



WiMAX Outdoor CPE
CPEMAX-OD500
User Manual
Rev. 3



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- 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.

Operation is subject to the following two conditions:

- 1 This device may not cause harmful interference.
- 2 This device must accept any interference received, including interference that may cause undesired operation.

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FCC Radiation Hazard Warning

To comply with FCC and ETSI RF exposure requirement, this equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.



R&TTE Compliance Statement

This equipment is confirmed to comply with the requirements set in the Council Directive of the Approximation of the laws of the Member States relating to R&TTE Directive (1999/5/EC) that include the Electromagnetic Compatibility Directive (2004/108/EC) and Low Voltage Directive (73/23/EEC).

Caution

To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

Line Voltage

Before connecting this instrument to the power line, make sure that the voltage of the power source matches the requirements of the instrument. The unit must be connected to an earthed (grounded) outlet to comply with international safety standards.

Radio

The instrument transmits radio energy during normal operation. To avoid possible harmful exposure to this energy, do not stand or work for extended periods of time in front of its antenna. The long-term characteristics or the possible physiological effects of Radio Frequency Electromagnetic fields have not been yet fully investigated.

Outdoor Unit and Antenna Installation and Grounding

Ensure that outdoor units, antennas and supporting structures are properly installed to eliminate any physical hazard to either people or property. Make sure that the installation of the outdoor unit, antenna and cables is performed in accordance with all relevant national and local building and safety codes. Even where grounding is not mandatory according to applicable regulation and national codes, it is highly recommended to ensure that the outdoor unit and the antenna mast (when using external antenna) are grounded and suitable lightning protection devices are used so as to provide protection against voltage surges and static charges. In any event, FRC, The Supplier, is not liable for any injury, damage or regulation violations associated with or caused by installation, grounding or lightning protection.

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IMPORTANT NOTICE:

This document describes in details the steps and procedure required to install and operate FRC WiMAX Outdoor CPE. The document also lists the different available CLI/Web commands to interact with the CPE with a detailed list of the parameters.

AUDIENCE

This user guide is intended for system administrators and operators responsible for managing and operating the WiMAX CPE.



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CHAPTER ONE: PRODUCT OVERVIEW

1.1 INTRODUCTION

The WiMAX Outdoor CPE with router/Bridge functionality provides WiMAX connectivity to wired LAN networks. The CPE functions as a WiMAX gateway providing wired and wireless broadband Internet access services through connection with a WiMAX base station. The CPE is easily installed, utilizing Plug and Play functionality. In addition to web-based configuration, users can update firmware, simplifying installation and operation of the device. The CPE operates in Router mode and Bridge mode, both providing Internet access:

1.1.1 ROUTER MODE

In Router mode, the internal IP address is acquired through dynamic host configuration protocol (DHCP), static IP address, or PPPoE connection to the WiMAX base station. With enabled DHCP service, connected PCs and notebooks can acquire addresses from the CPE.

A CPE deployed for operation in the router mode is basically used to provide a gateway to hosts on a local area network where the CPE hides all the traffic originating from the LAN behind its IP address which is assigned from the public domain, which makes the traffic appear as if it's originating from the CPE itself. A router CPE implements Network Address Port Translation protocol (NAPT).

1.1.2 BRIDGE MODE

This mode requires minimal presetting, with the internal IP address configured in the same or different network segment as the WiMAX base station. Bridging is a forwarding technique used in packet-switched computer networks.

A CPE deployed for operation in the bridge mode is basically used to provide Ethernet service to enterprise customer locations. An enterprise location has a CPE with an Ethernet interface that could support one or many user hosts in the local network through a switch. CPE supports both IP and Ethernet CS. If Ethernet CS is supported by the network then Layer 2 connectivity can be established between SS and CSN. In this case, the network service to the enterprise customer is an Ethernet service from the core network all the way to the enterprise MS.



1.2 PRODUCT OVERVIEW: WIMAX TRANSMISSION FEATURES

The following transmission features are supported by the WiMAX Outdoor CPE to provide stable and error-free connection.

1.2.1 DYNAMIC ADAPTATION

Dynamic adaptation enables the CPE to maintain a high data rate while taking into account current link conditions like half-loss, interference, and seasonal foliage changes. The CPE monitors wireless link conditions on a burst-by-burst basis and uses dynamic adaptive modulation control, based on the measured CINR (Carrier/(Interference + Noise) Ratio), to regulate the link.

1.2.2 ADAPTIVE CODING

Each data transmission to or from the CPE contains extra, redundant information to reduce the errors introduced during transmission. A coding rate is the ratio of meaningful data to this extra padding (including error correction data). Adaptive coding enables the CPE to dynamically change the coding rate depending on this ratio. This CPE supports coding rates of 1/2, 2/3, and 3/4.

1.2.3 ADAPTIVE MODULATION

Adaptive Modulation is used to specify what modulation technique is coded in to carriers composing orthogonal frequency-division multiplexing (OFDM) symbols. This CPE supports QPSK, 16 QAM, and 64 QAM modulation techniques.

1.2.4 TRAFFIC CLASSIFICATION

Traffic Classification categorizes transmission bursts by searching for pattern matches within the data. Classifications (for example, burst destination, source MAC address, and Virtual LAN tags) are defined and managed by the base station and transmitted to the CPE.



1.3 SYSTEM TOUR

1.3.1 MAIN FEATURES

- ❖ WiMAX Forum IEEE 802.16e-2005 compliance
- ❖ Frequency is 3.65 GHz – 3.675 GHz
- ❖ Supports TDD Duplexing mode
- ❖ Convolutional code: 1/2, 2/3, 3/4, 5/6
- ❖ Supports 5, 7 and 10 MHz bandwidth
- ❖ 26 dBm output power
- ❖ OFDMA modulation, 512/1024 FFT points, QPSK, 16QAM, 64QAM
- ❖ LAN /WAN port with IP Filtering Support.
- ❖ Supports DHCP Server/ Client/Relay, PPPoE, VPN pass-through (IPSEC/PPTP), NAT/PAT
- ❖ Ease-of-use web-based interface for managing and configuring
- ❖ Software features: Dual Image, Automatic/Manual Software Upgrade, Manual/Automatic Configuration file Support, Factory Reset and Status LED, Standard and Private MIBs, CLI support.
- ❖ Support both IP-CS and ETH-CS operation.

1.3.2 PACKAGE CONTENTS CHECKLIST

Once unpacked, ensure that all contents are included. Refer to the list below for the materials list.
List

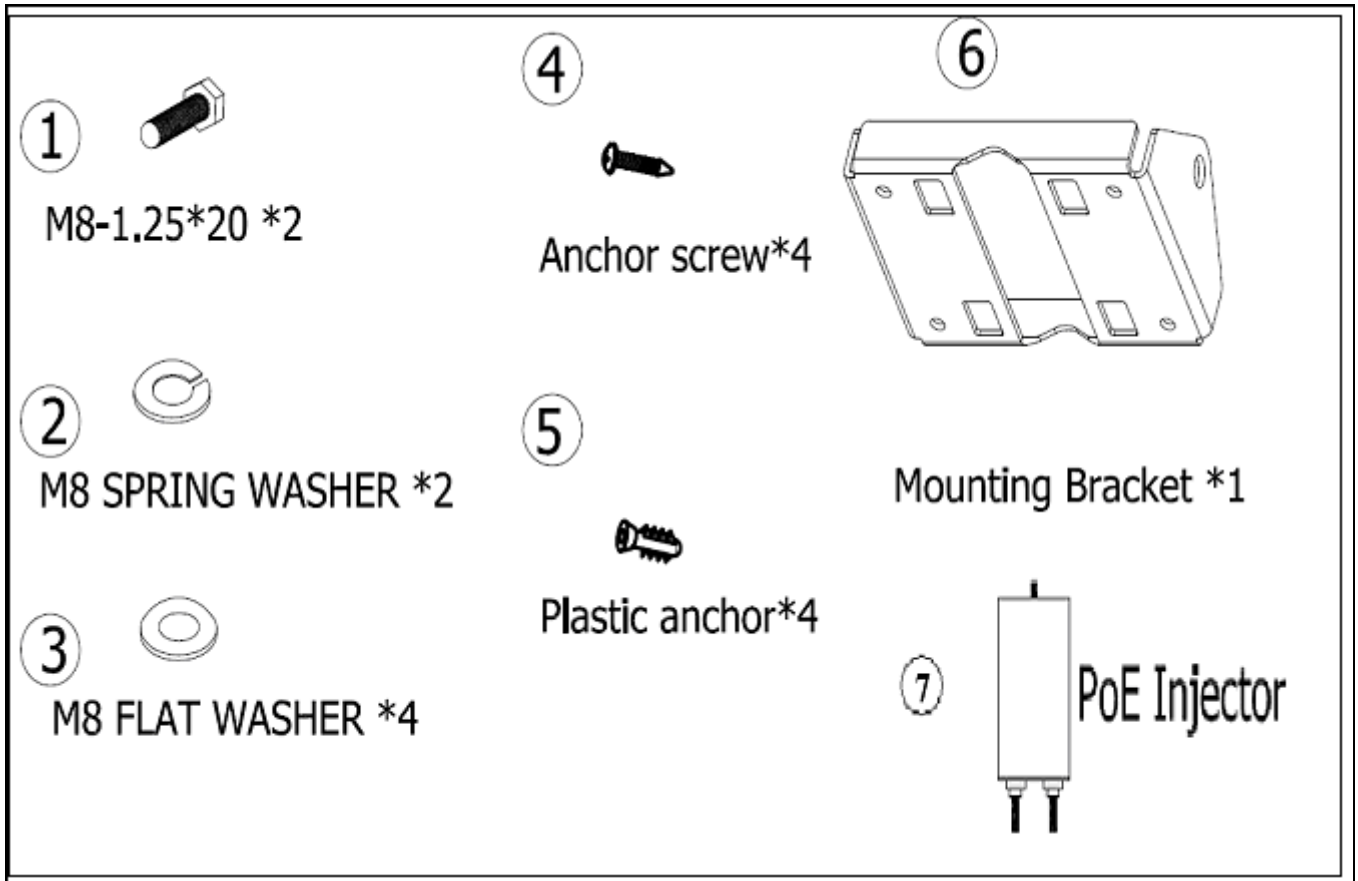


Figure 1: CPE package contents



CHAPTER TWO: BASIC INSTALLATION

This chapter contains information on safety and installation procedures for the WiMAX Outdoor CPE. Follow the recommendations outlined in this chapter to ensure the correct operation of the CPE and reduce the risk of damage to the device or personal injury.

2.1 SAFETY MEASURES

Before installing and using the CPE, take note of the following precautions:

- Read all instructions carefully
- Use only the Power over Ethernet adapter supplied
- Follow all warnings and cautions in this manual and on the unit case

2.2 SYSTEM REQUIREMENTS

Proper installation of the CPE requires the following minimal configuration:

- A PC with a 10/100Base-TX adapter
- A Web browser installed such as Microsoft Internet Explorer® version 8.0, Firefox® version 3.0, or Safari® version 3.0.3.

2.3 Deployment Models

This section describes the different deployment models supported by the CPE.

2.3.1 POINT TO POINT (PTP)

Point to Point deployment uses frequencies in the 5 GHz range and requires that the transmission medium is line of sight and tightly beamed from transmitter to receiver. The diagram shows a typical PTP scenario.

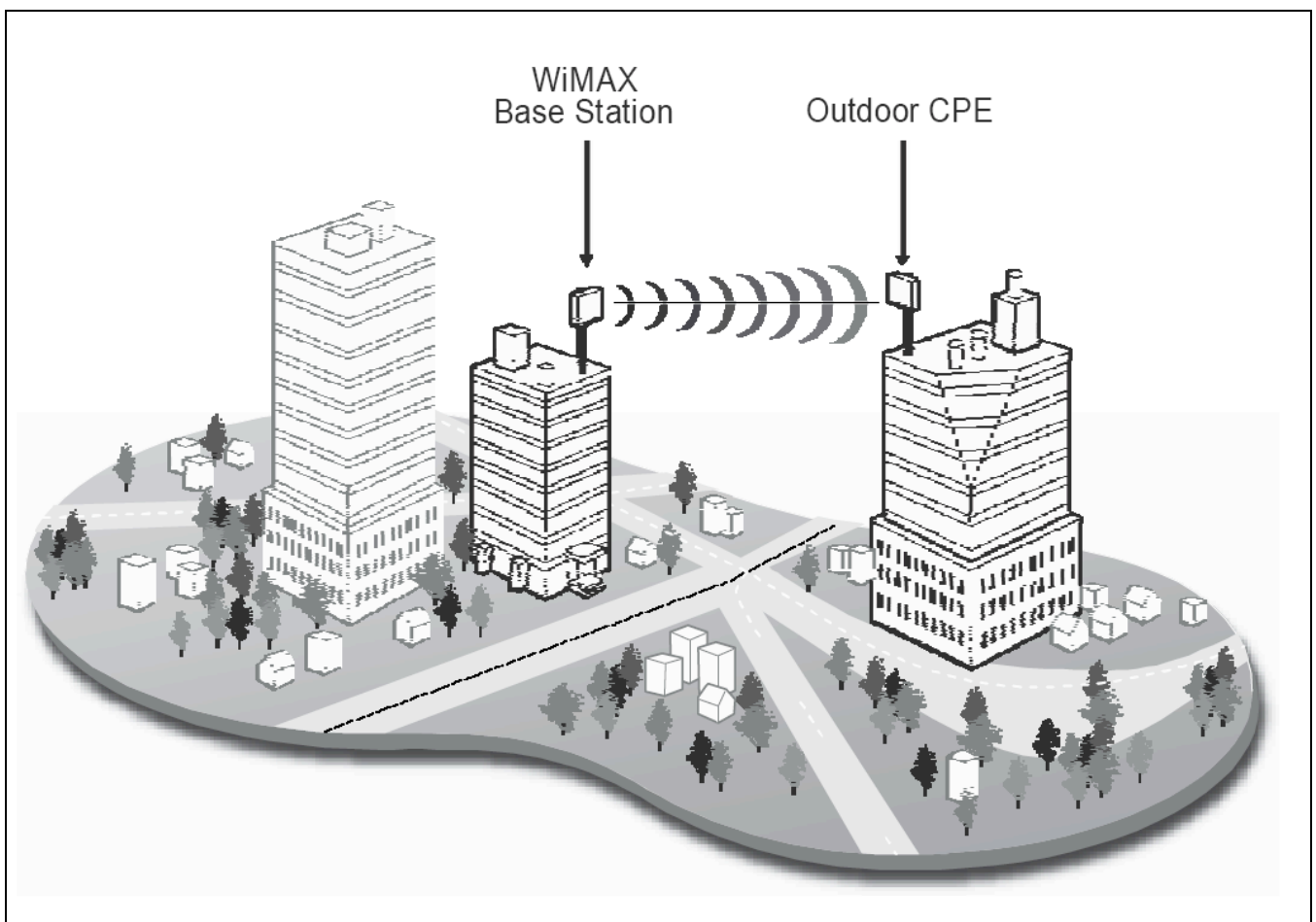


Figure 2: PTP Setup



2.3.2 POINT TO MULTIPOINT (PTM)

Point to Multipoint (PTM) is an extension of PTP deployment where a greater number of receivers are deployed. This CPE supports both PTP and PTM deployment.



2.4 HARDWARE INSTALLATION

This section describes the proper steps required to install the CPE, and to align the antenna.

2.4.1 CHOOSING A LOCATION

To make optimal use of the CPE, a suitable location is important. The range of the CPE largely depends upon the position of the antenna. It is recommended that CPE is within 2Km from the BS and an overall survey performed, observing the following requirements, before installing the CPE:

- Do not place the CPE near the floor or near metal objects, such as drain pipes.
- The location must allow easy disconnection of power to the CPE if necessary.
- Air must be able to flow freely around the hardware.
- The CPE unit must be kept away from vibration and excessive heat.
- The installation must conform to national and local electrical codes

2.4.2 POLE INSTALLATION STEPS

To pole mount the CPE, perform the following steps:

1. Ensure that the pole intended for installation is securely attached to a solid base.
2. Fasten the CPE on the pole with Mounting Bracket and bolt as shown below.

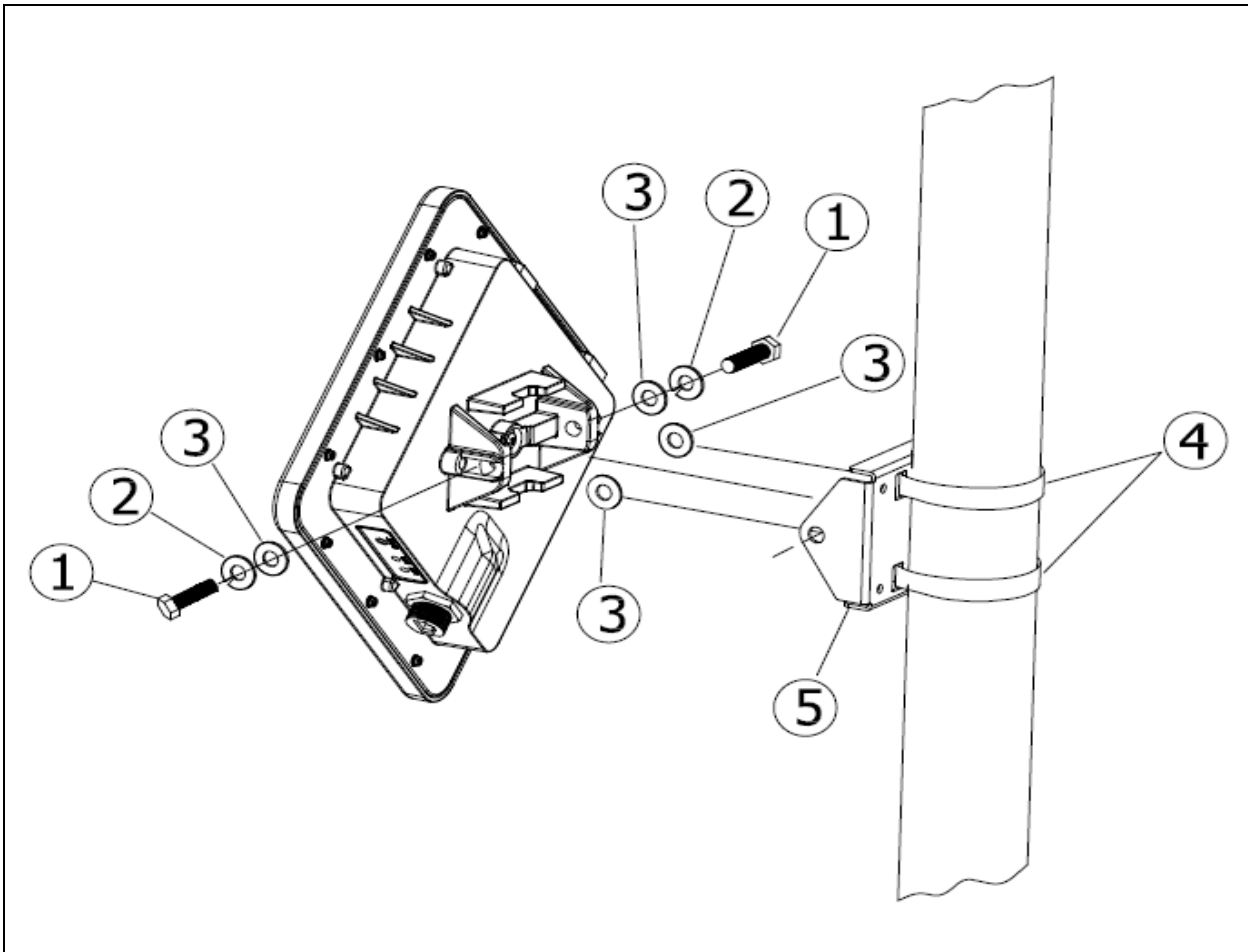


Figure3: CPE Pole Mounting

3. Install weather-proof CAT-5e cable between Ethernet port of CPE and “DC+Data output” port of POE injector as shown in Figure 4.

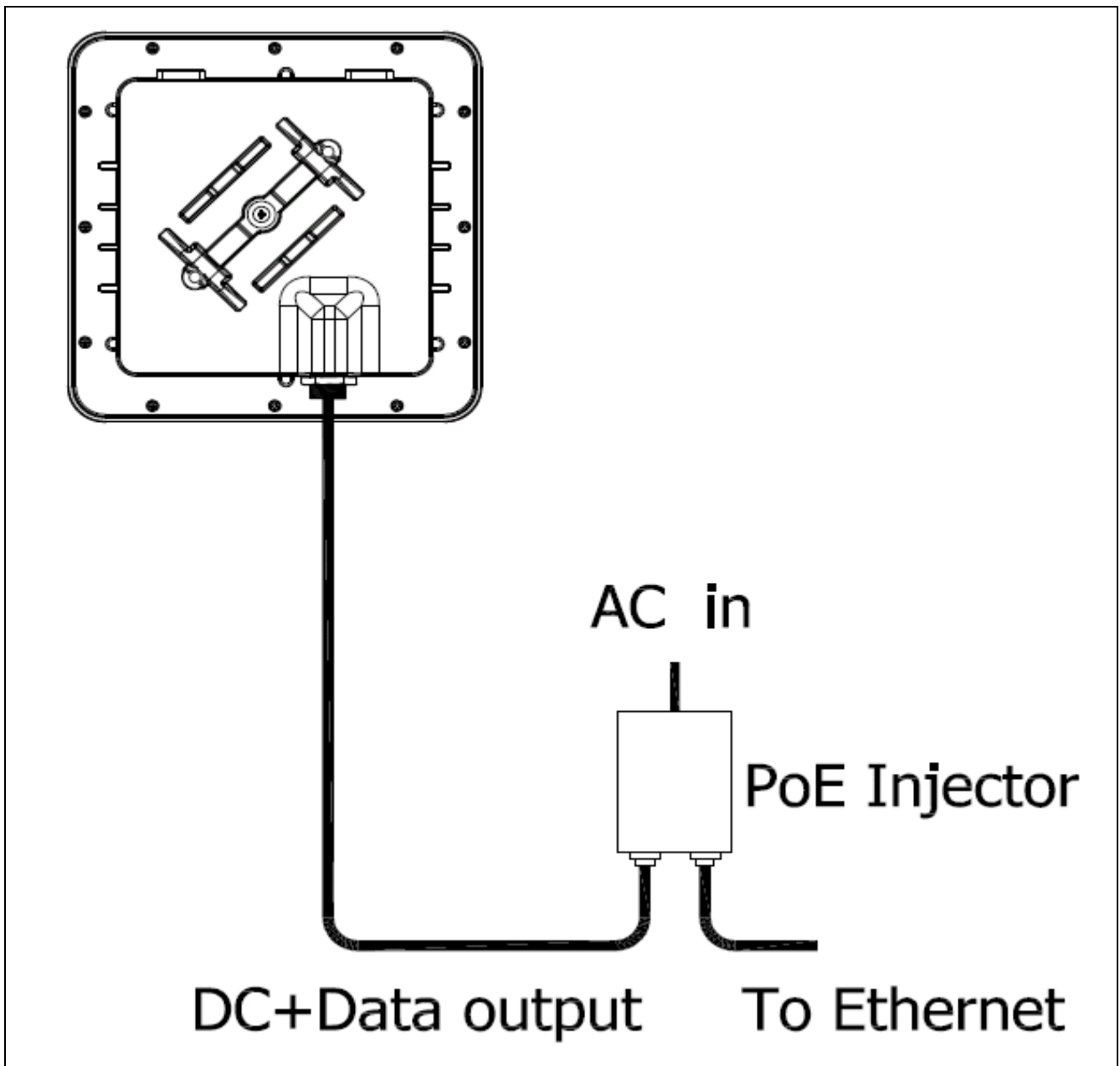


Figure 4: POE Connection Setup

4. Install CAT-5e cable to “To Ethernet” port of POE Injector as shown in Figure 5.

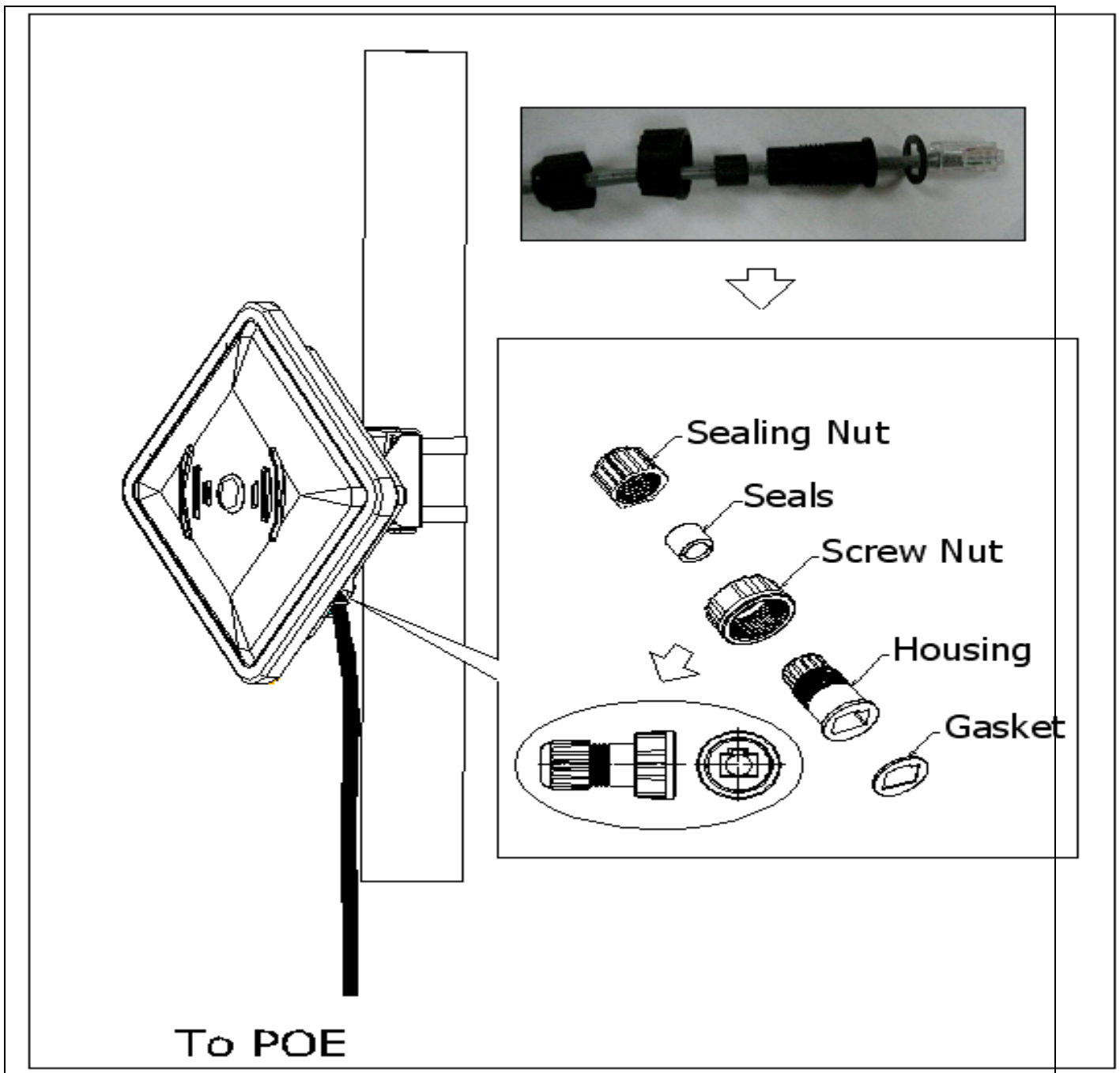


Figure 5: Ethernet installation

2.4.3 WALL INSTALLATION STEPS

To wall mount the CPE, perform the following steps:

1. Ensure that the wall intended for installation is securely solid base.
2. Fasten the CPE on the wall with Mounting Bracket and bolt as shown below.

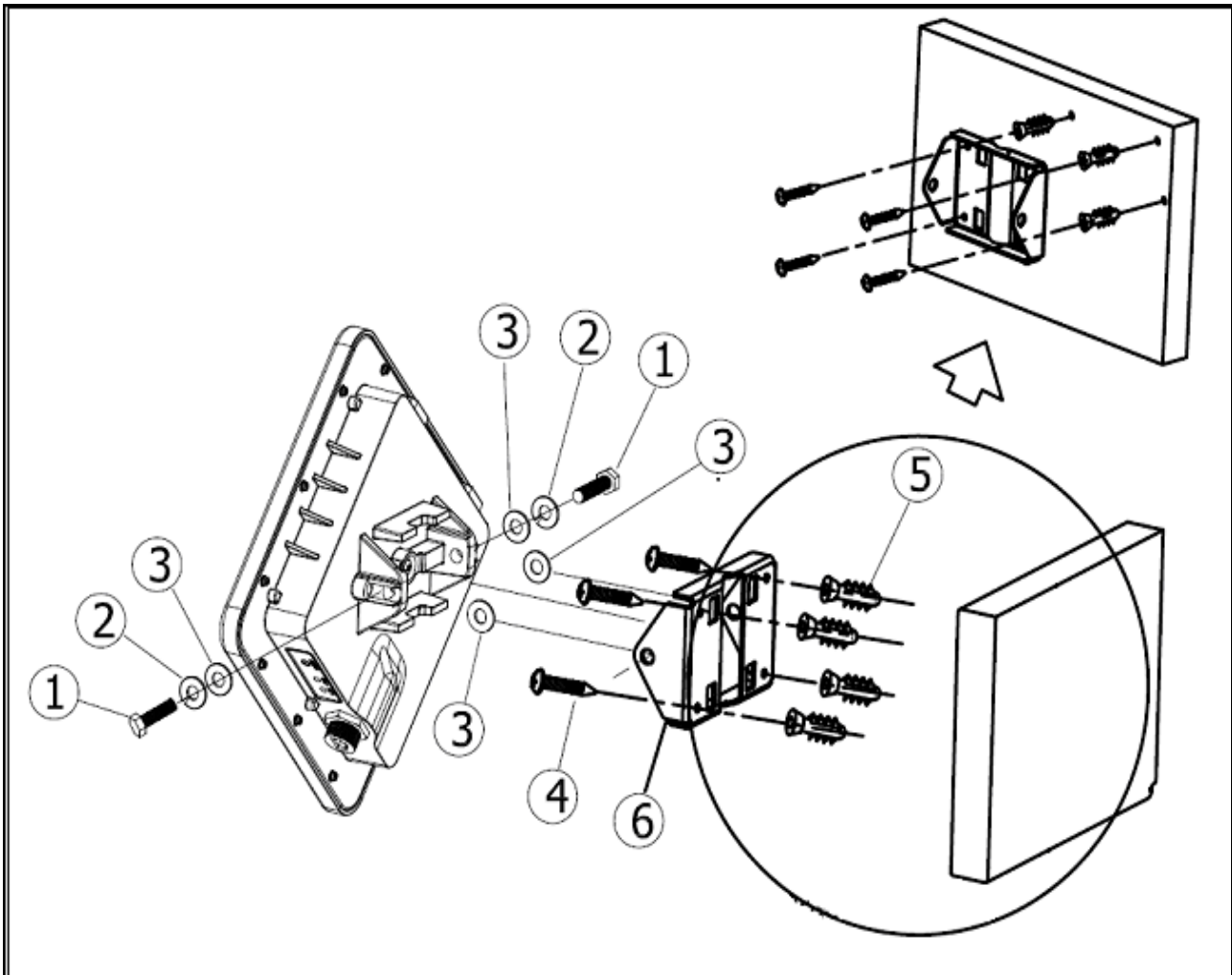


Figure6: CPE Wall Mounting

3. Install weather-proof CAT-5e cable between Ethernet port of CPE and “DC+Data output” port of POE injector as shown in Figure 4.

4. Install CAT-5e cable to “To Ethernet” port of POE Injector as shown in Figure 5.



2.4.4 INSTALLATION CHECK UP

The CPE is equipped with a green LED that indicates the status of the CPE software. The LED flashes with different speeds thus indicating three modes:

1. Before firmware loading → Off
2. During Firmware loading → Rapid flashing
3. Scanning for BS → Slow flashing
4. Connected to a BS → On

For correct installation, you need to do the following:

- I. Ensure the CPE is directed towards the WiMAX Base Station specified in the Work Order.
- II. Access the CPE webpage by entering the default IP address <http://192.168.0.25> in the browser address field. Click on the RF-STAT button to continuously read the RSSI level from the CPE.
- III. Adjust the direction of the CPE in small increments (both horizontally and vertically) until the best RSSI level is achieved.
- IV. Tighten all mounting hardware screws and clamps. Record the best achieved RSSI value on the Work Order.



CHAPTER THREE: WEB CONFIGURATION

A secure web page with multiple tabs is deployed on an embedded web server available on the CPE and is accessible from any web browser. The WiMAX Outdoor CPE's Web-based Graphical User Interface (GUI) enables quick and simple setup, and the configuration of the following options:

- Current settings and status display
- Connection of the configured CPE to WiMAX base stations
- Network setting changes, such as internal IP address, IP address pool, DHCP settings and more
- Wireless security setup
- Internal password change
- Configuration settings backup
- Default settings reset
- Firmware updates

The system configuration parameters are maintained in the configuration file saved on flash.

If the CPE is connected to the BS, then it will get an IP from DHCP and the default IP will no longer be accessible.