

Understand Aironet and Catalyst Access Point Power Requirements (Quick Reference)

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Introduction

This document describes different Power over Ethernet standards, lists power requirements, and compatible power supplies for Cisco APs.

PoE Standards

Power over Ethernet (PoE) refers to the system where electrical power is transferred along with data via twisted pair Ethernet cabling. The convenience of PoE allows Cisco APs to use a single cable to provide both power and data, which makes deployments much more cost-effective.

As of 2020, there are four Powers over Ethernet standards utilized by Cisco access points. This table lists them along with their characteristics:

| Codename | Maximum Power [W] | IEEE Standard |
|----------|-------------------|-------------------|
| PoE | 15.4 | 802.3af |
| PoE+ | 30 | 802.3at |
| UPoE | 60 | Cisco proprietary |
| UPoE+ | 90 | 802.3bt |

Table 1. PoE Standards

Power Cisco Access Points

There is no power difference between different regulatory domains of the same AP model. For example, Cisco 4800I-E and 4800I-S have identical power draw and power requirements.

Compatible Power Injectors and DC Power Supplies

Table 2. lists all officially supported PoE injectors for the latest Cisco AP models:

| AP Model | PoE Injectors | AC/DC Power Adapter |
|----------|---|---|
| 9124 | AIR-PWRINJ-60RGD1 = (full power), AIR-PWRINJ-60RGD2 = (full power), AIR-PWRINJ6 = (medium power) | Auxiliary DC input, 24V to 56V support 60W, model not specified in data sheet |
| 9166 | AIR-PWRINJ7 = (full power), AIR-PWRINJ6 = (medium power), MA-INJ-6 (full power) | MA-PWR-50WAC (full power) |
| 9164 | AIR-PWRINJ7 = (full power), AIR-PWRINJ6 = (medium power), MA-INJ-6 (full power) | MA-PWR-50WAC (full power) |
| 9162 | AIR-PWRINJ7 = (full power), AIR-PWRINJ6 = (full power), MA-INJ-6 (full power) | MA-PWR-30W (full power) |
| 9136 | AIR-PWRINJ7 = (full power) | X |
| 9130 | AIR-PWRINJ6 = (full power), AIR-PWRINJ5 = (medium power) | X |
| 9124 | AIR-PWRINJ6 = (medium power), AIR-PWRINJ-60RGD1 = (full power), AIR-PWRINJ-60RGD2 = (full power) | X |
| 9120 | AIR-PWRINJ6 = (full power), AIR-PWRINJ5 = (medium power) | X |
| 9117 | AIR-PWRINJ6 = (full power), AIR-PWRINJ5 = (medium power) | X |

| | | |
|-----------------|---|--|
| | power) | |
| 9115 | AIR-PWRINJ6= (full power), AIR-PWRINJ5= (medium power) | X |
| 9105 | AIR-PWRINJ6= (full power), AIR-PWRINJ5= (medium power) | X |
| 4800 | AIR-PWRINJ6= (full power) | AIR-PWR-50= (full power) |
| 3800 | AIR-PWRINJ6= (full power) | AIR-PWR-50= (full power) |
| 2800 | AIR-PWRINJ6= (full power) | X |
| 3700 | AIR-PWRINJ6= (full power), AIR-PWRINJ4= (medium power) | AIR-PWR-B= (full power) |
| 2700 | AIR-PWRINJ6= (full power), AIR-PWRINJ4= (full power) | AIR-PWR-C= (full power), AIR-PWR-D= (full power) |
| 1700 | AIR-PWRINJ5= (full power) | AIR-PWR-C= (full power), AIR-PWR-D= (full power) |
| 1850 | AIR-PWRINJ4= (full power), AIR-PWRINJ5= (medium power) | AIR-PWR-C= (full power) |
| 1840 | AIR-PWRINJ6= (full power), AIR-PWRINJ5= (medium power) | X |
| 1830 | AIR-PWRINJ6= (full power), AIR-PWRINJ5= (medium power) | AIR-PWR-C= (full power) |
| 1815i and 1815m | AIR-PWRINJ6= (full power), AIR-PWRINJ5= (full power) | X |

| | | |
|-----------------|--|---|
| 1815t | X | AIR-PWR-D= (full power) |
| 1815w | AIR-PWRINJ6= (full power), AIR-PWRINJ5= (full power) | X |
| 1810 | AIR-PWRINJ6= (full power), AIR-PWRINJ5= (full power) | AIR-PWR-D= (full power) |
| 1572 | AIR-PWRINJ1500-2= (full power) | |
| 1562I | AIR-PWRINJ-60RGD1= (full power), AIR-PWRINJ-60RGD2= (full power), AIR-PWRINJ6= (medium power) | AIR-PWRADPT-RGD1= (full power) |
| 1562E and 1562D | AIR-PWRINJ-60RGD1 = (full power), AIR-PWRINJ-60RGD2 = (full power), AIR-PWRINJ6 = (full power) | AIR-PWRADPT-RGD1 = (full power) |
| 1542 | AIR-PWRINJ-60RGD1 = (full power), AIR-PWRINJ-60RGD2 = (full power), AIR-PWRINJ6 = (full power), AIR-PWRINJ5 = (full power) | X |
| IW6300 | AIR-PWRINJ6 = (full power) | IW-6300H-AC-X-K9 (full power), IW-6300H-DC-X-K9 (full power), IW-6300H-DCW-X-K9 (full power) |
| IW3700 | AIR-PWRINJ1500-2 = (full power), AIR-PWRINJ-60RGD1 = (full power), AIR-PWRINJ-60RGD2 = (full power) | AIR-PWRADPT3700NA = (full power), AIR-PWRADPT3700IN = (full power) |

Table 2. Power Injectors and DC Power Adapters

Compatible PoE Standards

Table 3. contains information about what features are available when APs are powered with the use of different PoE standards. As of this article last update, all APs have full functionality with UPoE+ standard (802.3bt), so it is not included in the table. This table assumes that no PoE passthrough (PoE Out) is used.

Note: Unless APs are provided the full power they require, they show up with a Low/Medium Power in Wireless Controller Web interface.

| AP Model | Max Power Draw [W] | If powered with UPOE | If powered with PoE+ | If powered with PoE |
|----------|--------------------------------------|----------------------|---|--|
| 9124 | TBD (Not published in the datasheet) | Full functionality | 2.4GHz & 5GHz radios at 2x2, 6GHz radio shut down, Multigigabit port speed 1000mbps, SFP port disabled, PoE out disabled, Downlink ethernet interface enabled | Multigigabit port speed 1000mbps, all radios are shut down, SFP port disabled, PoE out disabled, Downlink GigabitEthernet interface disabled |
| 9166 | 30.5 | Full functionality | USB port disabled | Multigigabit port speed 1000mbps, all radios are shut down, USB port disabled |
| 9164 | 30 | Full functionality | USB port disabled | Multigigabit port speed 1000mbps, all radios are shut down, USB port disabled |
| 9162 | 25.5 | Full functionality | Full functionality | 2.4 GHz radio disabled 5GHz & 6GHz radios at 1x1, Multigigabit port speed 1000mbps, USB port disabled |
| 9136 | 47.3 | Full functionality | 2.4GHz radio at 2x2, 5GHz radio at 4x4, 6GHz radio at 2x2, Multigigabit port speed 2.5gbps, second multigigabit port disabled, USB port disabled | Multigigabit port speed 1000mbps, all radios are shut down, USB port disabled |
| 9130 | 30.5 | Full functionality | Before 17.10: USB | USB port disabled, |

| | | | | |
|------|--------------------------------------|--------------------|---|--|
| | | | port disabled, 17.10 and later: full functionality | ethernet port speed 1000mbps, both radios at 1x1 |
| 9124 | TBD (Not published in the datasheet) | Full functionality | Multigigabit port speed 1000mbps, both radios at 2x2, SFP port disabled, PoE out disabled (AUX port still operational for data) | Multigigabit port speed 1000mbps, both radios disabled, SFP port disabled, PoE out/AUX port disabled |
| 9120 | 25.5 | Full functionality | Full functionality | USB port disabled, ethernet port speed 1000mbps, with both radios at 1x1 or one of the radios on 2x2 with another one disabled |
| 9117 | 28.9 | Full functionality | If the USB port is enabled, the 5GHz radio is reduced to 4x4 | USB port disabled, ethernet port speed 2500mbps, both radios at 2x2 |
| 9115 | 21.4 | Full functionality | Full functionality | USB port disabled, ethernet port speed 1000mbps, both radios at 2x2 |
| 9105 | TBD (Not published in the datasheet) | Full functionality | Full functionality | USB port disabled, PoE out disabled |
| 4800 | 31 | Full functionality | USB port disabled, primary ethernet port speed 1000mbps, second AUX ethernet port disabled | AP does not power on |
| 3800 | 30 | Full functionality | Full functionality | Both radios are shut down, but AP powers up and is able to join WLC |

| | | | | |
|---------------|------|--------------------|----------------------|--|
| 2800 | 26.5 | Full functionality | Full functionality | Both radios are shut down, but AP powers up and is able to join WLC |
| 3700 | 19.6 | Full functionality | Full functionality | Both radios at 3x3 without Wireless Security Module (WSM) or both radios at 2x2 with WSM |
| 2700 | 15 | Full functionality | Full functionality | Both radios at 3x3 |
| 1700 | 15 | Full functionality | Full functionality | Full functionality |
| 1850 | 20.9 | Full functionality | Full functionality | USB port disabled, AUX ethernet port disabled, 2.4 GHz radio at 2x3 |
| 1840 | 17.8 | Full functionality | Full functionality | USB port disabled |
| 1830 | 15.4 | Full functionality | Full functionality | USB port disabled |
| 1815i & 1815w | 8.5 | Full functionality | Full functionality | Full functionality |
| 1815m | 13.9 | Full functionality | Full functionality | Full functionality |
| 1810 | 15.4 | Full functionality | Full functionality | Full functionality |
| 1572 | 31 | No PoE out | AP does not power up | AP does not power up |
| 1562i | 32 | Full functionality | Both radios at 2x2 | Both radios are shut down, but AP powers up and is able to join WLC |
| 1562e & 1562d | 25 | Full functionality | Full functionality | Both radios are shut |

| | | | | |
|--------|------|-----------------------------|-----------------------------|---|
| | | | | down, but AP powers up and is able to join WLC |
| 1542 | 13.9 | Full functionality | Full functionality | Full functionality |
| IW6300 | 28 | No PoE out | No PoE out | AP does not power up |
| IW3700 | 30 | 1 heater active, no PoE out | 1 heater active, no PoE out | No heaters are active, and both radios are at 2x2 |

Table 3. Compatible PoE Standards

Note: For additional information about each AP model refer to their data sheets and the installation guides.

Troubleshoot

Verify Switch Power Budget

These switch commands display the current switch, port, power allocation, and budget:

```
<#root>
```

```
Switch#
```

```
show power inline
```

```
Module   Available      Used      Remaining
         (Watts)        (Watts)   (Watts)
-----
1         472.0         344.5     127.5
Interface Admin  Oper      Power   Device      Class Max
         (Watts)
-----
Gi1/0/1  auto   on        25.5    C9120AXI-A  4      30.0
Gi1/0/2  auto   on        25.5    C9120AXI-A  4      30.0
Gi1/0/3  auto   on        25.5    C9120AXI-A  4      30.0
Gi1/0/4  auto   on        25.5    C9120AXI-A  4      30.0
...
```

Verify Power Negotiation

The default interface configuration works well in most deployments provided there is enough power budget, and the switch supports the minimum PoE standard requirement for a given AP model.

Particular caution has to be paid when you deal with power requirements greater than PoE (802.3af), as either CDP or LLDP needs to remain enabled (both globally and on the port level) to ensure proper power negotiation with the connected AP.

Ensure these options are not disabled (these commands are not visible in a normal running configuration as they are there by default):

```
<#root>
Switch(config)#
cdp advertise-v2

Switch(config)#interface GigabitEthernet1/0/1
Switch(config-if)#

cdp enable
```

To verify if CDP is enabled you can use this command:

```
<#root>
Switch#
show cdp

Global CDP information:
  Sending CDP packets every 60 seconds
  Sending a holdtime value of 180 seconds
  Sending CDPV2 advertisements is enabled
```

Common Issues Cisco TAC Encounters

- Power an Access Point with PoE standard that does not provide enough power that it requires and results in AP showing up in the WLC web interface with a Low/Medium Power . In some cases, this results in a non-functional AP that cannot even turn on its radios (for example, when 3800 AP is powered with the use of 802.3af), or it can result in reduced performance (for example, when 9115 AP is powered with the use of 802.11af and radios fall back to 2x2). Please take a look at Table 3. for the exact behavior of each AP model.
- Not all APs from the same series have the same power draw. For example, the 1562i can draw up to seven watts more than the 1562d version.
- Connecting AP to the power source with the use of a very long or non-certified cable can result in a higher power draw at the power source.
- When you use external or industrial APs, it is crucial to ground them. Refer to the 'AP deployment guides' for further information on the results of not properly grounding the AP.
- When you use power injectors, it is impossible to have mGig port speeds higher than 1000 Mbps.

