Aironet and WLAN Controller Product Power Options

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Contents

Introduction

This document describes the different power options that are available with these products:

- Cisco Aironet devices
- Aironet Lightweight Access Points (APs)
- Cisco Wireless LAN (WLAN) Controllers (WLCs)

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on these hardware versions:

- All Aironet APs and Bridges in these series:

  - Aironet 350 Series APs

- Aironet 1000 Series Lightweight APs
- Aironet 1100 Series APs
- Aironet 1130 AG Series
- Aironet 1140 AG Series
- Aironet 1200 Series
- Aironet 1230 AG Series
- Aironet 1240 AG Series
- Aironet 1250 AG Series
- Aironet 1300 Series Access Point/ Bridges Power Injector
- Aironet 1400 Series Bridge
- Aironet 1500 Series APs

- All models of the WLC in these series:

- Cisco 2000 Series WLCs
- Cisco 2100 Series WLCs
- Cisco 4100 Series and 4400 Series WLCs
- Cisco 5500 Series WLCs

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Cisco Discovery Protocol

Cisco Discovery Protocol is a device discovery protocol that runs on all Cisco−manufactured equipment, such as routers, bridges, and communication servers. Each device sends periodic messages to a multicast address and listens to the messages that others send in order to learn about neighboring devices. When the Aironet device boots, it sends a CDP packet with the information that the device is inline power−enabled. Then, the switch, or a comparable device, can supply the requested power.

The Cisco Aironet APs support local power as well as Power over Ethernet (PoE), either by an IEEE 802.3af−compliant Power Sourcing Equipment (PSE) device, such as a switch, or by a device capable that provides the required power and compliant with Cisco Inline Power. This does not affect the performance or range of the AP in any way.

The AP disables the radio interfaces when the unit senses that the power source to which it is connected does not provide enough power. It is possible, due to the power source, that you need to enter the power source type in the access point configuration.

If Cisco CDP is enabled, the AP tries to negotiate with the use of CDP. If CDP tells the AP that it cannot supply the power, the unit shuts down the radios. CDP is enabled on the Ethernet port of the APs by default. But, CDP is enabled on the radio port of the access points only when the radio is associated to another wireless infrastructure device, such as an access point or a bridge.

If you want to use a power injector to supply power to an AP and if POE is also available in the network, disable CDP on that port so that the AP draws power from the Power injector.

Power Options

Aironet 350 Series APs

Power to Aironet 350 Series equipment is supplied through Category 5 cable to the Ethernet port (inline). There is no separate power socket on the 350 Series equipment. The option to supply power to the devices over the data cable infrastructure eliminates the need for local power and AC infrastructure costs. This is the fundamental difference between the 340 and 350 Series Aironet equipment.

The Aironet 350 Series AP includes a 10/100–Mbps Ethernet uplink for seamless integration with existing wired LANs. In order to minimize installation costs, the Aironet 350 Series AP draws operating power from a powered Ethernet port. This line power configuration works with all Cisco line power–enabled devices, such as Catalyst switches and line power patch panels. You can also use a line power injector, which is included with the product, in order to power the Aironet 350 Series AP.

The voltage requirement for the 350, 1100, and 1200 Series is 48 V.

These diagrams show the power–up options for a 350 Series Aironet AP device:
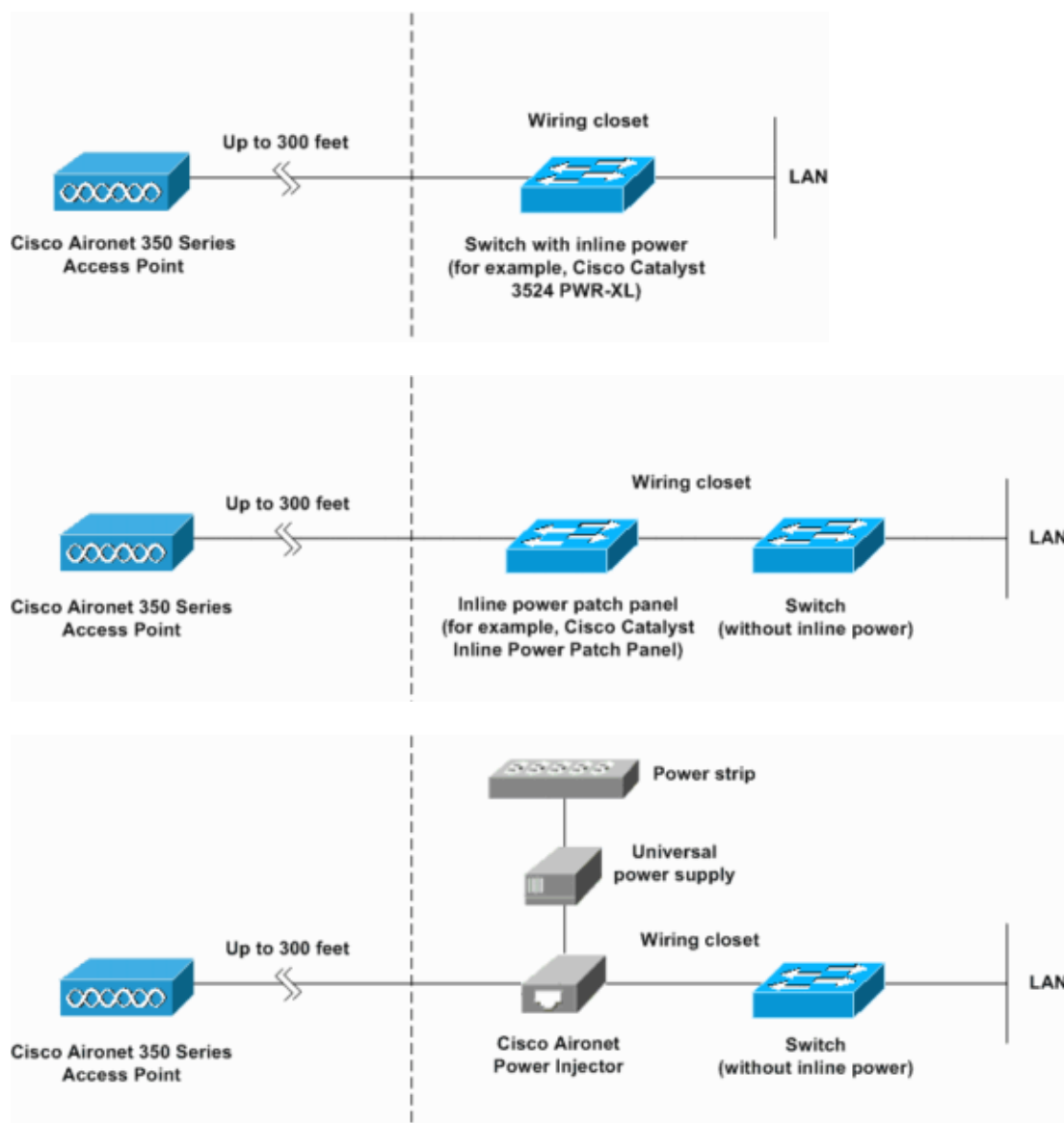
You can connect these devices to the 350, 1100, and 1200 Series of products:

Note: This list is not all−inclusive.

- Catalyst 6500/6000 Series Switches:

  - WS−X6148−GE−TX
  - WS−X6148V−GE−TX
  - WS−X6148−GE−45AF
  - WS−X6548−GE−TX
  - WS−X6548V−GE−TX
  - WS−X6548−GE−45AF
  - WS−X6748−GE−TX
  - WS−X6348−RJ45V and WS−X6348−RJ21V (Telco module)
  - WS−X6148−45AF
  - WS−X6148X2−45AF
  - WS−X6148X2−RJ−45
- Catalyst 4500/4000 Series Switches:

  - WS−X4224−RJ45V
  - WS−X4148−RJ45V
  - WS−X4148−RJ21V (Telco module)
  - WS−X4248−RJ45V
  - WS−X4248−RJ21V (Telco module)
- Catalyst 3550 Series Switches:

  - WS−C3550−24PWR−SMI
  - WS−C3550−24PWR−EMI
- Catalyst XL Series Switches:

  - WS−C3524−PWR−XL−EN
- 48−port Power Patch Panel (WS−PWR−PANEL)

  Note: You can use the Power Patch Panel with any switch that does not use inline power modules. This diagram provides an example:
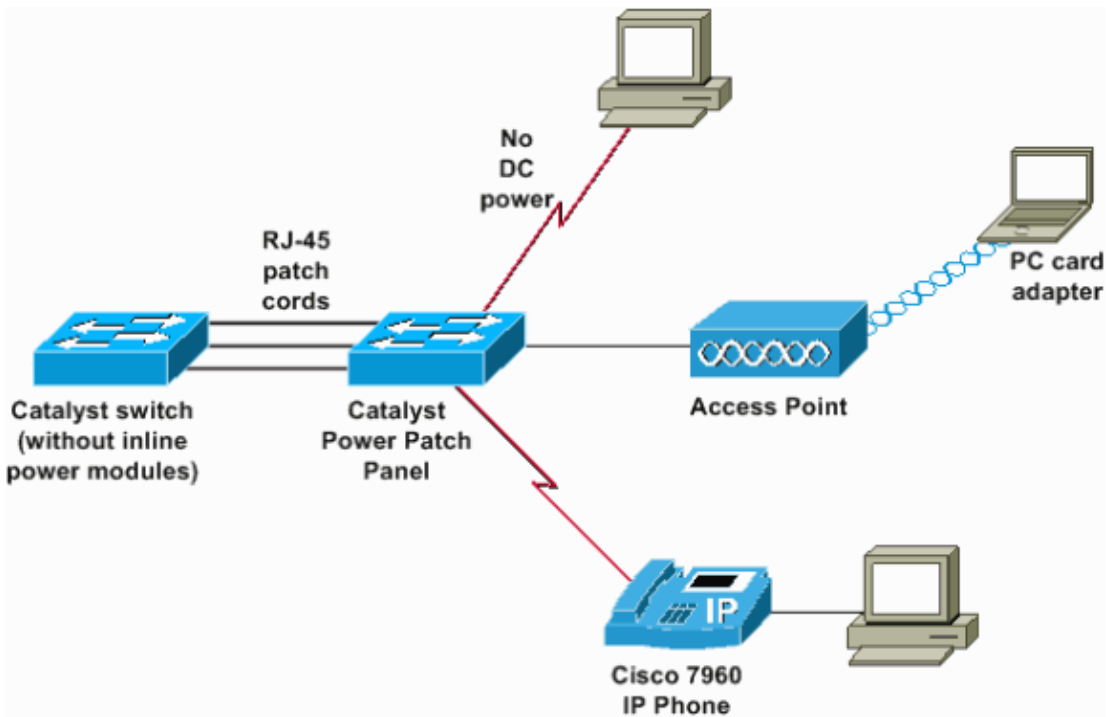
- Power Injector module (AIR−PWRINJ or AIR−PWRINJ3)

  The Power Injector module is a simple device with two ports:

  ♦ One port connected to the bridge or AP
  ♦ The other port connected to the wired part of the network, such as a noninline−capable switch or a hub

  The module is connected to an AC adapter that provides the connection to the power cord.

  ⚠ **Caution:** You can use the Cisco Power Injector with these devices only:

  ♦ BR350 (AIR−PWRINJ)
  ♦ AP350 (AIR−PWRINJ)
  ♦ AP1100 (AIR−PWRINJ3)
  ♦ AP1200 (AIR−PWRINJ3)

  If you attach any other Ethernet device to the power end of the power injector, damage to the Ethernet device occurs. These are examples of such Ethernet devices to avoid:

  ♦ BR340
  ♦ Workgroup bridge (WGB)
  ♦ Network interface card (NIC)
  ♦ Hub

Note: The maximum distance that is supported for inline power is 100 meters (m). This distance is the same for every Ethernet connection over Category 5 cable.

Note: The references to devices that support inline power were accurate at the time that this document was

written. Check with your local Cisco sales office or the Products pages on Cisco.com for a current list of devices that support inline power devices, such as the IP telephones and the Aironet devices.

Aironet 1100 Series APs

The Aironet 1100 Series AP provides a high–speed, secure, affordable, and easy–to–use WLAN solution that combines the freedom and flexibility of wireless networking with the features and services that Enterprise networks require. You can power the Aironet 1100 Series APs with local power or through inline power from a Power over Ethernet (PoE)–capable device. If the AC power source is close to the AP, you can use an external power adapter in order to power up the AP. And, as with the 350 Series equipment, you can use of any of these devices in order to power up with the PoE option:

- A patch panel
- A switch with inline power
- A power injector

Aironet Power Injector products increase the deployment flexibility of Aironet wireless APs and bridges. The Aironet Power Injectors provide an alternative power option to local power, inline power–capable multiport switches, and multiport power patch panels. Refer to the Cisco Aironet Power Injector Data Sheet for more information on Aironet Power Injectors.

Aironet 1140 Series APs

The Cisco Aironet 1140 Series Access Point is a business–ready 802.11n access point designed for simple deployment and energy efficiency. The high–performance platform, which offers at least six times the throughput of existing 802.11a/g networks, prepares the business for the next wave of mobile devices and applications. Designed for sustainability, the 1140 series delivers high performance from standard 802.3af Power over Ethernet. One of these options can be used to power the 1140 series AP:

- 802.3af Ethernet Switch
- Cisco AP1140 Power Injectors (AIR–PWRINJ4=)
- Cisco AP1140 Local Power Supply (AIR–PWR–A=)

Note: AP draws a total power of 12.95W. When deployed using PoE, the power drawn from the power sourcing equipment will be higher by some amount dependent on the length of the interconnecting cable. This additional power may be as high as 2.45W, bringing the total system power draw (access point + cabling) to 15.4W.

Aironet 1200 Series, 1230 AG, and 1130 AG APs

The nominal voltage for 1200 Series APs is 48 VDC, and the AP is operational up to 60 VDC. You can power the 1200 Series APs in one of these ways:

- A switch with inline power or a power injector that supplies power to the AP (PoE option)
- An external power supply that provides power to the AP power port

⚠ **Caution:** Voltage that is higher than 60 VDC can damage the equipment. You cannot provide redundant power to 1130 AG and 1200 Series APs with both DC power to the power port and inline power that a patch panel or switch to the AP Ethernet port provides. If you apply power to the AP from both sources, the switch or power patch panel can shut down the port to which the AP connects.

There are certain circumstances where an AP can end up without sufficient power and disable its radios. Assume that a 1130 AG Lightweight AP is connected to a controller. The lightweight AP is connected to a power injector as well as to a switch that is not capable of providing the inline power.

While the AP boots, with its Intelligent Power Management feature, it negotiates with the switch via Cisco Discovery Protocol messages in order to provide the necessary power to the AP. Even though the power injector is connected to the AP, the AP that uses this Intelligent Power Management feature gives priority to the Cisco Discovery Protocol information in order to identify whether or not the switch can provide the power. Therefore, after the Cisco Discovery Protocol message shows that the switch does not provide sufficient power (since it is not an inline power capable switch), the AP disables its radios. At this time, the status LED of the AP turns orange and this error message is recorded:

```
[ERROR] : AP <Ap mac-address> has not enough in-line power
to enable radio slot 1
```

In order to overcome this problem, issue the **config ap power injector enable** *<Ap name as shown on the controller>* **installed** command on the controller that is connected with this AP. This command is available from controller version 3.2.116.21. Ensure that you use the correct version in the controller.

This command specifies that a power injector is used in order to supply sufficient power to the AP.

Aironet 1240 AG Series APs

The Aironet 1240 AG Series AP ships with a 100− to 240−VAC power supply that provides 48 VDC to locally power the AP. You can order the Aironet 1240 AG series to ship without the power supply. If you intend to power the AP from an inline power−capable switch, you do not require the power supply.

Note: The power injector does not come with a power supply. Instead, the power injector uses the power supply from the AP. If you intend to use the power injector, be sure that the power supply is included with your AP. If you previously ordered the AP without a power supply, you need to order a spare power supply in order to use the power injector.

Aironet 1250 AG Series APs

The Cisco Aironet 1250 Series is an enterprise−class 802.11n access point designed for challenging RF environments. A dual−band rugged indoor access point, the 1250 Series supports data rates of up to 600 Mbps to provide users with reliable and predictable coverage for high−bandwidth data, voice, and video applications. 1250 series APs can be powered using these devices:

- Cisco Catalyst switch port capable of sourcing 20W or greater
- Cisco AP1250 Power Injector (AIR−PWRINJ4)
- Cisco AP1250 Local Power Supply (AIR−PWR−SPLY1)
- 802.3af switch (AP1250 with single radio only)

Aironet 1400 Series Bridge

The Cisco Aironet 1400 Series Wireless Bridge ships with all of the components and accessories necessary to complete most deployments. These components and accessories include:

- The Cisco Aironet Power Injector LR for supplying power to the bridge without expensive electrician costs (Power Injector).
- The power injector also extends the distance the Cisco 1400 Series Wireless Bridge can be installed from the network (see Figure).
- The Cisco Aironet 1400 Series Multifunction Mount, with its innovative design, provides greater ease of installation and flexibility. The mount comes complete with stainless steel hardware to improve corrosion resistance.
- Two lengths of shielded Dual RG–6 cables and a building entry point grounding block, all with F–Type connectors for use with the Cisco Aironet Power Injector LR and connection to the bridge unit.
- A power supply and cord, enough coaxial sealant for all outdoor connectors, and corrosion–proof gel to protect grounding connections.
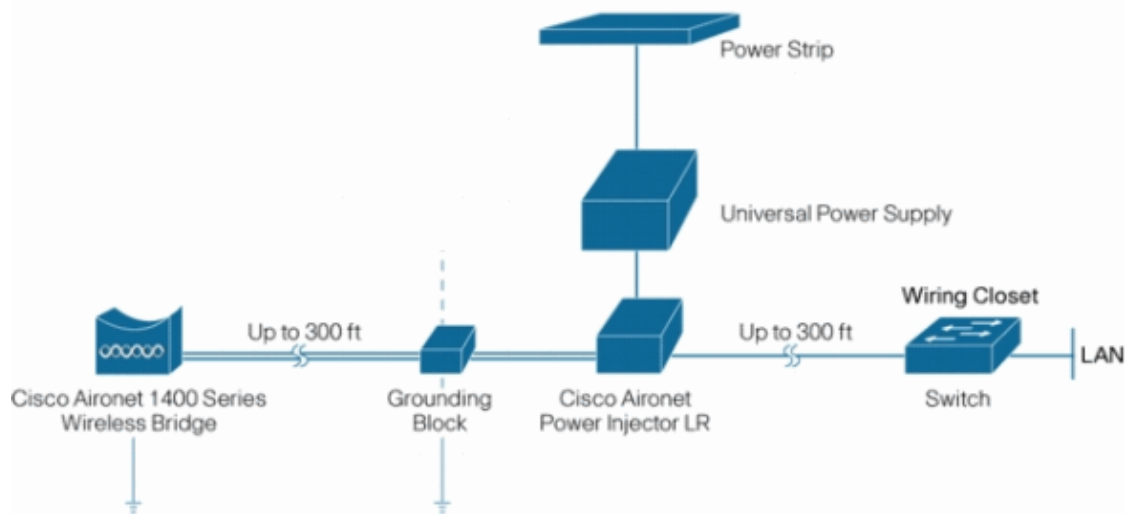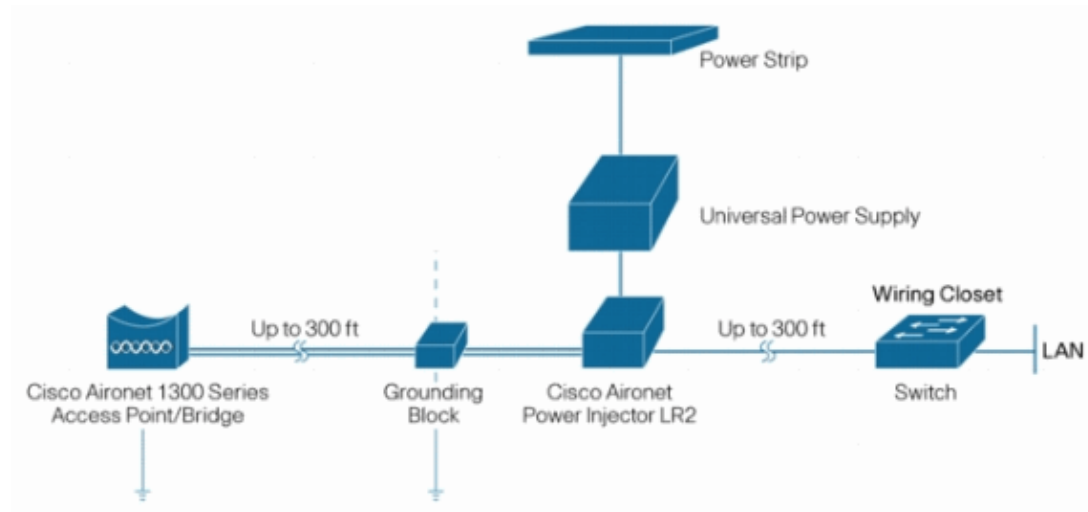

The Power Injector LR converts the standard 10/100 baseT Ethernet category 5 RJ–45 interface that is suitable for weather–protected areas to a dual F–Type connector interface for dual coax cables that are more suitable for harsh outdoor environments. While providing a 100baseT interface to the Cisco Aironet 1400 Series, the Power Injector LR also provides power to the unit over the same cables with a power discovery feature that protects other appliances from damage should they accidentally be connected. As an added benefit to the installer, Auto MDIX is built in. This allows the dual cables to be swapped and maintains the same functionality. In order to support longer cable runs from your infrastructure network switch or router, the Power Injector LR is designed to accommodate 100 m coaxial cable run plus 100 m of indoor cat5 cable, to enable total cable runs up to 200 meters. Lightning and surge protection is also included at the F–Type connector interface to provide added protection to your network infrastructure devices. Refer to Cisco Aironet 1400 Series Wireless Bridge for more information.

Aironet 1300 Series Access Point/ Bridges Power Injector

A flexible outdoor wireless bridge or access−point solution is provided through the combination of the Cisco Aironet 1300 Series, a power injector, and options for both antennas and mounting. This diagram shows how the units connect.

The Power Injector LR2 converts the standard 10/100 BaseT Ethernet category 5 RJ−45 interface that is suitable for weather−protected areas to a dual F−Type connector interface for dual coaxial cables that are more suitable for harsh outdoor environments. This port is unconfigurable. While providing a 100baseT interface to the Cisco Aironet 1300 Series, the Power Injector LR2 also provides power to the unit over the same cables with a power discovery feature that protects other appliances from damage should they accidentally be connected. The ports on the switch are set for auto−speed and auto−duplex, and auto−MDIX. Port 0 on the switch is used for the coaxial link to the bridge and port 1 on the switch is used for the RJ−45 jack on the power injector. The other switch ports are unused. For more information, refer to Cisco Aironet

1300 Series Outdoor Access Point/Bridge and Cisco Aironet 1300 Series Access Point/Bridge Power Injector.

Aironet 1500 Series APs

You can use either of these methods in order to power the Aironet 1500 Series APs:

- Local AC power
- DC PoE

- Power that is supplied at the top of streetlight poles is AC power. Use the Aironet 1500 Series Streetlight Power Tap in order to plug the AP into this power source.
- When an Aironet 1500 Series AP is installed on the roof of a building, you can use a power injector in order to supply PoE. The power injector converts AC power into DC power and sends the power along with the Ethernet signal to the AP. Use the Aironet 1500 Series Power Injector, along with the Aironet 1500 Series Outdoor Ethernet Cable, in order to power the AP. Do not use any other power injector. You need to specify the country−specific power cord with the power injector.

  Note: You must use only the power injector that is specified for this model of access point in order to power up these APs. Power options such as PoE switches, and 802.3af power sources do not provide adequate power, which can cause the access point to malfunction and cause over−current conditions at the power source.

  Note: You must ensure that the switch port connected to the access point has PoE turned off in order to avoid the AP being powered up through a PoE switch.

  Note: This is because when the AP is powered through PoE switches, the AP experiences poor signal strength when implemented in a long distance range. APs powered through Power Injector do not experience this problem.

Aironet 1000 Series Lightweight APs

The Aironet 1000 Series Lightweight AP is an 802.11a/b/g dual−band, zero−touch configuration and management AP. It delivers secure, cost−effective wireless access with advanced WLAN services for Enterprise deployments. You can power the 1000 Series Lightweight APs with the PoE option or with an external power supply. IEEE standards−based 802.3af PoE allows you to power the 1000 Series Lightweight APs over unused pairs in the Ethernet cable. A power injector or a switch with inline power is necessary in order to power the AP with the PoE option. The external power supply option allows the 1000 Series Lightweight APs to be easily moved during the site survey in order to verify radio frequency (RF) building characteristics.

Cisco 2000 Series WLCs

The Cisco 2000 Series WLC supports up to six lightweight APs, which makes it ideal for small− to medium−sized Enterprise facilities, such as branch offices. The PoE option is not supported on the 2000 Series WLC because the controller does not supply PoE. In order to use PoE to power APs, you must use a Cisco PoE injector or an external third−party PoE injector. The controller is powered by an external power supply that accepts power from an electrical outlet (100 to 240 VAC, 50 to 60 Hz).

Cisco 2100 Series WLCs

The Cisco® 2106 Wireless LAN Controller works in conjunction with Cisco lightweight access points and the Cisco Wireless Control System (WCS) in order to provide system−wide wireless LAN functions. As a component of the Cisco Unified Wireless Network, the Cisco 2106 Wireless LAN Controller presents network administrators with the visibility and control necessary to effectively and securely manage business−class WLANs and mobility services, such as voice, guest access, and location services.

The 2100 controller is powered by an external power supply that accepts power from an electrical outlet (100 to 240 VAC, 50 to 60 Hz).

Cisco 2100 series controllers have eight 10/100 copper Ethernet distribution system ports through which the controller can support up to six access points. Two of these ports (7 and 8) are Power over Ethernet (PoE) enabled and can be used to provide power directly to access points that are connected to these ports.

Cisco 4100 Series and 4400 Series WLCs

The Cisco 4100 Series WLCs and 4400 Series WLCs are designed for medium− to large−sized Enterprise facilities. Both series support the PoE option. You can use the PoE option to power the lightweight APs that connect to the controller. In addition, each 4400 WLC supports an optional redundant power supply in order to ensure maximum availability.

Cisco 5500 Series WLCs

The Cisco 5500 Series Wireless Controller is a highly scalable and flexible platform that enables systemwide services for mission−critical wireless in medium to large−sized enterprises and campus environments. The controller can be powered using one or two power supply units. When the controller is equipped with two power supply units, the power supplies are redundant. Either power supply continues to power the controller should the other power supply unit fail. Also, the power supplies are hot swappable; you do not need to remove power from the controller to replace a power supply. For more information on power supply to the WLC, refer to Installing a Power Supply Unit section of the Cisco 5500 Series Wireless Installation Guide.

Related Information

- **Cisco Aironet 350 Series Troubleshooting TechNotes**
- **Cisco Aironet Power Over Ethernet Application Note**
- **Wireless Support Page**
- **Technical Support & Documentation − Cisco Systems**

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