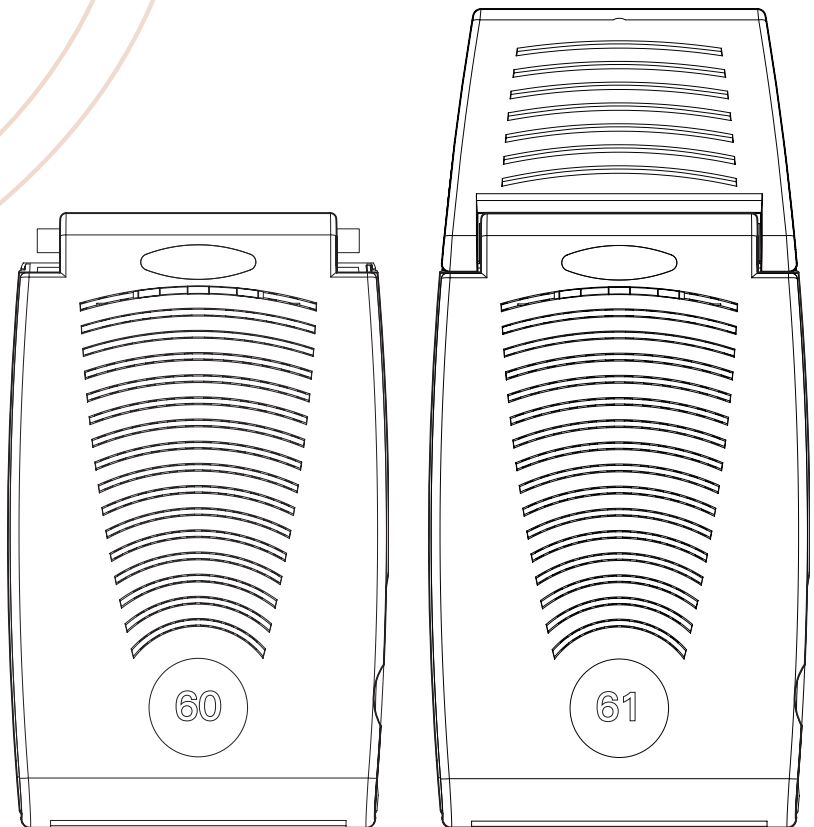


Aruba 60/61™

Wireless Access Point

Installation Guide



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CHAPTER 1

Introduction

The Aruba 60/61 is part of a comprehensive wireless network solution. The device works in conjunction with the Aruba WLAN Switch and can act as a wireless access point or air monitor.

As a wireless Access Point (AP), the Aruba 60/61 provides transparent, secure, high-speed data communications between wireless network devices (fixed, portable, or mobile computers with IEEE 802.11a or IEEE 802.11b/g wireless adapters) and the wired LAN.

As a wireless Air Monitor (AM), a feature unique to Aruba products, the Aruba 60/61 enhances wireless networks by collecting statistics, monitoring traffic, detecting intrusions, enforcing security policies, balancing wireless traffic load, self-healing coverage gaps, and more.

Note Installing the AP 60/61 requires setting the antenna power, which requires professional training. The AP60/61 installer must be trained to perform this configuration.

Front View

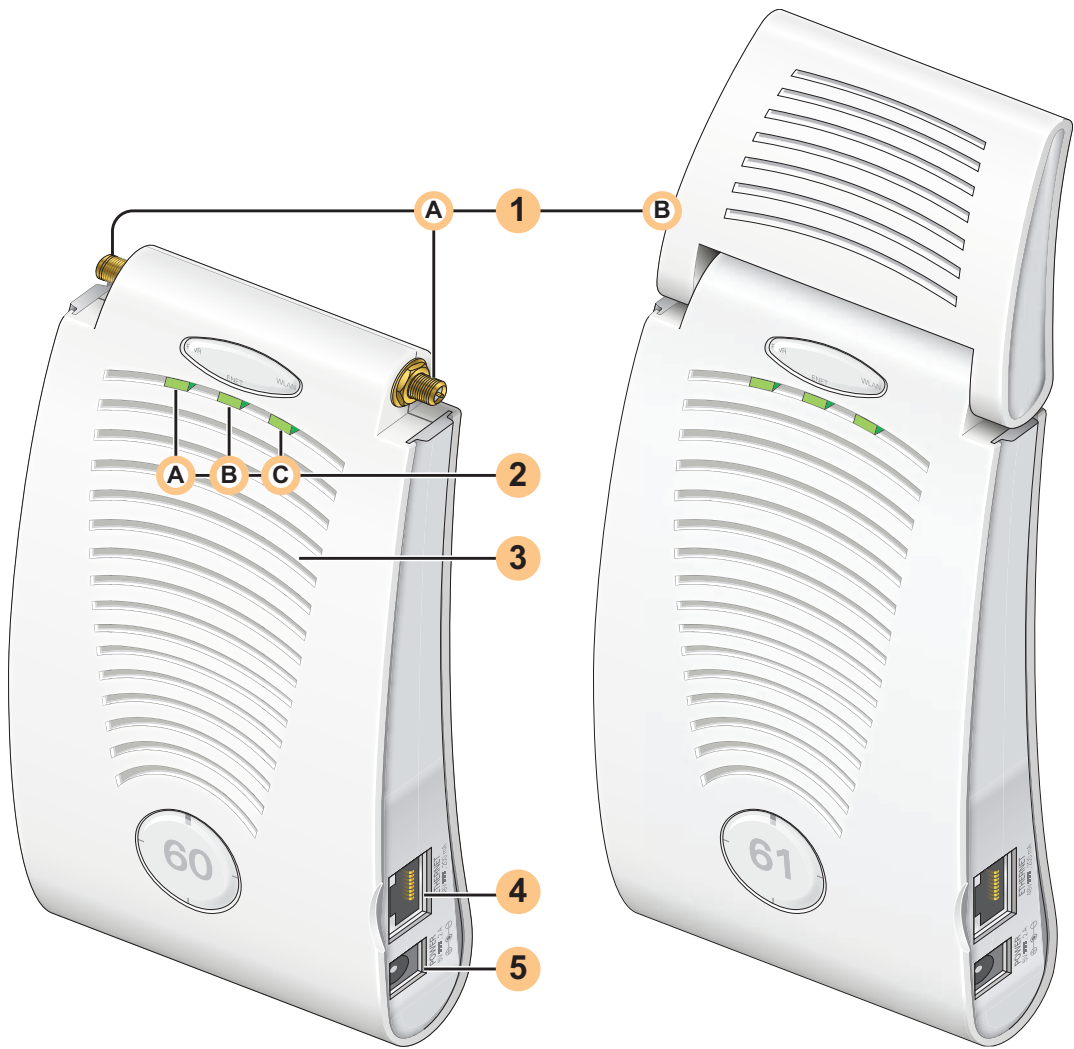


FIGURE 1-1 Aruba 60/61 Front View

1 Antenna fixtures for Wireless Communications

Depending on the model, the AP will have one of the following:

- (A) Aruba AP60—Two Reverse Polarity SMA (RP-SMA) connectors for attaching separate antennas (not included). For details, see [“Aruba AP60 Detachable Antennas”](#) on [page 24](#).
- (B) Aruba AP61—Built-in swivel array with dual, tri-band, omnidirectional antennas

2 Indicator LEDs

During operation, the Aruba 60/61 LEDs provide the following information:

TABLE 1-1 Aruba 60/61 LEDs

LED	State	Description
(A) PWR	Off	The device is off – no power.
	Green-Solid	The device is powered and operating.
(B) ENET	Off	No link on the FE port. No connection to the network.
	Green-Solid	Ethernet link detected on the FE port.
	Green-Flashing	Transmitting or receiving data across the FE port. Flashing rate is proportional to network activity.
(C) WLAN	Off	The wireless interface is disabled or down.
	Green-Solid	The wireless interface is enabled and functioning as an Access Point.
	Green-Flashing	The wireless interface is enabled and functioning as an Air Monitor.

Note LEDs on the Aruba WLAN Switch provide additional status and security information about connected APs. See the *Aruba AirOS User Guide* for more information.

3 Air Vents

These vents promote proper air circulation for cooling the device. Do not allow these vents to be obstructed by mounting equipment, network cables, or any other material.

4 FE Port

This port attaches the Aruba 60/61 to a 10Base-T/100Base-TX (twisted-pair) Ethernet LAN segment. This port also supports Serial and Power Over Ethernet (SPOE).

See [Appendix A](#) for port and cable specifications.

5 DC Power Socket

This socket is used to connect the optional AC power adapter (not included). If POE is being used to supply power to the Aruba 60/61, the power adapter is not necessary.

Back View

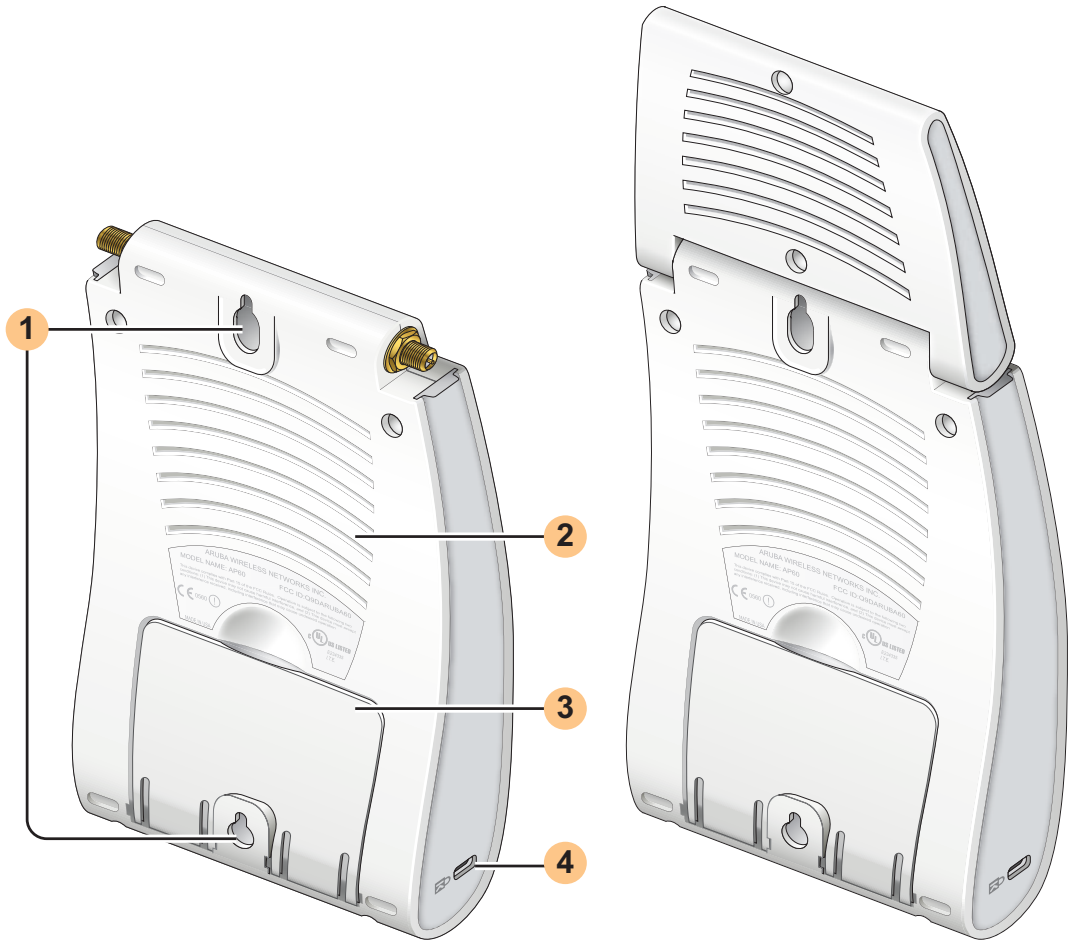


FIGURE 1-2 Aruba 60/61 Back View

1 Mounting Slots

The keyhole-shaped slots on the back of the chassis are used for mounting the Aruba 60/61.

2 Air Vents

These vents promote proper air circulation for cooling the device. Do not allow these vents to be obstructed by mounting equipment, network cables, or any other material.

3 Fold-Out Stand

This fold-out stand allows the Aruba 60/61 to be stood upright on a table or shelf.

4 Kensington Security Slot

This slot is compatible with a Kensington MicroSaver Security Cable (not included) which can be used to prevent the unauthorized removal of the Aruba 60/61 from its installed location. To secure the Aruba 60/61, wrap a security cable around an immovable object, insert the cable's lock into the Kensington Security Slot, and turn the key.

Note The serial number and model number are on the bottom of the unit.

The Aruba AP Setup Process

Setting up an Aruba AP typically consists of four stages:

- 1 **WLAN Planning**—The administrator determines how many Aruba APs will be needed for their wireless network strategy and where they will be deployed. This can be easily accomplished using Aruba's automated RF Plan site-survey software (available separately).
- 2 **AP Provisioning**—Provisioning provides each Aruba AP with initial settings that allow it to locate the host Aruba WLAN Switch. Depending on the network topology and services, AP provisioning can be performed manually for each AP or plug-and-play for batches of APs.

AP provisioning is discussed in [Chapter 2](#).

- 3 **AP Deployment**—Once provisioned, the AP can be physically installed at its intended place of operation.

AP deployment is covered in [Chapter 3](#).

- 4 AP Configuration—The administrator defines the operational behavior for each Aruba AP, such as RF characteristics and security features.

For AP configuration information, refer to the *Aruba AirOS User's Guide*.

CHAPTER 2

Provisioning Access Points

Access Points are radio broadcast devices and as such are subject to governmental regulation. Network administrators responsible for the configuration and operation of Access Points must comply with local broadcast regulations. Specifically, Access Points must use channel assignment and antenna gain settings (for detachable antennas) appropriate to the location in which the Access Point will be used. Aruba Networks, in compliance with governmental requirements, has designed the AP60 and AP61 such that only authorized network administrators can change these settings. For more information on Access Point configuration, refer to the *User Guide*.

Provisioning provides the AP with initial network settings that allow it to locate the host Aruba WLAN Switch. The following provisioning methods (listed in the order of preference recommended by Aruba Networks) are available:

- **Plug and Play**—Also known as the Aruba Discovery Protocol. This is the easiest method for AP provisioning. With plug and play, Aruba APs can be connected to the network and brought into operation automatically. Although plug and play requires no manual intervention for the APs, this method does require specific services to be configured on your network in advance.
- **AP Provisioning**—Using this AP programming mode, AP configuration parameters are defined on the WLAN switch (using the CLI or Web interface) and then uploaded to the APs.

This method can be used for adding Aruba APs to a highly customized network, or greatly simplified for the most common provisioning.

- Manual Provisioning—APs can be individually provisioned using a serial console terminal connected to the AP. Although this method is complex and requires considerable care, manual provisioning can be used in almost any scenario, with or without access to the WLAN switch.

Note Manual provisioning is intended for use when no Aruba WLAN Switch is available, and is not generally recommended as the primary method of AP provisioning. Plug and play or AP programming mode are the preferred provisioning methods.

Each of these three methods is explained in the following sections. Use these procedures for initial provisioning of APs. To change the configuration for APs that have already been provisioned, go to Maintenance > Program AP > Re-Provision. See the *User Guide* for more information on reprovisioning existing APs.



CAUTION—When an AP60 powers up for the first time, the WLAN switch will recognize that it is detachable-antennas capable. The network administrator must set the antenna gain manually before the AP60 can function as an Access Point. Until the antenna gain is set, the AP60 with detachable antennas will function as an Air Monitor but will not process wireless packets as an Access Point. Refer to the User Guide for instructions on manually setting antenna gain.

Aruba Discovery Protocol

Aruba Discovery Protocol (ADP) is a plug and play provisioning tool for AP60/61 Access Points. ADP performs two tasks:

- Obtains the IP address of the TFTP server from which it downloads the AP boot image
- It discovers the IP address of the master Aruba WLAN switch in the network from which the AP can download its configuration.

The address of the TFTP server that ADP discovers is the equivalent of the BOOTROM environment variable *serverip*. The IP address of the Aruba master switch is the equivalent of the environment variable *master*.

ADP can discover these values using DHCP or by discovery. In the case of DHCP, ADP relies on a DHCP server which is configured to return the IP address of the Master switch using the Vendor Specific Options in DHCP. To facilitate ADP, Aruba APs include this Vendor Specific

Option in the requested Option list, and if the DHCP server is configured to return the IP address of the Master switch, the IP address will be a part of the DHCP response. This is used by the AP to get its image as well as its configuration.

Discovery of the *serverip* and *master* variables is necessary when the DHCP response does not include the Vendor Specific option. The AP attempts to discover an Aruba Master switch by sending multicast packets and broadcast packets on its subnet. To use the ADP discovery method, the ADP discovery mechanism needs to be enabled on the Aruba Master Switch (using the **adp discovery enable** command).

If multicast routing is enabled in the IP network between the AP and the Master switch (which can be any one or more Aruba WLAN switches in the network), the IGMP-Join option should be enabled on the Aruba WLAN switch (using the **adp igmp-join enable** command). If multicast routing is not enabled on the network, the Aruba WLAN switches need to be on the same broadcast domain as the AP or an “IP Helper” must be configured to direct the broadcast ADP packets to the Aruba WLAN switch.

Once these discovery prerequisites are met, the switch will respond to APs with the IP address of the Master Aruba switch. The APs can then obtain their image and configuration.

To enable ADP on an Aruba WLAN switch, enter:

```
(A5000) (config) #adp discovery enable
```

To enable IGMP-Join on an ADP multicast group on an Aruba WLAN switch, enter:

```
(A5000) (config) #adp igmp-join enable
```

Note If you have location-specific configurations for your Access Points, you will need to apply this configuration information using AP Reprovisioning. Refer to the *User Guide* for details on AP Reprovisioning and see the feature description below.

AP Reprovisioning

AP Reprovisioning is the process by which APs are assigned, for example, location codes. Location codes are important for recalibration and triangulation. For details on AP Reprovisioning, see the *User Guide*.

AP Provisioning

AP Provisioning is useful for brand new APs with default configurations. To perform AP Provisioning from the GUI:

- 1 Go to **Maintenance > Program AP**.

On this window, there are two tabs: **Provisioning** and **Reprovisioning**. The Provisioning tab is selected by default.

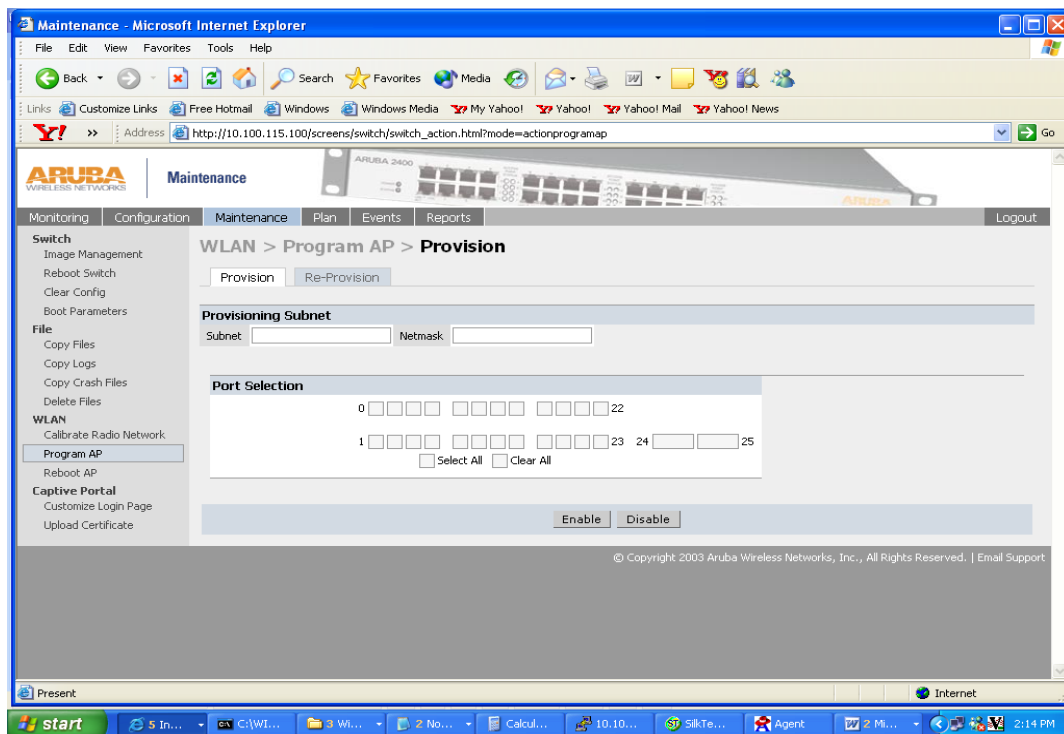


FIGURE 2-1 Provisioning Tab

- 2 Configure the APs IP address on the **Subnet** and the **Netmask**.

This is the subnet from which the AP gets an IP during provisioning.

- 3 Select the **Port** or **Port range** for provisioning.

To set the Port Range, select the first and the last ports of your range. All the ports in between are automatically selected. (Ports have to be sequentially assigned.)

- 4 Enter the required information and click **Enable**.The Port Range screen displays.

The screenshot shows a web browser window titled "Maintenance - Microsoft Internet Explorer" with the address bar displaying "http://10.3.17.75/screens/switch/switch_action.html?mode=actionprogramap". The page header includes the Aruba logo and the word "Maintenance". The navigation menu on the left includes "Monitoring", "Configuration", "Maintenance", "Plan", "Events", "Reports", and "Logout". The "Maintenance" menu is expanded, showing options like "Switch", "Image Management", "Reboot Switch", "Clear Config", "Boot Parameters", "File", "Copy Files", "Copy Logs", "Copy Crash Files", "Delete Files", "WLAN", "Calibrate Radio Network", "Program AP", "Reboot AP", "Captive Portal", "Customize Login Page", and "Upload Certificate". The main content area is titled "WLAN > Program AP > Provision > Port Range 3/12" and contains the following sections:

- AP Parameters:** Includes fields for "Location", "5 GHz Antenna Gain", and "2 GHz Antenna Gain".
- Master Discovery:** Includes radio buttons for "Use Aruba Discovery Protocol", "Host Switch IP Address", and "Host Switch Name". There are also input fields for "Master Switch IP Address" and "Host Switch Name".
- IP Settings:** Includes radio buttons for "Obtain IP Address Using DHCP" and "Use the following IP Address". Below are input fields for "IP Address", "Subnet Mask", "DNS IP Address", "Domain Name", and "Gateway IP Address".
- AP List:** A table with columns: "Index", "Slot/Port", "AP MAC/IP", "Location", "Master IP", "Host IP/Name", "IP", "GW IP/DNS IP/Domain", and "5GHz/2GHz Gain". Below the table, it says "No APs are currently connected for provisioning".

At the bottom right, there are "Apply" and "Cancel" buttons. A legend indicates "P = Provisioned U = Unprovisioned".

FIGURE 2-2 Port Range Screen

- 5 Plug the AP into one of the ports configured for provisioning.
 If your AP is already plugged into the port, unplug it and plug it in again.
 If AP is connected through POE, enter **poe off** followed by **poe on**.
 The AP will come up with an IP from the provisioning subnet
 After the AP comes up it should be in the provisioning list. Provisioning list shows the list of APs which are plugged into the provisioning ports.

- 6 Click the **Refresh** link (not the browser Refresh option) to see if the AP entry has displayed. (This might take a moment.)

If you cannot see the entry after 1–2 minutes, click **Refresh** again.

The **Clear Table** button appears after an entry in the list appears.

To erase all the table entries, click **Clear Table**. (You cannot clear selected entries.) If a number of APs are provisioned and you click **Clear Table**, only the entries which come up afterwards can be provisioned.

If the entry does not show up in the AP list, check network connectivity. Go to the AP console and verify if the AP has come up with the IP from the provisioning subnet.

- 7 After the entry shows up on the page, configure the **location**, **Host IP/Name**, **Master IP address**.

If AP is going to be assigned a static IP, click **Use the following IP Address** and enter the **IP address**, **Netmask**, **Gateway IP**.

If the AP is going to obtain an IP address using DHCP, click **Use IP Address Using DHCP**.

- 8 After configuring the required parameters, select the entry from the list (AP to which the configuration has to be applied) and click **Apply**.

The State field changes from **U (Unprovisioned)** to **In Progress**.

- 9 After a few seconds, click the **Refresh** link again and the State will have changed to **P (Provisioned)**.

Note Check that the configured parameters are reflected in the AP list entry.

Note Aruba Networks recommends that you provision each AP for a unique location as suggested by site-survey planning. Label each AP with this location information and place the AP in its proper location. Failure to place APs in the location for which they were provisioned will reduce the effectiveness of such RF features as triangulation.

- 10 Click **Back** to go into the previous page

We can see that the Subnet is still configured and Port/s are selected.

- 11 When finished provisioning APs, click **Disable** to disable AP Provisioning.

Note Disable AP Provisioning after all the required APs are provisioned. Ports that are enabled for provisioning do not handle traffic. Therefore plugging an already provisioned AP into a port still set to provisioning mode will prevent that AP from functioning.

Now the AP is configured with the Parameters given

12 Reboot the AP so the AP will come up with the new configured parameters.

Use the Reprovisioning tab for APs which are already deployed but need to be reconfigured. See the *AirOS User Guide* for information on reprovisioning.

Manual Provisioning

Requirements

- A console terminal (or workstation with terminal emulation software) with an available serial communications port using a DB-9 male connector.
- An Aruba serial breakout adapter kit, Part Number CA-SPOE-ADAPT-3, (not included). (See [“Connecting the Console Terminal”](#) on [page 15](#).)
- Access to the Aruba 60/61 FE port through one of the following:
 - Direct contact with the AP, or
 - If the AP is already deployed, you must have access to the end of the FE cable that leads directly to the AP with no intervening hubs, routers, or other networking equipment.

The cable must be an 8-conductor, Category 5 UTP, straight-through FE cable with RJ-45 connectors.
- A power source for the Aruba 60/61. Use one of the following:
 - An optional AC power adapter (not included) and an AC power outlet rated at 100~240 V, 50~60 Hz, or
 - The Aruba 60/61 FE port connected to an Aruba 800, 2400, or 5000 WLAN switch that supports IEEE 802.3af Power Over Ethernet (POE) via a 4- or 8-conductor, Category 5 UTP, straight-through FE cable.¹

Note Only IEEE 802.3af Power Over Ethernet is supported for manual provisioning. “Inline” or “midspan” POE devices requires Aruba serial breakout adapter, Part Number CA-SPOE-ADAPT-4.

1. IEEE 802.3af-complaint devices like the AP60 and AP61 use the same wire pairs for data versus for power. Within the 802.3af standard, there are two sub-specifications on how wire pairs are assigned. Aruba conforms to 802.3af, subparagraph a. If you POE installation uses all-Aruba equipment, you are assured proper operation. However, if you use non-Aruba POE equipment, make sure it conforms to the same standard that Aruba uses. Using POE equipment using IEEE 802.3af subparagraph b wiring assignments, or POE equipment not conforming to the 803.2af standard may result in damaged equipment.

Connecting the Console Terminal

Manual provisioning requires this procedure. You must use the serial console breakout adapter cable to be able to access the serial console interface to the AP60/61 while allowing the device to be powered by the AC adapter or POE (from an Aruba WLAN switch).

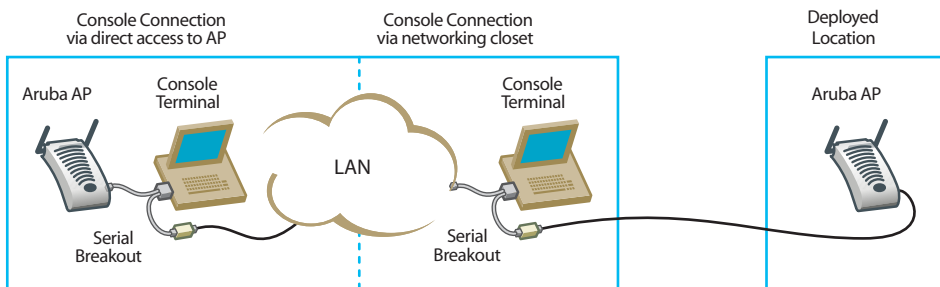


FIGURE 2-3 Aruba 60/61 Console Topologies

Note The LAN connections are optional unless POE is used to power the AP.

Console Access to the AP

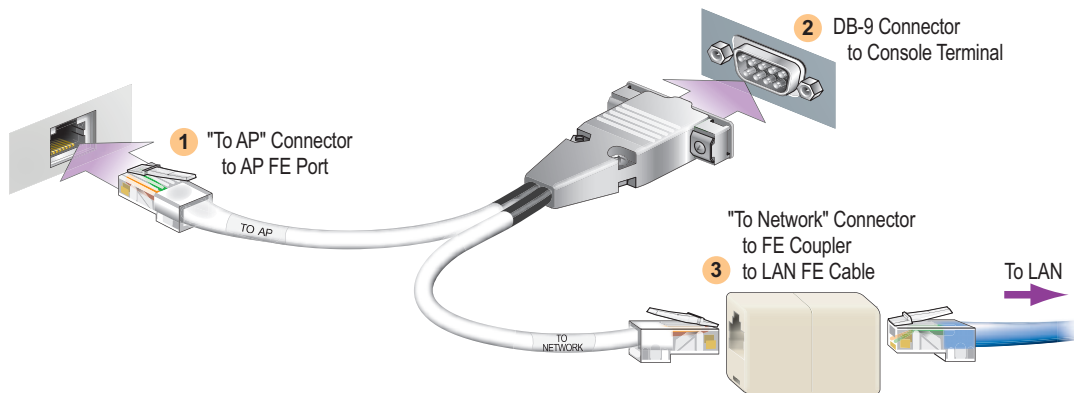


FIGURE 2-4 Connecting Directly to the AP

- 1 Connect the adapter's "To AP" RJ-45 connector to the Aruba 60/61 FE Port.
- 2 Connect the adapter's DB-9 connector to the serial port on the console terminal.
- 3 Connect the adapter's "To Network" RJ-45 connector to the LAN.

The LAN connection is optional unless POE is being used to power the AP. For convenience, the adapter kit includes an FE coupler to connect RJ-45 cable ends together.

4 Connect power to the Aruba 60/61.



CAUTION—Be sure to comply with electrical grounding standards during all phases of installation and operation of the AP. Do not allow the Aruba 60/61 or optional power adapter (if used) to be connected to or make contact with metal or power outlets on a different electrical ground than the device to which it is connected. Also, never connect the AP to external storm grounding sources.

The Aruba 60/61 can receive electrical power using the following options:

- POE—If connecting the Aruba 60/61 to a device that supplies IEEE 802.3af compliant POE, no additional power connection is necessary.
- Power Outlet

Note When the Aruba 60/61 is installed in an air-handling space, as described in NEC (2002) Article 300.22(C), POE must be used instead of a power outlet.

If local regulations and practices permit, connect the optional AC power adapter (not included) to the DC power socket on the rear panel of the Aruba 60/61 and plug it into an appropriate power outlet.



CAUTION—To prevent personal injury or damage to equipment, use only the AC power adapter certified for this device in the country where it is used.

Note The indicator LEDs on the Aruba 60/61 will remain dark during this procedure.

5 Set your local terminal to use the following communications:

TABLE 2-1 Console Terminal Settings

Baud Rate	Data Bits	Parity	Stop Bits	Flow Control
9600	8	None	1	None

6 Establish console communication.

Press <Enter> a few times to establish communication between the Aruba 60/61 and terminal.

7 From the Aruba 60/61 console, access the apboot prompt.

Depending on the Aruba 60/61 status, you will see one of the following on your terminal:

- Autoboot countdown—The countdown prompt allows you to interrupt the normal startup process and access the apboot prompt where provisioning is performed.

```
APBoot 1.2.1 (Apr  7 2004 - 08:54:57)
```

```
CPU:   AR2313 MIPS-32 at 180 MHz: 16 kB I-Cache 16 kB D-Cache
Board: Merlot Local Bus at 90 MHz
DRAM:  32 MB
POST:  passed
FLASH: 4 MB
Net:    en0 lo0
```

```
Hit any key to stop autoboot:  0
```

To access the apboot prompt, press any key (such as <Enter>) before the timer expires. If the countdown expires before you can interrupt it, turn the device off and then back on.

- TFTP time out—If the Aruba 60/61 cannot locate an Aruba WLAN Switch on its network port, the following type of output is repeatedly displayed:

```
Loading FLASH image...
Verifying checksum... failed!
BOOTP broadcast 1
DHCP IP address: 10.1.2.250
DHCP subnet mask: 255.255.255.0
DHCP def gateway: 10.1.2.1
DHCP DNS server: 10.1.1.2
DHCP DNS domain: arubanetworks.com
DHCP Aruba server: 10.1.2.11
Loading elf file: 10.1.2.11:mips.ari
Loading: T T T T T T T T
Retry count exceeded; starting again
```

Press <Control-C> to interrupt this process and access the apboot prompt.

Once the apboot prompt is displayed, perform provisioning as described in the next section.

Setting Aruba 60/61 Parameters

- 1 From the **apboot** prompt, configure the host information, if necessary.

In order to provide centralized management of the APs, each Aruba AP downloads its software image and configuration files from a master Aruba WLAN Switch.

Setting the correct host information depends on the following:

- Does your network use direct IP addresses or DNS with host names?
- If using host names, is **aruba-master** acceptable for the master WLAN switch, or do you need to define a different name?

Depending on your answers, select one of the following steps:

- **My network uses DNS and the **aruba-master** host name is acceptable.**

This is the default. It requires your DNS to be configured to resolve “**aruba-master**” to the IP address of the master Aruba WLAN Switch. Unless your system has been previously configured for different settings, you can skip to Step 2.

Otherwise, if your system was previously configured for a different setup, manually set the **servername** environment variable to the default host name:

```
apboot> setenv servername aruba-master
```

Note The **master** and **serverip** environment variables also affect how AP source files are selected and should be cleared when using this approach. To clear a variable, enter the **setenv variable** command with no host name or address value:

```
apboot> setenv master  
apboot> setenv serverip
```

When finished, proceed to Step 2.

- **My network uses DNS, but I will use a different host name for the WLAN switch.**

This requires that the **servername** variable be configured with your chosen host name for the master Aruba WLAN Switch. It also requires that your DNS be configured to resolve the specified host name to the IP address of the master Aruba WLAN Switch.

To manually set the host name, use the following command:

```
apboot> setenv servername <WLAN switch host name>
```

Note The `master` and `serverip` environment variables also affect how source files are selected and should be cleared when using this approach. To clear a variable, enter the `setenv variable` command with no host or address value.

When finished, proceed to Step 2.

- **My network uses direct IP addresses instead of DNS.**

If using direct IP addresses in your network, use the following commands:

```
apboot> setenv serverip <WLAN switch IP address>
apboot> setenv master <WLAN switch IP address>
```

Note If the `servername` variable is configured in this scenario, it will be ignored.

2 Specify an IP address for a specific AP, if necessary.

If using DHCP, the AP will obtain its IP address automatically and you can skip this step. Otherwise, configure the AP with a static IP address using the following commands:

```
apboot> setenv ipaddr <static IP address for the AP>
apboot> setenv netmask <static IP address mask>
apboot> setenv gatewayip <default gateway IP address>
```

3 Set the location for the specific AP, if necessary.

Location settings depend on how much control you want over configuring logical groups of APs in the future.

- **Default Locations**

If you wish all APs treated as a single entity for configuration and accounting purposes, you can use the default location profile (255.255.65535) and skip to Step 5.

Note If using default locations during initial provisioning, you can later reconfigure the APs to use specific location IDs using the Aruba WLAN Switch management tools.

- **Specific Locations**

By setting specific location IDs for each AP, you can later apply configuration changes or collect statistics and information for specific groups of APs (for example, all APs on a particular floor in a particular building).

To set a specific location for an individual AP, the following command is used:

setenv location *<building number>* . *<floor number>* . *<device number>*

where the following fields are required:

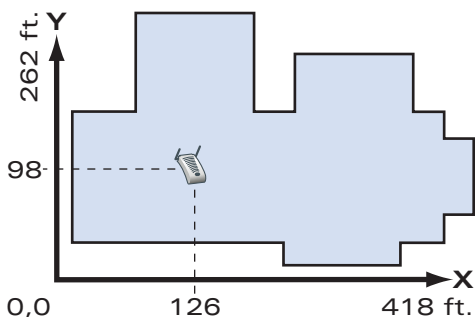
<i>Building Number</i>	A unique number (1-254) is required for each building in your campus.
<i>Floor Number</i>	Within any building, a unique number (1-254) is required for each floor.
<i>Device Number</i>	Within any floor, a unique number (1-65534) is required for each access point or air monitor.

If you performed the recommended site survey using the Aruba RF Plan tool, the location data for all access points and air monitors can be found on the tool's deployment page (see the *Aruba RF Plan User's Guide*).

If you prefer to enter the location data manually, record the location ID you set for each access point and air monitor along with the following:

Device Description Note the intended function of the device (access point or dedicated air monitor) and a brief description of its service location.

X, Y Coordinates For each access point and air monitor, measure its X and Y position (in feet) relative to the bottom-left corner of the building plan as seen from overhead. For example:



Use the same fixed point and orientation for all floors in a building.

4 Save the configuration and reboot the Aruba 60/61.

```
apboot> save
apboot> boot
```

Once the Aruba 60/61 boots, disconnect it and mount it in its intended service location (see [Provisioning Access Points](#) on page 23).

