Configuring and Provisioning Local Mesh in Controlled Mode

Technical Note

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Introduction

This document outlines two approaches to configuring and provisioning MSM3xx/4xx access points for local mesh. The first approach uses the controller to provision slave APs. The second involves provisioning slave APs independently.

Note:
All screenshots in this document reflect software version 5.7.

Terminology

Controlled-mode WLAN: A wireless network using MSM7xx series controllers and MSM3xx/4xx APs that are synchronized with the controller.

LM wired node: An MSM AP that is connected on the wired network and discovered and synchronized with the controller. This is usually the master node in the mesh link and can be either a single- or dual-radio AP.

LM Node: MSM APs that use local mesh to connect to the existing controlled mode WLAN. This is usually the slave or alternate master node in the mesh link. (Dual-radio APs are recommended as one radio can be dedicated to mesh operation exclusively.)

Assumptions

This document assumes that you:
- Have reviewed the local mesh chapter in the *HP MSM7xx Controllers Management and Configuration Guide*.
- Have checked that the same software version is installed on all APs.
- Can establish a stable link by achieving an SNR value of 25 or higher on a mesh link as seen from each node of the link.
- Have tested all components within close proximity of each other (i.e., 10 to 20 feet) in order to validate that your configuration works and that the links between mesh nodes are established as expected before your final deployment.

Note:
HP recommends that, when configuring local mesh, you provision APs either at the controller level *or* locally at the AP level. Mixing the two can result in locally provisioned settings to be overwritten by the settings of the controller's default group. As a result, the AP will be unable to connect to the local mesh after syncing for the first time.

Provisioning slave APs through the controller

This provisioning method is ideal when you can connect APs directly to the controller and allow them to quickly acquire provisioning information, thus avoiding individual configuration of each AP.

In the scenario that follows, the controller has been reset to factory defaults. In addition, two MSM3xx/4xx APs are wired to the controller and synchronized with the basic configuration.

The first AP will be configured as the master node (AP1). The other AP will be provisioned as the slave node (AP2). Once provisioned, the slave node can be disconnected from the controller and deployed. After the slave node powers up, it relies on its provisioning information to link to the master node and resynchronize with the controller, as the diagram below shows.

Figure 1: The MSM controller is connected to the master node (AP1). The slave node (AP2) links to the master node after it has been provisioned.
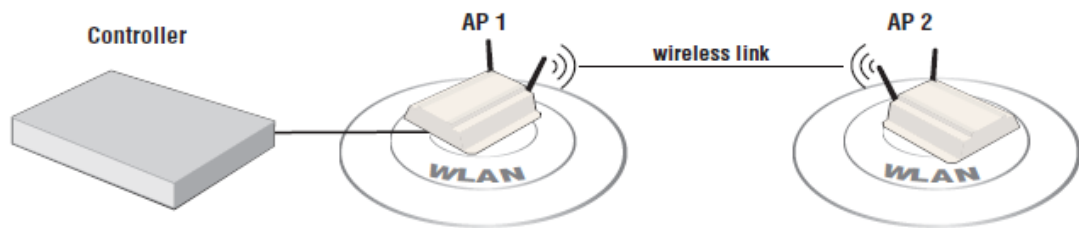

Theory

When a wired AP is synchronized with the controller and then moved to another group (i.e., Slave group), the AP always returns to that group upon mesh reconnection. This is because it was previously discovered in that group. This scenario shows you how to provision one or more slave APs by adding them to a Slave group that has the provisioning information needed to link to a master node.

Since the AP is already known in its Slave group, it cannot be allocated accidently to the Default group (and possibly lose its provisioning information) unless that is the group that it was provisioned from.

Configuring the master node for mesh

1. Select **Controlled APs > Group Management > Add new group**. Name the new group "Master" and select **Save**.
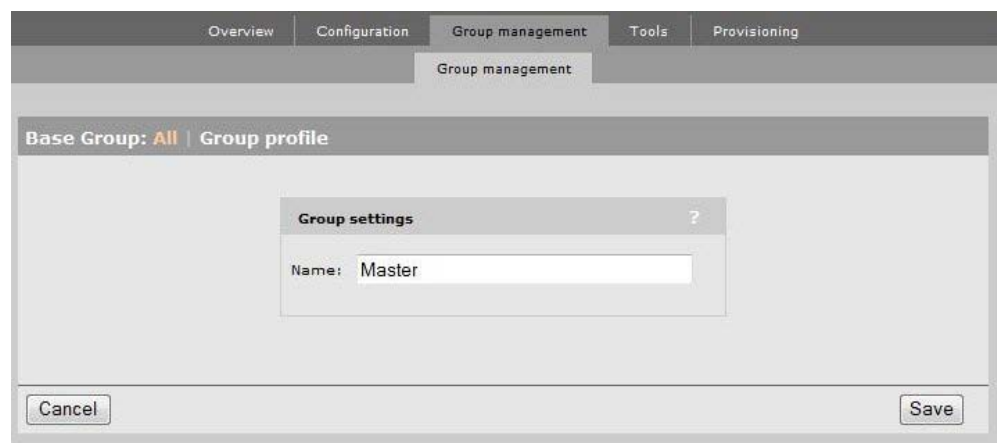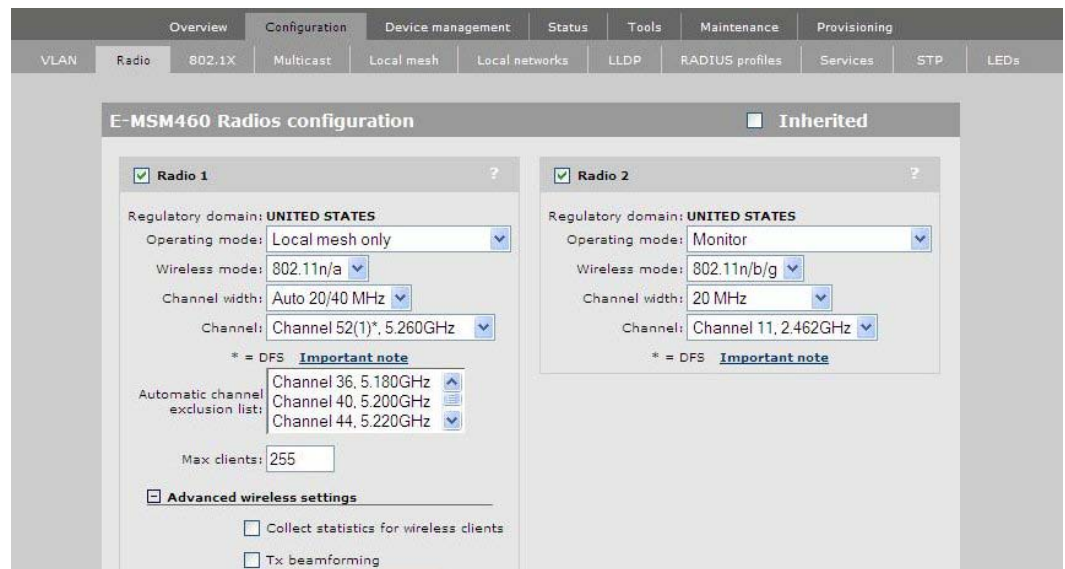

2. Select **Master group > Configuration > Radios** (make sure the **Inherited** checkbox is unchecked).

3. In the product list, select the AP that will serve as the master node. In the **Radios configuration** page under **Radio 1**, set the operating mode to either **Local Mesh** (or **Access Point and Local Mesh** if you want the AP to be able to operate in either mode), and set the wireless mode to **802.11n/a**. Select **Save**.

Note:

Radio 1 is used as an example for all scenarios in this document. Other radios can be configured for local mesh depending on the deployment. See the *HP MSM7xx Controllers Management and Configuration Guide*, the chapter on local mesh, for more information.

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4. Select the **Master group > Configuration > Local Mesh** (make sure the **Inherited** checkbox is unchecked).

5. Under **Settings** select **Local mesh profile #1** and then select the **Enabled** option. Assign a **Mesh ID** to the master and select **Save**.
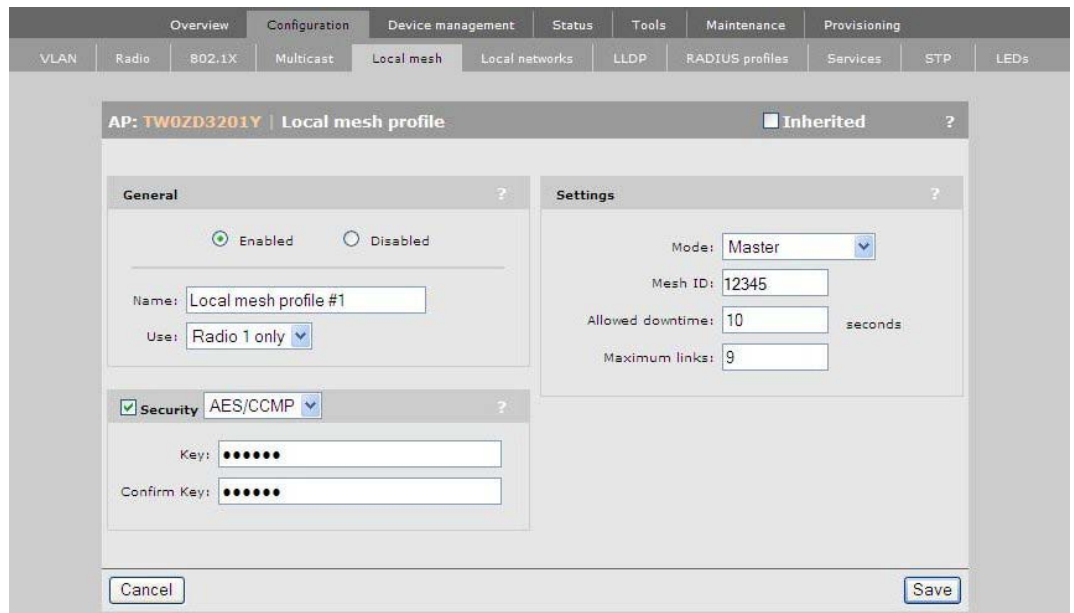
6. From the Default group, select the AP designated as the master node (the one that will remain wired to the controller), drag it over the Master group to move it to that group, and resynchronize the AP.

Provisioning the slave node for mesh

1. Select **Controller > Controlled APs > Provisioning** and then enable the **Enable provisioning of controlled APs** option. Select **Save**.

Note:
This global setting must be enabled before any provisioning information is applied to the APs.

2. Select **Controlled APs > Group Management > Add new group**. Name the new group "Slave" and select **Save**.

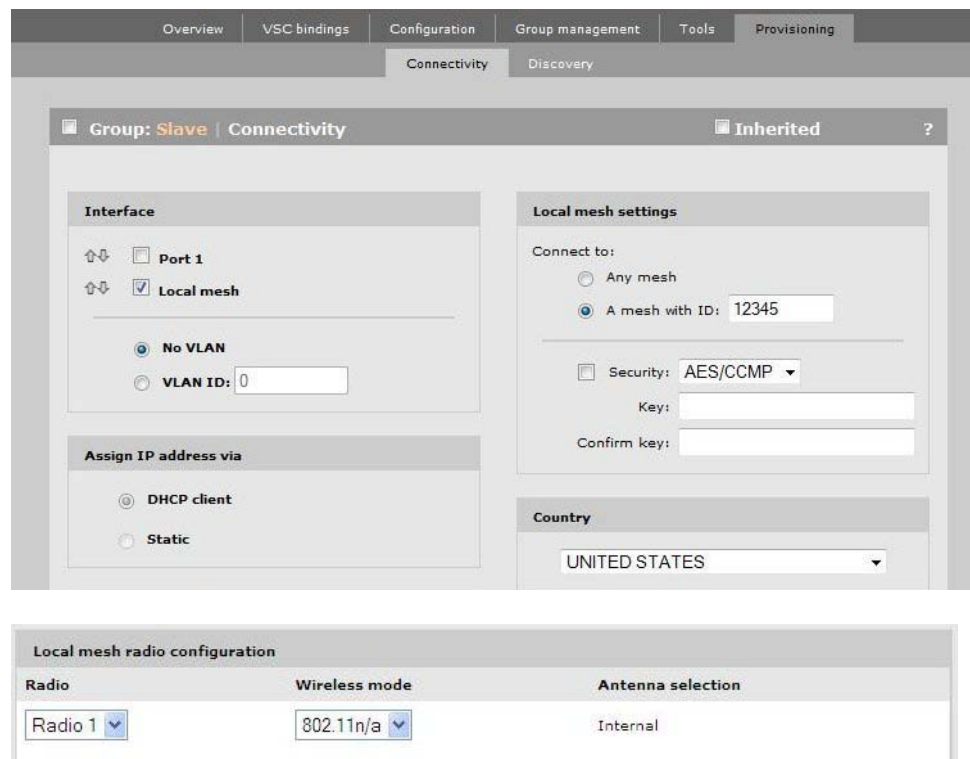3. Select the **Slave group > Configuration > Radios** (make sure the **Inherited** option is unchecked).

4. In the product list, select an AP. In the **Radios configuration** page under **Radio 1**, set the operating mode to **Access Point and Local Mesh** (or **Access Point and Local Mesh** if you want the AP to be able to operate in either mode), and set the wireless mode to **802.11n/a**. Select **Save**.

5. Select the **Slave group > Provisioning**. Disable the **Inherited** option and enable the Slave group.

6. Under **Interface**, enable the **Local Mesh**, and disable **Port 1** if the option is selected. Under **Local mesh settings**, enable the **A mesh with ID** option, and change the **Mesh ID** to match the ID you specified for the master node. Also ensure that the radio setting matches the radio you are configuring and that the **Country** setting matches the controller country. Select **Save**.

7. Drag the designated slave AP into the Slave group and resynchronize (note that no additional configuration is required). Once synchronized, you can disconnect the AP and redeploy it as a mesh slave.

> **Note:**
> See to the Status information and Troubleshooting sections for information on reviewing link status information.

Provisioning stand-alone slave APs

This provisioning method is ideal when you cannot connect APs directly to the controller, such as with remote site deployment. In such cases, a controller is not available until the mesh link is established, so the installer must provision APs directly from the AP user interface.

In the scenario that follows, the controller has been reset to factory defaults and has a single MSM3xx/4xx AP wired to the controller. Configuration of the master node is the same as described in the above sections, but since the slave AP has never been synchronized with the controller, it appears in the Default group. Therefore, the settings in the Default group must be compatible with the provisioning made on the slave AP.

Once provisioned, the slave node can be deployed. After powering up, it relies on its provisioning information to link to the master node and resynchronize with the controller, as shown in Figure 1, above.

Theory

Provisioning a standalone AP is usually fast and easy. Problems occur when the AP begins to synchronize with the controller after the mesh link is established. The AP is placed in the Default group since the controller has never seen nor classified it. Therefore, the controller's Default group must be configured to anticipate the appearance of slave APs that are new to the controller. This is done by modifying the configuration of the Default group. The radios must be configured for local mesh, and provisioning needs to be defined.

Configuring the master node for mesh

Repeat the steps in the Configuring the master node for mesh section, above.

Configuring the Default group to support slave nodes

Because slave nodes are discovered for the first time over mesh links, you must change the settings of the Default group to accommodate them.

1. Select the **Default Group > Configuration > Radios** (make sure the **Inherited** option is unchecked).

2. In the product list, select an AP. In the **Radios configuration** page under **Radio 1**, set the operating mode to **Access Point and Local Mesh**, (or **Access Point and Local Mesh** if you want the AP to be able to operate in either mode), and set the wireless mode to **802.11n/a**. Select **Save**.

3. Select **Default Group > Provisioning**. Disable the **Inherited** option, and enable the Default group.

Note:
The above step is optional if global provisioning is disabled.
New AP provisioning is not applied to the already provisioned
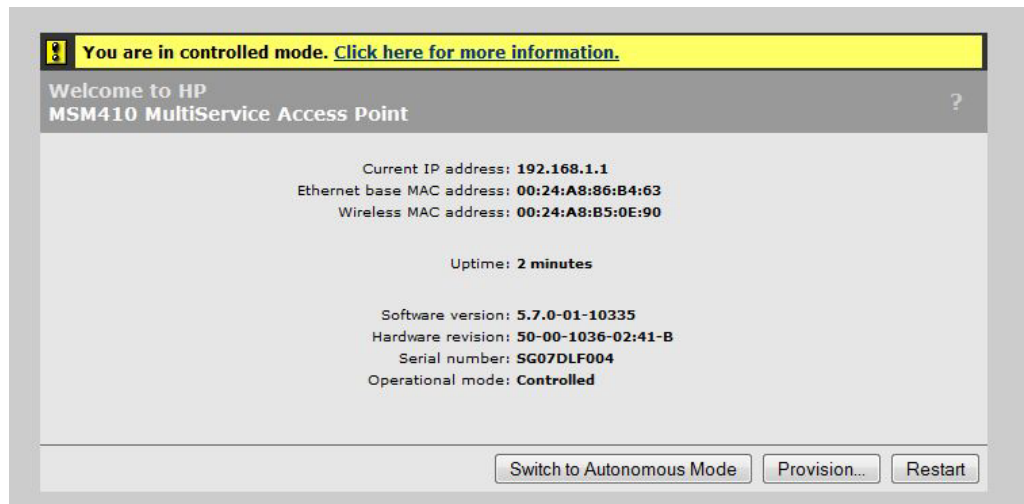AP unless global provisioning is enabled.

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4. Under **Interface**, enable the **Local Mesh** option, and disable **Port 1** if the option is selected. Under **Local mesh settings**, enable the **A mesh with ID** option, and change the **Mesh ID** to match the ID you specified for the master node. Also select a country that matches the local mesh group. Select **Save**.
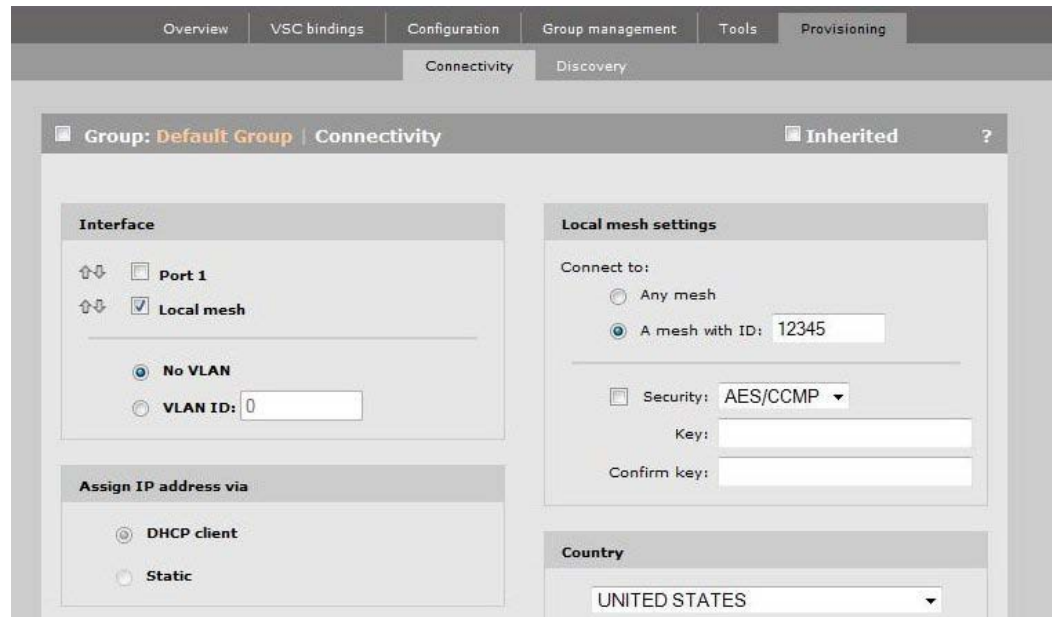

Provisioning a standalone AP as a slave node

This procedure requires a laptop or PC with a CAT5 crossover cable for connecting to the AP. Outdoor APs require a standard Ethernet cable between the PoE injector and the AP and a crossover Ethernet cable between the laptop and the PoE injector. It is recommended that you reset the AP to factory defaults.

1. On the laptop's Ethernet port, configure a static IP address of **192.168.1.2** and a mask of **255.255.255.0** and then enable it. Connect the crossover cable and power up the AP.

2. Ping the AP at **192.168.1.1**. Once the ping succeeds, you can access the AP administrator interface. Select **Provision**.

3. Enable the **Connectivity** option. Under **Interface**, enable the **Local Mesh option,** and disable **Port** 1 if the option is selected. Under **Local mesh settings**, change the Mesh ID to match the ID you specified for the master node, and set the **Country** to match the controller country settings. Select **Save**.
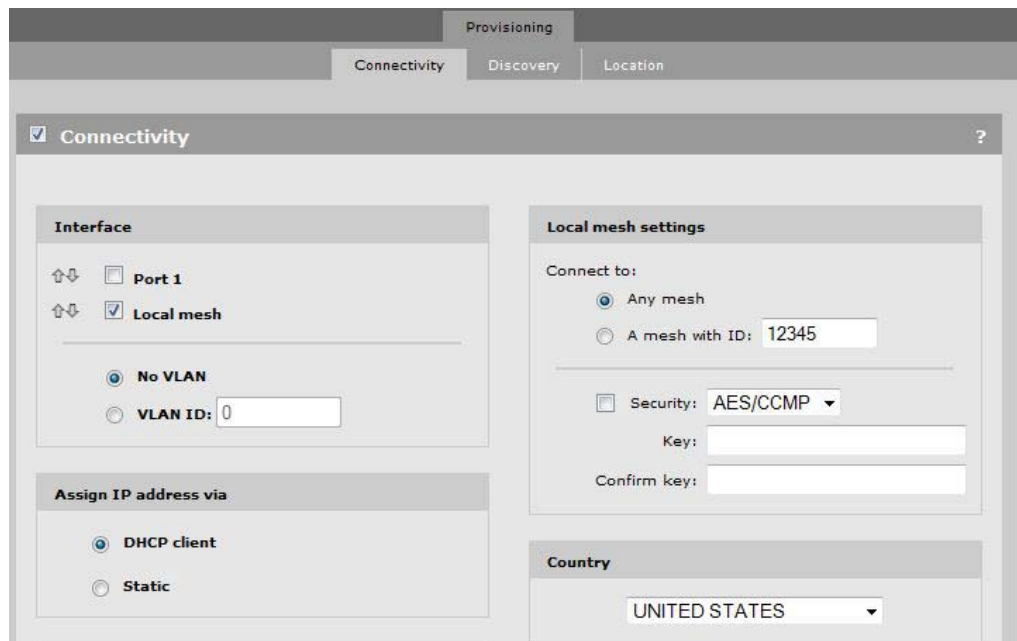
Note:
If the country setting for the AP does not match the country setting (regulatory domain) of the controller, the controller displays error messages and the AP does not synchronize.

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4. If the AP still appears in the Slave group you must remove it, otherwise it attempts to return to that group because it was previously discovered there. In the controller interface, select **Controlled APs > Configured APs**, and then select the AP from the list and delete it.

5. Disconnect the Ethernet cable from the AP, and power-cycle your AP again. After going through the Startup, Local Mesh, and Discovery steps, the AP should reappear in the Default group. Your AP should now be synchronized in the Default group through local mesh.

Status information

Checking the status of the mesh links

1. To view all mesh links established and controlled by this controller, select **Controlled APs > Local Mesh Neighborhood**.

> **Note:**
> For a stable mesh link, you need an SNR value of 30 to 40 as seen from both sides of the link. The following screens show the SNR at 70 and 67 respectively.

2. To view the status information for an AP, select a group, select **Local Mesh links**, and then select an AP.

Troubleshooting

LED sequence of APs synchronizing over a mesh Link

When an indoor AP is provisioned and attempts to connect, it helps to understand what to expect from the LED pattern of a successful startup sequence. The LED pattern is as follows:

- **Power light** blinks at 1 blink per second interval as the system boots
- **Power** and **wireless light** blink together at 2 blinks per second while establishing the mesh link
- **Power light** blinks at 2 blinks per second while it acquires an IP address
- **Walking lights** occur while the AP makes a discover broadcast to a controller
- **Power light** goes solid while LAN and wireless lights alternate during configuration upload
- **Power light** goes solid while controller uploads configuration and/or software
- **Wireless light** begins to blink when wireless services become active

Error messages

Incompatible settings message

The incompatible settings message appears next to an AP after the controller attempts to upload a configuration to an AP that is incompatible with the configuration on that AP. It is usually caused by a mismatch of radio and/or country settings between the controller and AP (a diagnostic information box that appears below the error message provides additional detail about the error). The result is loss of the mesh link. The controller reports the error without taking any further action.

The solution is to create a group with settings compatible with the AP's provisioning. For instance, if the AP is provisioned to perform local mesh on radio 1, then the settings on the group must also permit local mesh on radio 1, and so on.
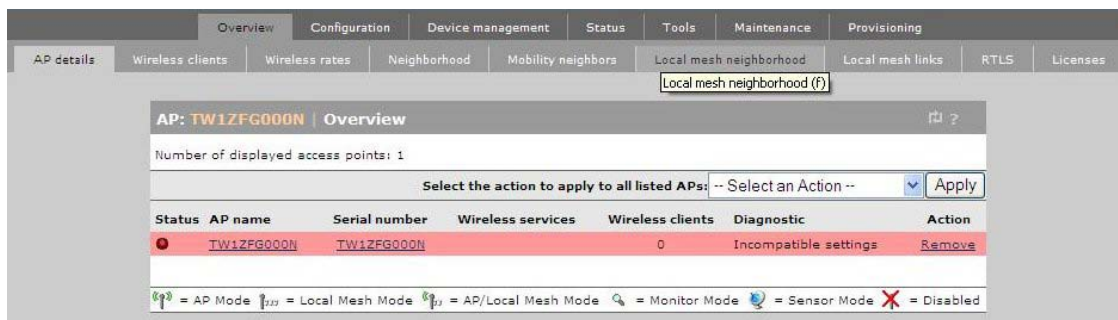
Invalid country diagnostic

If the incompatible setting error is due to an invalid country setting, this information appears in the diagnostic box below the error message. This error occurs if the regulatory domain that was selected during provisioning of the AP is different from the domain configured on the controller.

To correct this, change the **Country** setting on the provisioning page of the AP if it is possible to select it. APs sold in the United States are fixed and cannot be changed. Mixing products from different countries may prevent successful configuration of the AP to the controller.

Note:
For more information on error messages, see the *HP MSM7xx Controllers Management and Configuration Guide*, the chapter on working with controlled APs.

For more information

For more information on local mesh deployments, see the *HP MSM7xx Controllers Management and Configuration Guide*, the chapter on local mesh.

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