



Installation Guide Version 1.1

Altai A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point

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Radio Frequency Interference Requirements

This device complies with Part 15 of FCC Rules.

Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.
3. This device should not be co-located or operating in conjunction with any other antenna or transmitter.

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: To assure continued compliance, (example – use only shielded interface cables when connecting to computer or peripheral devices). Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Warning

The user is advised to keep apart from the base-station and antenna with at least 45cm when the base-station is in operation.

Please install a lightning arrestor to protect the base station for lightning dissipation during rainstorms. Lightning arrestors are mounted outside the structure and must be grounded by means of a ground wire to the nearest ground rod or item that is grounded.

A3-Ei requires professional installation. The installer is responsible for ensuring that the 5GHz radio is used exclusively for fixed, point-to-point operations.

Disclaimer

All specifications are subject to change without prior notice. Altai Technologies assumes no responsibilities for any inaccuracies in this document or for any obligation to update information in this document. This document is provided for information purposes only. Altai Technologies reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

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1. Introduction

This document is written to provide the necessary information for installing Altai A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point (A3-Ei) on field location.

This document is applicable for hardware platform with the following models:

Product name: A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point
Model number: WA3311NAC-E

It is assumed that site survey has been performed. Appropriate antenna pole and AP locations have been selected. It is highly recommended that cable lengths of various cables are confirmed. Good site installation plan should consist of site map, drawing illustrating AP and poles locations, antenna bearing/down-tilt, antenna height, and network topology.

User may refer the following documents during A3-Ei installation and configuration on necessary.

- [1] A3 Series Dual-band 3x3 802.11ac Wi-Fi Access Point Configuration Guide
- [2] A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point Data Sheet

2. Field Installation

2.1. Check A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point Package

Check the package against the packing list to ensure all equipment and necessary parts are included. Typical shipment consists of equipment and parts as shown below. Please contact the sales representative if there is any difference from the packing list.

Moreover, verifying if the equipment has any physical defect. If so, please contact the sales representative for repair or replacement.

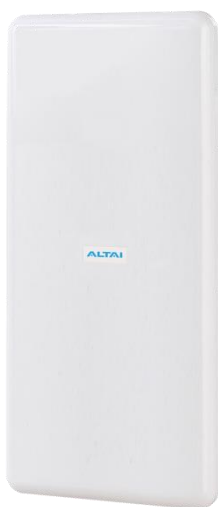


Figure 1 - A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point

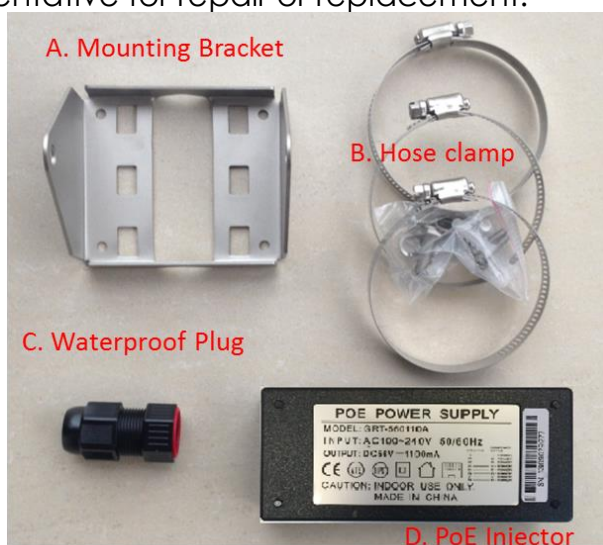


Figure 2 - Accessories

A3-Ei standard package contents:

Main Unit

- A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point x 1

Accessories

- Mounting Kit: x 1 set
 - Mounting Bracket x 1
 - Hose clamp x 3
 - M8-1.25*20 x 2
 - M8 Spring Washer x 2
 - M8 Flat Washer x 2
 - Anchor screw x 4
 - Plastic anchor x 4
- PoE Power Injector x 1
- Waterproof Plug x 1 set
- Mounting Configuration x 1 page

2.2. Introduction of A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point

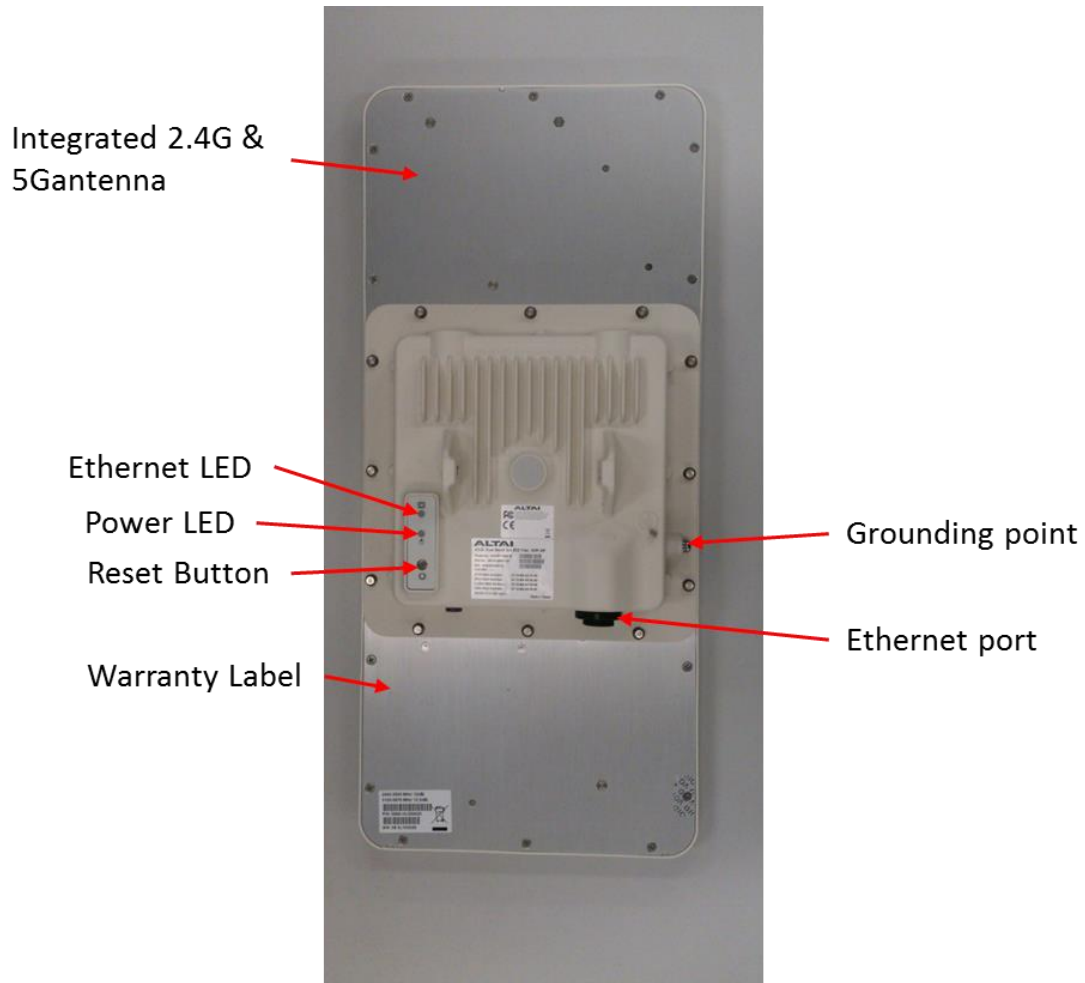


Figure 3 - A3-Ei Back View



Note: Warranty will be voided if warranty labels are broken



Note: AP configuration should be done before installation.

2.3. Preparation of A3-Ei Installation

Before installation, please prepare the following tools and accessories:

Tools:

- Drill with M6 drill bit (for wall mount only)
- Screw Driver
- Adjustable Wrench
- Hammer (for wall mount only)
- Wire Stripping Tool and Crimping Tool
- Waterproof Tape and Electrical Tape

Accessories

- | | |
|------------------|-----|
| • Ground Wire | x 1 |
| • Ethernet cable | x 2 |

2.4. A3-Ei Installation Procedure

2.4.1. Pole Mount

1. Secure the mounting bracket at the back of A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point with M8 screw.

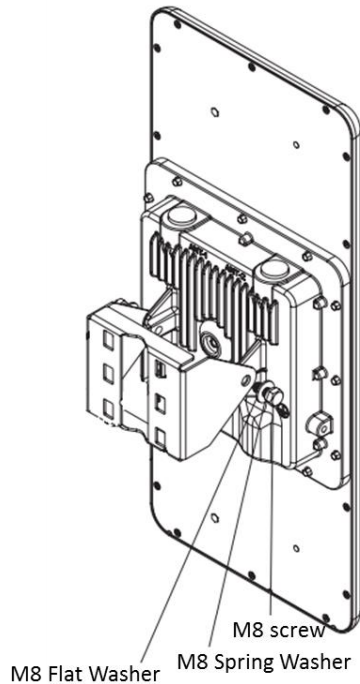


Figure 4 - Fix mounting bracket at the back of A3-Ei (pole mount)

2. Fix the mounting bracket on the pole using hose clamps.

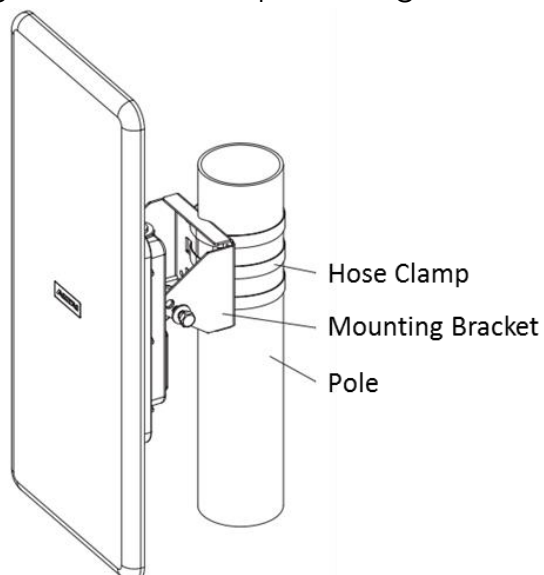


Figure 5 - Mount the bracket on the pole

Remark: Hose Clamp of A3-Ei is suitable for a pole with diameter from 50mm to 80mm only

2.4.2. Wall Mount

1. Position the Mounting Bracket at the desired location on the wall.
Mark the four mounting screw holes on the wall
2. Drill four holes into the wall.
3. Insert plastic anchor in each hole.
4. Secure the Mounting Bracket to the wall by inserting the screws into the anchors.

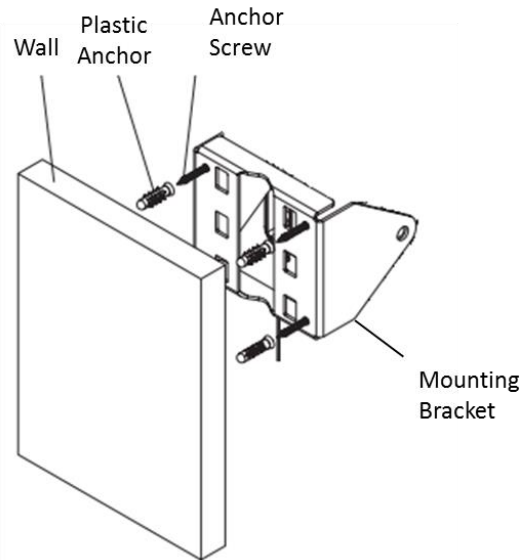


Figure 6 - Fix mounting bracket on the wall

5. Secure the mounting bracket at the back of A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point with M8 screw.

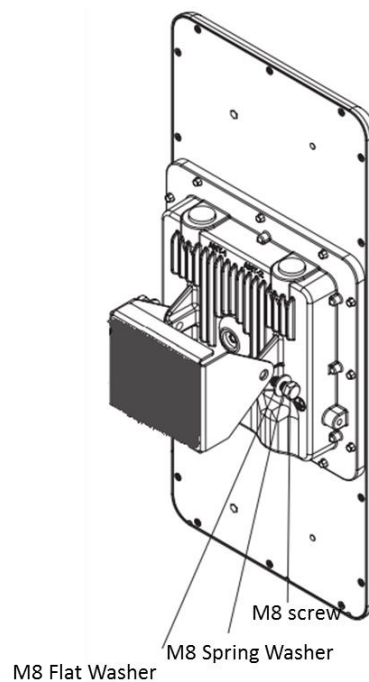


Figure 7 - Fix mounting bracket at the back of A3-Ei (wall mount)

2.5. Installing Waterproof Plug

With the field installation requirements, two CAT 5e (or above) Ethernet cable with appropriate length (Max. 100m) should be prepared before installation.

2.5.1. Waterproof plug installation procedure

1. Make sure the waterproof plug should contains four components (see Figure 8):

- NUT (housing) x 1
- Sealing x 1
- BODY (housing) x 1
- O-Ring x 1

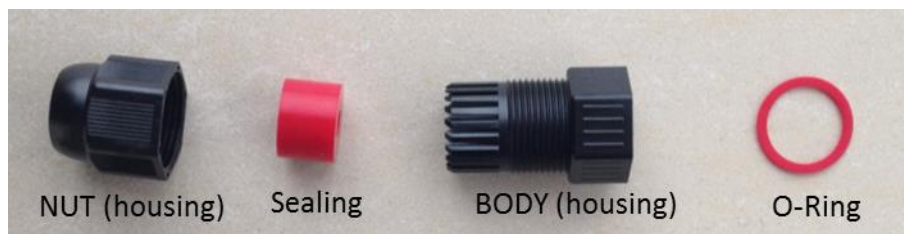


Figure 8 - Waterproof Plug Set

2. Insert sealing into the BODY(housing) as shown in Figure 9



Figure 9 - Insert sealing in the BODY(housing)

3. Thread Ethernet Cable through the component parts as shown in Figure 10.



Figure 10 - Insert Ethernet cable into the waterproof plug

4. Use wire stripping tool to remove Ethernet cable jacket.

5. Use the crimping tool to crimp the RJ-45 connector to the Ethernet cable (see Figure 11).



Figure 11 - Use the crimping tool to crimp the RJ-45 connector to the Ethernet cable

2.6. Ethernet Cable Wiring

Pins on RJ-45 connector are shown in Figure 12.

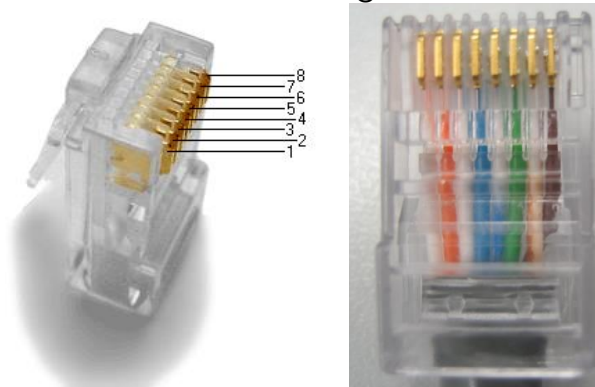


Figure 12 - Pins on RJ-45 connector

Assign the untwisted wire of Ethernet cable into the order which is shown in Table 1.


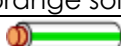


Pins	Pair	Wire Color
1	2	 white/orange strip
2	2	 orange solid
3	3	 white/green strip
4	1	 blue solid
5	1	 white/blue strip
6	3	 green solid
7	4	 white/brown strip
8	4	 brown solid

Table 1 - Assignment of wire pair of Ethernet cable and pins of RJ-45 connector

2.7. Power over Ethernet (PoE)

Refer to the following diagram for installing the components by using PoE to power the A3-Ei.

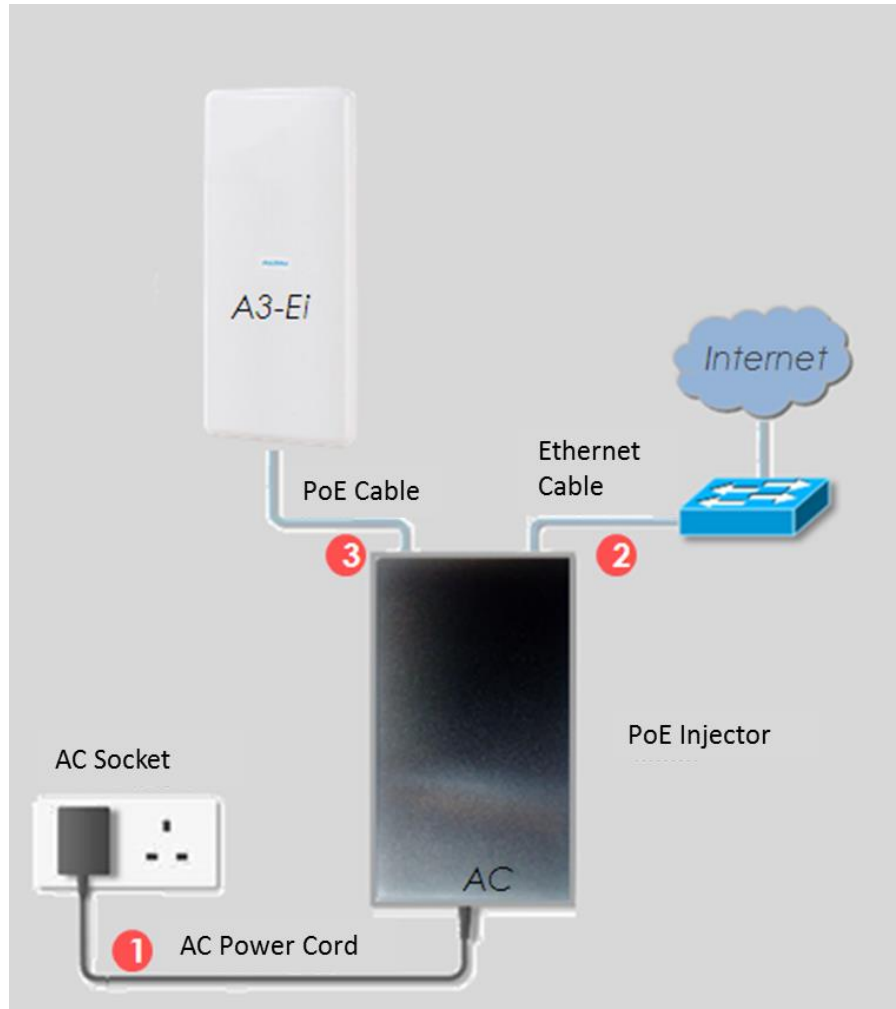


Figure 13 - Installation components for a PoE installation

Note:

- AC power cord, Ethernet cable, and PoE cable are not provided in the package
- Ethernet cable and PoE cable should be CAT 5e or above
- Maximum length of Ethernet cable and PoE cable must be less than (<) 100m

PoE Injector Connection:

Port on PoE Injector	Connect to
Data In	Backhaul link, computer or peripherals
Data & Power Out	A3-Ei Ethernet Port



Caution: Make sure cables are connect to correct ports of the PoE to avoid electrical damage to peripheral Ethernet port!

2.8. Waterproof Protection on Ethernet Connector of A3-Ei

In order to having better waterproof protection in outdoor environment, Altai highly recommends to protect the Ethernet connector on A3-Ei with waterproof tape and electrical tape.

Procedures:

1. Connect the Ethernet cable which is prepared on section 2.5 to A3-Ei Ethernet connector (see Figure 14).



Figure 14 - Connect Ethernet cable with waterproof plug to A3-Ei

2. Wrap a layer of electrical tape from 2 inches (50mm) below the edge of the cable connector. Overlap the tape to half-width. The tape should cover the cable connector body and the cable connector clamping nut.

The tape can be applied in one or more strips if necessary. A strip can be coiled onto an applicator such as a pencil. Apply only enough tension to get good adhesion and keep the tape smooth.

3. Wrap a layer of butyl rubber tape from 1 inch (25mm) below the edge of the cable connector. Overlap the tape to half-width. Take extra care to make sure that the cable connector of A3-Ei Ethernet port junction is tightly sealed. Press the tape edges together so that there are no gaps. Press the tape against the cable connector body and the Ethernet port.
4. Wrap a layer of electrical tape from 1 inch (25mm) below the edge of the cable connector. Overlap the tape to half-width.



Caution: Proper sealing to outdoor connector is recommended. Proper sealing prevent water ingress to it and protect it from gradual degradation due to UV radiation and pollution.

3. Grounding Protection

It is essential to properly ground all equipment to prevent the A3-Ei from the electrical damage and possible electric hazer due to non-proper power grounding. Failure to do so may result in equipment damage, injury or death. **Product warranty does not cover damage resulting in part or in whole from improper grounding.** An external grounding wire must be installed, especially when A3-Ei is deployed on a non-metal pole or the metal pole is not properly grounded. Please consult your location's building and electrical codes and follow them, or consult standards such as National Electric Code.

Use a **10 AWG** grounding wire to connect to the ground connector of the A3-Ei by screw driver. Secure the grounding screw tight and the strap connects to the ground.

It is recommended that the A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point should be installed with lightning rod to avoid any potential electrical damage and to be connected with the ground node to the existing ground. Proper grounding will always be the safety consideration for the A3-Ei Dual-band 3x3 802.11ac Wi-Fi Access Point.



Note: Grounding kits are not provided in the package

4. Surge Protection

Type of Ethernet cable in outdoor deployment is critical. The Ethernet cable should be either CAT 5e or CAT 6, outdoor rated, and shielded. Specifically, the following types of Ethernet cable should be used for outdoor installation: *screened fully shielded twisted pair (sFTP) cable, foiled twisted pair (FTP) cable, or shielded twisted pair (STP) cable.*

UTP Ethernet cable and/or unshielded RJ-45 jack are not recommended in outdoor deployment due to increasing electromagnetic noise level. Furthermore, using shielded Ethernet cable with unshielded RJ45 jack between the A3-Ei and PoE injector is not recommended. Improperly grounded STP Ethernet cable acts as a magnet for static surges presented in the environment. Since the charges discharged improperly, it couples with the data lines or power lines of the PoE cable. As a result, the coupling high voltages which presents on the PoE cable may damage the access point. Therefore, it

is very important that using shielded outdoor rated Ethernet cable together with shielded RJ45 jack for outdoor deployment at the time. The differentiation between unshielded twisted pair (UTP) Ethernet cable and foiled twisted pair (FTP) cable is that the latter has a small wire under the foil. This wire (preferably 2 cm longer than other wires), also known as the drain wire, should be wrapped around the outside of the shield when installing the shielded RJ45 plug. It is very important to have direct contact between the foil and the shield of the RJ45 connector.

Figure 15 shows a shielded, metal-enclosed RJ45 connector. First the boot is slid onto the cable, then the cable shield and drain wire are folded back, next the load bar is loaded with the eight inner cable conductors, then the load bar/cable assembly is inserted into the connector housing and crimped. Finally, the boot is slid over the assembly for additional strain relief.

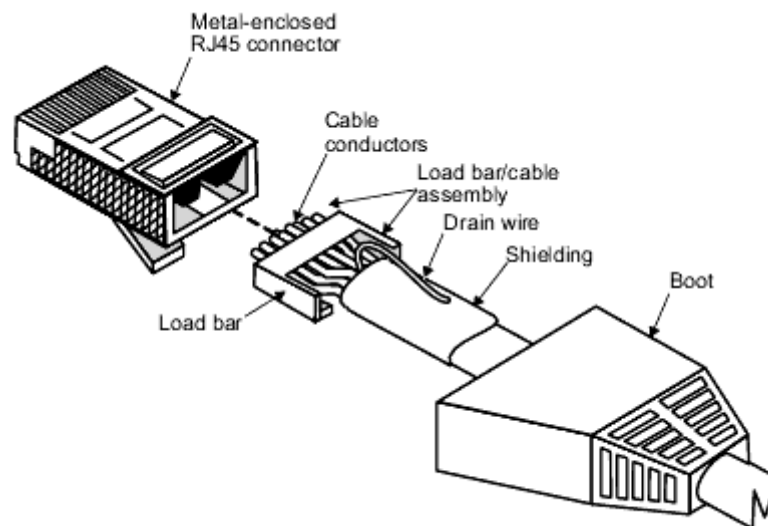


Figure 15 - Shielded, metal-enclosed RJ45 connector

Here are some more tips to improve the effectiveness of your surge protection scheme for fighting against lightning and power surges:

- Keep cable runs as straight as possible.
- Always run outdoor PoE cable inside of the mounting pole if possible. The mounting pole will act as insulation and help passing surges to ground.
- Use PoE cable and RJ45 plug that is shielded and is rated for outdoor or direct burial;
- Test the conductivity of the grounding system to ensure the installation is solid and electrically capable of grounding any ambient surge or static.

5. Electrostatic Discharge (ESD) Protection

Electrostatic discharge (ESD) can damage electronic components and cause latent damage that results in premature failure even if components remain functional. In addition, the equipment must be properly grounded. Technicians should always wear proper ESD grounding straps connected to the ESD connector during equipment installation, maintenance and repairs.

6. Post Installation Procedures

Make sure that all cables are connected properly with the following procedures after completing the A3-Ei installation and aligning the antenna:

- Make sure the antenna is mounted tightly after the alignment
- Make sure the grounding strap is connected properly to the ground.
- Check all cables are connected to PoE injector correctly and properly.
 - Make sure the Ethernet cable from PC or backhaul network equipment is connected to “Data In” port of PoE injector.
 - Make sure the Ethernet cable from A3-Ei is connected to “Data & Power Out” port of PoE injector.
- Make sure the PoE injector's light is on.
- Make sure the right cables are used during the installation
- Make sure all connectors are sealed with the waterproof seal properly.

After going through the above procedure, it is necessary to test the wireless quality and check whether the RSSI falls into the acceptable range or not via A3-Ei Web UI. It might be needed to re-aligns antenna again if the performance is not acceptable.

7. LED Colors and What They Mean

LED	Mode	LED Status (Color)	Meaning
Power LED	Thick AP	Off	Power off
		Blinking slowly (Orange)	Booting
		Solid (Orange)	Operating
	Thin AP	Off	Power off
		Blinking slowly (Orange)	Booting
		Blinking slowly (Green)	Discovery / Connect to Access Controller
		Solid (Green)	Connect to Access Controller successfully and operating
Ethernet LED	--	Off	Link Down
	100Mbps	Solid (Green)	Link Up
		Blinking (Green)	Activity
	1000Mbps	Solid (Blue)	Link Up
		Blinking (Blue)	Activity
Remarks: 1. All LED will be off once pressing down the reset button 2. Pressing and holding the reset button until Power LED blinks once, the device reboots. 3. Pressing and holding the reset button until Power LED blinks twice consecutively, the device restores the factory default setting.			

Table 2 –A3-Ei operation LED indicators

8. Accessing A3-Ei Administration Web Interface (Web UI)

8.1. Preparing the Administrative Computer

1. On your Windows XP or Windows 7 computer, open the Network Connections (or Change adapter settings) control panel according to how the Start menu is set up:

On **Windows XP**, click **Start > Control Panel > Network Connections**.

On **Windows 7**, click **Start > Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings**.

2. Right-click the icon for Local Area Connection, and then click Properties.
3. When the Local Area Connection Properties dialog box appears, select Internet Protocol (TCP/IP) (or Internet Protocol Version 4 (TCP/IPv4)) from the scrolling list, and then click Properties. The Internet Protocol (TCP/IP) Properties dialog box appears.
4. Write down all of the currently active network settings. You will need this information later when you restore your computer to its current network configuration.
5. Configure the IP address settings with the values listed in Table 3.

IP Address	Any address in the 192.168.1.x, except 192.168.1.222 and 192.168.1.255 Example: 192.168.1.2
Subnet Mask	255.255.255.0
Default Gateway	Blank
DNS	Blank

Table 3 - Configure administrative computer's IP address settings

6. Click **OK** to save the changes and close the TCP/IP Properties dialog box.
7. Click **OK** again to close the Local Area Connection Properties dialog box.

8.2. Login Web UI

1. Power on A3-Ei
2. Open a Web browser from the computer.
3. Type <http://192.168.1.222> in the address bar or location bar.
4. A3-Ei login page appear (see Figure 16).
5. Type "admin" in **Username**
6. Type "admin" in **Password**
7. Click **Login**

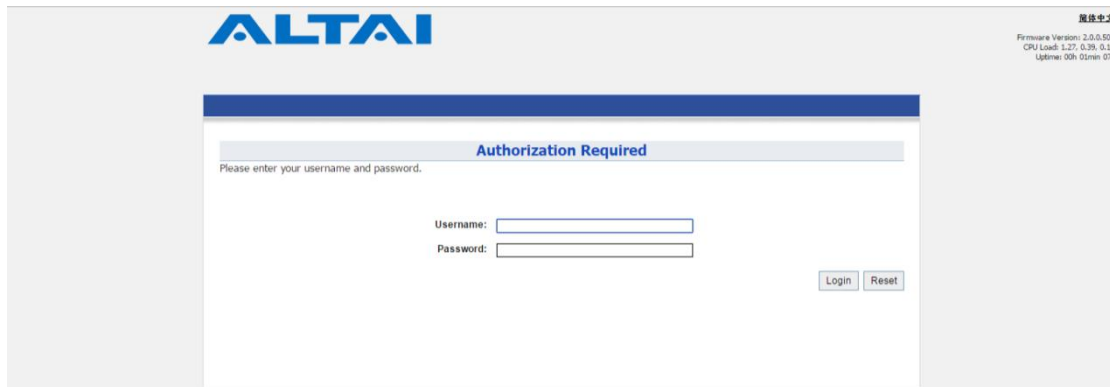


Figure 16 - A3-Ei login page

8.3. Secondary IP Address of A3-Ei

The default IP address of A3 series access point is *192.168.1.222/24*. A3 series products support another permanent IP address on the Ethernet connection, named as **Secondary IP Address**. This secondary IP address is *192.168.99.x/24* where x denotes as the decimal value of the last byte of the Ethernet MAC address on the access point.

Example 1:

Device Ethernet MAC address: 00:19:BE:20:03:**8C**

Secondary IP Address of this device: 192.168.99.**140** (**8C** (HEX) → **140** (DEC))

The secondary IP address shall use IP range from 192.168.99.5 to 192.168.99.254. The rest of IP addresses are reserved. If the last byte of the MAC address matches the reserved IP addresses, the supported device shall follow the MAC to IP address mapping shown in Table 4:

Ethernet MAC address	Reserved Purpose	Replaced MAC byte	Secondary IP address
XX:XX:XX:XX:XX:00	Invalid IP	A0	192.168.99.160
XX:XX:XX:XX:XX:01	For gateway	A1	192.168.99.161
XX:XX:XX:XX:XX:02	For operator computer	A2	192.168.99.162
XX:XX:XX:XX:XX:03	For operator computer	A3	192.168.99.163
XX:XX:XX:XX:XX:04	For operator computer	A4	192.168.99.164
XX:XX:XX:XX:XX:FF	Invalid IP	AF	192.168.99.175

Table 4 - A3 Series secondary IP address

Example 2

Device Ethernet MAC address: 00:19:BE:20:03:**FF**

Secondary IP Address of this device: 192.168.99.**175** (**FF** (HEX) → **AF** (HEX) → **175** (DEC))

9. Restoring Factory Default Setting

Press and hold the reset button until *Power LED blinks twice consecutively*, the device restores the factory default setting.



Caution: Restoring the device to factory default settings removes all configuration changes that you have made. These include the IP address, password, access control list, and wireless settings. Returning the configuration of these features to their factory default settings may result in network connectivity issues

10. Typical A3-Ei Setup

Typical A3-Ei setup on pole is shown as below:



Figure 17 - Typical setup of A3-Ei on the pole