



# Managing Power in Cisco UCS

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## Power Management in Cisco UCS

You can manage power through Cisco UCS Manager by configuring any of the following features:

- Power supply redundancy for all chassis in a Cisco UCS instance
- Policy-driven chassis-level power capping
- Manual blade-level power capping

## Rack Server Power Management

Power capping is not supported for rack servers.

## Power Management Precautions

If the CIMC is reset, the power monitoring functions of Cisco UCS become briefly unavailable for as long as it takes for the CIMC to reboot. While this usually only takes 20 seconds, there is a possibility that the peak power cap could be exceeded during that time. To avoid exceeding the configured power cap in a very low power-capped environment, consider staggering the rebooting or activation of CIMCs.

# Configuring the Power Policy

## Power Policy

The power policy is a global policy that specifies the redundancy for power supplies in all chassis in the Cisco UCS instance. This policy is also known as the PSU policy.

For more information about power supply redundancy, see *Cisco UCS 5108 Server Chassis Hardware Installation Guide*.

## Configuring the Power Policy

### Procedure

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- Step 1** In the **Navigation** pane, click the **Equipment** tab.
- Step 2** On the **Equipment** tab, click the **Equipment** node.
- Step 3** In the **Work** pane, click the **Policies** tab.
- Step 4** Click the **Global Policies** subtab.
- Step 5** In the **Power Policy** area, click one of the following radio buttons in the **Redundancy** field:
- **non-redundant**—All installed power supplies are turned on and the load is evenly balanced. Only smaller configurations (requiring less than 2500W) can be powered by a single power supply.
  - **n+1**—The total number of power supplies to satisfy non-redundancy, plus one additional power supply for redundancy, are turned on and equally share the power load for the chassis. If any additional power supplies are installed, Cisco UCS Manager sets them to a "turned-off" state.
  - **grid**—Two power sources are turned on, or the chassis requires greater than N+1 redundancy. If one source fails (which causes a loss of power to one or two power supplies), the surviving power supplies on the other power circuit continue to provide power to the chassis.

For more information about power supply redundancy, see *Cisco UCS 5108 Server Chassis Hardware Installation Guide*.

- Step 6** Click **Save Changes**.
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# Configuring the Global Cap Policy

## Global Cap Policy

The global cap policy is a global policy that specifies whether policy-driven chassis group power capping or manual blade-level power capping will be applied to all servers in a chassis.

We recommend that you use the default power capping method: policy-driven chassis group power capping.

**Important**

Any change to the manual blade-level power cap configuration will result in the loss of any groups or configuration options set for policy-driven chassis group power capping.

## Configuring the Global Cap Policy

### Procedure

- Step 1** In the **Navigation** pane, click the **Equipment** tab.
  - Step 2** On the **Equipment** tab, click the **Equipment** node.
  - Step 3** In the **Work** pane, click the **Policies** tab.
  - Step 4** Click the **Global Policies** subtab.
  - Step 5** In the **Global Cap Policy** area, click one of the following radio buttons in the **Allocation Method** field to determine the power cap management mode used in the Cisco UCS instance:
    - **Manual Blade Level Cap**—Power allocation is configured on each individual blade server in all chassis. If you select this option, you cannot create power groups.
    - **Policy Driven Chassis Group Cap**—Power allocation is configured at the chassis level through power control policies included in the associated service profiles. If you select this option, you can also create power groups that contain one or more chassis in the Cisco UCS instance.
- By default, power allocation is done for each chassis through a power control policy.
- Step 6** Click **Save Changes**.

## Configuring Policy-Driven Chassis Group Power Capping

### Policy-Driven Chassis Group Power Capping

When policy-driven power chassis group power capping is selected in the global cap policy, Cisco UCS can maintain the oversubscription of servers without risking costly power failures. This is achieved through a two-tier process. At the chassis level, Cisco UCS divides the amount of power available between members of the power group. At the blade level, the amount of power allotted to a chassis is divided between blades based on priority.

Each time a service profile is associated or disassociated, UCS Manager recalculates the power allotment for each blade server within the chassis. If necessary, power from lower-priority service profiles is redistributed to higher-priority service profiles.

UCS power groups cap power in less than one second in order to safely protect data center circuit breakers. A blade must stay at its cap for 20 seconds before the chassis power distribution is optimized. This is intentionally carried out over a slower timescale to prevent reacting to transient spikes in demand.

**Note**

The system reserves enough power to boot a server in each slot, even if that slot is empty. This reserved power cannot be leveraged by servers requiring more power. Blades that fail to comply with the power cap are penalized or shut down.

## Configuring Power Groups

### Power Groups

A power group is a set of chassis that all draw power from the same power distribution unit (PDU). In Cisco UCS Manager, you can create power groups that include one or more chassis and then set a peak power cap in AC watts for that power grouping.

Instituting power capping at the chassis level requires the following:

- IOM, CIMC, and BIOS version 1.4 or higher
- 2 PSUs

The peak power cap is a static value that represents the maximum power available to all blade servers within a given power group. If you add or remove a blade from a power group, but do not manually modify the peak power value, the power group adjusts the peak power cap to accommodate the basic power-on requirements of all blades within that power group.

A minimum of 3788 AC watts should be set for each chassis. This converts to 3400 watts of DC power, which is the minimum amount of power required to power a fully-populated chassis.

If insufficient power is available, Cisco UCS Manager raises an alert.

Once a chassis is added to a power group, every service profile associated with that chassis also becomes part of that power group. Similarly, if you add a new blade to a chassis, that blade inherently becomes part of the chassis' power group.

**Note**

Creating a power group is not the same as creating a server pool. However, you can populate a server pool with members of the same power group by creating a power qualifier and adding it to server pool policy.

### Creating a Power Group

#### Before You Begin

Make sure the global power allocation policy is set to **Policy Driven Chassis Group Cap** on the **Global Policies** tab.

## Procedure

- Step 1** In the **Navigation** pane, click the **Equipment** tab.
- Step 2** On the **Equipment** tab, click the **Equipment** node.
- Step 3** In the **Work** pane, click the **Policies** tab.
- Step 4** Click the **Power Groups** subtab.
- Step 5** On the icon bar to the right of the table, click +.  
If the + icon is disabled, click an entry in the table to enable it.
- Step 6** On the first page of the **Create Power Group** wizard, complete the following fields:
- Enter a unique name and description for the power group.  
This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters, and you cannot change this name after the object has been saved.
  - Click **Next**.
- Step 7** On the **Add Chassis Members** page of the **Create Power Group** wizard, do the following:
- In the **Chassis** table, choose one or more chassis to include in the power group.
  - Click the >> button to add the chassis to the **Selected Chassis** table that displays all chassis included in the power group.  
You can use the << button to remove one or more chassis from the power group.
  - Click **Next**.
- Step 8** On the **Power Group Attributes** page of the **Create Power Group** wizard, do the following:
- Complete the following fields:

Name	Description
<b>AC Power Cap</b> field	The maximum peak power (in watts) available to the power group. Enter an integer between 0 and 10000000.
<b>Enable Dynamic Reallocation</b> field	This can be: <ul style="list-style-type: none"> <li><b>none</b>—Blade allocations are not adjusted dynamically.</li> <li><b>chassis</b>—Cisco UCS monitors power usage and changes the blade allocations as required to maximize power utilization.</li> </ul>

- Click **Finish**.

## Adding a Chassis to a Power Group

### Procedure

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- Step 1** In the **Navigation** pane, click the **Equipment** tab.
- Step 2** On the **Equipment** tab, click the **Equipment** node.
- Step 3** In the **Work** pane, click the **Power Groups** tab.
- Step 4** Right-click the power group to which you want to add a chassis and choose **Add Chassis Members**.
- Step 5** In the **Add Chassis Members** dialog box, do the following:
- a) In the **Chassis** table, choose one or more chassis to include in the power group.
  - b) Click the >> button to add the chassis to the **Selected Chassis** table that displays all chassis included in the power group.  
You can use the << button to remove one or more chassis from the power group.
  - c) Click **OK**.
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## Removing a Chassis from a Power Group

### Procedure

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- Step 1** In the **Navigation** pane, click the **Equipment** tab.
- Step 2** On the **Equipment** tab, click the **Equipment** node.
- Step 3** In the **Work** pane, click the **Power Groups** tab.
- Step 4** Expand the power group from which you want to remove a chassis.
- Step 5** Right-click the chassis that you want to remove from the power group and choose **Delete**.
- Step 6** If Cisco UCS Manager GUI displays a confirmation dialog box, click **Yes**.
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## Deleting a Power Group

### Procedure

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- Step 1** In the **Navigation** pane, click the **Equipment** tab.
- Step 2** On the **Equipment** tab, click the **Equipment** node.
- Step 3** In the **Work** pane, click the **Power Groups** tab.
- Step 4** Right-click the power group that you want to delete and choose **Delete**.
- Step 5** If Cisco UCS Manager GUI displays a confirmation dialog box, click **Yes**.
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# Configuring Power Control Policies

## Power Control Policy

Cisco UCS uses the priority set in the power control policy, along with the blade type and configuration, to calculate the initial power allocation for each blade within a chassis. During normal operation, the active blades within a chassis can borrow power from idle blades within the same chassis. If all blades are active and reach the power cap, service profiles with higher priority power control policies take precedence over service profiles with lower priority power control policies.

Priority is ranked on a scale of 1-10, where 1 indicates the highest priority and 10 indicates lowest priority. The default priority is 5.

For mission-critical application a special priority called no-cap is also available. Setting the priority to no-cap prevents Cisco UCS from leveraging unused power from that particular blade server. The server is allocated the maximum amount of power that that blade can reach.

**Note**

You must include this policy in a service profile and that service profile must be associated with a server for it to take effect.

## Creating a Power Control Policy

### Procedure

- Step 1** In the **Navigation** pane, click the **Servers** tab.
- Step 2** On the **Servers** tab, expand **Servers > Policies**.
- Step 3** Expand the node for the organization where you want to create the policy.  
If the system does not include multi-tenancy, expand the **root** node.
- Step 4** Right-click **Power Control Policies** and choose **Create Power Control Policy**.
- Step 5** In the **Create Power Control Policy** dialog box, complete the following fields:

Name	Description
Name field	The name of the policy.  This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters, and you cannot change this name after the object has been saved.

Name	Description
<b>Description</b> field	<p>A description of the policy. We recommend including information about where and when the policy should be used.</p> <p>Enter up to 256 characters. You can use any characters or spaces except ^ (carat), \ (backslash), &gt; (greater than), &lt; (less than), ' (single quote), " (double quote), ` (accent mark).</p>
<b>Power Capping</b> field	<p>What happens to a server when the demand for power within a power group exceeds the power supply. This can be:</p> <ul style="list-style-type: none"> <li>• <b>no-cap</b>—The server runs at full capacity regardless of the power requirements of the other servers in its power group.</li> <li>• <b>cap</b>—The server is allocated a minimum amount of power capacity based on the the server's priority relative to the other servers in its server group. If more power becomes available, Cisco UCS allows the capped servers to exceed their original allocations. It only lowers the allocations if there is a drop in the total power available to the power group.</li> </ul>
<b>Priority</b> field	<p>The priority the server has within its power group when power capping is in effect.</p> <p>Enter an integer between 1 and 10, where 1 is the highest priority.</p>

**Step 6** Click **OK**.

### What to Do Next

Include the policy in a service profile or service profile template.

## Deleting a Power Control Policy

### Procedure

- Step 1** In the **Navigation** pane, click the **Servers** tab.
- Step 2** On the **Servers** tab, expand **Servers > Policies > *Organization\_Name***.
- Step 3** Expand the **Power Control Policies** node.
- Step 4** Right-click the policy you want to delete and select **Delete**.
- Step 5** If Cisco UCS Manager GUI displays a confirmation dialog box, click **Yes**.



# Configuring Manual Blade-Level Power Capping

## Manual Blade-Level Power Capping

When manual blade-level power capping is configured in the global cap policy, you can set a power cap for each blade server in a Cisco UCS instance.

The following configuration options are available:

### Enabled

You can specify the maximum amount of power that the server can consume at one time. This maximum can be any amount between 0 watts and 1100 watts.

### Disabled

No power usage limitations are imposed upon the server. The server can use as much power as it requires.

If the server encounters a spike in power usage that meets or exceeds the maximum configured for the server, Cisco UCS Manager does not disconnect or shut down the server. Instead, Cisco UCS Manager reduces the power that is made available to the server. This reduction can slow down the server, including a reduction in CPU speed.

## Setting the Blade-Level Power Cap for a Server

### Before You Begin

Make sure the global power allocation policy is set to **Manual Blade Level Cap** on the **Global Policies** tab.

### Procedure

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- Step 1** In the **Navigation** pane, click the **Equipment** tab.
  - Step 2** On the **Equipment** tab, expand **Equipment > Chassis > Chassis Number > Servers**.
  - Step 3** Choose the server for which you want to set the power budget.
  - Step 4** In the **Work** pane, click the **General** tab.
  - Step 5** In the **Power Budget** area, do the following:
    - a) Click the **Expand** icon to the right of the heading to display the fields.
    - b) Complete the following fields:

Global PoliciesName	Description
<b>Admin Status</b> field	<p>Whether this server is power capped. This can be:</p> <ul style="list-style-type: none"> <li>• <b>Unbounded</b>—The server is not power capped under any circumstances.</li> <li>• <b>Enabled</b>—Cisco UCS Manager GUI displays the <b>Watts</b> field.</li> </ul> <p><b>Note</b> Power capping only goes into effect if there is insufficient power available to the chassis to meet the demand. If there is sufficient power, the server can use as many watts as it requires.</p>
<b>Watts</b> field	<p>The maximum number of watts the server can use if there is not enough power to the chassis to meet the demand.</p> <p>Enter an integer between 0 and 10000000.</p>

**Step 6** Click **Save Changes**.

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## Viewing the Blade-Level Power Cap

### Procedure

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**Step 1** In the **Navigation** pane, click the **Equipment** tab.

**Step 2** On the **Equipment** tab, expand **Equipment > Chassis**.

**Step 3** Choose the chassis for which you want to view the server power usage.

**Step 4** Do one of the following:

- To view the power usage for all servers in the chassis, click the **Power** tab in the **Work** pane.
- To view the power usage for one server in the chassis, expand the chassis and click the server. Then click the **Power** tab in the **Work** pane.

**Step 5** If necessary, expand the **Motherboards** node to view the power counters.

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