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HotPort

Firetide Installation Guide

HotPort 7010 Mesh Node

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About this document

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

Audience

This document is intended for certified professionals who install Firetide wireless solutions.

Purpose

This document has the information and procedures necessary to install and do basic tests with Firetide 7010 mesh nodes.

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. An image appears before each electrical hazard statement.

Warnings contain safety information that you must obey. If you do not obey the instruction in a warning, the result might include serious injury or death. An image appears before each warning statement.

Cautions contain information that you should obey to avoid minor injury, inconvenience, and damage to equipment. An 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.

Document feedback

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

Contacting customer support

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

- Description of the problem
- Computer with HotView Pro and an installed management license
- Channel and frequency plans
- Recent spectrum analysis
- Device topology in Google Earth (KMZ file)
- Network map or topology plan with the names and 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
North America Central America	Monday to Friday 7:00 am to 5:30 pm PST (Pacific standard time)	http://www.firetide.com/requestsupport 1 (877) FIRETIDE, extension 2 +1 (408) 399-7771, extension 2 +1 (408) 355-7271
Asia Europe Middle East Africa	Monday to Friday 8:00 am to 5:30 pm IST (India standard time)	http://www.firetide.com/requestsupport +918040215111 Fax +1(408) 317-2257

Contents

HotPort 7010 mesh nodes

Firetide HotPort™ mesh nodes come from the factory with one radio that operates in 802.11a, b, and g mode. You can enable the second radio, enable 802.11n to use MIMO, or configure the mesh node to operate in other modes with HotView Pro™.

Licenses enable other software features.

The next table lists the number of radios, licenses included with a purchase, and the model number that appears in HotView Pro.

Radio	Software license (included)	HotView Pro model number
One radio	—	7011
Two radios	SW-7000-RADIO-1	7012
One radio, 802.11n-capable MIMO	SW-7000-MIMO	7101
Two radios, 802.11n-capable MIMO	SW-7000-RADIO-1 SW-7000-MIMO	7102

To use the second radio, you must have a radio license.

To use MIMO, you must have one MIMO license for each mesh node. One MIMO license is sufficient for all of the radios in one mesh node. A MIMO license enables a mesh node for all radios currently licensed or licensed in the future.

If you plan to use DFS, you must take the web-based training class. After you pass the class, Firetide will give you a license to install in HotView Pro.

Before you permanently install

Before you install a 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.

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

Preparing what you need to install

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

1. Open the box.

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

Box contents for an indoor mesh node

The box for a HotPort 7010 mesh node contains:

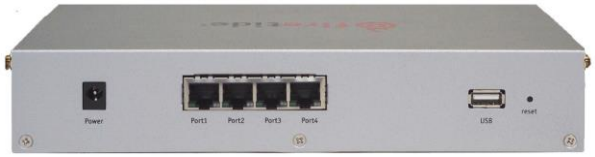
- HotPort 7010 mesh node
- 6 detachable 2.4/5 GHz omni-directional antennas
- External power module with NEMA5-15 (US) to IEC-320 cord

Note. Other IEC cords are available separately.

Parts of an indoor mesh node

The next picture shows the front panel of the HotPort 7010 mesh node, which has the mesh radio, status, and power LEDs.

The next pictures shows the back panel, which has the power connector, four ports, one USB port (do not use), and a reset button.



LEDs

The front panel has these LEDs:

- Mesh radio 1 and 2. Each radio LED comes on when a neighbor connects to that radio. The LEDs are dark when there is no neighbor.
- Status, which is a green color when the firmware is loaded and running. The LED is dark when the mesh node is not ready. The LED blinks when the firmware is loading.
- Power, which is a green color when the device receives power. The LED is dark when the mesh node does not receive power.

Ethernet LEDs are on the ports on the back panel. Each port shows a green color when a client is attached to the port. The LED is dark when the port is open and has no client.

Ports

Four Ethernet ports are on the back panel of the mesh node.

Port 1 can pass data and receive power over Ethernet (PoE) to supply power to this mesh node.

Note. Port 1 cannot provide power to another device.

Reset button

The reset button is a recessed button on the back panel of the mesh node.

Antenna connectors

Each side has three antenna connectors for each radio. The next picture shows one side (Radio 2) with three antenna connectors and the fan exhaust. Two antenna connectors are active to carry data, and one connector is redundant.

Test before you install

You should set up and test your mesh nodes indoors, on a bench or table, before you install them in permanent locations.

The benefits of tests before you install include:

- Make sure all of the equipment works before you install it
- Consistent settings across mesh nodes to reduce software configuration errors in the field
- Test bandwidth to make sure the radios work

Caution: You must use the power supply that comes with the mesh node. If you use a different power supply you void the product warranty.

Types of tests to do:

- Power on each device
- Attach all antennas and make sure you can see all devices in HotView Pro software
- Use the test features in HotView Pro to send data and do other application throughput tests
- Learn to position the antennas with the radio alignment tool
- Train installation personnel

The exact tests you do depend on your deployment plan.

Required materials that are not included

If you do not use all six antenna connectors, you must cover each unused connector with a 50 Ohm terminator to minimize signal reflection.

Caution: If you do not terminate the open antenna connector, the RF signal from the open connector can cause significant interference.

Terminators are not included in the box. Rubber caps are not sufficient for network use.

Required software that is not included

HotView Pro 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 *HotView Pro Reference Manual*.

Certification requirement

All people who install and manage networks that contain Firetide products must comply with the training and certification requirements.

Preparing for tests

For efficiency, you want to set up 6 to 8 mesh nodes at one time.

To do tests and capture data with HotView Pro software:

1. Put the mesh nodes on a table.
2. Attach the power cable to each mesh node.
3. Attach the staging antennas to each mesh node:
   - For OFDM mode, attach one staging antenna to one radio.
   - Dual radio MIMO mode, attach more than one staging antenna to each radio.
   - Panel antenna, attach the antenna cables in the correct order to keep the polarization correct.
   - For single radio MIMO, attach multiple antennas to radio 1.

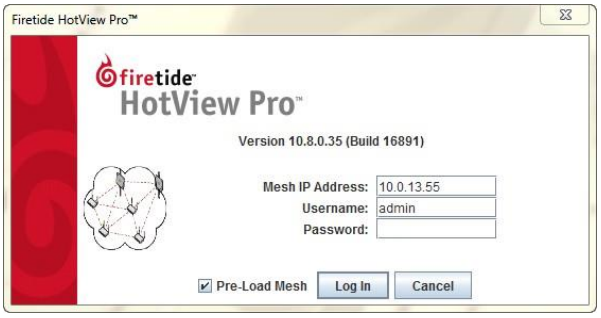
Note: For specific procedures to attach antennas, see the *Firetide Best Practices Guide*.

4. Single-click to start the Quick Launch feature of HotView Pro, which opens the server and client software at the same time.

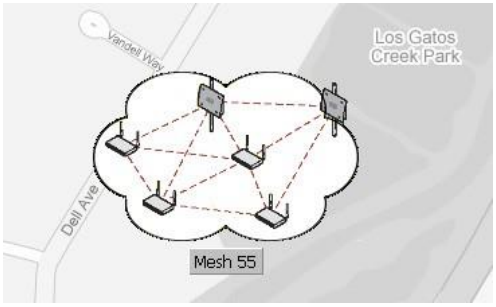
5. Login with the correct user name and password. The default user name is hv_admin; and the default password is firetide.

   The system initializes.

6. Go to **Mesh > Add Mesh >** login with the default user name and password.



7. Make sure that all of the mesh nodes are visible in HotView Pro.



   If you cannot see any or all of the mesh nodes, see the troubleshooting information in the *HotView Pro Product Configuration Guide*.

8. Set the country code for each node to change the device from a low-power, low range setting to a correct full-power operational mode.

   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 or create problems with other wireless devices.

   a. Log into the mesh network.
   b. Right-click each mesh node > **Country Code**
   c. Select the country in which you intend to operate the device.

d. Click **Save**.

e. Repeat steps b to d until all of the mesh nodes are fully operational.

When you set the country code the system refreshes the mesh configuration. For a few minutes the mesh nodes might appear and disappear from the graphic mesh record in HotView Pro.

f. Wait for three minutes for the system to finish the refresh.

9. Configure each mesh node as needed.
   - Set the operational mode as needed.
   - Set the extended range feature if the distance between the mesh nodes is more than 0.8 km (0.5 mile).
   - Set the hop optimization feature if needed.

Note: For information about specific features and the configuration process, see the *HotView Pro Product Configuration Guide*.

10. Check network throughput from end to end and for each link with several wireless clients. For procedures, see the *HotView Pro Product Configuration Guide*.

Note: If you are not able to get the mesh to send and receive data traffic indoors, see "Troubleshooting" on page 13.

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

    You are now ready to permanently install the mesh nodes.

Power Consumption table

Power input from DC supply: 24.5 W (Typical), 25.2 W (Max)

Power input from PoE: 30.6 (Typical), 31.5 W (Max)

Indoor installation procedures

You need to install the mesh node in a permanent location that meets the product's operational requirements and install the antennas correctly.

Operational requirements

The HotPort 7010 mesh node operates within these environmental constraints:

- Operating temperature: 0˚C to +60˚C (32˚F to 140˚F)
- Storage temperature: -20˚C to +70˚C (-4˚F to 158˚F)
- Humidity (non-condensing): 10% to 90%
- Storage humidity (non-condensing): 5% to 95%
- Maximum altitude 4600 meters (15,000 feet)

Installing the mesh node in an enclosure

If you install a mesh node in an enclosure not manufactured by Firetide, the installation is not supported.

Refer to the product operational requirements to make sure that the enclosure you select is compatible with the operating environment required by the HotPort 7010 mesh node.

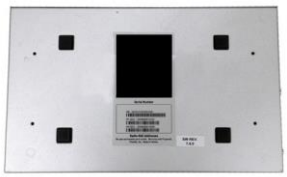
Installing the mesh node to a wall or ceiling

In addition to the mesh node and antennas, you need these materials:

- Mount kit (Part number MT-7100)
- For concrete wall, four wall anchors (not included in the mount kit)

To install a HotPort 7010 mesh node to an interior wall or ceiling:

1. Select a location that meets the operational requirements of the mesh node.
2. Use the bracket as a pattern to correctly install the connectors or anchors in the wall or ceiling.
3. Put the mesh node upside down on a table.



4. Align the bracket over the holes in the chassis.

5. Attach the bracket to the mesh node with the four screws from the mount kit.
6. Install the device and bracket to the wall or ceiling with the two anchors.
7. Install the cables:
   - AC power cable
   - Ethernet cable of Cat 5 or greater
8. Apply power.

   The power LED should illuminate immediately. After one minute, the status LED becomes a steady green color. If the LED does not become a steady green color, see "Troubleshooting" on page 13.

   If the mesh node is not easily removed from the wall or ceiling and the LEDs operate correctly, you can install the antenna and other peripheral devices.

Installing the antennas

Firetide recommends the use of antennas specifically designed for your intended application. For more information, see the *Firetide Antenna and Accessory Guide*.

For installation procedures for various types of antennas, see the *Firetide Best Practices Guide*.

If you use a panel antenna, you must connect the antenna cables correctly to maintain correct polarization.

The next picture shows the HotPort 7010 mesh node with six 2.4 to 5 GHz staging antennas. To confirm correct antenna position, use the HotView Pro antenna alignment tool. For more information, see the *HotView Pro Product Configuration Guide*.

Link throughput tests

The benefits of tests before you install the mesh node in a permanent location include:

- Make sure all of the equipment works before you install it
- Consistent settings across mesh nodes to reduce software configuration errors
- Test the bandwidth and make sure that the radios work

Types of tests to do:

- Power on each device
- Attach all antennas and make sure you can see all devices in HotView Pro software
- Data and other application throughput tests
- Learn to position the antennas with the antenna alignment tool
  For more information about the antenna alignment tool, see the *Firetide HotView Pro Reference Manual*.
- Train installation personnel

When you are satisfied with the performance of the network, record the performance so that you have a benchmark against which you can compare future performance.

The information from benchmark tests is helpful for troubleshooting issues when the network changes.

Measuring link throughput

HotPort mesh nodes have a built-in link throughput tool that you can access through HotView Pro.

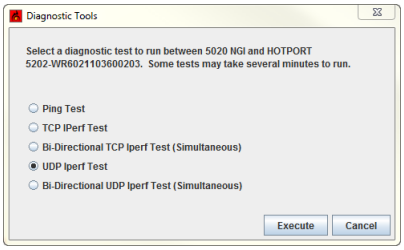
The Iperf test is a deployment diagnostic tool and is not a performance benchmark test. The results are indicative of baseline performance, but actual throughput performance can be higher.

To measure link throughput performance:

1. Set the RSSI setting to be less than -30 between the mesh nodes.
2. Right-click one of the two nodes between which you want to measure throughput.
3. Select **Run Diagnostics Tools**, and select the second node from the menu.
   A window appears from which to select a test:
   - Ping. A ping test checks for a link between the nodes. It does not generate enough traffic to affect mesh operation. The ideal result is a low, consistent, ping response time. Highly inconsistent times indicate RF signal problems.
   - TCP Iperf and bi-directional TCP Iperf. Both tests send a large amount of TCP traffic between the nodes on one link. The bi-directional test runs the test traffic in both directions simultaneously.

- UDP Iperf and bi-directional UDP. Both tests run a large amount of UDP traffic between the nodes on one link. The bi-directional test runs traffic in both directions simultaneously.

4. Select the type of test.
5. Click **Execute**.



Note: Iperf tests flood a link with as much traffic as it can carry. This can disrupt other traffic on the mesh. Iperf sends a large, fixed amount of traffic. If iperf cannot complete the transfer in a fixed period of time, it stops. If you receive a failure message, run the test again. If the test fails consistently, substantial interference exists on the RF link.

Troubleshooting

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 HotView Pro

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

The extended range feature is for applications where mesh nodes are 0.8 km (0.5 mile) or more apart.

The multi-hop optimization feature decreases the possibility of packet collisions.

If you can see the head node but not 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 HotView Pro will not detect the mesh node.

To prevent this behavior, always upgrade the firmware image on each mesh node two times, so both images are the same.

Performance not as expected

If the network performance is not as expected:

- Make sure you set the country code for each mesh node. Factory new mesh nodes do not operate at full power and the system might not be able to detect the mesh nodes in their permanent locations due to distance or interference.
- Make sure that the extended range and hop optimization features are enabled.
- 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.
- If you have a 900 MHz node, check to make sure that the radio is not a traffic bottleneck.
- Determine the total throughput with an end-to-end test.
- Determine the throughput of each link with tests.
- Change the transmit data rates from automatic (Auto) to a lower rate (between 50 and 70 Mbps) if throughput is low.
- If this is a linear mesh and the mesh nodes do not use the same channels, do not use the multi-hop optimization feature.

Resetting a mesh node to the factory default settings

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

The back panel of the mesh node has a recessed reset button.

Do a reset when you remove a device from the field or when communication with a device is lost.

You need these items for this procedure:

- Paper clip or piece of stiff wire
- Computer with HotView Pro
- Ethernet cable

To reset an indoor mesh node:

1. Power on the mesh node.

   Wait until the status LED comes on. After one minute, the mesh node is ready to be reset.
2. Press and hold the reset button with the paper clip until the status LED changes.

   The device reboots, and the LEDs indicate its operational status.
3. Wait one minute, and then log in with HotView Pro.
4. Configure the mesh node or apply a previously saved configuration file.

Recommendations for outdoor use

If you want to use an indoor mesh node in an outdoor environment, you need to use special pigtails.