

# **AP Power Save**

- Feature History for AP Power Save, on page 1
- Information About AP Power Save, on page 2
- Wakeup Threshold for Access Point Power Save Mode, on page 9
- AP Power Save Scenarios, on page 9
- Configuring Power Policy Profile (GUI), on page 11
- Configuring a Power Policy Profile (CLI), on page 11
- Configuring a Calendar Profile (GUI), on page 14
- Configuring a Calendar Profile (CLI), on page 15
- Configuring a Power Policy in an AP Join Profile (GUI), on page 16
- Mapping a Power Profile Under an AP Profile (CLI), on page 16
- Configuring Client Wakeup Threshold (CLI), on page 17
- Configuring PoE-Out Interface in Power Profile (GUI), on page 18
- Configuring PoE-Out Interface in Power Profile (CLI), on page 18
- Configuration Example of Power Profile, on page 19
- Verifying Access Point Power Policy (GUI), on page 19
- Verifying the Access Point Power Profile, on page 20
- Verifying Radio Spatial Streams, on page 21
- Verifying Client Threshold, on page 22
- Verifying PoE-Out Details, on page 22

### **Feature History for AP Power Save**

This table provides release and related information for the feature explained in this module.

This feature is also available in all the releases subsequent to the one in which they are introduced in, unless noted otherwise.

Table 1: Feature History for AP Power Save

Release	Feature Information
Cisco IOS XE Cupertino 17.8.1	This feature allows a network administrator to force APs to operate in low-power mode to reduce power consumption.

Release	Feature Information
Cisco IOS XE Cupertino 17.9.1	Feature support for the following APs:
	Cisco Catalyst 9164 Series Access Points
	Cisco Catalyst 9166 Series Access Points
Cisco IOS XE Dublin 17.10.1	The following features are supported:
	Radio spatial streams
	• Flexible PoE profiles
Cisco IOS XE 17.13.1	AP Power Distribution support in Cisco Catalyst 9124 Series APs.

### **Information About AP Power Save**

The power-save mode in APs allows a network administrator to force APs to operate in low-power mode to reduce power consumption.

The AP Power Save feature is supported in the following APs:

- Cisco Catalyst 9115 Series Access Points
- Cisco Catalyst 9120 Series Access Points
- Cisco Catalyst 9124 Series Access Points
- Cisco Catalyst 9130 Series Access Points
- Cisco Catalyst 9136 Series Access Points
- Cisco Catalyst 9164 Series Access Points
- Cisco Catalyst 9166 Series Access Points
- Cisco Catalyst 9162 Series Access Points

### **Access Point Power Policy**

The access point power policy allows you to define the power budget utilization available for an AP, wherein, you can define a set of policies for different interfaces on an AP. You can manage interfaces such as Wi-Fi radios, USB, and so on, as required.

Cisco Catalyst 9124 AXI/D APs support up to two radio interfaces (single 5 GHz), and Cisco Catalyst 9124 AXE APs support up to three (dual 5 GHz) radio interfaces. When Cisco Catalyst 9124 Series APs operate under 802.3at/PoE+/30W insufficient power condition, the new operating modes support both dual or Tri-Radio mode.

#### **Use Case for AP Power Policy**

The following is the use case of an AP power policy:

 You can define a power policy for the available power inputs, such as, 802.3af, 802.3at, 802.3bt (for multiple levels), DC power, and so on. With tri-radio and quad-radio APs, the power requirement has gone beyond the capability of the 802.3at Power over Ethernet (PoE) mode. Therefore, with the AP power policy, for example, we statically predefine an AP operation when provided with non-802.3bt power (such, as TX power, radio chains, USB port, SFP, and so on).

### **Power-Save Mode**

The power-save mode enables an AP to switch to a low-power mode when no clients are associated with the AP. For example, when this mode is enabled in workspaces, the AP falls asleep during after hours, thereby saving power consumption of the AP throughout the night.

From Cisco IOS-XE Cupertino 17.10.1 onwards, you can shut down AP radios or lower the radio spatial streams, to reduce usage of power. You can enforce radio speed by configuring the number of spatial streams on the radios. The combinations for radio spatial stream policies are: 1X1, 2X2, 3X3 (only for Cisco Catalyst 9130 Series Access Points), 4X4, and 8X8.

The following are the advantages of the power-save mode:

- Increases the energy saving per AP: In the power save mode you can reduce AP functions during off-peak hours and save an additional 20% in energy costs compared to the regular idle mode.
- Enables environmentally conscious purchases: Large enterprises and companies track environmental performance as one of their key indices. They have a centralized energy team to monitor their energy efficiency, which magnifies the importance of the power-save feature.

### **PoE Profiles**

• Fixed PoE Profile: The APs negotiate the power that is required, from the switches they are connected to. The power required varies from one AP model to another AP model. If an AP is not granted the power it requested, it operates under the power budget. In such conditions, some of the interfaces operate under *degraded conditions*.

For example, some radios may operate at 2SS instead of at 4SS, which they are capable of. The operating conditions for each of the AP interfaces differs from one power level to another. These are referred to as fixed PoE profiles. Fixed PoE profiles are applied when the AP is operating in normal mode, that is, nonpower-save mode. When the AP operates in power-save mode, the configured PoE power policies are applied.

- PoE Power Policy: With power policies or profiles, you can configure interfaces that you want to set at certain speeds. With this policy, you can configure a profile of your choice that will be pushed to the AP based on your calendar or timing. For example, on a group of APs in the second floor, push a profile where you want to turn off all APs, except 2.4-GHz radio, from 7 p.m. to 7 a.m.
- Flexible PoE Profile: With flexible PoE profiles, you can configure different interfaces and set specific
  parameter values and states for each interface, instead of following fixed PoE profile rules. If an AP does
  not get the power it requires, it operates under the power budget by using the flexible PoE profile.

In Cisco IOS XE 17.13.1, PoE-out is a new interface introduced in Cisco Catalyst 9124 Series APs, in addition to the USB, Ethernet, and LAN interfaces. The PoE-out for Cisco Catalyst 9124 Series AP RLAN works only if you have enabled the RLAN port.

Access Points	PoE-In-Mode/DC Mode	Consumption @ Power Device	Consumption @ Power Source Equipment	Feature Mode									
		AP	Worst-Case Cable	Radio 1	Radio 2	Radio 3	Ethernet	USB	Module	PoEOut			
Cisco Catalyst	.3af	13.0	15.4	2X2	2X2	_	1G	N		_			
9115AXI	.3at	16.0	18.9	4X4	4X4		2.5G	Ν					
Points	.3at	20.4	24.1	4X4	4X4		2.5G	Y(3.75W)		—			
Cisco Catalyst	.3af	13.0	15.4	2X2	2X2	—	1G	N	—				
9115AXE	.3at	17.0	20.1	4X4	4X4		2.5G	N		_			
Access Points	.3at	21.4	25.3	4X4	4X4	—	2.5G	Y(3.75W)	—				
Cisco Catalyst	.3af	13.8	15.4	1X1	1X1	Enabled	1G	N					
9120AXIE	.3at	20.5	23.2	4X4	4X4	Enabled	2.5G	N					
Access Points	.3at	25.5	30.0	4X4	4X4	Enabled	2.5G	Y(4.5W)					
Cisco Catalyst	.3af	13.8	15.4	1X1	1X1	Enabled	1G	Ν					
9130AXIE	.3at	25.5	30.0	8X8	4X4	Enabled	5G	N		_			
Points	.3at	25.5	30.0	Primary 4X4	4X4	Enabled	5G	Y(4.5W)					
				Secondary Off									
	.3at	25.5	30.0	Primary 4X4	Disabled	Enabled	5G	Y(4.5W)		—			
				Secondary 4X4									
	.3bt	30.5	33.3	8X8	4X4	Enabled	5G	Y(4.5W)					

Table 2: AP Power Draw Specifications: Cisco Catalyst 9115, 9120, 9130 Series APs

Access Points	Rilliviae	Consumption @Power Device	Mode	e									
		at AP	Worst-Case Cable	5G Radio	2G Radio	6G Radio	AUX Radio	Mgig0	Mgig1	USB	Module	PdEOut	
Cisco Catalyst	.3af - Fixed	13.9	15.4	Disabled	Disabled	Disabled	Enabled	1G	Disabled	Disabled		—	
Series Access Points	.3at - Fixed	24.0	27.90	Primary - 4X4 Secondary - Disabled	2X2	2X2	Enabled	2.5G	2.5G (hitless failover standby)	Disabled			
	.3bt - Fixed	43.4	54.81	8X8 or Dual 4X4	4X4	4X4	Enabled	5G	5G	Y(9W)			
	.3bt - PoE Policy 1	37.3	41.63	8X8 or Dual 4X4	4X4	4X4	Enabled	5G	5G	Disabled			

Table 3: AP Power Draw Specifications: Cisco Catalyst 9136 Series APs

Access Points	Rillvie	Consumption @Power Device	Consumption @Power Source Equipment	Feature Mode											
		at AP	Worst-Case Cable	5G Radio	2G Radio	6G Radio	AUX Radio	Mgig0	Mgig1	USB	Module	PdEQ.t			
Cisco Catalyst 9166	.3af - Fixed	13.9	15.4	Disabled	Disabled	Disabled	Enabled	1G		Disabled					
Series Access Points	.3at - Fixed Policy	25.5	30.0	4X4	4X4	4X4	Enabled	5G		Disabled					
	.3bt - Fixed	30.5	32.8	4X4	4X4	4X4	Enabled	5G		Y (4.5 W)					
	DC Jack - Fixed	30.5		4X4	4X4	4X4	Enabled	5G		Y (4.5 W)					

Table 4: AP Power Draw Specifications: Cisco Catalyst 9166 Series APs

Table 5: AP Power Draw Specifications: Cisco Catalyst 9164 Series APs

Access Points	Rillvine	Consumption @Power Device	Consumption @Power Source Equipment	Feature	Mode							
		at AP	Worst-Case Cable	5G Radio	2G Radio	6G Radio	AUX Radio	Mgig0	Mgig1	USB	Module	PdE-Out
Cisco Catalyst 9164	.3af - Fixed	13.9	15.4	Disabled	Disabled	Disabled	Enabled	1G		Disabled		
Series Access	.3at - Fixed	25.5	30.0	4X4	2X2	4X4	Enabled	2.5G		Disabled		
Points	.3bt - Fixed	30.1	32.8	4X4	2X2	4X4	Enabled	2.5G		Y (4.5 W)		
	DC Jack - Fixed	30.1		4X4	2X2	4X4	Enabled	2.5G		Y (4.5 W)		

Access Points	<b>Rillvid</b> e	Consumption @Power Device	Consumption @Power Source Equipment	Feature	Mode							
		at AP	Worst-Case Cable	5G Radio	2G Radio	6G Radio	AUX Radio	Mgig0	Mgig1	USB	Module	PdEOut
Cisco Catalyst	.3af	13.3	14.32	1X1	Disabled	1X1	Enabled	1G	—	Disabled	_	
9162	.3at	20.1	22.67	2X2	2X2	2X2	Enabled	2.5G	—	Disabled	—	
Access Points	.3at	25.5	30	2X2	2X2	2X2	Enabled	2.5G		Y (4.5W)		

Table 7: AP Power Draw Specifications: Cisco Catalyst 9124 Series APs

Access Points	Riive	Consumption @Power Device	Consumption @Power Source Equipment	Featur	e Mod	e								
		at AP	Worst-Case Cable	Radio O	R0 dBm Per Path	Radio 1	R1 dBm Per Path	Radio 2	R02 dBm Per Path	AUX Radio	Ehenet Mgig	SFP Maatule	GbE PHY	REQU
				2.4 GH Radio	Z	5 GHz Prima Radio	ry	5 GHz Secon Radio	dary	Cinae				
Cisco	.3af	13.8	15.4	Disabled	—	Disabled	—	NA	NA	Ended	1G	N	N	N
9124	.3at	25.5	30	2X2	23	2X2	23	NA	NA	Endoted	1G	N	Y	N
AXI Cisco Catalyst 9124	.3bt / URE / DC	33.6	39.5	4X4	24	4X4	24	NA	NA	Enddad	2.5G	Y	Y	N
Cisco Catalyst 9124 AXE Dual Radio Mode	.3bt / URCE /DC	51	60	4X4	24	4X4	24	NA	NA	Endbad	2.5G	Y	Y	Y

I

Access Points	Rive	Consumption @Power Device	Consumption @Power Source Equipment	Featur	e Mod	e								
		at AP	Worst-Case Cable	Radio O	R0 dBm Per Path	Radio 1	R1 dBm Per Path	Radio 2	R02 dBm Per Path	AUX Radio	Ehenet Mgig	SFP Madule	GbE PHY	REQU
				2.4 GH Radio	Z	5 GHz Prima Radio	ry	5 GHz Secon Radio	dary	Cilvae				
Cisco Catalyst 9124 AXI Cisco Catalyst 9124 AXD Single 5G	.3at	25.5	30	Shtiwn		4X4	24	Sutown		Endted	2.5G	Y	N	N
Cisco	.3af	13.8	15.4	Disabled		Disabled		Disabled		Enddad	1G	N	N	N
Catalyst 9124	.3at	25.5	30	Disabled		Disabled		Disabled		Ended	1G	N	N	N
AXE TiiRado Mode	.3bt / UPCE / DC	33.6	39.5	2X2	24	2X2	24	2X2	24	Fredbed	2.5G	Y	Y	N
	.3bt / URCE /DC	51	60	2X2	24	2X2	24	2X2	24	Endded	2.5G	Y	Y	Y
Cisco Catalyst 9124 AXE Dual 5G Radio	.3at	25.5	30	Shttbwn		2X2	23	2X2	23	Enddad	1G	N	Y	N

### Wakeup Threshold for Access Point Power Save Mode

The Wakeup Threshold feature enables you to define the client threshold in the AP power profile configuration to determine when the AP wakes up from the power save mode or enter into the power save mode.

When the AP applies the calendar associated power profile (for an active calendar), and the number of connected clients reach the wakeup threshold, the AP wakes up from power save mode and goes into the Fixed power profile mode or the Regular power profile (insufficient power) mode.

When the AP applies the calendar associated power profile (for an active calendar), and the number of connected clients is less than the wakeup threshold, the AP applies the calendar associated power profile to shut down the interface or to lower the interface speed to save power.

### **AP Power Save Scenarios**

The AP Power Save feature helps APs to enter into a power-save mode or low-power mode by applying a calendar, for example, for after hours, associated with the corresponding power profile. The AP profile is enhanced to associate a PoE power policy with calendar profiles. The following are the scenarios for Eco mode APs:

• Figure 1: AP in Eco Mode Behavior: Working Days



#### AP in Eco Mode Behavior: Working Days

On working days, from 7:00 a.m. to 7:00 p.m, the AP functions in normal mode or fixed mode, when the maximum number of clients are connected to the AP. From 7:00 p.m. to 12:00 a.m., the **Cal1** calendar profile timer starts to put the AP in the power-save mode. Likewise, the **Cal2** calendar profile timer starts, and extends the power-save mode from 12:00 a.m. to 7:00 a.m. Again, at 7:00 a.m., the AP goes into normal mode.

• Figure 2: AP in Eco Mode Behavior: Nonworking Days

#### AP in Eco Mode Behavior: Nonworking Days



On nonworking days, the AP goes into power-saving mode from 12:00 a.m. to 11:59:59 p.m. The **Cal3** calendar profile is applied here. This profile defines the timer for the power-save mode. This means that there are no clients connected to the AP, and that the AP is asleep.

#### • Figure 3: AP in Eco Mode Behavior: With Clients



#### AP in Eco Mode **Behavior**: With Clients

When clients are connected to the AP, the AP automatically switches to the normal mode. For example, in the calendar profile **Cal1**, the AP is in normal mode, because wireless clients are connected to the AP. At 8:00 p.m., clients get dissociated from the AP, and the AP goes into power-save mode. When clients enter the AP coverage area at 9:30 p.m., the AP automatically switches from power-save mode to normal mode of operation.

## **Configuring Power Policy Profile (GUI)**

#### Procedure

Step 1	Choose Configuration > Tags & Profiles > Power Profile.
Step 2	Click Add. The Add Power Profile window is displayed.
Step 3	Enter a name and description for the power profile. The name must be ASCII characters of up to 128 characters, without leading or trailing spaces.
Step 4	Click Add to add rules for the power profile.
Step 5	In the <b>Sequence number</b> field, enter a unique sequence number to designate the priority in which power should be disabled for the component. The sequence number of 0 indicates that the component should be disabled first.
Step 6	From the <b>Interface</b> and <b>Interface ID</b> drop-down list, choose interface and interface ID to designate to the component for which the power derating rule applies.
Step 7	From the <b>Parameter</b> and <b>Parameter value</b> drop-down list, choose the values depending on the interface you chose in step 6.
	For example, if you chose <b>Ethernet</b> as an interface, you can further customize the rule for the interface by choosing the associated speed. This rule ensures that the AP disables power for the Ethernet interface that is operating at a higher speed, and thereby consuming more power.
Step 8	Click the check mark to save and then click <b>Apply to Device</b> .

# **Configuring a Power Policy Profile (CLI)**

#### Before you begin

You must keep at least one radio interface up and running before you configure a power policy profile.

	Command or Action	Purpose
Step 1	configure terminal	Enters global configuration mode.
	Example:	
	Device# configure terminal	
Step 2	wireless profile power power-profile-name	Configures the power policy profile.
	Example:	
	<pre>Device(config)# wireless profile power power-profile-name</pre>	

I

	Command or Action	Purpose
Step 3	<pre>sequence-number ethernet {GigabitEthernet0   GigabitEthernet1 speed {1000mbps   100mbps   2500mbps   5000mbps}   LAN1   LAN2   LAN3 state disable} Example: Device (config-wireless-power-profile) # 10 ethernet gigabitethernet1 speed 1000mbps</pre>	Configures the power policy for Ethernet. sequence-number: The power profile settings are ordered by sequence numbers. AP derating takes place as per the sequence number entered. The same combination of interface identifiers and parameter values does not appear in another sequence number. The same interface with the same parameter can appear multiple times with different parameter values. Note • The Ethernet interface is used to join the controller
		<ul> <li>The uplink interface is not disabled even if it is defined in the power policy.</li> <li>Ethernet speed configuration is not operational in Cisco IOS XE Cupertino 17.8.1.</li> </ul>
Step 4	sequence-number radio 24ghz {spatial-stream {1   2   3   4}   state shutdown}	Configures spatail stream for the 2.4-GHz band radio.
	Example:	Here:
	Device(config-wireless-power-profile)# 20 radio 24ghz spatial stream 2	<i>sequence-number</i> : The power profile settings are ordered by sequence numbers. AP derating takes place as per the sequence number entered. The same combination of interface identifiers and parameter values does not appear in another sequence number. The same interface with the same parameter can appear multiple times with different parameter values.
		• 1: Specifies a 1X1 radio spatial stream.
		• 2 : Specifies a 2X2 radio spatial stream.
		• 3 : Specifies a 3X3 radio spatial stream.
		• 4 : Specifies a 4X4 radio spatial stream.
		<b>state shutdown</b> : Indicates that the radio state is down.
Step 5	sequence-number radio 5ghz {spatial-stream {1   2   3   4   8}   state shutdown}	Configures spatail stream for the 5-GHz band radio.
	Example:	Here:
	Device(config-wireless-power-profile)# 30 radio 5ghz spatial stream 4	<i>sequence-number</i> : The power profile settings are ordered by sequence numbers. AP derating takes place as per the sequence number entered.

	Command or Action	Purpose
		The same combination of interface identifiers and parameter values does not appear in another sequence number. The same interface with the same parameter can appear multiple times with different parameter values.
		• 1: Specifies a 1X1 radio spatial stream.
		• 2 : Specifies a 2X2 radio spatial stream.
		• 3 : Specifies a 3X3 radio spatial stream.
		• 4 : Specifies a 4X4 radio spatial stream.
		• 8 : Specifies a 8X8 radio spatial stream.
		<b>state shutdown</b> : Indicates that the radio state is down.
Step 6	sequence-number radio secondary-5ghz {spatial-stream {1   2   3   4   8}   state chutdown}	Configures spatail stream for a secondary 5-GHz band radio.
	snutdown}	Here:
	Example: Device(config-wireless-power-profile)# 40 radio 5ghz spatial stream 4	<i>sequence-number</i> : The power profile settings are ordered by sequence numbers. AP derating takes place as per the sequence number entered. The same combination of interface identifiers and parameter values does not appear in another sequence number. The same interface with the same parameter can appear multiple times with different parameter values.
		• 1: Specifies a 1X1 radio spatial stream.
		• 2 : Specifies a 2X2 radio spatial stream.
		• 3 : Specifies a 3X3 radio spatial stream.
		• 4 : Specifies a 4X4 radio spatial stream.
		• 8 : Specifies a 8X8 radio spatial stream.
		<b>state shutdown</b> : Indicates that the radio state is down.
Step 7	sequence-number radio 6ghz {spatial-stream {1   2   3   4   8}   state shutdown}	Configures spatail stream for the 6-GHz band radio.
	Example:	Here:
	Device(config-wireless-power-profile)# 50 radio 6ghz spatial stream 2	<i>sequence-number</i> : The power profile settings are ordered by sequence numbers. AP derating takes place as per the sequence number entered. The same combination of interface identifiers and parameter values does not appear in another

	Command or Action	Purpose
		sequence number. The same interface with the same parameter can appear multiple times with different parameter values.
		• 1: Specifies a 1X1 radio spatial stream.
		• 2 : Specifies a 2X2 radio spatial stream.
		• 3 : Specifies a 3X3 radio spatial stream.
		• 4 : Specifies a 4X4 radio spatial stream.
		• 8 : Specifies a 8X8 radio spatial stream.
		state shutdown: Indicates that the radio state is down.
Step 8	sequence-number usb 0 state disable	Configures the power policy for USB.
	Example:	
	Device(config-wireless-power-profile)# 60 usb 0 state disable	

# **Configuring a Calendar Profile (GUI)**

Configure calendar profiles to set up a daily, weekly, or monthly recurrence schedule.

Step 1	Choose Configuration > Tags & Profiles > Calendar.
Step 2	Click Add. The Add Calendar Profile window is displayed.
Step 3	Enter a name for the calendar profile. The name must be ASCII characters of up to 32 characters, without leading or trailing spaces.
Step 4	From the <b>Recurrence</b> drop-down list, choose the schedule for which you want to create a profile.
Step 5	Select the Start Time and the End Time for the recurrence schedule.

Note	• For daily recurrences, you can select the start time and end time. For example, if you want the AP to derate the power on certain interfaces between 7 p.m. to 7 a.m. daily, or if you want the controller to not allow any clients to be associated during this period, you can set up this daily recurrence schedule.
	To cover this timespan, you must create two calendar profiles, one for 7 p.m. till 23:59:59, and another one from midnight to 7 a.m. of the next calendar day, and map it to the same power profile. After this, assign it to the AP Join profile.
	• For weekly recurrences, select the specific days of the week along with the start and end time.
	• For monthly recurrence, select the specific days of the month along with the start and end time.

**Step 6** Click **Apply** to save the configuration.

# **Configuring a Calendar Profile (CLI)**

	Command or Action	Purpose
Step 1	configure terminal	Enters global configuration mode.
	Example:	
	Device# configure terminal	
Step 2	<b>wireless profile calendar-profile name</b> calendar_profile_ap_power	Configures a calendar profile. Enters the calendar profile configuration mode.
	<b>Example:</b> Device# wireless profile calendar-profile	Here, <b>name</b> refers to the name of the calendar profile.
	name ap_power_calendar	
Step 3	recurrence daily	Configures daily recurrence for daily profile.
	Example:	
	<pre>Device(config-calendar-profile)# recurrence daily</pre>	
Step 4	start start-time end end-time	Configures the start time and end time for
	Example:	calendar profile.
	<pre>Device(config-calendar-profile)# start 16:00:00 end 20:00:00</pre>	
Step 5	end	Returns to privileged EXEC mode.
	Example:	

 Command or Action	Purpose
Device(config-calendar-profile)# end	

### **Configuring a Power Policy in an AP Join Profile (GUI)**

Power policy supports the use of a power profile or a mapped configuration of a power profile and a calendar profile that are pushed to an AP during an AP join session. You can map a maximum of five combination profiles (calendar and power) per AP profile.

#### Before you begin

Ensure that the power profile and calendar profile are created and displayed in the respective drop-down lists in the GUI.

#### Procedure

Step 1	Choose <b>Configuration</b> > <b>Tags &amp; Profiles</b> > <b>AP Join</b> . The <b>Add AP Join Profile</b> window is displayed.	
Step 2	Click the	e AP tab.
Step 3	Under th	e AP tab, click the <b>Power Management</b> tab.
Step 4	4 From the <b>Regular Power Profile</b> drop-down list, choose the power profile. The AP applies these settings to derate the power based on the configured priority list.	
	Note	If you want the AP to apply the power profile configuration during a specific time period, choose the <b>Calendar Profile</b> and map it to the power profile from the drop-down list.
Step 5	Click the	e check mark to associate the mapping.
Step 6	Click Ap	<b>oply to Device</b> to save the configuration.

### Mapping a Power Profile Under an AP Profile (CLI)

#### Before you begin

Ensure that you have defined a calendar profile in the wireless profile, before you map the calendar profile to an AP join profile.

	Command or Action	Purpose
Step 1	configure terminal	Enters global configuration mode.
	Example:	
	Device# configure terminal	

	Command or Action	Purpose
Step 2	<pre>ap profile ap-profile-name Example: Device(config)# ap profile ap-profile-name</pre>	Configures an AP profile and enters AP profile configuration mode.
Step 3	<pre>power-profile power-profile-name Example: Device(config-ap-profile)# power-profile power-profile-name</pre>	Configures the AP power profile. This power profile is used during non-calendar hours to meet the power budget provided by the switch connected to the AP.
Step 4	<pre>calendar-profile calendar-profile-name Example: Device(config-ap-profile)# calendar-profile ap-calendar-profile</pre>	Maps a calendar profile to the AP profile. Enters the AP profile calendar configuration mode.
Step 5	<pre>[no] action power-saving-mode power-profile power-profile-name Example: Device(config-ap-profile-calendar)# action power-saving-mode power-profile power-profile1</pre>	Maps a specific power profile to a specific calendar profile. Maps the power-saving mode action for the calendar profile. Use the <b>no</b> form of this command to disable the command.NoteYou can have more than one mapping of calendar profile to power profile.

# **Configuring Client Wakeup Threshold (CLI)**

#### Procedure

	Command or Action	Purpose
Step 1	configure terminal	Enters global configuration mode.
	Example:	
	Device# configure terminal	
Step 2	wireless profile power power-profile-name	Configures the power policy profile.
	Example:	
	<pre>Device(config)# wireless profile power power-profile1</pre>	
Step 3	power-save-client-threshold client-threshold	Configures the client threshold up to which the
	Example:	AP can stay in the power save mode. The valid
	Device(config-wireless-power-profile)# power-save-client-threshold 5	value is 1.

## **Configuring PoE-Out Interface in Power Profile (GUI)**

#### Before you begin

Enable the RLAN port for the AP.

#### Procedure

Step 1	Choose Configuration > Tags & Profiles > Power Profile.
Step 2	Click Add.
	The Add Power Profile window is displayed.
Step 3	Enter a name and description for the power profile. The name can contain up to 128 ASCII characters, without leading or trailing spaces.
Step 4	(Optional) From the <b>Power Save Client Threshold</b> counter, select a value to set a limit to the number of client associations with the AP. The default value is 1. The valid range is between 1 to 32.
Step 5	Click <b>Add</b> to create a rule for the PoE-Out interface. The <b>Rule</b> section is displayed in the window.
Step 6	In the <b>Rule</b> section, complete the following steps:
	a) In the <b>Sequence number</b> field, enter a unique sequence number to assign the priority in which power should be disabled for the component. A sequence number of 0 indicates that the component should be disabled first.
	b) From the <b>Interface</b> drop-down list, choose <b>Ethernet</b> as the interface.
	c) From the Interface ID drop-down list, choose one of the following interfaces: LAN1, LAN2, or LAN3.
	d) From the <b>Parameter</b> drop-down list, choose <b>POE-out</b> .
	A POE-out port on an AP is used to provide power to the another device, for example, a camera. This selection ensures that the power usage of the port is reduced or shut down at the specified sequence.
Step 7	Click the check mark button to save.
Step 8	Click Apply to Device.

## **Configuring PoE-Out Interface in Power Profile (CLI)**

	Command or Action	Purpose
Step 1	configure terminal	Enters global configuration mode.
	Example:	
	Device# configure terminal	

L

	Command or Action	Purpose
Step 2	wireless profile power power-profile-name	Configures the power policy profile. Enters the
	Example:	wireless power profile configuration mode.
	<pre>Device(config)# wireless profile power poe-out-power-profile</pre>	
Step 3	sequence-number ethernet LAN1 poe-out disable	Disables the PoE-out state.
	Example:	
	Device(config-wireless-power-profile)# 1 ethernet LAN1 poe-out disable	

### **Configuration Example of Power Profile**

The following example shows how to define a power save policy:

wireless profile power power-save			
10 radio 5ghz state shutdown			
20 radio secondary-5ghz state shutdown			
30 radio 6ghz state shutdown			
40 usb 0 state disable			
The following example shows how to define a calendar profile:			
wireless profile calender-profile name eve-to-midnight			

```
recurrence daily
start 19:00:00 end 23:59:59
wireless profile calender-profile name midnight-to-morning
recurrence daily
start 00:00:00 end 07:00:00
wireless profile calender-profile name weekends
recurrence weekly
day Saturday
day Sunday
start 00:00:00 end 23:59:59
```

The following example shows how to define an AP join profile and map a calendar profile to a power profile:

```
ap profile wireless-prof-sitel
calendar-profile eve-to-midnight
action power-saving-mode power-profile power-save
calendar-profile midnight-to-morning
action power-saving-mode power-profile power-save
calendar-profile weekends
action power-saving-mode power-profile power-save
```

### **Verifying Access Point Power Policy (GUI)**

To verify the applied configuration on the GUI, follow these steps:

#### Procedure

ep 1	Choose Monitoring > AP Statistics.
ep 2	Click a Cisco Catalyst 9136 series AP from the list of APs. The <b>General</b> window is displayed.
ep 3	Click the <b>Power</b> tab. The <b>Power Operational Status</b> and the <b>AP Fixed Power Policy</b> details are displayed.
•	
	To verify the AP fixed power policy details from the list of configured APs, follow these steps:
	To verify the AP fixed power policy details from the list of configured APs, follow these steps: <b>Procedure</b>
ep 1	To verify the AP fixed power policy details from the list of configured APs, follow these steps: Procedure Choose Configuration > Access Points.
ep 1 ep 2	To verify the AP fixed power policy details from the list of configured APs, follow these steps: <b>Procedure</b> Choose <b>Configuration</b> > <b>Access Points</b> . Click a Cisco Catalyst 9136 series AP from the list of APs. The <b>Edit AP</b> window is displayed.
ep 1 ep 2 ep 3	To verify the AP fixed power policy details from the list of configured APs, follow these steps: <b>Procedure</b> Choose <b>Configuration</b> > <b>Access Points</b> . Click a Cisco Catalyst 9136 series AP from the list of APs. The <b>Edit AP</b> window is displayed. Click the <b>Interfaces</b> tab. The <b>AP Fixed Power Policy</b> details are displayed.

# **Verifying the Access Point Power Profile**

To view the calendar profile and its mapping, run the following command:

Device# show ap profile name defau:	lt-ap-profile detailed
AP Profile Name	: default-ap-profile
Description	: default ap profile
Power profile name	: power prof day
AP packet capture profile	: Not Configured
AP trace profile	: Not Configured
Mesh profile name	: default-mesh-profile
Power profile name	: Not Configured
Calendar Profile	
Profile Name	: cal47
Power saving mode profile name	: pow_da
Profile Name	: cal48
Power saving mode profile name	: pow23

To view the operational details of the AP, run the following command:

Device# show ap name cisco-ap power-profile summary AP power derate Capability : Capable Power saving mode Power saving mode profile : pow2 Associated calendar profile : call

AP power profile status		: Insufficient De-rating			
Interface	Interface-ID	Parameter	Parameter value	Status	
Radio	5 GHz	State	DISABLED	Success	
Radio	6 GHz	State	DISABLED	Not Applicable	
Ethernet	LAN1	State	DISABLED	Not Applicable	
Radio	2.4 GHz	State	DISABLED	Success	
Ethernet	Gig0	Speed	5000 MBPS	Fixed Policy	

**AP power derate capability** is displayed in the output as **Capable** only for those APs that support power policy. For the other APs, it is displayed as **Not Capable**.

In the **show ap name cisco-ap power-profile summary** output, in the power saving mode, the status of the interface configured in the power profile (for example, **pow2**) is applied on the AP, and the AP sends the details (that are displayed in the show command) such as, the name of the power saving profile and the associated calendar profile.

The table that is displayed shows the interfaces and the parameter status of the power saving profile. The AP sends the information as to which of the interfaces are disabled. For example, if the AP does not have a 6-GHz radio interface, the **Status** is displayed as **Not Applicable**. If the interfaces are applied without any errors, then **Success** is displayed.



#### Note

When the AP uses the fixed power policy, due to inactive calendar or client connectivity, the interfaces are not displayed in the power profile summary if their status is UP on the AP.

### Verifying Radio Spatial Streams

Description

To view the configuration and operational details of radio spatial stream rules in the power profile, run the following commands:

```
Device# show wireless profile power detailed wireless_pow_profile_name

Power profile name : wireless_pow_profile_name

------
```

:

•				
• Seq No	Interface	Interface-id	Parameter	Parameter value
100	Radio	6 GHz	Spatial Stream	2 x 2
200	Radio	5 GHz	Spatial Stream	8 x 8
400	USB	USB0	State	DISABLED
500	Ethernet	Gig0	Speed	100 MBPS
600	Radio	6 GHz	State	DISABLED
700	Radio	2.4 GHz	State	DISABLED
900	Radio	5 GHz	State	DISABLED

Device# show ap name *cisco-ap-name* power-profile summary AP power derate Capability : Capable

```
AP fixed power policy
```

Interface	Interface-ID	Parameter	Parameter value	Status
Ethernet	Gig0	Speed	5000 MBPS	Fixed Policy
Radio	2.4 GHz	Spatial Stream	4 x 4	Fixed Policy

Radio	5 GHz	Spatial Stream	8 x 8	Fixed Policy
Radio	Sec 5 GHz	Spatial Stream	4 x 4	Fixed Policy
USB	USB0	State	DISABLED	Fixed Policy

### **Verifying Client Threshold**

To view the client threshold details, run the following command:

Device# sh Power prof	ow wireless pr ile name	ofile power detai: : profile1	led profile1		
Descriptio	n	: Power pro	ofile 1		
Power save	client thresh	old : 5			
Seq No	Interface	Interface-id	Parameter	Parameter value	
 0	Radio	6 GHz	State	DISABLED	-
1	Radio	5 GHz	Spatial Stream	1 x 1	
2	Radio	2.4 GHz	Spatial Stream	2 x 2	
3	USB	USB0	State	DISABLED	

### **Verifying PoE-Out Details**

To view the PoE-out details in the wireless power profile, run the following commands:

```
Device# show wireless profile power detailed poe-out profile name
Power profile name : poe-out_profile_name
-----
Description : profile-description
Seq No Interface Interface-id Parameter
                                   Parameter value
_____
10 ...
20
       Ethernet LAN 1
                           POE OUT
                                     DISABLED
30 ...
Device# show ap name Cisco-Ap1 power-profile summary
AP power derate Capability : Capable
AP fixed power policy
------
Interface Interface-ID
                  Parameter
                            Parameter value Status
_____
. . .
Ethernet LAN 1
                  POE OUT
                            DISABLED
                                      Fixed Policy
. . .
```