

Firetide Installation Guide

HotPort 8020 Mesh Node



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1 About this document

This section lists the audience, purpose, summary of information, and conventions used in this document.

1.1 Audience

This documents intended for certified professionals who install Firetide wireless solutions.

1.2 Instructions to purchaser and installer

This equipment must be professionally installed. The installer is responsible for adjusting the transmit power output of the system to assure compliance with FCC Part15 EIRP limits and human radiation safety regulations.

1.3 Purpose

This document has the information and procedures necessary to install and do basic tests with Firetide HotPort 8020 mesh node.

1.4 Conventions

Certain information has special meaning for the reader. This information appears with an icon that indicates a particular condition, such as a warning or caution, or a label, such as “Note” or “Best Practice”.

- Electrical hazards are those environments where the danger of electrocution is probable. This image appears before each electrical hazard statement.
- Warnings contain safety information that you must obey. If you do not obey the instruction in warning, the result might include serious injury or death. This image appears before each warning statement.
- Cautions contain information that you should obey to avoid minor injury, inconvenience, and damage to equipment. This image appears before each caution statement.
- Notes contain optional advice and information particular to a special case or application.
- Best practices contain specific recommendations based on industry-standard expectations.

1.5 Document feedback

If you find an error or content missing from this document, we want to hear about it. You can send you feedback about any of our documents to FT-Techpubs@firetide.com.

1.6 Contacting customer support

If you need support, depending on the problem, you might be asked for this information:

- Description of the problem
- FMA and an installed management license
- Channel and frequency plan
- Recent spectrum analysis
- Device topology in Google Earth (KMZ file)
- Network map or topology plan with device information

You must also have administrator access to the mesh to be able to receive technical support.

The next table lists the contact information for customer support.

Worldwide customer support	Days/Hours	Contact
Americas	Monday to Friday 7:00 am to 5:30 pm PST (Pacific Standard Time)	http://www.firetide.com/support +1(877)FIRETIDE, extension 2 +1(408) 399-7771, extension 2 +1(408) 355-7271

Africa Asia Australia Europe	Monday to Friday 8:00am to 5:30 pm IST (India Standard Time)	http://www.firetide.com/support +91-8040215111 Fax +1(408) 317-2257
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2 HotPort 8020 mesh node

FiretideHotPort™ meshnode has two radios which operate in 802.11a, n and ac 4x4 MIMO mode.

The default configuration is 2x2 MIMO. With Software license 4x4 MIMO can be enabled.

The following software licenses are available. **

License	Descriptions	Remarks
SW-8020-2x2MIMO	802.11n/ac 2x2MIMO	Default
SW-8020-4x4MIMO	802.11n/ac 4x4 MIMO	Add on license
SW-FMA-Mgmt.	Management License	Add on license
SW-Mobility	Mobility License	Add on license

If you plan on using DFS, it is mandatory to take training class from Firetide. On successful completion of the class Firetide will provide login credentials for DFS configuration using Firetide Management Appliance.

**Subject to software implementation.

3 Installation



Please read before Installation

You must complete the training program and be certified by Firetide to be able to install Firetide products.

Before you install an outdoor mesh node in a permanent location, you need to make sure you have all of the correct components and make sure the components are operational.

Preparing what you need to install

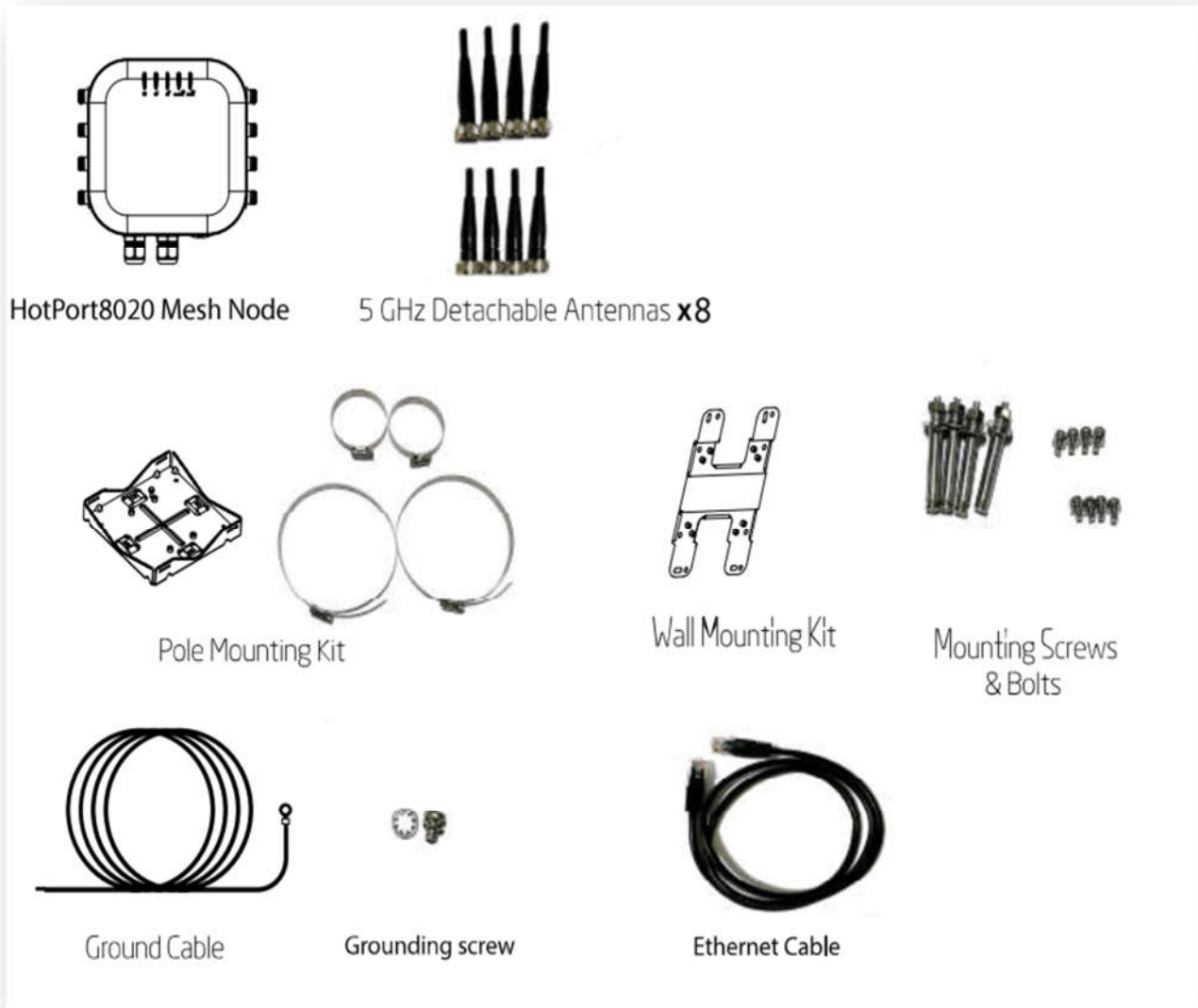
To get what you need to set up a mesh node:

- Open the box.
- Remove the contents.
- Check the contents for damage. If a part is missing or damaged, call your Firetide reseller.
- If the contents are good and correct, keep the box for future use.

3.1 HotPort mesh node in an IP67 enclosure

3.1.1 Package contents of 8020 mesh node

- Eight detachable 5GHz Omni- directional antennas for staging
- Pole and wall mounting kit
- Mounting screws and bolts
- Ground cable
- Cat6 Ethernet cable



The following accessories can be purchased separately from Firetide

- 4x4 MIMO 18.5 dBi gain 5G panel outdoor rated antenna
- 7 dBi gain 5G dipole antenna
- RF cable assembly with lightning arrester
- 802.3 AT+ PoE injector

3.2 Interface of an outdoor mesh

The following picture of 8020 mesh node shows the **front view and the rear view** describing node LEDs, antenna port connectors of the radio, Ethernet ports(PoE input and PSE output port), debug console/reset and the pressure valve with weatherproof cap protection and node ground point.

For information about cables and accessories approved for use with Firetide devices, refer to the Accessories Guide.

- Front View

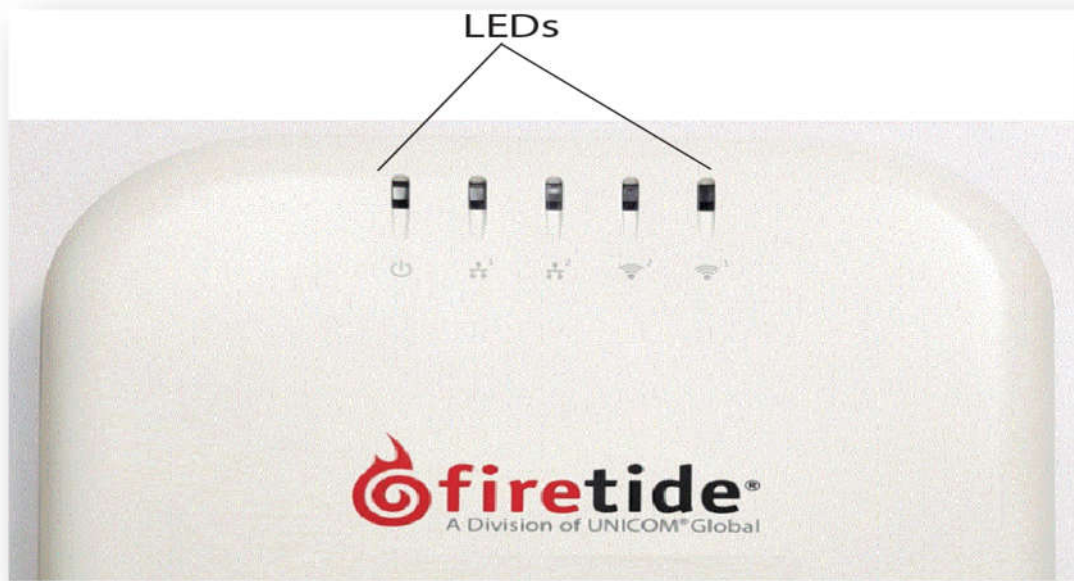


- Rear View



3.2.1 Node LEDs

- Hotport8020 mesh node has 5 LEDs as shown in the following picture.
 - Power LED
 - OFF: Mesh node does not receive power.
 - Amber: Device is powering up
 - Green: Device is powered up and ready to use
 - Ethernet LEDs of LAN1 and LAN2 port
 - OFF: No Ethernet link detected
 - Amber: Link speed (10/100 Mbps),Blinking - Activity
 - Green-Link speed (1000Mbps), Blinking- Activity
 - Radio1 and Radio2 LEDs
 - OFF: No Radio neighbor detected
 - Green: Radio Neighbor connected, Blinking-Activity



3.2.2 Console Port/Reset

Console port and reset button are co-located as shown in the picture below, which is covered by a weatherproof cap, held with a cable tie.

Note: Console port is meant to be used only for debugging purpose by Firetide support.



Reset button is above the console port RJ45 connector.

Refer the "procedure for reset" on page 24 to do a factory reset of the mesh node.

3.2.3 Ethernet ports

- Ports 1 & 2 of HotPort 8020 mesh node are Gigabit Ethernet LAN ports.
- LAN1 Port can receive power from an 802.3at+ compliant PoE source.
- LAN2 Port can source power to an 802.3af compliant device.

3.2.4 Antenna Connectors

- HotPort 8020 mesh node has eight N type female antenna connectors, four connectors per radio.

3.2.5 Pressure relief valve

- The pressure relief valve shown on the rear cover is protected by a weatherproof cap.

3.2.6 Ground screw point

- The ground screw is on the lower left side of the bottom cover. Adequate grounding of the mesh node must be ensured.

4 Test before you install

You should setup and test the mesh node indoors on a table before you install them in permanent locations.

4.1 Before you install:

- Make sure all of the equipment are in working condition
- Configure mesh nodes to reduce configuration effort in the field
- Test the stability and performance of the nodes.

4.2 Tests to do

- Power on each device
- Attach all antennas and make sure you can see all devices in Web NMS
- Perform throughput test

4.3 Licenses which are not included

FMA network management software and appropriate licenses are required. Before you set up the network, you must purchase all licenses from your Firetide distributor.

For the procedures related to license installation, refer to the *FMA Reference Manual*.

4.4 Certification requirement

Professionals who install and manage networks that contain Firetide products must comply with the training and certification requirements of the installation.

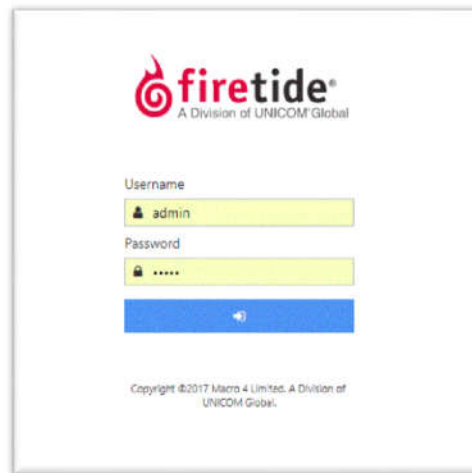
5 Doing the tests

For efficiency, you can configure six to eight mesh nodes at one time. To do tests and capture data with FMA software:

1. Refer to the FMA product guide for the prerequisites of HW requirement.
2. Connect the power cable to the PoE adaptor, connect through CAT5e / CAT6 Ethernet cable from the PoE output of PoE Adaptor to LAN1 PoE input port of the mesh node.
3. Attach the staging antennas to each mesh node
4. FMA can be accessed through its URL using an internet browser. It will launch the login page.

5. Enter user name and password to login. The default username and password is: admin / admin.

The picture below shows the Login screen.



6. Make sure that all mesh nodes are loaded in FMA. if you can not see any or all of the mesh nodes, see the troubleshooting information in the *FMA Product Guide*
7. Set the country code on the nodes. All nodes intended for use in the United States will be set to US Country code. Once the US Country code is set, changing to a different Country code later will not be possible.



Caution: Make sure you configure the device for the correct country. If you do not configure the country correctly, the device might operate in a manner that is not legal in that country and/or create problems with other wireless devices

- a) Go to Mesh configurations, Select the country of operation from the drop-down list.
 - b) Save Mesh configurations. When you set the country code the system refreshes the mesh configuration and gives all visible nodes in the same country code. For a few minutes the mesh nodes might disappear from the topology view in WebNMS.
8. To configure mesh-wide settings, go to **Mesh > Configure Mesh...** Set the radio operational mode as needed.

Note: For information about specific features and the configuration process, see the *FMA Reference Manual*.

9. Check network throughput on each link between mesh nodes. For procedures, see the *FMA Product Configuration Guide*.

Note: If you are not able to send and/or receive data, see “Troubleshooting” on page 23.

10. After you finish the tests, remove the staging antennas.

6 Power Specifications

6.1 Power input and Power out

- Power input: LAN1 port: IEEE 802.3at+ compliant, PoE-PD
- Power output: LAN2 port: IEEE 802.3af compliant, PoE-PSE

6.2 Operating TX Power limit of radio

Allowed Radio Power limits, supported frequencies and channel bandwidth shall vary based on country/region of operation and Operating TX Power is compliant to FCC 15.407(a) power limit.

7 Environmental Specifications

- Operating temperature: -30° C to + 60° C
- Storage temperature: -40° C to +70° C
- Humidity (non-condensing): 10 % to 90 %
- Storage humidity (non-condensing): 5 % to 95 %
- Max altitude: 15,000 ft. (4,600 meters)

8 HotPort8020 mesh node installation

The configured mesh nodes are ready for installation in the permanent outdoor location.

8.1 Installation Steps:

1. Do a site survey to make sure that no safety hazards are present.
2. Gather all required tools.
3. Prepare safety equipment and confirm earth ground procedures.
4. Attach the mesh nodes and antennas to poles that are attached to a mast, tower, or roof.
5. Install the mesh node and antennas assembly and other devices, such as cameras.

8.2 Tools required

To install HotPort8020 mesh nodes, you need to use:

- Screwdriver set
- Small adjustable wrench
- Wire cutters to cut tie wraps around cables
- Electrical tape and butyl mastic tape to weatherproof the connectors
- Spray to prevent corrosion

Other equipment you might need includes:

- Ladder
- Lift truck
- Safety equipment

8.3 Doing the site survey

Before you install any equipment outside, check the entire site:

- To identify possible hazards that might be new since the site survey
- To identify the presence of objects that might cause interference for the radios



Warning! Certified professionals must install Firetide products. Failure to install this equipment correctly can result in equipment damage, personal injury, or death.



Electrical shock hazard warning! Make a plan to keep the installation personnel safe.



Warning! Do not install Firetide products where possible contact with power lines can be made. Antennas, poles, towers, guy wires, or cables can touch power lines. People can be injured or killed if they touch or hold any part of the equipment when it contacts electric lines. Make sure that equipment and personnel do not directly or indirectly contact power lines.



Warning! Do not open the cover:

- Dangerous voltages inside.
- No serviceable parts inside.

8.4 Safe installation practices

Best practice: Install HotPort 8020 mesh nodes on poles that are at sufficient distance from power lines.

- The horizontal distance from a tower, pole or antenna to the nearest power line should be at least twice the total length of the pole/antenna combination. This distance ensures that the pole will not contact a power line if it falls during or after installation.
- Select equipment locations that allow safe and simple installation.
- Do not work alone.
- Use approved non-conducting ladders, shoes, and other safety equipment.
- Make sure all equipment is in good condition.
- If a tower or pole begins falling, do not catch it.
- If a wire or pole touches a power line, do not touch it.
- Do not install antennas or towers on windy days.
- Make sure all towers and poles are correctly grounded.
- Make sure all electrical cables connected to antennas have lightning arrestors.
- A connection to earth ground and a lightning arrestor can prevent fire damage or personal injury in case of lightning, static build-up, or short circuit within the equipment connected to the antenna.

- Use 10AWG ground wire and corrosion-resistant connectors to connect the base of the antenna pole or tower directly to the building protective ground or to one or more approved grounding rods.
- Refer to the National Electrical Code for grounding information.

8.5 Preparing a mesh node for installation

It is easier to install all devices to one object, such as a pole, and then attach the pole assembly to the roof. If you attach the devices to a pole attached to the roof top, factors, such as weather, can make the installation more difficult and dangerous.



Warning! Only use antennas that are rated for outdoor applications.



Warning! Failure to comply with these installation instructions might result in severe personal injury including electrical shock or permanent damage to equipment.



Warning! Make sure that all safety equipment is in good condition. Do not use broken or damaged tools or equipment. Always use safe work practices and obey all local and national guidance for earth ground requirements and electricity.

Note: Collect all tools before you install the mesh nodes.

Make sure that you have antennas rated for outdoor use. For information about antennas and how to select them, see the Firetide Antenna and Accessory Guide.



Warning! Max Operating TX Power allowed Power limits is as per FCC 15.407(a).

Note: Install the antenna and any other wireless devices higher than the HotPort mesh node.

1. To a pole that you can install at a permanent outdoor site, attach these items:
 - a) Brackets for the mesh node
 - b) Antenna bracket
2. Attach the antenna to the antenna bracket. Refer to the antenna installation procedures.

8.6 Preparing earth ground



Warning. A Hot Port mesh node must be correctly connected to earth ground. Failure to do so can result in equipment damage, injury, or death.

The product warranty does not include damage from incorrect grounding.

Obey all local building and electrical codes regarding antennas.

If not available, refer to the National Electric Code (NEC).

Earth grounding guidelines include:

- If you attach a mesh node and antenna to a tower or pole, attach the base of the tower pole to the building's ground or to one or more approved grounding rods with 10 AWG ground wire and corrosion-resistant connectors.
- Connect the grounding cable to rain gutters only if the rain gutter is connected to earth ground.
- Ground rods are copper-plated and 1.8 to 2.4 meters (6 to 8 feet) long.
- Install all ground components in straight lines. If you must make a bend, do not make a sharp bend.
- Earth-to-ground should be less than 5 ohms.
- Some salt compounds are corrosive and can cause copper ground rods to corrode.
- To prepare the soil for ground rods:
 - 1 If the soil contains rocks or sand, insert the ground rods into the ground. Pull out the ground rods.
 - 2 Put in an approved ground enhancement material into the holes where the grounding rods go.
- Put in the ground rods.

8.7 Installing a mesh node and antenna assembly

The process to install antenna to a mesh node for a mast or tower or to a roof installation are same.

Note: Gather and take all tools and materials with you to the installation site.



Warning! Do not install this product on a windy or rainy day.

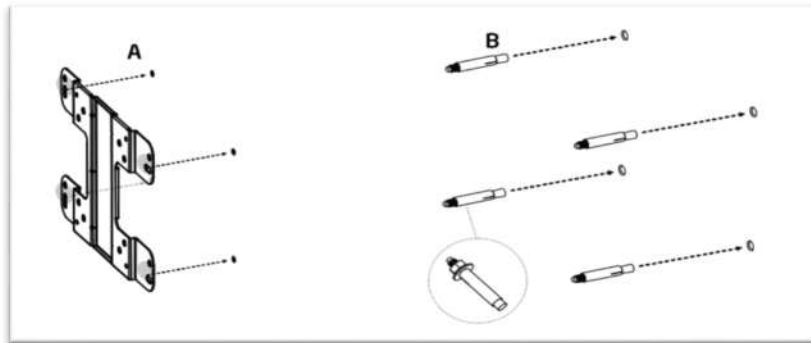
To install a mesh node and antenna assembly in a permanent outdoor location:

- 1) Safely lift and carefully put the assembly on the roof.
- 2) Connecting to a MIMO antenna:
 - Terminate the unused port of radio antenna ports and MIMO antenna ports with a 50 ohm terminator.
 - If your MIMO antenna has four RF Connectors (two 45 degree connectors and two 90 degree vertical connector), then only use the two 45 degree connectors. DONOT use the vertical connector, and place a 50 ohm terminator on the vertical connector. The neighbor antenna should also use two 45 degree connectors.
 - If your MIMO antenna has four connectors (two 45 degree connectors and two 90 degree connector), but your neighbor MIMO antenna has only two connectors (two 90 degree connectors), then mount your MIMO antenna with the two 90 degree connectors in a diamond pattern. The MIMO antenna with the four connectors should maintain its mount in a square pattern.
- 3) Attach the pole to which the mesh node and antenna are attached to a mast, tower or roof.
 - Attach the cables that have integrated lightning arrestors, or attach the cables and install lightning arrestors.
 - Make drip loops with cables.
 - Connect earth ground. See “Preparing earth ground” on page 15.
- 4) Make all connectors weatherproof. See “Weather proof procedures” on page 25.
- 5) Connect the CAT5E/CAT6 Ethernet cable from PoE adaptor power port to LAN1 port of the Mesh node.
- 6) Cover all unused connectors, if any.
- 7) Verify that the mesh node works:
 - Ping the IP address
 - Use one or more mesh nodes
 - Do throughput tests with FMA and record the results as a benchmark test

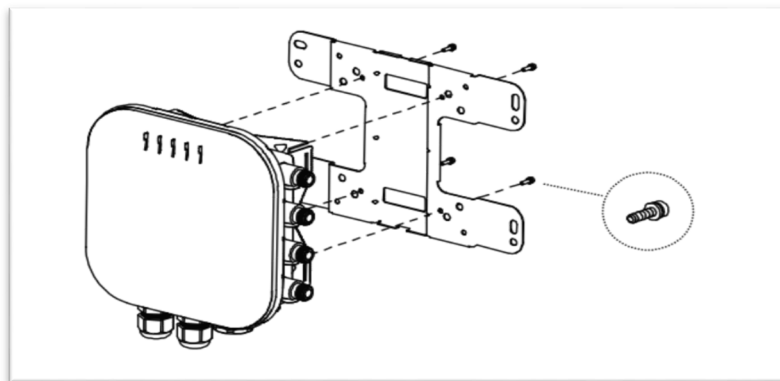
8.8 Attaching the mesh node to a wall

The below procedures shows how to install the Mesh node into a wall.

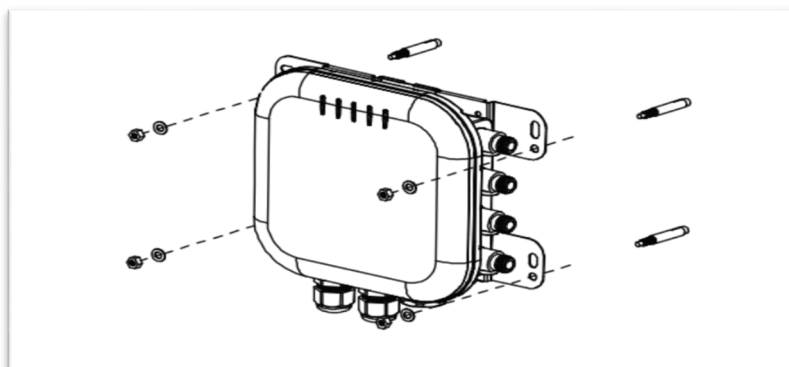
- 1) Mark the four locations of the mounting holes on the flat mounting surface.
- 2) Drill 37mm deep 8mm holes on the markings and hammer the bolts into the openings.



- 3) Place the lock and flat washer on the four hex cap screws and drive the screws to attach the bracket to the back of the Mesh node.



- 4) Attach the device on to the wall by tightening the bolt's flat washer and nuts to secure the mounting base to the mounting surface.



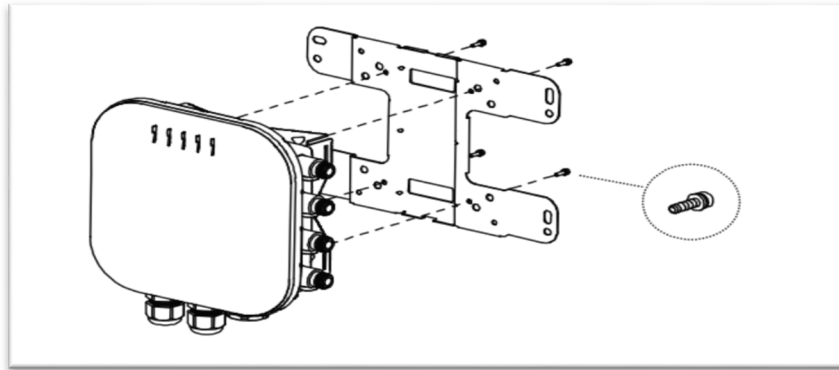
Note: The installation is correct if the node does not easily move from side to side.

Best practice: Use a spray to prevent corrosion on the bracket and mount hardware.

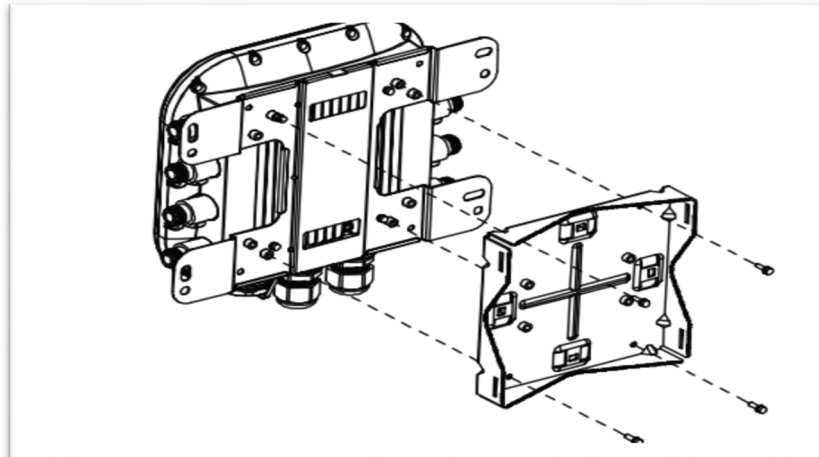
8.9 Attaching a mesh node to a vertical pole

The Mesh node comes with two sets of brackets - wall mount bracket and pole mount bracket. Attaching the mesh node to a pole requires both pole mount as well as wall mount brackets. The below procedures show how to attach the Mesh node into a vertical pole.

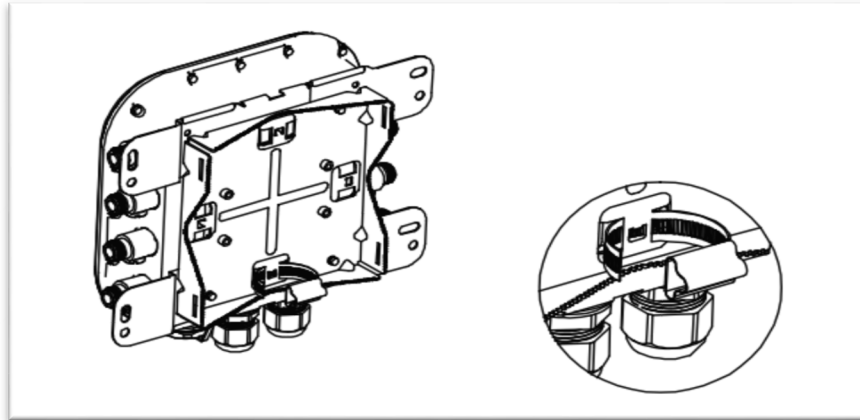
1. Place the lock and flat washer on the four hex cap screws and drive the screws to attach bracket to the back of the mesh node.



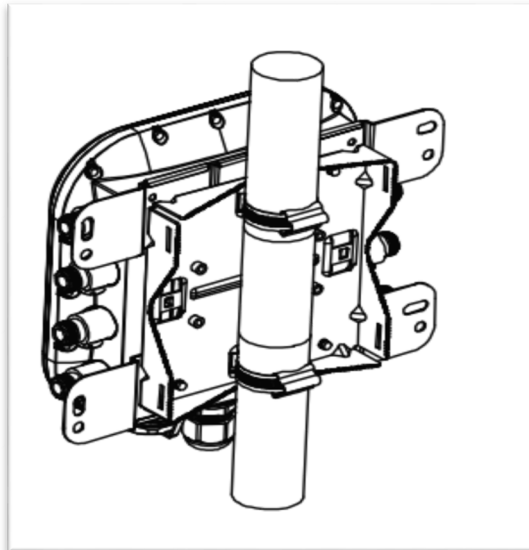
2. Drive the four round head screws to attach the pole mount bracket to the wall mount bracket.



3. Thread the open end of the pole strap through the two tabs on the pole mount brackets.



4. Lock and tighten the pole strap to secure the pole mount bracket to the pole.

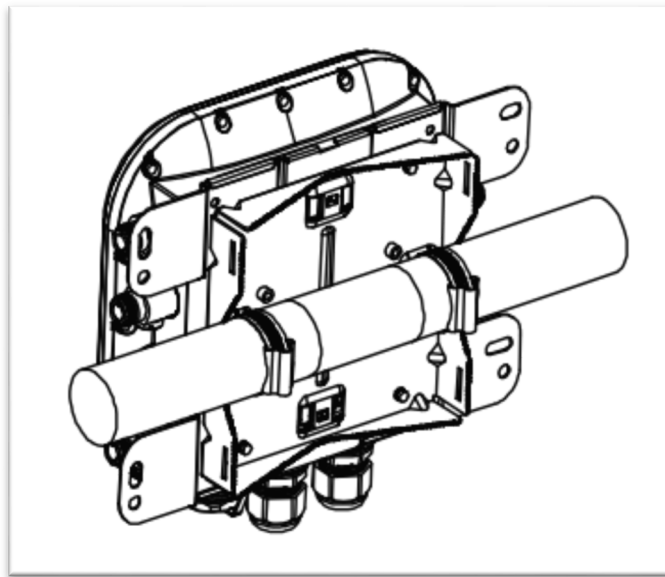


Note: The installation is correct if the node does not easily move from side to side.

Best practice: Use a spray to prevent corrosion on the bracket and mount hardware.

8.10 Attaching a mesh node to a horizontal pole

To attach the mesh node to a horizontal pole procedures are same as attaching the node to a vertical pole. Following picture shows the mesh node attached to a horizontal pole.

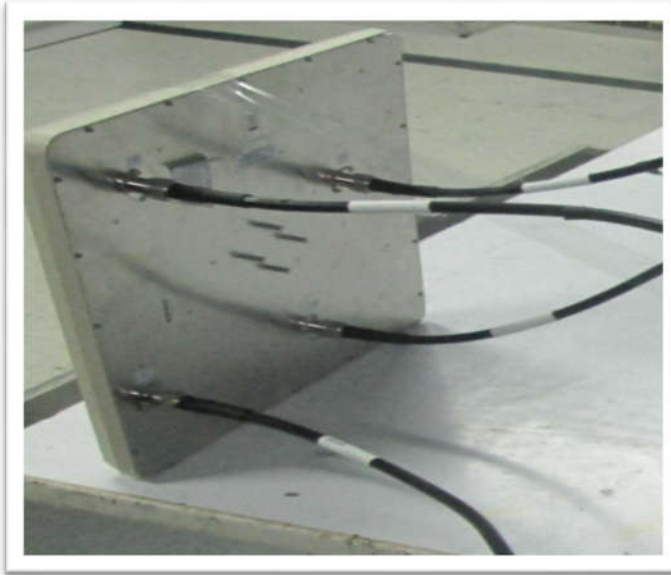


Note: The installation is correct if the node does not easily move from side to side.

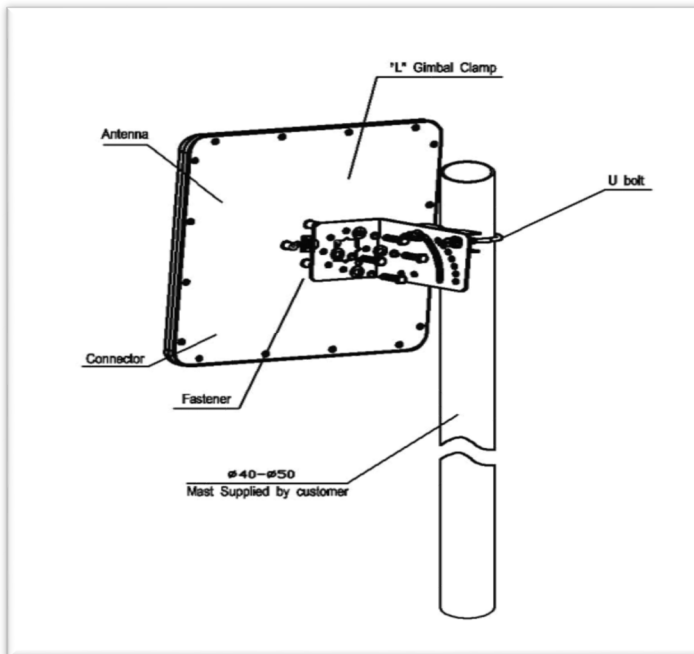
Best practice: Use a spray to prevent corrosion on the bracket and mount hardware.

8.11 Panel antenna Assembly

Following picture shows 4x4 Panel Antenna installed with RF cable.



Following picture shows the Installation of Panel Antenna to a vertical pole.



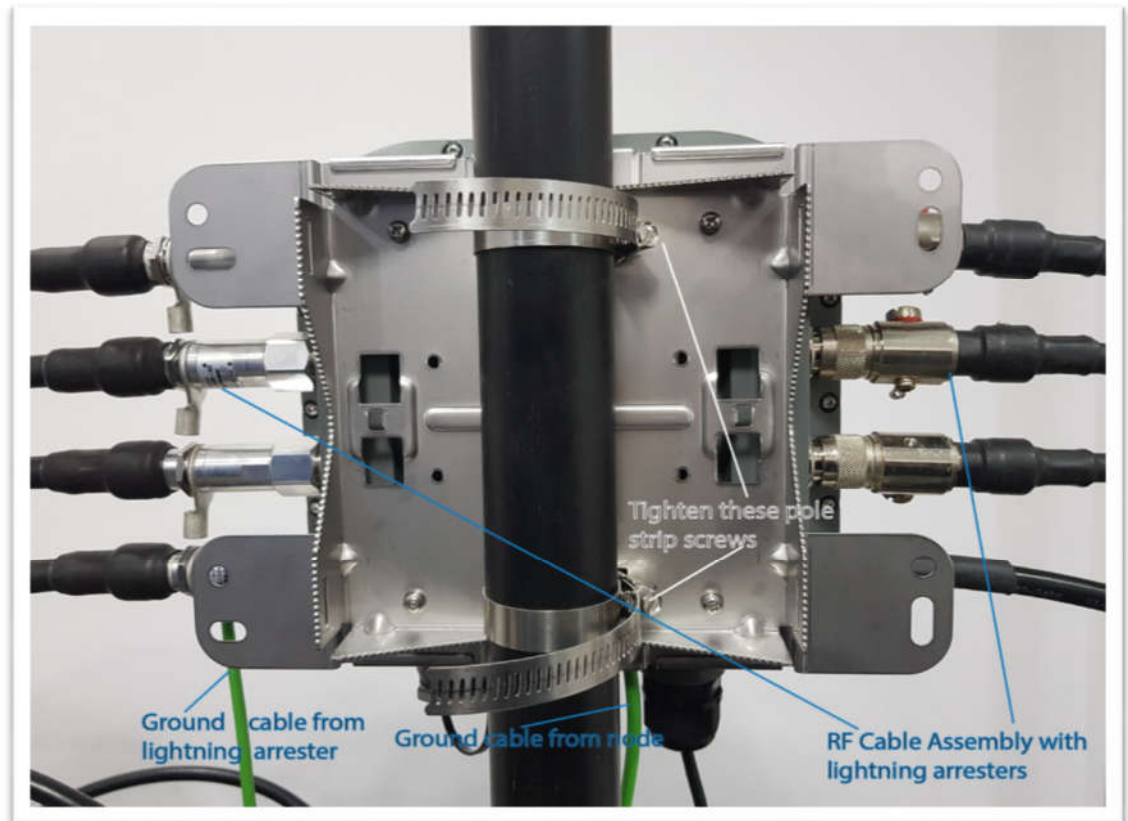
- Attach the panel antenna to the antenna bracket
- Attach one end of RF cable to the Panel antenna and the other end of RF cable that have lightning arrestors to the mesh node.
- Refer section 8.7 for installation of mesh node and panel antenna assembly process.

**8.12 Mesh node installation with RF cable assembly on a vertical pole.
Front View:**



Note: Connect the lightning arrester of all antenna ports to protective ground.

Rear view:



9 Trouble shooting

If a mesh node does not operate correctly try these suggestions.

If you recorded the performance of your network when you set it up, you have a benchmark against which you can compare future performance and you might be able to identify problem areas faster than if you try to diagnose a new problem.

Cannot see a mesh node in Web NMS

If you cannot see one or more mesh nodes in FMA, make sure that you set the extended range and multiple hop feature.

If you can see the head node but no other nodes, then you also might have a configuration problem.

After multiple reboots a mesh node is missing

If a mesh node reboots five times within 10 minutes, the mesh node loads the second saved firmware image.

The previous firmware, if older or different from the firmware of the other mesh nodes in a mesh network, might not be recognized by the mesh and FMA will not detect the mesh node.

Performance not as expected

If the network performance is not as expected:

- Identify reuse in your channel plan. If you have no channel reuse in the network, do a spectrum analysis.
- Check for self-interference. For example, the radios in a single device might connect.
- Check the frequency plan and make sure that all the radios are configured correctly.
- Make sure that each node is connected to the correct devices and nodes.
- Determine the total throughput with an end to end test.
- Determine the throughput of each link with tests.

Resetting an outdoor mesh node to factory default settings

You can reset an outdoor mesh node with this procedure.

The reset button is inside the console opening above the RJ45 Connector.



Caution! When a HotPort mesh node is reset, all configuration information is erased.

For this procedure you need these items:

- 1 Paperclip, pen, or pencil
- 2 Adjustable wrench

To reset an outdoor mesh node:

- 1 Power up the mesh node.
- 2 Remove the weather proof cover of console / reset port. Use a wrench if the valve is too tight to remove by hand.



Caution! Do not use pliers to remove the pressure relief valve because you can break it.

- 3 Press and hold the reset button with the paperclip for 10 seconds until the Power LED changes the color to amber and blinks.
- 4 The device reboots, and the LEDs turn to green indicating its operational status.
- 5 Wait one minute, and then log into WebNMS.
- 6 Configure the mesh node or apply a previously saved configuration file.
- 7 Cover the console / reset port with the weather proof cover.
- 8 Using WebNMS configure the mesh node.

10 Weather proof procedures

Cable connections become loose over time because of vibration. Loose connections let moisture contact and erode the interface to a connector. To prevent performance problems due to moisture damage, Firetide recommends that you use butyl mastic to make weather proof all outdoor connections.

Butylmastic is a synthetic rubber sealant that you can use to make a connection weather proof. It is slightly sticky and stays flexible; it bonds to itself to make a good seal. Butylmastic and a layer of electrical tape keeps the cable assembly clean, dry, and easy to change in the future.

Note: To make a strong water tight connection, keep a high level of tension in the butyl mastic when you stretch it over the cable and connector.

10.1 Tools and materials

To make a weatherproof connection you need the following tools and materials:

- Screw driver
- Pliers
- Utility knife
- Vinyl electrical tape

Note: Vinyl electrical tape between the cable assembly and the mastic tape makes future changes easier than mastic tape put directly on the cable. Vinyl electrical tape as a cover over the mastic tape prevents the mastic from melting in hot weather.

- Rubber splicing or mastic tape (also known as self-amalgamating, self-sealing, self-fusing, non-vulcanized tape)
- Pencil or wooden dowel for small clearances
- Cleaning supplies (if necessary)

Making weatherproof cable to node connections

You need to make weather proof two connections:

- From the antenna cable to the lightning arrester
- From the lightning arrester to the node

To make a weather proof cable to node connection:

- Gather the tools and materials to do the procedure.
- Ensure that the cable and connectors are clean. Clean off oil, water, grease, and dirt before you continue.
- Wrap a layer of electrical tape (sticky side out) over the arrester to node connector and wrap approximately 1 inch (2.5cm) of cable. Overlap the tape by 40% with each turn.
- Repeat for the antenna cable to arrester connection.



Note: To make a watertight connection, keep tension in the butyl mastic when you stretch it over the cable and connector.

- Tightly wrap a layer of mastic tape over the electrical tape. Make a 40% overlap on each turn. Start from the base of the unit to at least 1inch (2.5 cm) of the cable.
- Wrap a layer of electrical tape (smooth side out, sticky side in) over the mastic tape.
- Wrap a second layer of electrical tape over the first layer of electrical tape.
- The lightning arrestor connections are ready for installation in an outdoor environment.

11 Information to User, Purchaser & Installer

11.1 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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, 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 transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Accessories or components to be used with this equipment to use in the system, must comply with the FCC Part 15.27 special accessories regulations. It is the responsibility of the user to use the needed special accessories along with the equipment.

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 51cm between the radiator & your body.

This equipment must be professionally installed. The installer is responsible for adjusting the transmit power output of the system to assure compliance with FCC Part 15 EIRP limits and human radiation safety regulations. Operating TX Power allowed Power limits is as per FCC 15.407(a).

Professional installation instruction

1. Installation personal

This product is designed for specific application and needs to be installed by a qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting.

2. Installation location

The product shall be installed at a location where the radiating antenna can be kept 51cm from nearby person in normal operation condition to meet regulatory RF exposure requirement.

3. External antenna

Use only the antennas which have been approved by the applicant. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC limit and is prohibited.

4. Installation procedure

Please refer to user's manual for the detail.

5. Warning

Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalty.