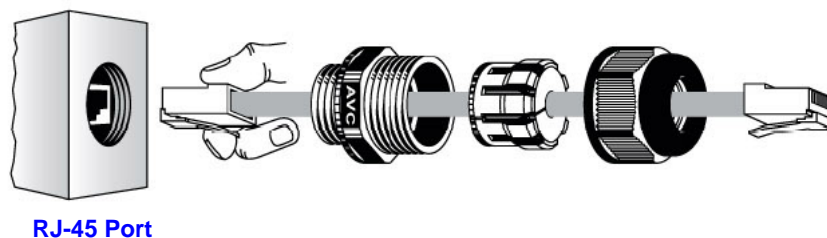
Connect Up – Step 1

2. Slide the sealing nut to the RJ-45 cable from its middle breach and then insert the sealing into the cable.



Connect Up – Step 2

- Insert the RJ-45 connector and make sure that the locking tab snaps home.



Connect Up – Step 3

-
- Screw the sealing on the gland and tighten.



Connect Up – Step 4

Grounding

The ZC-3635-5-23 is shipped with a grounding wire. The unit must be properly grounded to protect against power surges. The ZC-3635-5-23 grounding point can be found on the bottom of the unit. It is supplied with an appropriate grounding lug for attachment to the ODU. Ground the Wire.



Grounding

Power on

To power up the ZC-3635-5-23, follow the steps bellow:

1. Plug a user-supplied Cat-5 Ethernet cable from your wired LAN (or a computer) into the power injector RJ-45 jack (**DATA IN**);
2. Plug a user-supplied Cat-5 Ethernet cable from the ZC-3635-5-23 into the power

injector RJ-45 jack (**P+DATA OUT**);

3. Connect the power module to the power injector and plug the AC cord into an AC power receptacle;
4. After being powered on, the device will send out the beep sound lasting about 1.5 seconds, informing you that the ZC-3635-5-23 is powered up! Wait for about 60 seconds the system will be initialized and start working.



1.

 **Warning:**

- Make sure PoE is correctly connected to the RJ-45 port on the ZC-3635-5-23 labeled PoE+Data, otherwise the extender will be severely damaged!



Align Antenna

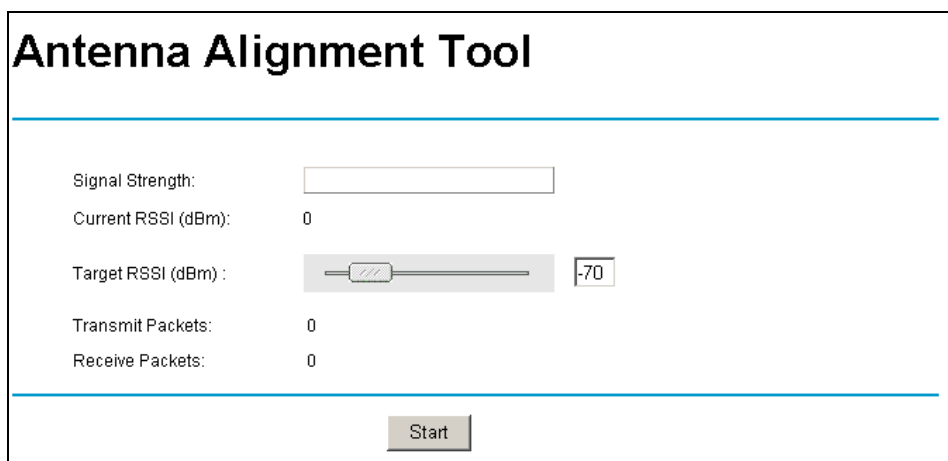
After powering up the wireless bridge, align the integrated antenna to point in the approximate direction of the remote bridge antenna.

If the antenna is at a significant angle, use binoculars, satellite global positioning system (GPS) or reference objects to detect the remote bridge or antenna, and then manually adjust the horizontal and vertical positions accordingly. To verify whether the two antennas are correctly pointed to each other, ping the remote wireless bridge.

Positioning antenna is to align the local antenna to reach maximum signal strength. Using “**Align Antenna**” to measure signal strength is convenient and appropriate for most installations, but note that this method is only available in “**Peer-to-Peer (CSMA)**” mode.

To use “**Align Antenna**”, follow the steps below:

1. Login the Web-based management interface of wireless bridge;
2. Open “**Peer-to-Peer Setup**”, by clicking “**Align Antenna**”, “**Antenna Alignment Tool**” window will popup. Set the target RSSI and click “**Start**” to begin alignment. If the RSSI is below -70 dBm, align the antenna by panning the antenna from side to side and tilting up and down while observing the RSSI value. By doing so, you will be able to know where is the best position for the antenna to reach its maximum signal strength. During adjustment, the device will send out the beep sound, assisting you with the alignment.



The screenshot shows the "Antenna Alignment Tool" interface. It features a title bar at the top, followed by a horizontal line. Below the line, there are several input fields and a slider. The "Signal Strength:" field is empty. The "Current RSSI (dBm):" field shows "0". The "Target RSSI (dBm) :" field has a slider set to "-70". The "Transmit Packets:" and "Receive Packets:" fields both show "0". At the bottom, there is a "Start" button.

3. After the two integrated antennas are well positioned, secure the bridge mounting fasteners. The bridges now are ready to be configured and incorporated into your network.

3. Enter the user name (admin) and password (password) to login and make configurations.



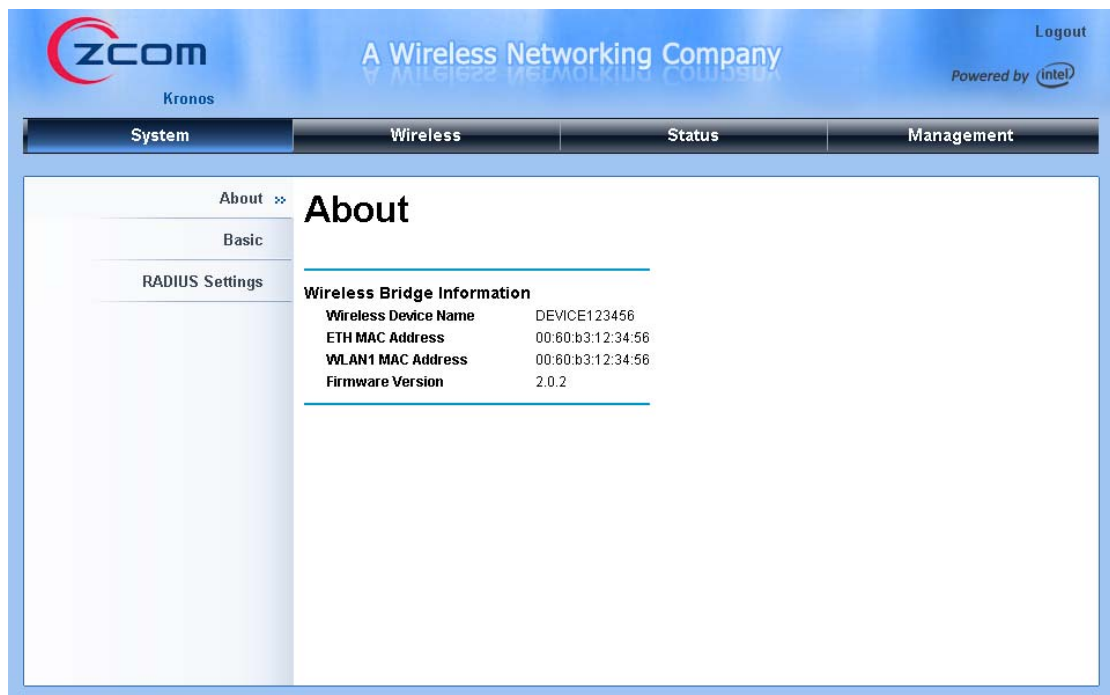
The image shows the ZCOM login page. At the top left is the ZCOM logo with 'Kronos' underneath. To the right, it says 'A Wireless Networking Company' and 'Powered by intel'. The main content area has two input fields: 'Name' and 'Password'. Below these fields are two buttons: 'Login now' and 'Reset'.

4. After configuring the bridge, remove the Ethernet cable from PC and connect the power injector back to your wired LAN port.

Basic Settings

After login to the Web-based management interface, you will see the “**About**” page as below.

Click “**Basic**” in the left menu bar to make basic system configurations.



The image shows the ZCOM Web-based management interface. At the top left is the ZCOM logo with 'Kronos' underneath. To the right, it says 'A Wireless Networking Company' and 'Powered by intel'. In the top right corner, there is a 'Logout' link. Below the header is a navigation bar with four tabs: 'System', 'Wireless', 'Status', and 'Management'. The 'System' tab is selected. On the left side, there is a menu with three items: 'About', 'Basic', and 'RADIUS Settings'. The 'About' item is selected and expanded, showing a sub-menu with 'About' and 'Basic'. The main content area displays the 'About' page. It has a title 'About' and a section titled 'Wireless Bridge Information'. Below this section, there is a table with the following data:

Wireless Bridge Information	
Wireless Device Name	DEVICE123456
ETH MAC Address	00:60:b3:12:34:56
WLAN1 MAC Address	00:60:b3:12:34:56
Firmware Version	2.0.2

IP Address

Enter the settings obtained from your system administrator. The most important setting is IP Address. You may manually assign an IP address or check “**DHCP**” to automatically obtain one from DHCP server on your network.

The screenshot shows the ZCOM Kronos web management interface. The top navigation bar includes 'System', 'Wireless', 'Status', and 'Management'. The 'Basic Setup' page is displayed, featuring a sidebar with 'About', 'Basic', and 'RADIUS Settings'. The main content area is titled 'Basic Setup' and contains the following settings:

Wireless Device Name	DEVICE123456
Ethernet Data Rate	Automatic
Spanning Tree Protocol (STP)	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Link Aggregation	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
	<input type="checkbox"/> Full Duplex Two Channels
	(Note: Link aggregation only takes effective when both cards work on P2P model)
IP Settings	<input checked="" type="radio"/> Manual <input type="radio"/> DHCP Client
IP Address	192.168.1.1
IP Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
Primary DNS Server	0.0.0.0
Secondary DNS Server	0.0.0.0

Note:

- Do not change the IP address of the bridge while you are configuring with Web-based management interface, otherwise you will disassociate from it! If this occurs, login again with that new IP address; if DHCP is enabled then, login again by entering bridge’s wireless device name in the IP address field.

Operating Mode

Four operating modes are available in this bridge: **Base Station**, **CPE**, **Peer to Peer (CSMA)** and **Peer to Peer (TDMA)**. Open “**Radio**” in “**Wireless**” and select the mode suitable for your application.

- **Base Station**

Under this mode, the bridge connects directly to the main Ethernet LAN and receives connectivity from other CPE bridges.

The screenshot shows the ZCOM Kronos management interface. The top navigation bar includes 'System', 'Wireless', 'Status', and 'Management'. The 'Wireless' tab is active. The main content area is titled 'Radio Settings'. On the left, there is a sidebar menu with options: 'Radio', 'Peer-to-Peer Setup', 'Security', 'Access Control', and 'Link Test'. The 'Radio' section is expanded. The main settings area includes:

- Operating Mode: Base Station (dropdown), Site Survey (button)
- Base Station ID: Edit (button)
- Wireless Mode: 802.11a (dropdown)
- Channel / Frequency: 165 / 5.825GHz (dropdown)
- Transmit Rate: Best (dropdown)
- Output Power: 100% (dropdown)
- Band Width: 40MHz (dropdown)
- TDM Coordination: Enable Disable
- WMM Mode: Enable Disable
- Super Mode: Fast Frame, Burst, Compression

At the bottom of the settings area, there is a link for 'Advanced Parameters'.

- CPE

Under this mode, the bridge connects to a remote LAN and that Base Station. Select “**Multicli**” or “**LAN-to-LAN**” for your network application and specify the SSID of the corresponding Base Station.

The screenshot shows the ZCOM Kronos management interface, similar to the first one, but with the 'CPE' mode selected. The 'Wireless' tab is still active. The main content area is titled 'Radio Settings'. The sidebar menu is the same. The main settings area includes:

- Operating Mode: CPE (dropdown), Site Survey (button)
- CPE Mode: Multicli LAN-To-LAN
- Base Station ID: Wireless (text input)
- Use BSSID:
- Wireless Mode: 802.11a (dropdown)
- Channel / Frequency: 165 / 5.825GHz (dropdown)
- Transmit Rate: Best (dropdown)
- Output Power: 100% (dropdown)
- Band Width: 40MHz (dropdown)
- TDM Coordination: Enable Disable
- WMM Mode: Enable Disable
- Super Mode: Fast Frame, Burst, Compression

- **Peer to Peer (CSMA)**

Under peer-to-peer (CSMA) mode, set the same channel for all the peer units. Open “Peer-to-Peer Links” (as below) page to enter the MAC address of the remote peer unit.

- **Peer to Peer (TDMA)**

Under peer-to-peer (TDMA) mode, set one group ID for all the peer units.

Base Station ID

The SSID is a unique identifier that bridges use to associate to each other. It is case-sensitive and consists of no more than 32 alphanumeric characters. By default, it is set to **“Wireless”**.

Output Power

If the bridges are installed less than 328ft (100m) apart, the output power should be adjusted lower to avoid overloading the bridge’s receivers.

To configure the output power, open **“Radio”** and select the appropriate output power value: Full, Half, and Quarter.

Advanced Settings

After basic settings, you might need to configure some parameters to optimize performance or enhance your network security.

Super Mode

The super mode is designed to enhance throughput by decreasing data waiting time slot. Open **“Radio”** and check **“Fast Frame”**, **“Burst”** or **“Compression”** box accordingly.

Security Settings

Security settings are effective to prevent unauthorized access to your network. It supports open system, shared key, WPA-PSK, WPA2-PSK and WPA-PSK&WPA2-PSK. To enable security, open **“Security”** page as below:



Alternatively, under “**Base Station**” mode, by clicking “**Edit**”, the “**Security Profile Configuration**” window will popup. You can set the SSID and security configuration here.



- **Network Authentication Type**

- Open System: It allows any device to join the network without performing security check.

-
- Shared Key: Encryption strength and key are required.
 - WPA-PSK: No need for specific authentication server. In this so-called WPA Pre-Shared Key, all you have to do is just pre-enter a key in each WLAN node and this is the common way to be adopted in large and middle enterprise as well as residential network.
 - WPA2-PSK: Only all the clients support WPA2, can it be available. If it is selected, the data encryption type must be AES and the passphrase is required.
 - WPA-PSK & WPA2-PSK: It provides options of WPA (TKIP) or WPA2 (AES) encryption for the client. If it is selected, the data encryption must be TKIP + AES and the WPA passphrase is required.

- **Data Encryption**

Select your desired authentication and enter the encryption keys. STA and bridge must use the same keys. By default, it is set to **“None”**.

- 64 bit: 10 Hexadecimal digits (any combination of 0-9, a-f, or A-F)
- 128 bit: 26 Hexadecimal digits (any combination of 0-9, a-f, or A-F)
- 152 bit: 32 Hexadecimal digits (any combination of 0-9, a-f, or A-F)
- TKIP: It will be automatically enabled if WPA-PSK authentication is selected.
- AES: It will be automatically enabled if WPA2-PSK authentication is selected.
- AES & TKIP: It allows for backwards compatibility with devices using TKIP.

- **Security Encryption Keys**

- Passphrase: Enter a passphrase and click **“Generate Keys”** button. You can also enter keys manually. These keys must match the ones of other wireless stations or bridges. Only 8 to 63 characters can be entered.
- Key1~Key4: Select the key to be used as the default one and data transmissions are always encrypted using this default key. The other keys are only used to decrypt received data.

Chapter 5 Troubleshooting

This chapter provides troubleshooting procedures for basic problems with the bridge.

Q 1. What if my bridge fails to connect to the remote one?

- **Ethernet Link:** Check the availability of power to the bridge by observing the LED status on the power injector.
 - Green: The wireless bridge is connecting to the backhaul network.
 - Off: The wireless bridge disconnects from the wired network, check whether the power cord and Ethernet cables to the network and bridge are correctly connected.
- **Basic Configurations:** Mismatched basic settings among bridges are the most common cause of connectivity fail. If the bridge does not associate with a remote bridge, check whether options in each device are identical.
- **Security Settings:** Remote bridges attempting to authenticate to your bridge must support the same security options configured in your bridge, such as WEP and WPA (2)-PSK. If your bridge fails to associate with others, check whether the security settings are the same as your bridge settings.
- **Antenna Alignment:** If the methods above are all checked to be correct, you can observe and verify antenna alignment with RSSI value.

Q 2. What if I forget my password?

You may restore the bridge to its factory default settings in “**Backup/Restore Settings**” from “**Management**”.

Q 3. What if my bridge encounters a firmware failure?

Retrieve the settings you have backed up previously in “**Backup/Restore Settings**” from “**Management**”.

Chapter 6 Technical Support

If you still have any trouble using the wireless bridge or you would like to require additional support, please check the following information for support:

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