



# User Guide

## EZMesh

### Multi-Radio Wireless Mesh Network Access Point

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**IMPORTANT:**

Information presented are based on information available and they are subject to change without notice.

# Chapter 1

## Overview

Teletronics' s Triple RF mesh access point extends hotspot coverage using multi 5GHz wireless technology as a backhaul connection between mesh access points, and uses one 802.11b/g as a client connection.

The EZMesh is designed for maximum performance, scalability, and ease of use. The EZMesh is ideal for metro Wi-Fi solutions and offers full 802.11b/g client compatibility, along with mesh network protection with user defined Mesh ID. The multiple wireless path design for both backhaul and user traffic eliminates adjacent AP signal interference and provides zero performance degradation.

## Features

- Dual Radio Backhaul, Single Radio Client AP access
- Backhaul Encryption: WEP, WPA, WPA2
- Client AP Encryption: WEP, WPA2
- Full VPN compatibility
- MAC address access control lists
- Secure local and remote configuration via HTTPS
- Web (HTML) Browser-based management tool supports both http and https
- Network and client monitoring and statistical capture features
- Full 802.11b/g client compatibility
- Layer 2 support

## Reliable, Intelligent, High Performance Mesh Network

- Patented Auto-discovery, auto-configure, and auto-healing POP (Predictable Optimum Path) mesh routing algorithm
- Multiple wireless path design for both backhaul and user traffic eliminates adjacent AP signal interference and provides zero performance degradation
- Best network throughput via layer 2 fast switching and bridging from AP to AP to support real time video, voice, and data applications

## Fully Compatible with Existing Access Servers, Routers, and Gateways

- Transparent to layer 3 and up protocols, fully compatible with existing network equipment
- Directly connects to existing Routers, Gateways, or APs through 10/100 Ethernet

## Management and Security

- GPS Receiver(optional) Antenna provides physical location information of each MeshAP, simplifies maintenance task and adds a new potential of location related services (outdoor version only)
- Web Based HTML browser management interface
- Supports WEP, WPA, MAC filtering, and AES encryption security across wireless mesh network
- Unique mesh network protection with user defined Mesh ID

**Figure 1-1**

***EZMesh Full-Duplex Wireless Mesh Network Access Point***



## Power

Teletronics's EZMesh outdoor access point receives power from the power injector. It uses an external 48-VDC power module and injects the DC voltage into the Ethernet cables to power the outdoor access point.

## External Antennas

Teletronics's EZMesh access point is designed for use with an external 2.4GHz antenna with an N-type male connector, and three external 5GHz antenna with an N-type male connector.

## Ethernet Port

Teletronics's EZMesh access point is able to link to your 100BASE-T Ethernet LAN through the optional power injector. The Ethernet cables are used to supply inline 48-VDC power from the power injector.

## Metal Enclosure

Teletronics's EZMesh access point consists of a weatherproof metal enclosure, providing an industrial grade temperature support of -40°F to 131°F (-40°C to 55°C).

## Outdoor Wireless Benefits

Teletronics's EZMesh wireless solutions allow users to deploy a scalable, secure and cost-effective outdoor wireless network. The MeshAP solutions deliver a true wireless broadband network over large geographic areas or other locations where wiring is too difficult or expensive to install.

## Outdoor Wireless Challenges

Outdoor wireless deployments offer a number of challenges, with the main one being interference. Special equipment may be needed in order to overcome signal interference. Listed below is a list of challenges that may affect an outdoor wireless network, compared to a standard indoor WLAN:

- Coverage
- Environment
- Equipment cost

## **Solution Features and Benefits**

### **Auto-recovery Auto-configuring mesh**

Teletronics 's intelligent wireless routing is based on the Predictable Optimum Path (POP). The POP mesh routing algorithm examines the network and makes appropriate connections among MeshAP access points in real time and dynamically optimizes the best route to the connected network within the mesh. This helps ensure high network capacity and provides resiliency to interference. The POP automatically determines the best path back to the Mesh Manager by calculating the cost of each path in terms of signal strength and hops. The POP continuously monitors changes in conditions and changes routes to reflect those changes.

## Chapter 2

### Safety Warnings

**Warning:** Do not place antennas near power circuits or power lines. Choose your location carefully and keep in mind that power lines look similar to phone lines so always use caution. Make sure not to come into contact with any such circuits while installing the antenna because it may cause serious injury or death.

**Warning:** Only qualified personnel should be allowed to install and/or replace the equipment.

**Warning:** Make sure to read the installation instructions thoroughly before you install the unit(s).

**Warning:** To avoid the risk of being electrocuted, do not work on the unit(s) during a lightning storm.

**Warning:** Disposal of any unit(s) should be handled according to national laws and regulations.

### Installation Guidelines

Follow the guidelines below to ensure the best possible performance:

1. Before you install your outdoor unit(s), choose a location where buildings and trees will not block the signal.
2. Make sure to install your outdoor unit at a moderate height (approximately 40 feet), so it can provide a clear signal to neighboring nodes.
3. Before you install your outdoor unit(s), choose a location where power circuits or power lines are not near. Failing to do so could cause serious injury or death.
4. Plan your complete installation before you begin. It is best to have one person chaperone the installation team to be able to spot any signs of trouble.

5. When installing the antenna, make sure to do the following:
  - Wear shoes with rubber soles, rubber gloves, long sleeved shirt or jacket.
  - Do not use a metal ladder
  - Do not work on a wet or windy day
6. If the assembly starts to drop, let it fall. All the attachments are excellent conductors of electrical current, so even the slightest touch of any of the parts could electrocute you.
7. If any part of the unit comes in contact with a power line, do not touch it or remove it yourself. Call your local power company and they will safely remove it.
8. Mounting units on a “vertical” mount metal objects may interfere the signal pattern of the antenna. (Note: A horizontal mount metal object will not have this effect.)
9. Provide a clear signal to neighboring nodes.
10. When installing the unit(s), allow at least 20 feet of separation between each unit.
11. All the antennas need to be properly connected. The unit may experience permanent hardware failure if the antennas are not properly connected and the unit is powered on.
12. EZMesh unit **MUST** be properly grounded, surge protected, and lightning protected to avoid unit being damage with electrical stresses.

**IMPORTANT:** Any damages due to improper installation voids warranty.

## Site Survey

Before any Wi-Fi mesh network is installed, a site survey is needed to determine how to maximize the coverage and network performance.

Data rates – Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. A decrease in receiver sensitivity occurs as the radio data increases

Antenna type and placement – Do not place the antenna higher than necessary. The extra height could cause possible interference.

Physical environment – Open areas provide a better signal than closed areas.

Obstructions – Avoid placing the access points in a location where there are obstructions between the sending and receiving antennas such as trees, buildings or hills.

## Package Contents

Each EZMesh contains the following items:

- Outdoor Wireless Mesh Access Point
- Quick Installation Guide
- CD (User Guide, Quick Installation Guide)

## Optional Equipment

- Pole mounting kit
- Street light adapter
- PoE Injector
- 8dbi 5GHz Antenna
- 8dbi 2.4GHz Antenna

## Installation Components

Review the figure below to familiarize yourself with the system components and connectors

## Default Setting

User Name: **admin**

Password: **admin**

Wireless Network Name (SSID): **mymesh**

No Mesh Link (SSID): **arrow** (unchangeable)

IP Address: **192.168.1.8**

Subnet Mask: 255.255.255.0

Mesh Link Connection: **station**



## Chapter 3

### Installation Options

There are two common installation options:

- Installing the EZMesh access point on a pole
- Installing the EZMesh access point on a wall

### Installing the EZMesh Access Point on a Pole

When removing the access point from its box, make sure not to remove the foam blocks attached to the antenna connectors, until after your unit is installed. This will protect the antenna connectors during installation.

**Figure 3-1**  
*Pole Mounting Kit with EZMesh Full-Duplex Wireless Mesh Network Access Point*



1. You can attach any outdoor EZMesh access point to any light pole
2. Mount the access point to the pole within 3ft. of the outdoor lighting control.
3. Connect a 10-AWG or larger ground wire to one of the EZMesh access point screw. Make sure it is connected to a reliable earth ground, such as a grounded pole or a grounding rod.

**Warning:** This equipment must be externally grounded using a customer supplied ground wire before power is applied. Contact an electrician if you are uncertain that suitable grounding is available.

**Notes:** When powering the product with AC power the power plug should be installed where it can be conveniently accessed to de-energize power from the unit. Power should not be removed by disconnecting the AC power connector itself and where it is not subjected to water or outdoor elements.

**Warning:** Be careful when connecting the street light adapter to the pole. You may fall or electrocute yourself

4. Disconnect the lightning control from its fixture.
5. Make sure that the voltage available is between 100 and 240 VAC 50/60Hz.
6. Turn off power to the fixture at the designated circuits
7. Connect the adapter to the access point AC power connector.
8. Make sure the antennas are connected before the MeshAP is connected to electrical power. Failure to do so may result in permanent hardware damage to the MeshAP unit.
9. Plug the street light adapter into the outdoor control fixture
10. Plug the lighting control into the street light adapter

**Note:** Use your hands to tighten the cable until the connector locks.

11. Use either a level or the attached circular level to align the MeshAPs external antennas.

Loosely assemble the rest of the pole mount kit around the pole

**Note:** Each pole clamp is equipped with the bolts of the appropriate length. If a different length is required, purchase 3/16-16 bolts of the correct length for your installation.

**Note:** Leave the screws somewhat loose so you can adjust the access point's orientation.

12. Use a level to verify that the top edge of the pole clamp subassembly is horizontal, and tighten its adjustment screws.

## Installing the EZMesh Access Point on a Wall

**Figure 3-3**  
EZMesh with wall mounting kit installed



1. Use the mounting plate as a template to mark four screw hole locations on your mounting surface.
2. Mount the mounting plate on the back of the enclosure with two screws.
3. Mount the unit on the wall with 4 screws.

**IMPORTANT:** The EZMesh must be mounted level. A circular level is attached to assist with this.

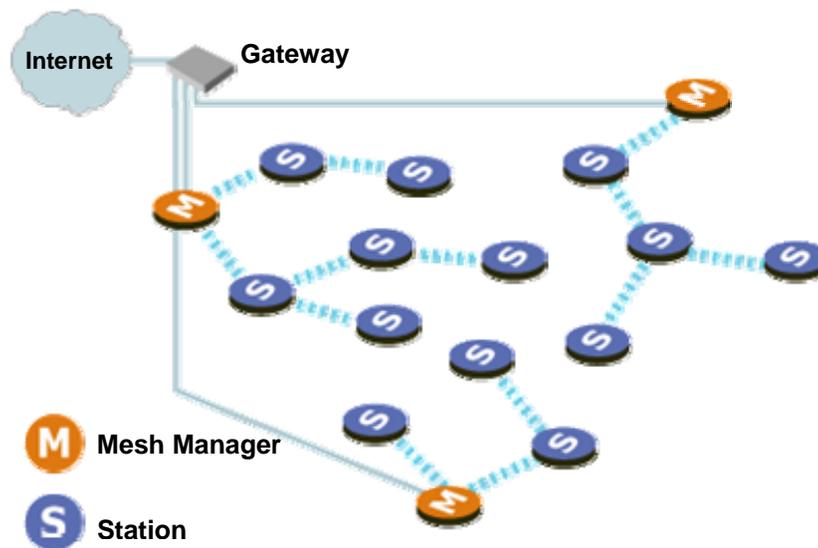
## Chapter 4

### MeshAP Infrastructure

Teletronics Wireless Mesh Network consists of multiple wireless nodes (**MeshAP Access Points**). In a typical Teletronics Wireless Mesh Network, one or more MeshAP units will be assigned as a Mesh Manager and other node will be assigned as Mesh Station. Any MeshAP access point can be assigned as a **Mesh Manager Mode** or **Station Mode**. (*The default setting for a MeshAP Access Point is set as Station Mode.*)

#### Mesh Manager Mode

The MeshAP unit configures as the Mesh Manager and has a direct-wired link to the Internet Gateway/Router/Access Server. It is used as the management unit and Internet Gateway for the MeshAP unit (Station) on the mesh network. (Any MeshAP access point can be configured as the Mesh Manger unit.)



#### Station Mode

The MeshAP unit configured as the Station (node), and is the child unit of the Mesh Manager unit. Station units expand the wireless signal coverage for the mesh network. Stations could be added to the mesh network based on network signal quality needs.

## Chapter 5

### Accessing the MeshAP Access Point (Login)

#### Important Default Settings of the MeshAP

User Name: **admin**  
Password: **admin**  
Wireless Network Name (SSID): **mymesh**  
No Mesh Link [AP] (SSID): **arrow** (unchangeable)\*  
No Mesh Link [Backhaul] (SSID): **span** (unchangeable)\*  
IP Address: **192.168.1.8**  
Subnet Mask: **255.255.255.0**  
Mesh Link Connection: **station**  
Default Mesh Manager IP Address: **192.168.1.254** \*\*  
\*\*This ONLY applies when MeshAP "Working Mode" is set to "Manager" mode

**\*The SSID, "arrow", is reserved for a MeshAP Station that has not associated with(or formed an uplink) with another MeshAP.**

### Direct Ethernet Connection

**WARNING---**The antennas must be connected before the MeshAP is powered on.

**Step 1.** Make sure the MeshAP unit is **Powered On** and **Ready**. Once it is powered on, it takes about 35 seconds for the MeshAP unit to completely get booted and be ready for service and configuration.

Use wireless WLAN utility application on PC to scan for SSID: **mymesh**. Make sure the SSID: **mymesh** MeshAP unit has the correct Mac address.

**Note:** The SSID for Client AP(802.11b/g), "**arrow**", is reserved for a MeshAP Station that has not associated with(or formed an uplink) with any MeshAP network.

The SSID for Backhaul Radio, "**span**", is reserved for a MeshAP Station that has not associated with(or formed an uplink) with any MeshAP network.

**This can prevent end users from accidentally connecting to APs that are not part of a mesh network. They will not get internet access when they connect to APs that are not part of a mesh network.**

**Step 2.** Change PC IP address to **192.168.1.XXX** Subnet mask: **255.255.255.0**

**Step 3.** Access MeshAP via **WAN Ethernet Port**

Make sure the Ethernet cable is properly connected to both MeshAP - **WAN Ethernet Port** and PC - **Ethernet Port**. (Connect via **PoE Injector**)

**Note:** Please review the Hardware installation Guide for more information.

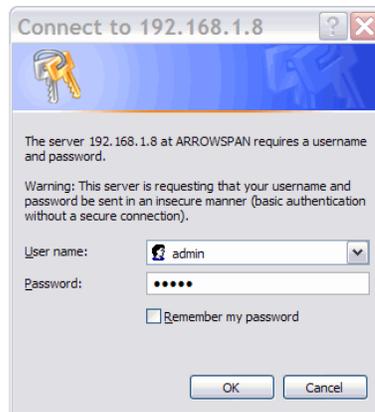
**Step 4.** Open a Web Browser and type **192.168.1.8** to access the MeshAP Access Point.



**Step 5. User Name:** admin

**Password:** admin

Click "**OK**"



## Wireless LAN Access

**Step 1.** Make sure the MeshAP unit is **Powered On** and **Ready**. Once it is powered on, it takes about 35 seconds for the MeshAP unit to completely get booted and be ready for service and configuration.

Use wireless WLAN utility application on PC to scan for SSID: **mymesh**. Make sure the SSID: **mymesh** unit has the correct Mac address.

**Note:** The SSID for Client AP(802.11b/g), “**arrow**”, is reserved for a MeshAP Station that has not associated with(or formed an uplink) with any MeshAP network.

The SSID for Backhaul Radio, “**span**”, is reserved for a MeshAP Station that has not associated with(or formed an uplink) with any MeshAP network.

**This can prevent end users from accidentally connecting to APs that are not part of a mesh network. They will not get internet access when they connect to APs that are not part of a mesh network.**

**Step 2.** Change the PC IP address to **192.168.1.XXX** Subnet mask: **255.255.255.0**

**Step 3.** Access the MeshAP via **Wireless LAN**

Make sure the PC is connected to the SSID: **MeshAP** (The default SSID for MeshAP)

**Note:** Please review the Hardware installation Guide for more information.

**Step 4.** Open a Web Browser and type **192.168.1.8** to access the MeshAP Access Point.



**Step 5. User Name:** admin

**Password:** admin

Click "OK"



## **Access MeshAP unit via Mesh Manager's Topology Page**

(See Chapter 8 - Managing the Topology on the Mesh Manager unit)

# Chapter 6

## Mesh Manager Configuration

### Setup Mesh Manager Unit

The Mesh Manager has a direct wired link to the existing network and Internet. The Mesh Manager unit also manages all the Station units associated with the MeshAP.

**Note: ANY MeshAP unit could be setup as the Mesh Manager unit.**

**Step 1.** Login to the MeshAP Access Point.

**Step 2.** Go to the **Setup** page.

The screenshot shows the 'Mesh Station' configuration page for a MeshAP 3800. The 'MESH' section is selected in the left sidebar. The 'Basic' tab is active. The configuration includes:
 

- This MeshAP Working Mode: Station (dropdown)
- Mesh Link Connection:  Auto  Manual
- Minimum Mesh Link SNR: 24 dB (Signal to Noise Ratio)
- Mesh ID: mymesh (case sensitive)
- MeshAP Name: mystation (appear on topology page only)
- MeshAP Location: mylocation (appear on topology page only)
- GPS Location: Not Available
- Traffic Log Interval Time: 3 minute(s)

 Buttons for 'Save Settings and Apply' and 'Cancel' are at the bottom right.

**Step 3.** Select “**Mesh Manager**” to assign a MeshAP unit to become a Mesh Manager unit on the mesh network.

This screenshot is similar to the previous one but highlights the 'Mesh Link Connection' dropdown menu, which now has 'Mesh Manager' selected. A red 'Step 3' label is placed next to the dropdown. The 'Mesh IP Address' field is also visible, set to 192.168.1.8.

Click “**Save Setting and Apply**” The unit will apply the change and reboot.

**Step 4. Assign IP Address to Mesh Manager unit.**

**IMPORTANT:** The default IP Address for Mesh Manager is **192.168.1.254**  
 The IP address will be automatic assign to Mesh Manager unit once the “MeshAP Working Mode Change from “Mesh Station” to “Mesh Manager”

There are two modes available to assign IP address to the Mesh Manager unit

**DHCP Mode** – Auto Assign an IP address to Mesh Manager unit via Network Gateway/Router.

**Static Mode** – Assign IP address manually to Mesh Manager unit

The screenshot shows the configuration interface for a Mesh Station (MeshAP 3800). The 'MESH' section is expanded, showing the following settings:

- MESH**
  - This MeshAP Working Mode: Mesh Manager
  - Minimum Mesh Link SNR: 24 dB (Signal to Noise Ratio)
  - Mesh Manager IP Setting:  DHCP  Static
  - Mesh Manager IP Address: 192 . 168 . 1 . 254 **Step 4**
  - Subnet Mask: 255 . 255 . 255 . 0
  - Gateway IP: . . . .
- 802.11b/g AP**
  - HTTPS:  Enable HTTPS
  - HTTP Port: 80 (Default: 80 see **more**)
  - HTTPS Port: 443 (Default: 443 see **more**)
  - If ports other than 80 for http and 443 for https are used, the port must be specified for access.
- Ethernet**
  - Weight of This Mesh Network: 10 (1, 2, 3, ..., 10)
  - Mesh ID: QAmesh (case sensitive)
  - MeshAP Name: QAstation3 (appear on topology page only)
  - MeshAP Location: mylocation (appear on topology page only)
  - GPS Location: Not Available
  - Traffic Log Interval Time: 3 minute(s)
- VLAN**

At the bottom, there are buttons for 'Save Settings and Apply' and 'Cancel'.

- *Replace* the default **IP address** to an IP address of your choice that could be reached from the existing network. You can also select an IP address provided by the ISP as your **MeshAP IP Address**
- *Replace* the default **Subnet Mask** with the one belonging to the above IP address.
- *Enter* the **Gateway IP** of the above IP address or the IP address provided by your ISP as a **Gateway IP** address. (For Remote Management)

**IMPORTANT:** Make sure the gateway address and the IP address of the unit are under the same network. If not, the unit may not be able to log-on because the network is not logically connected.

**EXAMPLE:** (IP address and Gateway should under same domain.)  
 Mesh IP Address: **192.168.0.120**, and Gateway IP: **192.168.0.1**

### Http Port

The default **Http Port** for MeshAP is **80**. Http Port could be set to any port number based on the network administrator’s requirement.

HTTPS:  Enable HTTPS

HTTP Port:

HTTPS Port:

To reassign a number Http Port enter the desire port number to Http Port field. And *Click Save Setting and Apply*

### Https Port

The default **Https Port** for MeshAP is **443**. Http Port could be set to any port number based on the network administrator’s requirement.

HTTPS:  Enable HTTPS

HTTP Port:

HTTPS Port:

To reassign a number Http Port enter the desire port number to Https Port field. And *Click Save Setting and Apply*

### Weight

Weight number (1 – 10) help identify the level of connection desire for the nodes (Stations) to connect to particular Mesh Manager unit on the Mesh. Setting a Mesh Manager’s Weight to “10” may force all nodes on the mesh network to associate with this Mesh Manager than other Mesh Manager on the mesh. Whereas Setting Mesh Manager to “1” may force this Mesh Manager low chance for Nodes to associate to compare with other high Weight number Mesh Manager on the mesh.

**Note:** Total Bandwidth score is based on Hop Count, Signal Quality, and Mesh Manager Weight. This guideline affects the routing decision of each node on the mesh to decide which Mesh Manager to associate

To set Mesh Manager weight, Enter number (1-10) in the “Weight of this Mesh Network” field and *Click Save Setting and Apply*

## Mesh ID

The Mesh ID is a unique identification for a mesh network. Only MeshAP Access Points with the same Mesh ID will be able to associate with each other on the mesh network.

**Step 6.** Replace the default **Mesh ID** with a preferred name.

**Note:** MeshAP Stations **MUST** have the same Mesh ID to be able to associate with each other and to be managed by the Mesh Manager unit.

**Step 7.** Update Station Name. (Station Name is NOT required, it is recommended for easy identification of each Station.) The Station Name will appear on the Mesh Manager's topology page.

**Step 8.** Update **Station Location**. (Station Location is NOT required, it is recommended for easy identification of each Station.)

**Step 9.** Click "**Save Settings and Apply**" to confirm changes.

The screenshot shows a configuration form with the following fields and values:

Mesh ID:	<input type="text" value="mymesh"/> (case sensitive) <b>Step 6</b>
MeshAP Name:	<input type="text" value="mystation"/> <b>Step 7</b> (appear on topology page only)
MeshAP Location:	<input type="text" value="mylocation"/> <b>Step 8</b> (appear on topology page only)
GPS Location:	Not Available
Traffic Log Interval Time:	<input type="text" value="3"/> minute(s)

At the bottom of the form are two buttons: "Save Settings and Apply" and "Cancel". A red arrow points to the "Save Settings and Apply" button, labeled **Step 9**.

# Chapter 7

## Station Configuration

### Mesh Link Connection Mode

There are two modes available for the MeshAP Station, **Auto** and **Manual**.

**Auto Mode** – The MeshAP Station automatically determines which MeshAP to form an upstream link, or uplink, with. The POP algorithm uses the Bandwidth Score to make this determination.

**Manual Mode** – The upstream link, or uplink, is selected from the Site Survey page on the MeshAP Station. From the Site Survey page, it possible to select one or more MeshAP devices to be the uplink.

### Setup Station in Auto Mode

**IMPORTANT:** To access a MeshAP Station unit on the mesh network, you need to access the MeshAP Mesh Manager unit first and then you could access the MeshAP station from the **Topology** page.

(See Chapter 5 for more detail information)

**Step 1.** Login to the MeshAP Access Point.

**Step 2.** Go to **Setup** page.

Mesh Station	Basic   Advanced
MeshAP 3800	Mesh > Setup
<b>MESH</b>	This MeshAP Working Mode: <input type="text" value="Station"/>
Topology	Mesh Link Connection: <input checked="" type="radio"/> Auto <input type="radio"/> Manual
Site Survey	Minimum Mesh Link SNR: 24 dB (Signal to Noise Ratio)
Setup	Mesh ID: <input type="text" value="mymesh"/> (case sensitive)
Wireless	MeshAP Name: <input type="text" value="mystation"/>
Administration	MeshAP Location: <input type="text" value="mylocation"/> (appear on topology page only)
Diagnostic	GPS Location: <input type="text" value="Not Available"/> (appear on topology page only)
Status	Traffic Log Interval Time: <input type="text" value="3"/> minute(s)
<b>802.11b/g AP</b>	<input type="button" value="Save Settings and Apply"/> <input type="button" value="Cancel"/>
Wireless	
Status	
<b>Ethernet</b>	
VLAN	

**Step 3.** Select “Station” for This MeshAP Working Mode.

Mesh > Setup

This MeshAP Working Mode:  **Step 3**

Mesh Link Connection:  Auto  Manual

Minimum Mesh Link SNR: 24 dB (Signal to Noise Ratio)

Mesh ID:  (case sensitive)

MeshAP Name:

MeshAP Location:  (appear on topology page only)

GPS Location: Not Available

Traffic Log Interval Time:  minute(s)

**Step 4.** Select “Auto” for a Mesh Link Connection

Mesh > Setup

This MeshAP Working Mode:

Mesh Link Connection:  Auto  Manual **Step 4**

Minimum Mesh Link SNR: 24 dB (Signal to Noise Ratio)

Mesh ID:  (case sensitive)

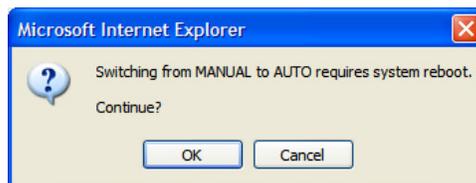
MeshAP Name:

MeshAP Location:  (appear on topology page only)

GPS Location: Not Available

Traffic Log Interval Time:  minute(s)

**Note:** The system will reboot when changed from “Manual” mode to “Auto” mode. It takes about 40 seconds and requires re-login to the unit (See Step 1 in Chapter 1).



**Note:** “Minimum Mesh Link SNR” is 24dB. This setting could not be change to ensure the routing protocol is function property under the Auto mode.

**\*SNR - Signal to Noise Ratio**

**Note:** The grayed out area is the default IP address and subnet mask for the unit. This setting should be used to access the MeshAP Station unit if the MeshAP Station unit lost the mesh link connection with the Mesh Manager unit.

## Mesh ID

The Mesh ID is a unique identification for a mesh network. Only MeshAP Access Points with the same Mesh ID will be able to associate with each other on the mesh network.

**Step 5.** *Replace* the default **Mesh ID** with a preferred name that is identical with the Mesh Manager. MeshAP Stations **MUST** use the same Mesh ID in order to be managed by the Mesh Manager unit.

**Step 6.** *Update Station Name.* (The Station Name is NOT required, it is recommended for easy identification of each Station.)

**Step 7.** *Update Station Location.* (The Station Location is NOT required, it is recommended for easy identification of each Station.)

Mesh ID:	<b>Step 6</b>	<input type="text" value="mymesh"/> (case sensitive)
MeshAP Name:	<b>Step 7</b>	<input type="text" value="mystation"/> (appear on topology page only)
MeshAP Location:	<b>Step 8</b>	<input type="text" value="mylocation"/> (appear on topology page only)

**Step 8.** *Click "Save Settings and Apply"* to confirm changes.

Mesh > Setup

This MeshAP Working Mode:	Station
Mesh Link Connection:	<input checked="" type="radio"/> Auto <input type="radio"/> Manual
Minimum Mesh Link SNR:	24 dB (Signal to Noise Ratio)
Mesh ID:	mymesh (case sensitive)
MeshAP Name:	mystation (appear on topology page only)
MeshAP Location:	mylocation (appear on topology page only)
GPS Location:	Not Available
Traffic Log Interval Time:	3 minute(s)

**Step 8**       

### Connect a MeshAP Station to other Stations/Mesh Managers under Auto Mode

MeshAP Stations with identical Mesh IDs under the Auto Mode will automatically associate with the Mesh Manager or the Stations on the mesh network. The association will be based on the wireless signal quality and hop counts of the adjacent unit.

Each MeshAP Access Point will only accept up to five (5) child Stations.

**Step 1.** Power ON the MeshAP Station with Auto Mode.

**Step2.** Login to the Mesh Manager unit.

**Step 3.** Review the **Topology** section to manage the Stations on the mesh network.

**Note:** The MeshAP Station under Auto Mode should automatically associate with the Mesh Manager unit or the other Stations on the mesh network. The only way to make sure the Station is properly associated with the mesh network is to review the **Topology** in the Mesh Manager.

# Chapter 8

## Managing the Topology of the Mesh Manager unit

### Accessing the Topology Page

**Step 1.** *Login* to the Mesh Manager unit

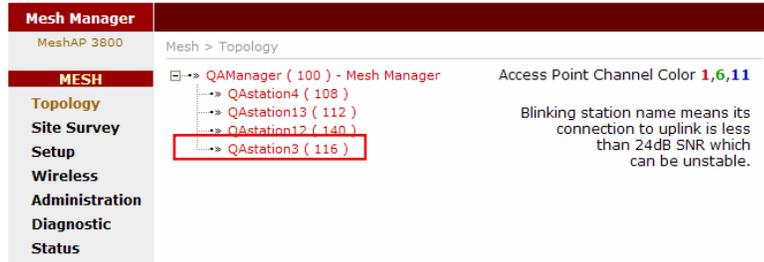
**Step 2.** *Go to the Topology* page under Mesh

### Topology Tree Expanded

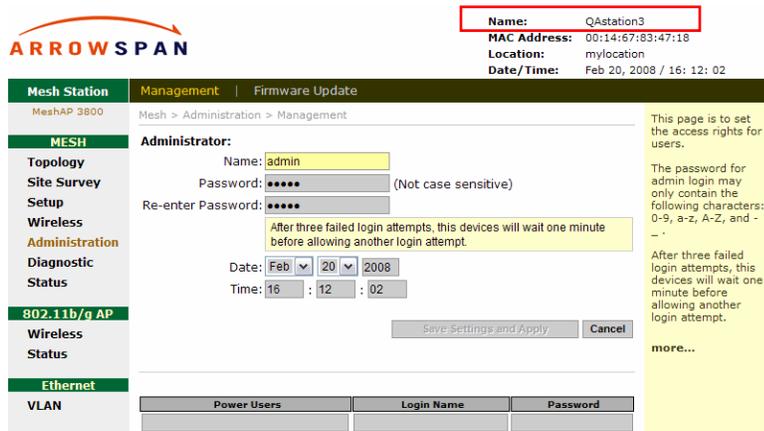
**Step 3.** *Click the “+”* to expand the topology tree. The color Red represents the MeshAP under Channel 1, Black represents the MeshAP under Channel 6, and Blue represents the MeshAP under channel 11

## Managing the MeshAP on the Topology Tree

To manage any MeshAP under the Topology, click the **Station Name** on the **Topology tree**, the GUI will automatically enter into the station for management.

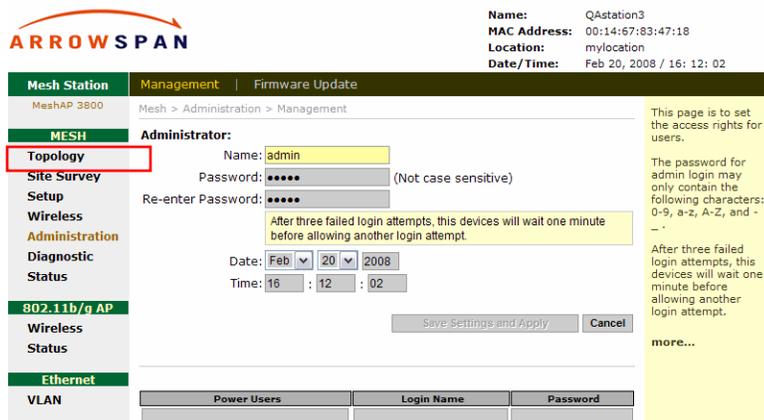


Once the user enters the **Station** unit, the screen will change to the **Mesh Station Administration** page.



Go back to the Mesh Manager unit

Click on the **Topology** page link to re-enter the **Mesh Manager** unit.



Back to the **Mesh Manager** unit.

**ARROWSPAN**

**Mesh Manager** MeshAP 3800 Mesh > Topology

**Mesh**

- Topology
- Site Survey
- Setup
- Wireless
- Administration
- Diagnostic
- Status

**802.11b/g AP**

- Wireless
- Status

**Ethernet**

- VLAN

**Name:** QAManager  
**MAC Address:** 00:14:67:83:44:D8  
**Location:** mylocation  
**Date/Time:** Feb 22, 2008 / 15: 06: 46

**Refresh**

Mesh > Topology

- QAManager ( 100 ) - Mesh Manager Access Point Channel Color **1,6,11**
- QASation5 ( 136 )
- QASation4 ( 124 )
- QASation13 ( 116 )
- QASation12 ( 140 )
- QASation3 ( 112 )

Blinking station name means its connection to uplink is less than 24dB SNR which can be unstable.

This page shows the station links under the Mesh Manager. Each station is indicated by their MeshAP Name. A station with a Plus (+) sign indicates it has other stations(or children) connected to it. To expand a station's tree, click on its Plus (+) sign. To collapse a tree, click on its Minus (-) sign.

To manage a station, use mouse to Click on the MeshAP Name to be managed. The web interface will go to that station's Administration page.

The MeshAP Name of the Mesh Manager and the Mesh

**Monitor MeshAP Up/Down Activity** **Save MeshAP Info**

Last saved: **Feb 21 2008 12:00:29**

# Chapter 9

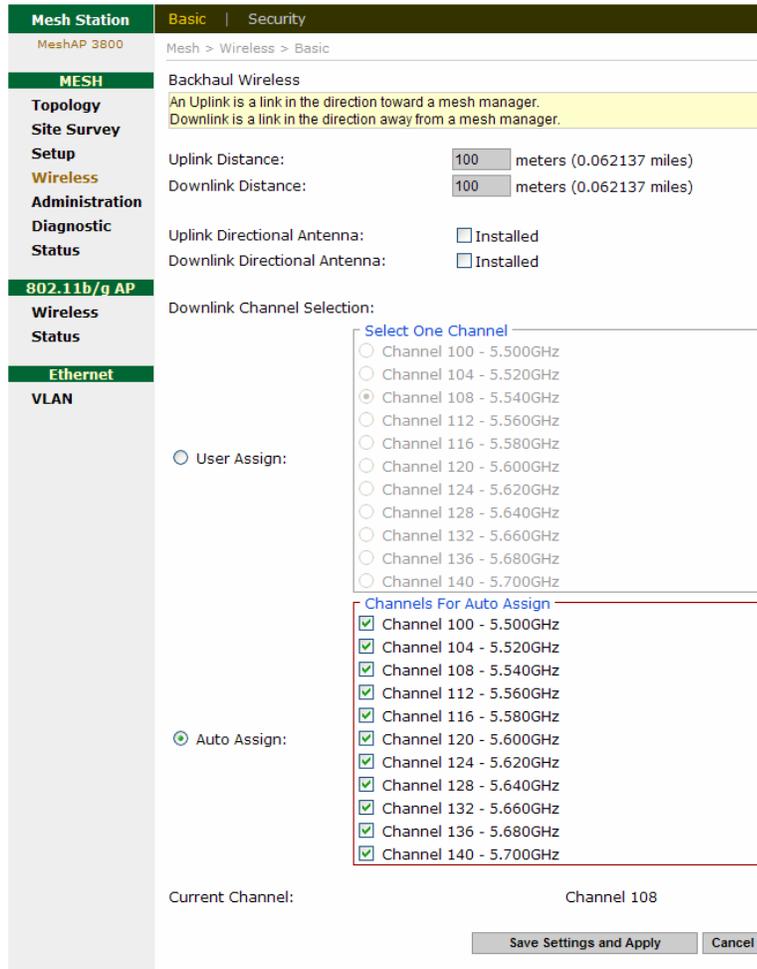
## Setup Mesh Wireless (Backhaul)

**Step 1.** Login to the MeshAP Access Point.

**Note:** To access a MeshAP Access Point on the mesh network, login to the Mesh Manager unit, and access the Topology page to locate the MeshAP Access Point unit needing configuration.

**Step 2.** Go to the **Wireless** page under the **MESH** section.

**Step 3.** Select the Auto Assign or User Assign for the wireless backhaul



**Note:** the Channels shown on the interface may vary base on country of regulation. The image captured above is based on the **US version**.

## Mesh Wireless Channel (Backhaul)

Channel/Frequency. This field identifies which operating frequency will be used. The selection is set automatically by the MeshAP unit based on the environmental conditions.

MeshAPs associated with a Mesh Manager unit will automatically calibrate its channel to reduce interference between MeshAPs on the mesh network.

## Mesh Wireless Security (Backhaul)

### Mesh Wireless Security

The Mesh Wireless (Backhaul) Security could only be configured at Mesh Manager unit  
The default setting of the wireless security mode for the MeshAP unit is “WPA2.”

### WPA2 Key

**Step 1.** To automatically program the data encryption *Enter* a Passphrase in the **WPA2 Key** field.

**Note:** It is important to remember the WPA2 key. This key needs to be applied for both MeshAP units on the mesh network.

**Step 2.** Click “**Save Settings and Apply**” to apply the new setting.

### WPA Key

**Step 1.** To automatically program the data encryption *Enter* a Passphrase in the **WPA Key** field.

**Note:** It is important to remember the WPA key. This key needs to be applied for both MeshAP units on the mesh network.

Step 2. Click “Save Settings and Apply” to apply the new setting.

## Wireless Diagnostic

Diagnostic page provides Link Speed, Signal Noise Ratio, and Noise Floor rate for the Station.

### Local Link Quality

Local Link Quality provides link quality for both the uplink and downlink data rate, signal to noise ratio(SNR), and noise floor are displayed.

**Tx Link Speed:** (in Mbps)

**SNR:** (in dB)

**Noise Floor Level:** (in dBm)

**Tx Error, Tx Dropped, Rx Error, and Rx Dropped:** (Number of packets)

**Tx and Rx Error Rates:** (% difference between dropped and total packets)

**Note:** The data is updated every second and the last five samples are displayed.

Mesh Manager	Local Link Quality   Mesh Link Quality   Topology Change Log   Radio Self-Test						
MeshAP 3800	Mesh > Diagnostic > Local Link Quality						
<b>MESH</b>	<b>Uplink:</b>						
Topology	Tx Link Speed (Mbps):	n/a					
Site Survey	SNR (dB):	n/a					
Setup	Noise Floor (dBm):	n/a					
Wireless	<b>Downlink:</b>						
Administration	<b>Station Name</b>	<b>Data</b>					
Diagnostic		Time (mm:ss):	8:48	9:1	9:9	9:14	9:23
Status		Tx total:	57	96	65	65	82
<b>802.11b/g AP</b>		Rx total:	40	80	45	43	69
Wireless		Tx Error:	0	0	0	0	0
Status		Tx Dropped:	0	0	0	0	0
<b>Ethernet</b>		Rx Error:	0	0	0	0	0
VLAN		Rx Dropped:	0	0	0	0	0
		Tx Error Rate (%):	0.0	0.0	0.0	0.0	0.0
		Rx Error Rate (%):	0.0	0.0	0.0	0.0	0.0
	<b>QAStation3 (00:14:67:83:47:19)</b>	Tx Link Speed (Mbps):	54	54	54	54	54
		SNR (dB):	30	30	29	28	29
		Noise Floor (dBm):	-96	-96	-96	-96	-96
	<b>QAStation5 (00:14:67:83:5c:31)</b>	Tx Link Speed (Mbps):	54	54	54	54	54
		SNR (dB):	35	36	35	36	36
		Noise Floor (dBm):	-96	-96	-96	-96	-96
	<b>QAStation13 (00:14:67:83:5c:81)</b>	Tx Link Speed (Mbps):	54	54	54	54	54
		SNR (dB):	32	32	32	32	33
		Noise Floor (dBm):	-96	-96	-96	-96	-96
	<b>QAStation4 (00:14:67:83:47:49)</b>	Tx Link Speed (Mbps):	54	54	54	54	54
		SNR (dB):	42	42	42	42	42
		Noise Floor (dBm):	-96	-96	-96	-96	-96
	<b>QAStation12 (00:14:67:83:5c:39)</b>	Tx Link Speed (Mbps):	36	36	36	36	36
		SNR (dB):	36	36	35	35	35
		Noise Floor (dBm):	-96	-96	-96	-96	-96

## Mesh Link Quality

The Mesh Link Quality page only appears on the Mesh Manager. It displays the link data for every link in the mesh network.

The MeshAP Name column lists all the devices that are a part of this mesh. Uplink--Downlink column lists the MeshAP that each of those devices have a mesh link with. An Uplink is a link in the direction toward a mesh manager. A Downlink is a link in the direction away from a mesh manager. Downlinks are displayed in italics text. Uplinks are displayed in normal text and their text is blue.

A Mesh Manager will only have downlinks.

The packet count listed in the following columns: Tx Total, Rx Total, Tx Error, RxError, Tx Dropped, and Rx Dropped, are the number packets that have passed in the previous five seconds.

**Note:** The data is updated every second and the last five samples are displayed.

Mesh Manager									
Local Link Quality   <b>Mesh Link Quality</b>   Topology Change Log   Radio Self-Test									
MeshAP 3800									
Mesh > Diagnostic > Mesh Link Quality									
<p>An Uplink is a link in the direction toward a mesh manager. A Downlink is a link in the direction away from a mesh manager. Numbers in this table are updated every 5 seconds.</p>									
MeshAP Name	Channel	Uplink Downlink	Tx Link Speed (Mbps)	SNR (dB)	Noise Floor (dBm)	Tx Total (packet)	Rx Total (packet)	Tx Error (packet)	Rx Error (packet)
QAManager	n/a	<i>n/a</i>	n/a	n/a	n/a	n/a	n/a	0	0
	100	<i>QAstation5</i>	48	38	-96	0	0	0	0
	100	<i>QAstation4</i>	54	42	-96	0	0	0	0
	100	<i>QAstation13</i>	48	36	-96	0	0	0	0
	100	<i>QAstation12</i>	36	38	-96	0	0	0	0
	100	<i>QAstation3</i>	54	32	-96	0	0	0	0
QAstation5	100	QAManager	48	38	-87	0	0	0	0
QAstation4	100	QAManager	54	42	-89	0	0	0	0
QAstation13	100	QAManager	48	36	-87	0	0	0	0
QAstation12	100	QAManager	36	38	-87	0	0	0	0
QAstation3	100	QAManager	54	32	-85	0	0	0	0
	112	<i>QAstation2</i>	54	32	-91	0	0	0	0
QAstation2	112	QAstation3	54	32	-87	0	0	0	0

## Topology Change Log

Topology Change Log shows the history of the Topology. The Time column represents the Time and the Date the log was generated. The Topology column shows the structure of Topology when the log was generated.

**Example:**

Node 1  
Node 2 === Node1

The Left side of the Topology shows the Root node, and Child node. The Right side of the Topology shows the Parent node.

The Link Line between Child node, and Parent node  
 === Normal link  
 - - - Weak Link

Mesh Manager		Local Link Quality   Mesh Link Quality   <b>Topology Change Log</b>   Radio Self-test
MeshAP 3800		Mesh > Diagnostic > Topology Change Log
<b>MESH</b>		The past 500 changes in Topology are logged on this page. Each log entry displays the entire mesh topology.
<b>Topology</b>		
Site Survey		
Setup		
Wireless		
Administration		
Diagnostics		
Status		
<b>802.11b/g AP</b>		
Wireless		
Status		
<b>Ethernet</b>		
VLAN		
Time	Topology	
Fri Feb 22 15:14:03 2008	QAManager	
Fri Feb 22 15:14:12 2008	QAManager QAstation4 === QAManager	
Fri Feb 22 15:14:17 2008	QAManager QAstation4 === QAManager QAstation13 === QAManager	
Fri Feb 22 15:14:21 2008	QAManager QAstation4 === QAManager QAstation13 === QAManager QAstation5 === QAManager	
Fri Feb 22 15:14:23 2008	QAManager QAstation4 === QAManager QAstation13 === QAManager QAstation5 === QAManager QAstation3 === QAManager	
Fri Feb 22 15:14:39 2008	QAManager QAstation4 === QAManager QAstation13 === QAManager QAstation5 === QAManager QAstation3 === QAManager QAstation12 === QAstation3	
Fri Feb 22 15:15:11 2008	QAManager	

## Radio Self-Test

The Radio Test tests backhaul radios in the MeshAP device. The test runs in two cycles. One radio transmits while the other listens during the first cycle. During the second cycle, the other radio transmits while the first one listens.

The results of the previous test are displayed. Prior to running a radio self-test, the results will be zero.

**Mesh Manager**
Local Link Quality | Mesh Link Quality | Topology Change Log | **Radio Self-Test**

MeshAP 3800 Mesh > Diagnostic > Radio Self-Test

The Radio Test allows one to test the two mesh, or backhaul, radios in the MeshAP device. The test runs in two cycles. One radio transmits while the other listens during the first cycle. During the second cycle, the other radio transmits while the first one listens.

Antenna	Tx Link Speed (Mbps)	SNR(dB)	Noise Floor (dBm)	Test Result
Uplink Radio	0	0	0	n/a
Downlink Radio	0	0	0	n/a

**MESH**

Topology

Site Survey

Setup

Wireless

Administration

Diagnostic

Status

**802.11b/g AP**

Wireless

Status

**Ethernet**

VLAN

# Chapter 10

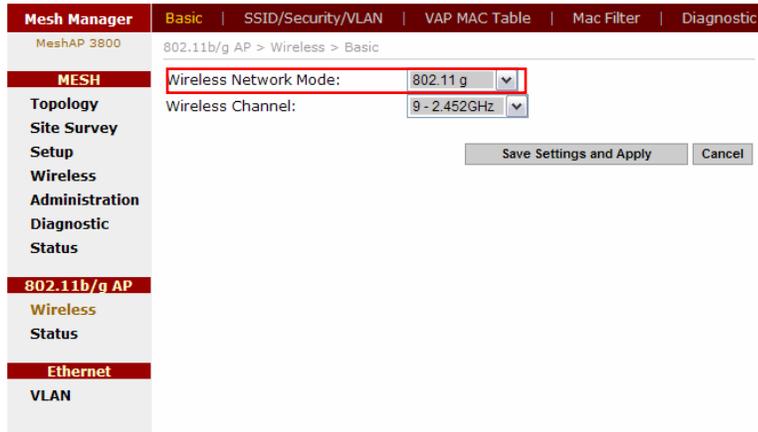
## Setup AP Wireless

This section demonstrate how to change SSID, and channel setting for the mesh network

### Wireless Mode

#### 802.11b/g Mode

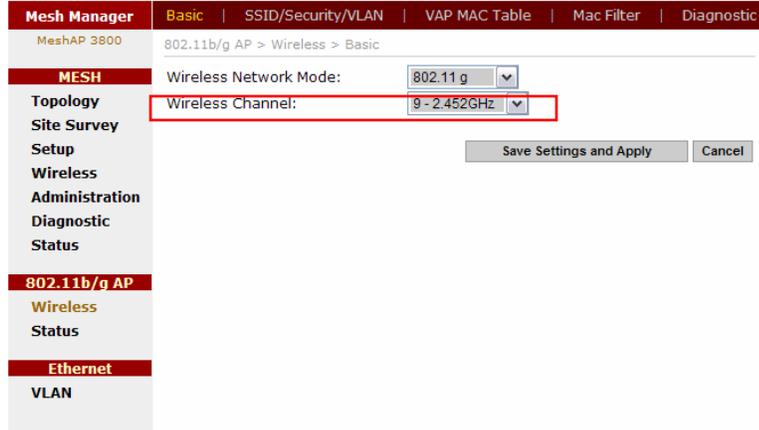
MeshAP is set under “Auto Mode”, MeshAP Access Point will accept both only 802.11g and 802.11b clients.



### Wireless Channel

Channel/Frequency. This field identifies which operating frequency will be used. The selection is set automatically by the MeshAP unit based on the environmental conditions.

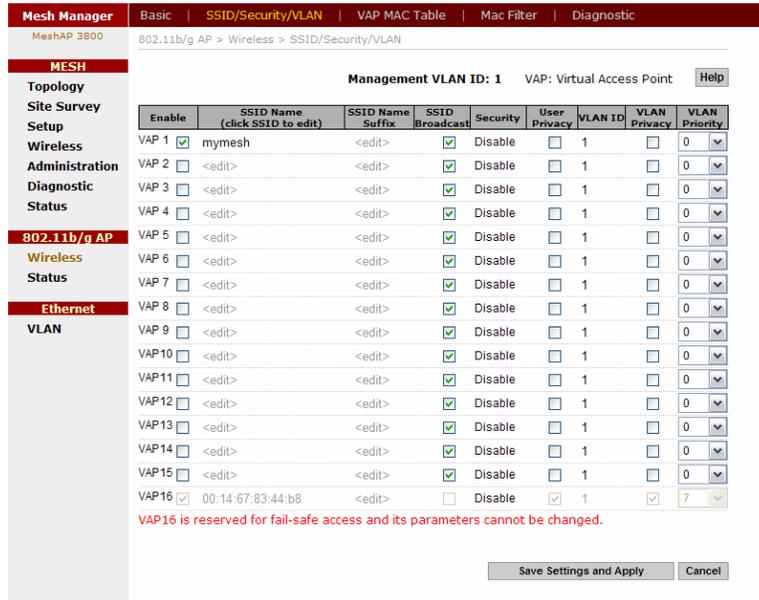
To Manually setup Wireless Channel simply use the drop down menu to select the ideal channel.



## Changing and modifying the SSID

**Step 1.** Login to the MeshAP Manager unit.

**Step 2.** Go to the **Wireless** page under the **SSID/Security/VLAN** tab at the **802.11b/g AP** section.



**Step 3.** click on the SSID “mymesh” to change to the appropriate SSID. The SSID will propagate to all mesh units in the mesh network.

802.11b/g AP > Wireless > SSID/Security/VLAN

Management VLAN ID: 1 VAP: Virtual Access Point Help

Enable	SSID Name (click SSID to edit)	SSID Name Suffix	SSID Broadcast	Security	User Privacy	VLAN ID	VLAN Privacy	VLAN Priority
<input checked="" type="checkbox"/>	mymesh	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0
<input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0
<input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0

**Note:** Certain PCs or laptops may not reflect SSID changes instantly. If this occurs, disable and re-enable the Wireless Network Connection in the Operation System, doing this will ensure that all the updates are received.

## Wireless Security

### Disable Wireless Security (Default)

The default setting of the wireless security mode for the MeshAP unit is “Disable”.

### Configure WEP Wireless Security

To configure WEP data encryption, follow these steps:

**Step 1.** Go to the Security section under Administration.

**Step 2.** Use the drop down menu to select WEP Mode.

802.11b/g AP > Wireless > SSID/Security/VLAN

Management VLAN ID: 1 VAP: Virtual Access Point Help

Enable	SSID Name (click SSID to edit)	SSID Name Suffix	SSID Broadcast	Security	User Privacy	VLAN ID	VLAN Privacy	VLAN Priority
<input checked="" type="checkbox"/>	mymesh	<edit>	<input checked="" type="checkbox"/>	WEP	<input type="checkbox"/>	1	<input type="checkbox"/>	0

Security Mode: WEP

Encryption:  64-bit/10 Hex Digits  128-bit/26 Hex Digits

Passphrase:  Generate (maximum 16 characters)

Key Index:  1  2  3  4

WEP Key 1:

WEP Key 2:

WEP Key 3:

WEP Key 4:

Close

<input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0
<input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0

**Step 3.** Select the Encryption Strength, and Select 64- or 128-bit encryption

Security Mode:

Encryption:  64-bit/10 Hex Digits  128-bit/26 Hex Digits

Passphrase:

Key Index:  1  2  3  4

WEP Key 1:  :  :  :  :

WEP Key 2:  :  :  :  :

WEP Key 3:  :  :  :  :

WEP Key 4:  :  :  :  :

**Note:** You can manually or automatically program the four data encryptions to be identical on all PCs and access points in your network.

**Step 4.** To automatically program the data encryption, *Enter* a Passphrase in the **Passphrase** field and *Click* “**Generate**” to generate the WEP key.

Security Mode:

Encryption:  64-bit/10 Hex Digits  128-bit/26 Hex Digits

Passphrase:

Key Index:  1  2  3  4

WEP Key 1:  :  :  :  :

WEP Key 2:  :  :  :  :

WEP Key 3:  :  :  :  :

WEP Key 4:  :  :  :  :

There will be four sets of WEP Keys generated from the Passphrase. You could choose any set of the WEP Keys from the Index by selecting the radio button of the Key Index.

Security Mode:

Encryption:  64-bit/10 Hex Digits  128-bit/26 Hex Digits

Passphrase:

Key Index:  1  2  3  4

WEP Key 1:  :  :  :  :

WEP Key 2:  :  :  :  :

WEP Key 3:  :  :  :  :

WEP Key 4:  :  :  :  :

**Note:** It is important to remember the WEP key. This key needs to be applied for both MeshAP units on the mesh network and for the client devices that need to access the mesh network.

**Step 5.** *Click* “**Save Settings and Apply**” to apply the new setting.

802.11b/g AP > Wireless > SSID/Security/VLAN

Management VLAN ID: 1 VAP: Virtual Access Point Help

Enable	SSID Name (click SSID to edit)	SSID Name Suffix	SSID Broadcast	Security	User Privacy	VLAN ID	VLAN Privacy	VLAN Priority
VAP 1 <input checked="" type="checkbox"/>	mymesh	<edit>	<input checked="" type="checkbox"/>	WPA	<input type="checkbox"/>	1	<input type="checkbox"/>	0 <input type="button" value="v"/>
Security Mode: <input type="text" value="WPA"/> <input type="button" value="v"/> WPA Key: <input type="text"/> Please enter 8 to 63 characters. Key Renewal Interval: <input type="text" value="0"/> hour(s) <span style="float: right;"><input type="button" value="Close"/></span>								
VAP 2 <input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0 <input type="button" value="v"/>
VAP 3 <input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0 <input type="button" value="v"/>

802.11b/g AP > Wireless > SSID/Security/VLAN

Management VLAN ID: 1 VAP: Virtual Access Point Help

Enable	SSID Name (click SSID to edit)	SSID Name Suffix	SSID Broadcast	Security	User Privacy	VLAN ID	VLAN Privacy	VLAN Priority
VAP 1 <input checked="" type="checkbox"/>	mymesh	<edit>	<input checked="" type="checkbox"/>	WPA2	<input type="checkbox"/>	1	<input type="checkbox"/>	0 <input type="button" value="v"/>
Security Mode: <input type="text" value="WPA2"/> <input type="button" value="v"/> WPA2 Key: <input type="text"/> Please enter 8 to 63 characters. Key Renewal Interval: <input type="text" value="0"/> hour(s) <span style="float: right;"><input type="button" value="Close"/></span>								
VAP 2 <input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0 <input type="button" value="v"/>
VAP 3 <input type="checkbox"/>	<edit>	<edit>	<input checked="" type="checkbox"/>	Disable	<input type="checkbox"/>	1	<input type="checkbox"/>	0 <input type="button" value="v"/>

# Chapter 11

## Multiple SSID / VLAN Configuration

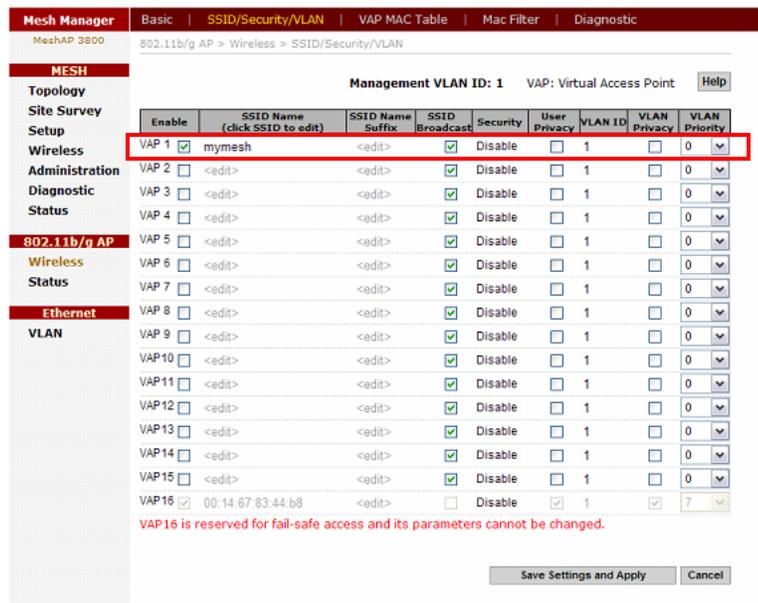
### SSID / VLAN Page

MeshAP access point has the ability to set up to sixteen(16) sets of SSID and VLAN.

To Set Multiple SSID and VLAN

**Step 1.** Login to the Mesh Manager unit and access the 802.11b/g AP Wireless page

Step 2. Go to SSID/Security/VLAN tab



**Step 3.** Check the **Enable** box for the next available **VLAN ID**. Enter the appropriate SSID, and Security to finish the configuration.

**Step 4.** Click **Save Setting and Apply**

### Understand SSID “span” and “arrow”

As for the "span", it is the default name for SSID to indicate that this MeshAP has not joined any mesh network yet. It serves as a warning and provides a way for fast meshing. Once the station joins a mesh network, the "span" is replaced with last 3 bytes of MAC address.

The other question regarding MAC addresses is a little bit complicated. Each MeshAP has many networking interfaces, which has ONE or MORE MAC addresses associated with each interface. This is why you may see MAC addresses differ from the MAC address on label.

## VLAN Tag

### Access Mode

Untagged (no VLAN ID) frames entering (ingress) the Ethernet port will be accepted, and transit the network with the VLAN ID and priority specified in the VLAN ID field. Tagged (with a VLAN tag) frames entering the Ethernet port will be dropped. The VLAN tag will be removed from frames leaving (egress) the Ethernet port.

Setup Access Mode

**Step 1.** Login to the **Ethernet/VLAN**

**Step 2.** Check “Access” radio button under the **VLAN Ethernet Mode**

The screenshot shows the Mesh Manager interface for a MeshAP 3800. The navigation menu on the left includes MESH, 802.11b/g AP, Ethernet, and VLAN. The main content area is titled 'Ethernet > VLAN'. It features a 'Management VLAN ID' field set to '1' (range 1 ~ 4094). A yellow callout box contains the following text: 'Management VLAN ID - This ID represents Ethernet Port VLAN ID for MeshAP Management Interface. The default Management VLAN ID is (1). The ID could be configured under Mesh Manager unit Ethernet->VLAN section. The Management VLAN ID could be assigned with number 1 - 4094. This VLAN ID MUST match with the connected 3rd party VLAN Switch assigned VLAN ID to make proper connection link for Management Interface. IMPORTANT NOTE: Management VLAN ID and VLAN ID under Mesh Manager->Ethernet->VLAN section must have the same value in order for MeshAP Manager to pass the 3rd party VLAN Switch command to the MeshAP nodes.' Below this, the 'VLAN Ethernet Mode' section has three radio buttons: 'Access' (selected and highlighted with a red box), 'Trunk and Native VLAN', and 'Pure Trunk'. The 'VLAN ID' field is set to '1' (range 1 ~ 4094) and the 'VLAN Priority' dropdown is set to '0'. At the bottom are 'Save Settings and Apply' and 'Cancel' buttons.

**Step 3.** Click **Save Setting and Apply**

### Trunk and Native VLAN Mode

Trunk and Native VLAN - Both untagged and tagged (VLAN IDs and priority included) frames entering the Ethernet port will be accepted. Untagged frames will be on Native or Management VLAN. Tagged frames will pass through the mesh network unchanged. Egress (outgoing) frames will exit the Ethernet port unaltered. If the frame leaving the Ethernet port contains a VLAN tag, it will be transmitted with that same tag. If the frame leaving the Ethernet port does not contain a VLAN tag, the frame will be transmitted without a tag.

## Setup Trunk and Native VLAN Mode

**Step 1.** Login to the **Ethernet/VLAN**

**Step 2.** Check “Trunk and Native VLAN” radio button under the **VLAN Ethernet Mode**

**Step 3.** Click **Save Setting and Apply**

## Pure Mode

Pure Trunk - Only tagged (VLAN IDs and priority included) frames entering the Ethernet port will be accepted. Egress frames will exit the Ethernet port unaltered. If the frame leaving the Ethernet port contains a VLAN tag, it will be transmitted with that same tag. If the frame leaving the Ethernet port does not contain a VLAN tag, the frame will be transmitted without a tag. In this mode, the MeshAP must be connected to a VLAN capable device and the port on that device must be configured as a Trunk port.

Setup Pure Mode

**Step 1.** Login to the **Ethernet/VLAN**

**Step 2.** Check “Pure” radio button under the **VLAN Ethernet Mode**

**Mesh Manager** VLAN

MeshAP 3800 Ethernet > VLAN

**MESH** Management VLAN ID: 1 (1 ~ 4094)

**Management VLAN ID** - This ID represents Ethernet Port VLAN ID for MeshAP Management Interface. The default Management VLAN ID is (1). The ID could be configured under Mesh Manager unit Ethernet->VLAN section. The Management VLAN ID could be assigned with number 1 - 4094. This VLAN ID MUST match with the connected 3rd party VLAN Switch assigned VLAN ID to make proper connection link for Management Interface.

**IMPORTANT NOTE:**  
Management VLAN ID and VLAN ID under Mesh Manager->Ethernet->VLAN section must have the same value in order for MeshAP Manager to pass the 3rd party VLAN Switch command to the MeshAP nodes.

VLAN Ethernet Mode:  Access  Trunk and Native VLAN  Pure

Trunk

Setting the Ethernet port to Pure Trunk Mode requires that it be connected to a VLAN capable device. Also the port on that device must be configured as a trunk port and allow all VLANs configured in the mesh network.

Fail-safe access to the GUI is available via the Access Point, SSID Arrowspan.

VLAN ID: [1] (1 ~ 4094)  
VLAN Priority: [7]

Save Settings and Apply Cancel

**Step 3. Click Save Setting and Apply**

# Chapter 12

## Firmware Upgrade

### Direct Upgrade – Mesh Station

**Step 1.** Login to the MeshAP Access Point.

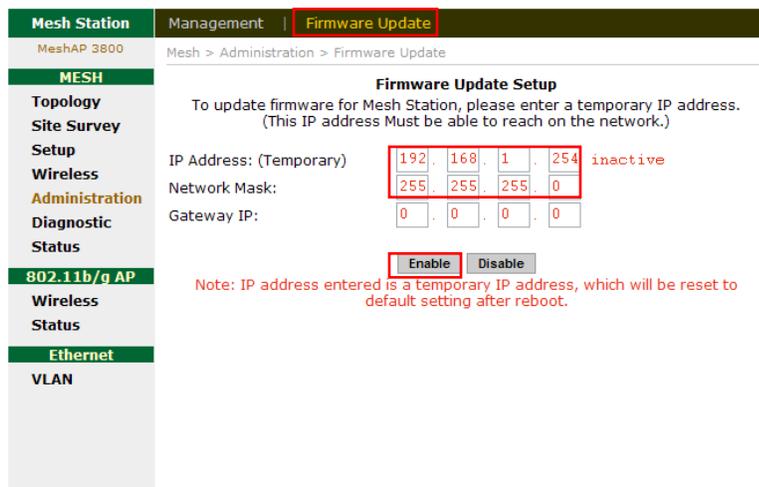
**Step 2.** Go to the **Status** link under the **AP** section, and check the current firmware version/build date.



**Step 3.** Go to Administration: **Firmware Update** link,

Enter a Temporary IP for firmware update. The IP must be reachable from the network.

Click on **“Enable”** to temporary enable to IP for the unit



**IMPORTANT:** Once the temporary IP has assigned the unit will prompt for re-login.

Follow the **Login prompt** to login with username/password.

**Step 4.** Click “Browse...” to select the firmware bin file on the local hard drive for update

**Mesh Station** Management | **Firmware Update**

MeshAP 3800 Mesh > Administration > Firmware Update

**MESH**

Topology  
Site Survey  
Setup  
Wireless  
**Administration**  
Diagnostic  
Status

**802.11b/g AP**

Wireless  
Status

**Ethernet**

VLAN

**Firmware Update Setup**

To update firmware for Mesh Station, please enter a temporary IP address.  
(This IP address Must be able to reach on the network.)

IP Address: (Temporary) 192 . 168 . 2 . 125 active  
Network Mask: 255 . 255 . 255 . 0  
Gateway IP: 0 . 0 . 0 . 0

Enable Disable

Note: IP address entered is a temporary IP address, which will be reset to default setting after reboot.

**Firmware Update**

Current Firmware Build Date: Feb 14, 2008  
Current Firmware Version : 7.00.QA28.2049-0000  
Current Boot Loader: 2.53

Please select a file to update:

**Step 4.** Click **Upgrade** to start the firmware upgrade process. The firmware upgrade process takes about 2 minutes.

**Mesh Station** Management | **Firmware Update** | Manufacturer

AP > Administration > Firmware Update

**MESH**

Site Survey  
Setup  
Status

**AP**

Wireless  
**Administration**  
Status

**Firmware Upgrade**

Please select a file to upgrade: C:\Documents and Se

**Mesh Station** Management | **Firmware Update** | Manufacturer

AP > Administration > Firmware Update

**MESH**

Site Survey  
Setup  
Status

**AP**

Wireless  
**Administration**  
Status

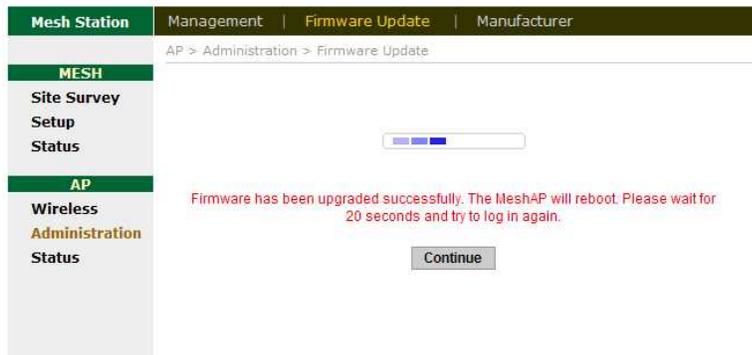
**Firmware Upgrade**

Please select a file to upgrade: C:\Documents and Se

Upgrading firmware. It will take about one minute. Please wait.  
Page will be refreshed when upgrading firmware is completed.

**Warning Warning Warning**  
Do not turn off device power to avoid permanent damage.  
Do not change webpage until upgrading firmware is completed.

**Step 5.** When the firmware upgrade is ready, the following page will be displayed on the screen. Click **“Continue”**.



If after 30 seconds the same image still appears on the screen, please click on the **Continue** button and re-login to the unit.

# Smart Firmware Upgrade

Smart Firmware update propagate flash update to all Mesh Stations via Mesh Manager

**Step 1.** Login to the Mesh Manager unit.

**Step 2.** Go to Firmware Batch Update tab under the Administration page.

The screenshot shows the 'Firmware Batch Update' page in the Mesh Manager. The left sidebar contains navigation menus for MESH, 802.11b/g AP, Ethernet, and VLAN. The main content area includes a file selection field, IP address (192.168.1), network mask (255.255.255.0), and radio buttons for 'Best Effort' (selected) and 'Stop Upon Error'. Below these are 'Start' and 'Stop' buttons. A table lists MeshAP units with checkboxes in the first column:

<input type="checkbox"/>	MeshAP Name	BSSID	Version	Hop	Status	Time
<input type="checkbox"/>	mm2 usR6001	00:14:67:83:44:B8	6.00	0		
<input type="checkbox"/>	STA6	00:14:67:83:44:78	6.00	1		
<input type="checkbox"/>	STA5	00:14:67:83:47:58	6.00	2		
<input type="checkbox"/>	STA4	00:14:67:83:47:18	6.00	2		

**Step 3.** Check the appropriate MeshAP units for firmware update

This screenshot is identical to the previous one, but the checkboxes in the table are now checked, indicating that the units mm2, STA6, STA5, and STA4 are selected for the firmware update.

<input checked="" type="checkbox"/>	MeshAP Name	BSSID	Version	Hop	Status	Time
<input checked="" type="checkbox"/>	mm2 usR6001	00:14:67:83:44:B8	6.00	0		
<input checked="" type="checkbox"/>	STA6	00:14:67:83:44:78	6.00	1		
<input checked="" type="checkbox"/>	STA5	00:14:67:83:47:58	6.00	2		
<input checked="" type="checkbox"/>	STA4	00:14:67:83:47:18	6.00	2		

**Step 4.** Browse the appropriate firmware update file, and Enter a temporarily IP Address in the IP Address file. The IP Address must be reachable in the mesh network.

Mesh > Administration > Management

Please select a file to upgrade:

IP Address: (See **more**)  .  .  .

Network Mask:  .  .  .

Action while mesh link lost:  Best Effort  Stop Upon Error

<input checked="" type="checkbox"/>	MeshAP Name	BSSID	Version	Hop	Status	Time
<input checked="" type="checkbox"/>	mm2 usR6001	00:14:67:83:44:B8	6.00	0		
<input checked="" type="checkbox"/>	STA6	00:14:67:83:44:78	6.00	1		
<input checked="" type="checkbox"/>	STA5	00:14:67:83:47:58	6.00	2		
<input checked="" type="checkbox"/>	STA4	00:14:67:83:47:18	6.00	2		

**Step 5.** Click Start to begin the update.

Mesh Manager	Management	Firmware Update	Mesh Upgrade																																			
MeshAP 3100/5100	Mesh > Administration > Management																																					
<b>MESH</b>	IP Address: (Temporary) <input type="text" value="192"/> . <input type="text" value="168"/> . <input type="text" value="2"/> . <input type="text" value="55"/> Network Mask: <input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="0"/> Action while mesh link lost: <input checked="" type="radio"/> Best Effort <input type="radio"/> Stop Upon Error <input type="button" value="Start"/> <input type="button" value="Stop"/>																																					
<b>802.11g AP</b>	<table border="1"> <thead> <tr> <th><input checked="" type="checkbox"/></th> <th>Mesh AP Name</th> <th>BSSID</th> <th>Version</th> <th>Hop</th> <th>Status</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td>mm2</td> <td>00:14:67:83:44:B8</td> <td>5.62</td> <td>0</td> <td>File transfer complete.</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>STA3</td> <td>00:14:67:83:43:10</td> <td>5.62</td> <td>1</td> <td>File transferring...</td> <td>7 s</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>STA1</td> <td>00:14:67:83:44:98</td> <td>5.62</td> <td>2</td> <td>Flash programming complete.</td> <td>102 s</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>STA4</td> <td>00:14:67:83:47:18</td> <td>5.62</td> <td>2</td> <td>Flash programming complete.</td> <td>108 s</td> </tr> </tbody> </table>			<input checked="" type="checkbox"/>	Mesh AP Name	BSSID	Version	Hop	Status	Time	<input checked="" type="checkbox"/>	mm2	00:14:67:83:44:B8	5.62	0	File transfer complete.		<input checked="" type="checkbox"/>	STA3	00:14:67:83:43:10	5.62	1	File transferring...	7 s	<input checked="" type="checkbox"/>	STA1	00:14:67:83:44:98	5.62	2	Flash programming complete.	102 s	<input checked="" type="checkbox"/>	STA4	00:14:67:83:47:18	5.62	2	Flash programming complete.	108 s
<input checked="" type="checkbox"/>	Mesh AP Name	BSSID	Version	Hop	Status	Time																																
<input checked="" type="checkbox"/>	mm2	00:14:67:83:44:B8	5.62	0	File transfer complete.																																	
<input checked="" type="checkbox"/>	STA3	00:14:67:83:43:10	5.62	1	File transferring...	7 s																																
<input checked="" type="checkbox"/>	STA1	00:14:67:83:44:98	5.62	2	Flash programming complete.	102 s																																
<input checked="" type="checkbox"/>	STA4	00:14:67:83:47:18	5.62	2	Flash programming complete.	108 s																																
<b>Ethernet</b>																																						
<b>VLAN</b>																																						

Once the batch update is complete the MeshAP Name will have a check mark next to the unit.

# APPENDIX A

## Specification

### Wireless

**Standards:** IEEE 802.11a, IEEE 802.11g, IEEE 802.11b **Media Access Protocol:** CSMA/CA with ACK

**Frequency:** 5GHz ISM radio band  
2.4GHz ISM radio band

### Modulation

802.11a: OFDM(64-QAM, 16-QAM, QPSK, BPSK)

802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK)

802.11b: CCK(11, 5.5MHz), DOPSK(2Mbps), DQPSK(1Mbps)

### Data Rates

802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps

802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps

802.11b: 1, 2, 5.5, 11Mbps

### Tx Power

802.11a: typical 22.5dBm

802.11g: typical 23dBm

802.11b: typical 24dBm

### Wireless Channels

#### 802.11a:

USA, Canada: 12 non-overlapping channels (5.15 ~ 5.35GHz, 5.725~5.825GHz)

Europe: 19 non-overlapping channels (5.15~5.35GHz)

Japan: 8 non-overlapping channels (4.9~5.1GHz and W56 channels)

China: 5 non-overlapping channels (5.725~5.85GHz)

#### 802.11g:

USA, Canada: 11

Most European countries: 13

France: 4

Japan: 13

China: 13

#### 802.11b:

USA, Canada, Taiwan: 11

Most European countries: 13

France: 4

Japan: 14

China: 13

Antenna (Not included in package)

(3x) 8dbi 5GHz omni directional antenna

(1x) 8dbi 2.4GHz omni directional antenna

(1x) GPS Antenna (MA3100G series)

## Operating Range

### Backhaul

Outdoor: 304m(1000ft)@54Mbps

### 802.11g

Outdoor: 150m@54Mbps

(Transmission speed may vary according to the environment)

## Network Management

Web (HTML) based Management, and SNMP

## Encryption & Security

64bit, 128bit WEP encryption (Hardware Accelerated)

WPK (Hardware Accelerated)

SSID broadcast enable/disable

Mesh operator username/password

Mesh ID protection

RESET button to factory default (Inside Enclosure)

## Network Ports

(1) 10/100Mbps auto crossover Ethernet WAN Port

(For connecting to 3rd party network device)

IEEE 802.3, 802.3u compliant

## Power

Power Interface: POE

Input: 48VDC 380mA

## Environmental Conditions

### Operating Temperature:

-40°F to 131°F (-40°C to 55°C)

### Storage Temperature:

-50°F to 158°F (-58°C to 70°C)

**Humidity:** 95% maximum relative humidity, non-condensing

## Physical Specifications

**Enclosure Rating:** IP 66

**Antenna Connector:** (3) weatherproof antenna connectors

### Power Connector:

(1) weatherproof Power/Data connector

(1) 100V-240V power connector

**Dimension:** 23.4cm x 17cm x6.3cm

**Weight:** 3.4lb (1.5kg)

**Regulatory Compliance**

FCC Part 15

UL 60950-1

## APPENDIX B

### Power Consumption and PoE Injector Pin Assignments

#### Power Consumption

48V DC 380mA

#### Maximum power consumption

18W

#### PoE Injector Pin assignments of RJ45 connector

EZMesh has a RJ45 modular jack for data connection and PoE power input. The pin assignments of RJ45 connector are

#### Data Line:

Pair 1: Pin 1 and pin 2

Pair 2: Pin 3 and pin 6

#### Power Pins:

+VDC: Pin 4 and pin 5

-VDC: Pin 7 and pin 8

**Caution:** EZMesh does not support reverse polarity power input.

## Appendix C: Warranty Policy

### Limited Warranty

All Teletronics' products are warranted to the original purchaser to be free from defects in materials and workmanship under normal installation, use, and service for a period of one (1) year from the date of purchase.

Under this warranty, Teletronics International Inc. shall repair or replace (at its discretion) during the warranty period, any part that proves to be defective in material of workmanship under normal installation, use and service, provided the

product is returned to Teletronics International Inc. or to one of its distributors with transportation charges prepaid.

Returned products must include a copy of the purchase receipt. In the absence of a purchase receipt, the warranty period shall be one (1) year from the date of manufacture.

This warranty shall be voided if the product is damaged as a result of defacement, misuse, abuse, neglect, accident, destruction or alteration of the serial number, improper electrical voltages or currents, repair, alteration or maintenance by any person or party other than a Teletronics International, Inc. employee or authorized service facility, or any use in violation of instructions furnished by Teletronics International, Inc.

This warranty is also rendered invalid if this product is removed from the country in which it was purchased, if it is used

in a country in which it is not registered for use, or if it is used in a country for which it was not designed. Due to variations in communications laws, this product may be illegal for use in some countries. Teletronics International, Inc.

assumes no responsibility for damages or penalties incurred resulting from the use of this product in a manner or location other than that for which it is intended.

**IN NO EVENT SHALL TELETRONICS INTERNATIONAL, INC. BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR**

**CONSEQUENTIAL DAMAGES FOR BREACH OF THIS OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED,**

**WHATSOEVER.**

Some states do not allow the exclusion or limitation of special, incidental or consequential damages, so the above exclusion or limitation may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

## Appendix D: RMA Policy

### Product Return Policy

It is important to us that all Teletronics' products are bought with full confidence. If you are not 100% satisfied with any product purchased from Teletronics you may receive a prompt replacement or refund subject to the terms and conditions outlined below.

**IMPORTANT:** Before returning any item for credit or under warranty repair, you must obtain a Return Merchandise

Authorization (RMA) number by filling out the RMA form. Products will not be accepted without an RMA number. All

products being shipped to Teletronics for repair / refund / exchange must be freight prepaid (customer pays for shipping). For all under warranty repair/replacement, Teletronics standard warranty applies.

### 30-Day full refund or credit policy:

1. Product was purchased from Teletronics no more than 30 day prior to the return request.
2. All shipping charges associated with returned items are non-refundable.
3. Products are returned in their original condition along with any associated packaging, accessories, mounting hardware and manuals. Any discrepancy could result in a delay or partial forfeiture of your credit.

### Unfortunately Teletronics cannot issue credits for:

1. Products not purchased from Teletronics directly. If you purchased from a reseller or distributor you must contact them directly for return instructions.
  2. Damaged items as a result of misuse, neglect or improper environmental conditions.
  3. Products purchased directly from Teletronics more than 30 days prior to a product return request.
- To return any product under 1 year warranty for repair/replacement, follow the RMA procedure.