



# Installing Battery Backup Units (BBUs)

The Cisco 1240 Connected Grid Router (CGR 1240 or router) supports up to three battery backup units (BBUs), which provide power to the router if the router AC power supply fails or is not available. This section describes the BBU features and installation procedures.

These topics are discussed:

- [Battery Backup Units, page 141](#)
- [BBU Lifecycle Handling and Storage Guidelines, page 144](#)
- [Preparing to Install the BBU, page 146](#)
- [Installing a BBU in the Router, page 150](#)
- [Disabling and Enabling the BBU in the Router, page 155](#)
- [Battery Backup Unit LED, page 159](#)
- [Related Commands, page 160](#)
- [BBU Technical Specifications, page 170](#)

## Battery Backup Units

This section contains information about:

- [Battery Backup Operations, page 141](#)
- [BBU Status, page 142](#)
- [BBU Firmware Upgrade, page 143](#)
- [BBU Capacity, page 144](#)

## Battery Backup Operations

The battery backup unit (BBU) provides the router with an emergency power source if the AC power source is unavailable.

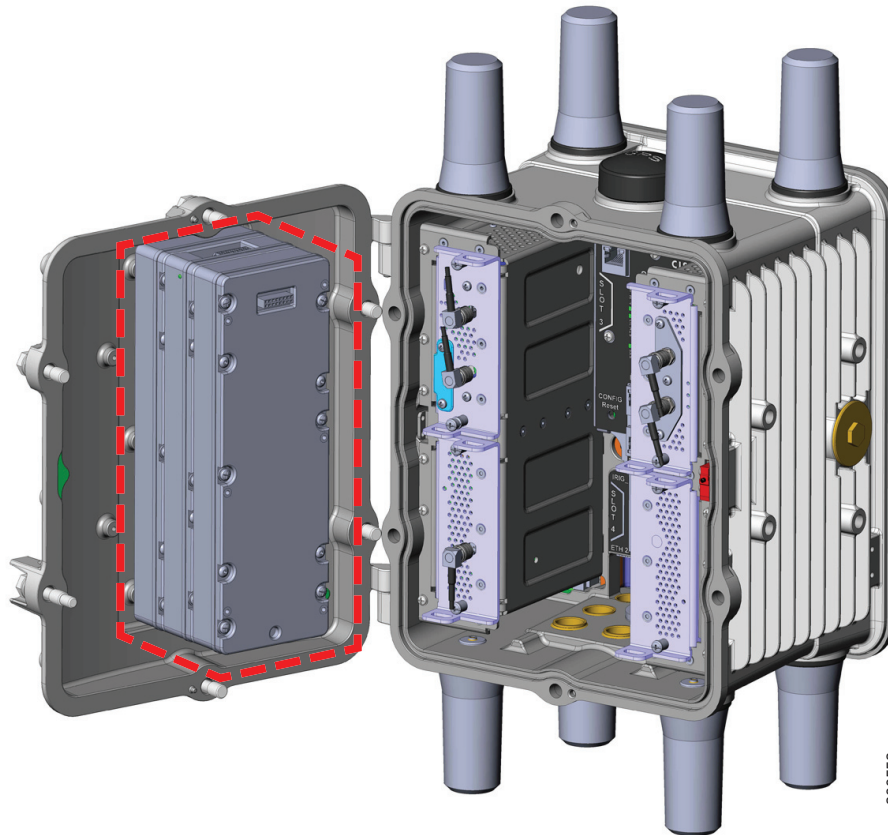
The router supports up to three BBU units installed at one time. The units are mounted on the router door interior ([Figure 87 on page 142](#)).

The total amount of time that the installed BBUs can supply power to the router depends on the configuration of the FAR and how many BBUs are installed in the router.

The BBU can be installed in the router while the router is powered on and operating normally.

The BBU internal components include battery cells, a primary protection circuit, a fuel gauge, and a charger. For detailed, illustrated descriptions of the BBU, see [BBU Components, page 147](#).

**Figure 87 Battery Backup Units Mounted on Router Door**



Item	Cisco Product ID (PID)	Description
1	CGR-BATT-4AH	Battery backup units. The router supports up to three BBUs. <a href="#">Figure 87</a> shows the router with three BBUs, highlighted in red.

## BBU Status

The BBU is automatically enabled and begins supplying power to the router when the router detects that power is not being received from the AC power supply. The BBU continues to supply power to the router until at least one of the following conditions is met:

- All BBUs are completely discharged
- AC power to the router is enabled
- The BBU is disabled with software commands (see [Related Commands, page 160](#))

**Note:** For information on technical details about the router power path selection and the conditions that trigger the BBU to begin operating, see [BBU Technical Specifications, page 170](#).

## Battery Backup Mode

This section describes the impact on the router configuration and operating capabilities when the router switches from AC power to BBU power.

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These topics are discussed:

- [Router Configuration, page 143](#)
- [Ethernet Switch and Connected Grid Module Operation, page 143](#)
- [Router Interface Operation, page 143](#)

## Router Configuration

The router software configuration is not impacted when the router switches from AC power to BBU power.

## Ethernet Switch and Connected Grid Module Operation

By default, the Ethernet switch module (referred to as module 2 in the system software) and any modules installed in slots 3, 4, 5, and 6 continue to operate normally when the router switches from AC power to BBU power.

On routers using the Cisco CG-OS operating system, you can use the **poweroff module *number* backup-battery** command to configure the modules (including the Ethernet switch) to shut down when the router switches to BBU power. See [poweroff module \*number\* backup-battery, page 163](#).

You can configure the router to automatically power off specific modules when the router switches to BBU power.

**Note:** You can only use the **poweroff module *number* backup-battery** command to configure modules to shut down when the router switches to BBU power, on routers using the Cisco CG-OS operating system. This CLI action cannot be performed on routers using the Cisco IOS operating system.

## Router Interface Operation

To conserve power, the router will power off some interfaces when AC power is not available and the router is being powered by the BBU. The following interfaces and router components switch to power-off mode when the BBU is supplying power to the router:

- Both SFP interfaces
- Both external USB ports
- Both serial (S232/485) ports
- IRIG-B port

When these interfaces are in power-off mode, you cannot configure them with the system software; however, you can display information about each interface using the following **show** commands:

- **show running config**
- **show hardware**
- **show interface**

## BBU Firmware Upgrade

**Note:** You can only use the **backup-battery firmware upgrade** command, to upgrade the BBU firmware and to show information about the BBU firmware upgrade, on routers using the Cisco CG-OS operating system. This command cannot be used on routers using the Cisco IOS operating system.

To upgrade the BBU firmware and to show information about the BBU firmware upgrade, issue the following command:

```
CGR1240# backup-battery firmware upgrade
```

---

The firmware upgrade is executed in background and a syslog message is displayed when the BBU firmware upgrade has completed. During the firmware upgrade, you can issue the **show environment power** command to view the state of the BBU firmware upgrade.

## BBU Capacity

The router supports up to three BBUs at one time. You should install as many BBUs as needed, up to three, to meet your emergency power requirements.

If all installed batteries fully discharge while providing backup power to the router, the router will send a dying gasp message and then shut down.

## BBU Lifecycle Handling and Storage Guidelines

This section contains information about the BBU status and condition during the BBU lifecycle and how to approach and manage it. These topics are discussed:

- [BBU Storage Related Definitions, page 144](#)
- [BBU Shipping and Receiving Guidelines, page 144](#)
- [BBU Storage and Handling Guidelines, page 145](#)
- [Recharging a BBU, page 145](#)
- [Replacing a BBU, page 145](#)
- [BBU Disposal Guidelines, page 146](#)

## BBU Storage Related Definitions

- [Shelf Life, page 144](#)
- [State of Charge, page 144](#)

### Shelf Life

Shelf life is the length of time before a BBU needs to be recharged in order to avoid BBU over-discharge.

### State of Charge

State of charge (SOC) is the amount of charge on a battery and it is expressed as a percentage value. For example, an SOC of 100% represents a battery that is fully charged, and an SOC of 0% represents a battery that is fully discharged or has no charge.

## BBU Shipping and Receiving Guidelines

The BBU shipping and receiving guidelines define the BBU SOC status and how it can be managed at this stage of the BBU life cycle:

- Cisco ships BBUs with a minimum of 60% SOC from the Cisco contract manufacturer (CM).
- Each BBU should have a minimum SOC of 50% upon receipt from the Cisco CM.
  - A minimum SOC of 50% allows for approximately 10 weeks between shipment from Cisco's CM and a customer checking the SOC.

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- SOC decreases approximately 1% per week.
  - BBU SOC status can be checked using the command line interface (CLI) or CG-NMS.
  - BBUs with less than 50% SOC should be recharged by the system integrator or customer to >50% SOC.

## BBU Storage and Handling Guidelines

The BBU storage and handling guidelines define the BBU shelf life status and how it can be managed at this stage of the BBU lifecycle:

- The shelf life of a BBU installed in a router with discharge disabled and BBU disabled, or for a spare BBU, is a minimum of 365 days.
- Prior to connection to an AC source, the BBU shelf life is a minimum of 21 days.
- When long term storage at a customer site is anticipated, Cisco requires that the BBUs be recharged prior to expiration of shelf life.
- When AC power is disconnected and the Cisco Connected Grid router is removed from service:
  - The CGR switches to DC power supplied by the BBU(s) and remains powered for approximately 8 hours.
  - After 8 hours the BBU(s) reaches low voltage disconnect, and the remaining shelf life is a minimum of 21 days.
  - The BBU should be placed in "BBU disable mode" when the CGR is removed from service in order to extend BBU shelf life up to 365 + 21 days
  - The remaining shelf life depends on the elapsed time between removal of AC power and the BBU placed in "BBU disable mode" .
  - Disabling a BBU at 0% SOC means a minimum remaining shelf life of 21 days, and disabling a BBU 100% SOC means a maximum remaining shelf life of 386 days.

## Recharging a BBU

To recharge a BBU:

1. Enable the BBU.
2. Connect the CGR to an AC power source.
3. Allow at least 8 hours of charge time per BBU, i.e. for CGRs with 3 BBUs each, allow 24 hours charge time per CGR.
4. When the charge time is finished, disable the BBU.

## Replacing a BBU

**Note:** When you replace a BBU in the CGR 1240, we highly recommend:

- Replacing all the BBUs.
- Verifying all the replacement BBUs are the same version.

When a CGR 1240 operates with different BBU versions, it may result in misbehavior in the BBU functionality. This condition is seen in CGR 1240s installed with either Cisco IOS or Cisco CG-OS software.

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To replace a BBU:

1. Remove AC power from the CGR.
2. Disconnect the BBU Harness from the BBU.
3. Replace all BBUs of the CGR at the same time.

**Note:** Do not mix used BBUs with new BBUs.

## BBU Disposal Guidelines

Instructions for disposal of BBUs

- For CGRs under warranty, follow the standard Cisco RMA procedures.
- If Cisco identifies a BBU or set of BBUs as a non-functional item that can be discarded without being returned for failure analysis, BBUs removed for replacement must be disposed of in accordance with local guidelines.
- US and Canadian customers should utilize [www.call2recycle.org](http://www.call2recycle.org) to properly recycle the lithium ion BBUs.
- For local recycling outside of the US and Canada, customers should contact the following Cisco email for guidance specific to customer's country/region: [environment@cisco.com](mailto:environment@cisco.com)
- For further local take-back and recycling information, customers can refer to: [www.cisco-returns.com](http://www.cisco-returns.com)

## Preparing to Install the BBU

### Tools You Supply

You must provide a #1 Phillips screwdriver to install the BBU.

## Safety Information for Installation

### Safety Warnings

Read the safety warnings in [Installation Safety and Site Preparation, page 3](#).

**Warning: There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** Statement 1015

**Warning: Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

**Note:** When you replace a BBU in the CGR 1240, we highly recommend:

- Replacing all the BBUs.
- Verifying all the replacement BBUs are the same version.

When a CGR 1240 operates with different BBU versions, it may result in misbehavior in the BBU functionality. This condition is seen in CGR 1240s installed with either Cisco IOS or Cisco CG-OS software.

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## Preventing Electrostatic Discharge Damage

The BBUs are sensitive to electrostatic discharge (ESD) damage which can occur when electronic cards or components are handled improperly, and can result in complete or intermittent failures.

To prevent ESD damage, follow these guidelines:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- Place the BBU on an antistatic surface or in a static shielding bag. If the BBU will be returned to the factory, immediately place it in a static shielding bag.
- Avoid contact between the battery and clothing. The wrist strap protects the battery from ESD voltages on the body only; ESD voltages on clothing can still cause damage.
- Do not remove the wrist strap until the installation is complete.

## BBU Components

This section illustrates and describes the BBU components you should be familiar with when installing the BBU.

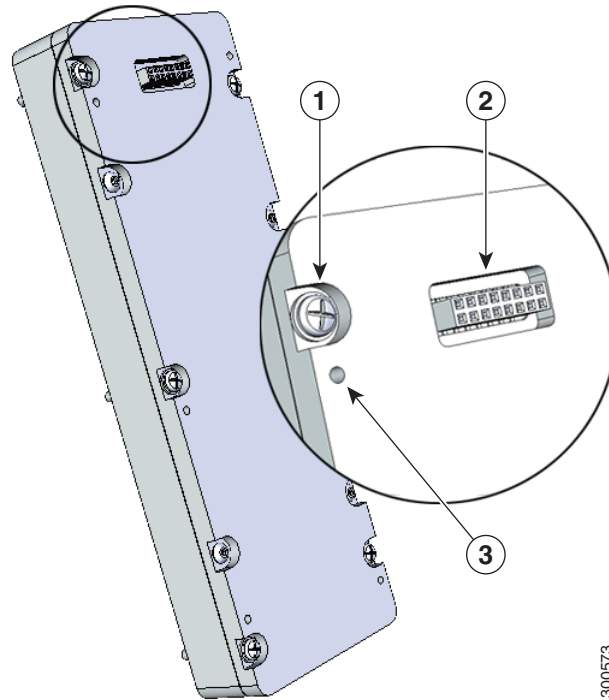
**Note:** For technical specifications of the components described in this section, see [BBU Technical Specifications, page 170](#).

- [Battery-to-Battery Connectors, page 148](#)
- [Battery-to-Router Connector, page 149](#)
- [Locating Pin and Notch, page 150](#)

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## Battery-to-Battery Connectors

**Figure 88 Front of Battery Backup Unit**



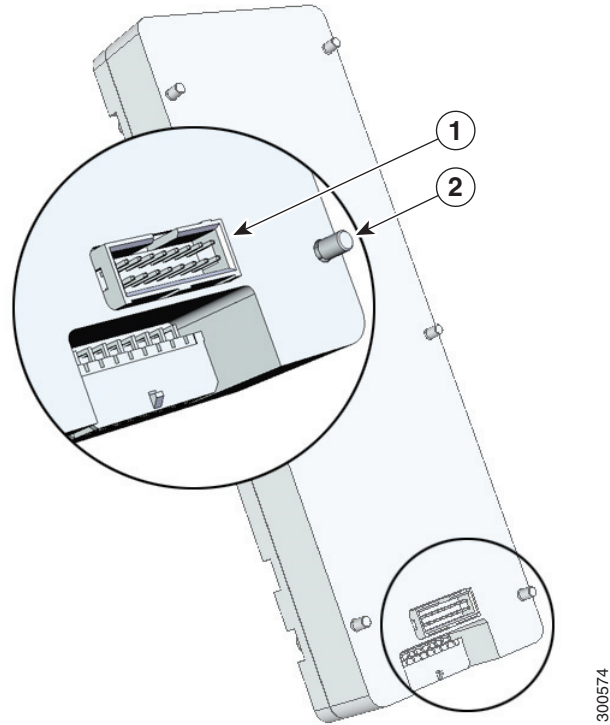
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Item	Description
------	-------------

- |   |   |
|---|---|
| 1 | Captive screws (6) for installing the BBU directly to the router door or to another BBU already installed on the router door.   |
| 2 | Battery-to-battery connector, female. The BBU features two battery-to-battery connectors: one male and one female, which are used to connect batteries together when two or more batteries are installed in one router. |
| 3 | Threaded insert used to attach an additional BBU (6)  |



**Figure 89 Rear of Battery Backup Unit**

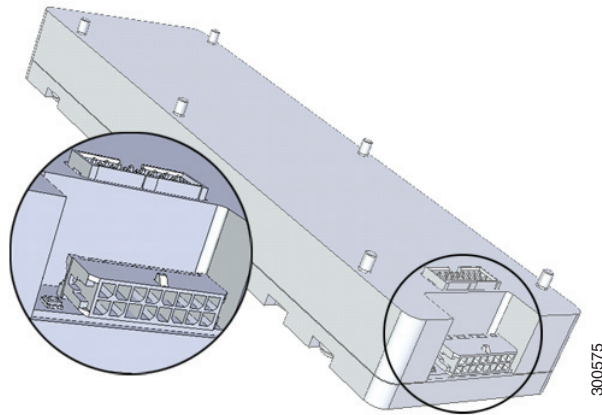


Item	Description
1	Battery-to-battery connector, male. The BBU features two battery-to-battery connectors: one male and one female, which are used to connect batteries together when two or more batteries are installed in one router.
2	Captive screws (6)

### Battery-to-Router Connector

The first BBU installed features a single battery-to-router connector at the base, which connects to the BBU cable inside the router (shown in [Figure 92 on page 152](#)).

**Figure 90 Battery-to-Router Connector**

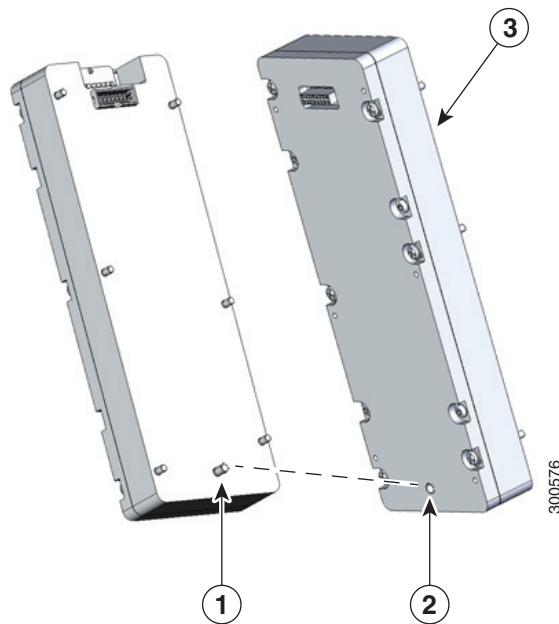


### Locating Pin and Notch

When you connect a second or third battery to a battery already installed in the router, use the locating pin and notch to ensure correct battery position and align the battery connectors.

Figure 91 on page 150 illustrates the pin and notch location on the BBU.

**Figure 91 Locating Pin and Notch**



Item	Description	Item	Description
1	Locating notch (back of BBU)	2	Locating pin (front of BBU)
3	Side that attaches to router door		

## Installing a BBU in the Router

This section describes how to install a BBU in the router. A new BBU will be about 50% charged when you receive it.

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**Caution:** When you install a BBU in the router, if there is no AC power being supplied to the router, the BBU will immediately begin to power the router when it is connected to the BBU harness cable.

To prevent the BBU charging the router prior to installation in the field, the BBU is disabled during shipment. To ensure the BBU can be charged and power the router when required, enable the BBU right after installation.

**Note:** When you replace a BBU in the CGR 1240, we highly recommend:

- Replacing all the BBUs.
- Verifying all the replacement BBUs are the same version.

When a CGR 1240 operates with different BBU versions, it may result in misbehavior in the BBU functionality. This condition is seen in CGR 1240s installed with either Cisco IOS or Cisco CG-OS software.

These topics are discussed:

- [Online Insertion and Removal, page 151](#)
- [Installation Illustrations, page 151](#)
- [Installation Procedures, page 151](#)
- [Installing BBU 0, page 153](#)
- [Installing BBU 1 or BBU 2, page 154](#)

## Online Insertion and Removal

BBU Online Insertion and Removal (OIR) is not supported by the Cisco CG-OS or Cisco IOS operating systems.

For routers using the Cisco CG-OS operating system, the workaround is to execute the **battery disable** command at the CLI and then perform the insertion or removal. There is no workaround for Cisco IOS.

## Installation Illustrations

The procedures in this section refer to the following illustrations:

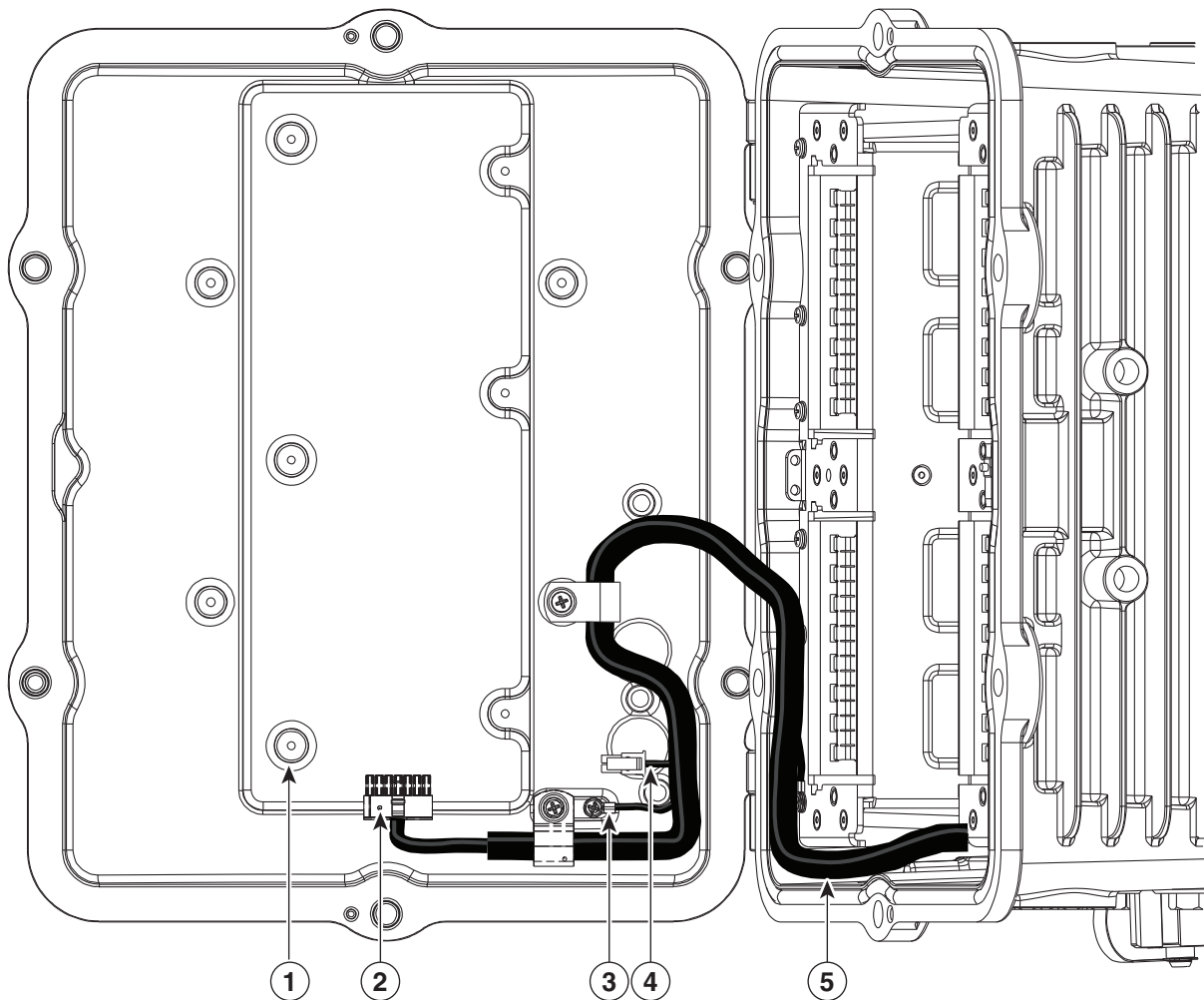
- BBU components illustrated in [BBU Components, page 147](#)
- Router installation features shown in [Figure 92 on page 152](#)
- BBU installation assembly shown in [Figure 93 on page 153](#)

## Installation Procedures

This section includes steps for the following procedures:

- [Installing BBU 0, page 153](#) (Installing a single BBU)
- [Installing BBU 1 or BBU 2, page 154](#) (Installing additional BBUs)

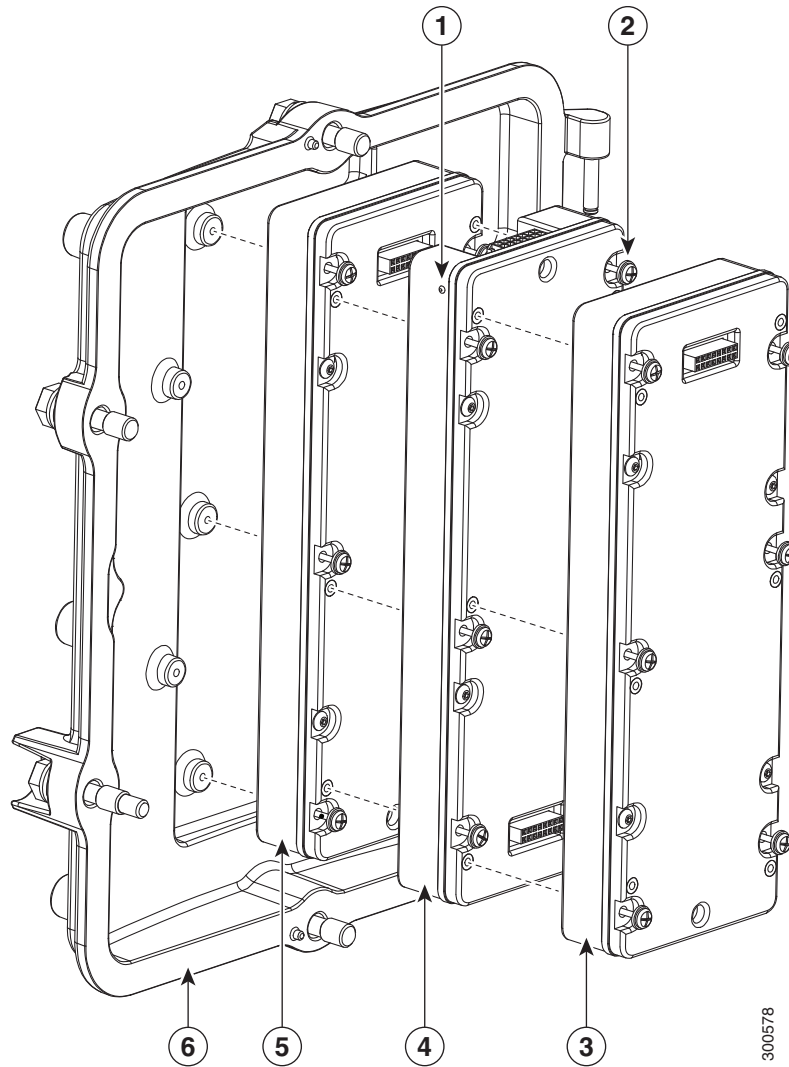
**Figure 92 Router Features for BBU Installation**



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Item	Description
1	Mounting bosses, for installing first BBU to router (6).
2	BBU cable connector. The BBU is connected to the router cable harness with this connector.
3	Ground lug (door to chassis).
4	Non-Cisco module power connector (12 V). If you install a non-Cisco module on the router exterior, you can optionally use this connector to provide power to the module.  See <a href="#">Installing External Non-Cisco Modules, page 173</a> .
5	BBU cable harness. The cable harness connects the BBU(s) to the router and is the physical connection over which BBU power is supplied to the router when AC power is not available. The router is shipped with this cable even if the router is not shipped with a BBU installed.

Figure 93 BBU Installation Assembly



Item	Description
1	BBU LED.
2	Captive screws (6 per BBU). Use 7-9 in-lbs torque when tightening.
3	BBU 2
4	BBU 1
5	BBU 0
6	Router door

## Installing BBU 0

**Note:** When you replace a BBU in the CGR 1240, we highly recommend:

- Replacing all the BBUs.
- Verifying all the replacement BBUs are the same version.

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When a CGR 1240 operates with different BBU versions, it may result in misbehavior in the BBU functionality. This condition is seen in CGR 1240s installed with either Cisco IOS or Cisco CG-OS software.

**Note:** If you are installing a second or third BBU, follow the steps in [Installing BBU 1 or BBU 2, page 154](#).

To install BBU 0 (the first BBU) in the router:

1. Power down the router completely.

For more information:

<http://www.cisco.com/en/US/docs/routers/connectedgrid/cgr1000/hardware/cgr1240/power.off.html>

2. Open the chassis.

For more information:

<http://www.cisco.com/en/US/docs/routers/connectedgrid/cgr1000/hardware/cgr1240/chassis.html>

3. Remove the BBU cable (from BBU 0, if present).
4. Install the new BBU.
5. Connect the BBU cable to the newly installed BBU.
6. Close the router chassis.

For more information:

<http://www.cisco.com/en/US/docs/routers/connectedgrid/cgr1000/hardware/cgr1240/chassis.html>

7. Reconnect the router to AC power.

For more information:

<http://www.cisco.com/en/US/docs/routers/connectedgrid/cgr1000/hardware/cgr1240/cabling.html#wp1054345>

## Installing BBU 1 or BBU 2

**Note:** When you replace a BBU in the CGR 1240, we highly recommend:

- Replacing all the BBUs.
- Verifying all the replacement BBUs are the same version.

When a CGR 1240 operates with different BBU versions, it may result in misbehavior in the BBU functionality. This condition is seen in CGR 1240s installed with either Cisco IOS or Cisco CG-OS software.

To install BBU 1 or BBU 2 (a second or third BBU) in the router:

1. Open the chassis door by following the steps in [Opening and Closing the Router Chassis, page 75](#).
2. Align the BBU so that the locating pin and the female battery-to-battery connector are facing out and the locating notch is at the top of the router.
3. Slide the locating notch on the new BBU over the locating pin on the installed battery, and verify that the BBU male connector on the new BBU is aligned with the female connector on the installed BBU.
4. Press firmly against the new BBU to seat the connectors and connect the new BBU to the installed BBU.
5. Use your hand to loosely and evenly tighten the six captive screws on the new BBU into the corresponding six threaded connectors on the installed BBU.
6. Use the #1 Phillips screwdriver to tighten the screws to the installed BBU using 7-9 in-lbs of torque

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7. Verify that the BBU has been successfully installed and is operating normally by viewing the status of the BBU LED. See [Battery Backup Unit LED, page 159](#). The LED displays the following sequence:
    - a. Red fast blinking—BBU is powered on and is initializing.
    - b. Red and green alternate blinking— BBU is synchronizing with the router and the other BBUs.
    - c. The final BBU LED state is one of the following:
      - Blinking amber—BBU detects that there is no AC power supplied to the router and begins discharging (supplying power to the router).
      - Blinking green—The BBU was not fully charged when installed and is charging to full capacity. The router is powered by the AC power supply.
      - Solid green—The BBU is fully charged. The router is powered by the AC power supply.
  8. Close the chassis door by following the steps in [Opening and Closing the Router Chassis, page 75](#).

## Disabling and Enabling the BBU in the Router

The BBU automatically begins to supply power to the router when it detects that power is not being received from the AC power supply. You may wish to disable and enable the BBU for the following reasons:

- To inhibit the BBU discharge during storage, shipping or transportation in order to preserve battery life.
- To replace the battery in an installed and operating router.

The BBU can be disabled and enabled by using a hardware approach or by using software command line interface (CLI) commands.

- [Disabling the BBU, page 155](#)
- [Enabling the BBU, page 157](#)

### Disabling the BBU

- [Disabling the BBU via Hardware, page 155](#)
- [Disabling the BBU via the CLI, page 156](#)

**Note:** The default setting is the BBU becomes enabled when it is connected to the router BBU cable.

### Disabling the BBU via Hardware

To disable the BBU via hardware, use the following method:

Disable the BBU via BBU Cable Connector on the Router Cable Harness

1. Open the chassis door by following the steps in [Opening the Router Door, page 75](#).
2. Locate the BBU cable connector attached to the base of BBU 1. Find the latch on the underside of the connector. Press the tab of the latch and pull it to disconnect the connector from BBU 1.
3. Tuck the BBU connector into the chassis door to prevent any interference with the closure of the door.
4. Close the chassis door by following the steps in [Closing the Door, page 78](#).

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## Disabling the BBU via the CLI

Different BBU functionality can be disabled via the CLI:

- Disable the BBU discharge—for example, to inhibit the BBU discharge during storage, shipping or transport in order to preserve battery life.
- Disable the BBU operation—for example, to replace the battery in an installed and operating router.

The CLI operations are detailed in the following sections:

- [Disabling the BBU Discharge in a Cisco CG-OS Router, page 156](#)
- [Disabling the BBU Discharge in a Cisco IOS Router, page 156](#)
- [Disabling the BBU Operation in a Cisco CG-OS Router, page 156](#)
- [Disabling the BBU Operation in a Cisco IOS Router, page 157](#)

### Disabling the BBU Discharge in a Cisco CG-OS Router

**Note:** Disable the BBU discharge—for example, during storage, shipping or transportation, in order to preserve battery life.

**Note:** When the BBU discharge is disabled by the **backup-battery inhibit discharge command**, the BBU does not charge, even if it is connected to AC power. The BBU discharge must be enabled by the **backup-battery un-inhibit discharge command**, and the BBU connected to AC power, for the BBU to charge.

To disable the BBU discharge in a Cisco CG-OS router:

1. Connect the router to an AC power source.
2. Enter the **backup-battery inhibit discharge EXEC** command:

```
CGR1240# backup-battery inhibit discharge
```

See [backup-battery inhibit discharge, page 163](#).

### Disabling the BBU Discharge in a Cisco IOS Router

**Note:** Disable the BBU discharge—for example, during storage, shipping or transportation, in order to preserve battery life.

**Note:** When the BBU discharge is disabled by the **backup charge-discharge disable command**, the BBU does not charge, even if it is connected to AC power. The BBU discharge must be enabled by the **backup charge-discharge enable command**, and the BBU connected to AC power, for the BBU to charge.

To disable the BBU discharge in a Cisco IOS router:

1. Connect the router to an AC power source.
2. Enter the **backup charge-discharge disable EXEC** command:

```
CGR1240# battery charge-discharge disable
```

See [battery charge-discharge, page 164](#).

### Disabling the BBU Operation in a Cisco CG-OS Router

**Note:** Disable the BBU operation—for example, when a battery is due for replacement in an installed and operational router.



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To disable the BBU operation in a Cisco CG-OS router:

1. Connect the router to an AC power source.
2. Enter the **backup-battery disable** EXEC command:

```
CGR1240# backup-battery disable
```

See [backup-battery disable, page 162](#).

## Disabling the BBU Operation in a Cisco IOS Router

**Note:** You cannot disable BBU operation using the CLI on routers using the Cisco IOS operating system. You can only disable BBU operation using the CLI on routers using the Cisco CG-OS operating system.

## Enabling the BBU

- [Enabling the BBU via Hardware, page 157](#)
- [Enabling the BBU via the CLI, page 157](#)

**Note:** The default setting is the BBU becomes enabled when it is connected to the router BBU cable.

## Enabling the BBU via Hardware

To enable the BBU (depending on the method used):

- [Enable the BBU via BBU Cable Connector on the Router Cable Harness, page 157](#)

### Enable the BBU via BBU Cable Connector on the Router Cable Harness

1. Open the chassis door by following the steps in [Opening the Router Door, page 75](#).
2. Locate the BBU cable connector in the chassis door. Find the socket on the base of BBU 1. With the latch of the connector facing the chassis door, press the connector into the socket.
3. Tuck the router cable harness into the chassis door to prevent any interference with the closure of the door.
4. Close the chassis door by following the steps in [Closing the Door, page 78](#).

## Enabling the BBU via the CLI

The default setting is the BBU becomes enabled when it is connected to the router BBU cable. If the BBU is disabled for any reason, you may need to enable it once more.

Different BBU functionality can be enabled via the CLI:

- Enable the BBU discharge—for example, used to reenable the BBU discharge after storage, shipping or transport in order to resume battery discharge.
- Enable the BBU operation—for example, used to enable a replacement battery in an installed and peritoneal router.

The CLI operations are detailed in the following sections:

- [Enabling the BBU Discharge in a Cisco CG-OS Router, page 158](#)
- [Enabling the BBU Discharge in a Cisco IOS Router, page 158](#)
- [Enabling the BBU Operation in a Cisco CG-OS Router, page 158](#)

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- [Enabling the BBU Operation in a Cisco IOS Router, page 158](#)

## Enabling the BBU Discharge in a Cisco CG-OS Router

**Note:** Enable the BBU discharge—for example, if it is in a disabled state after storage, shipping or transportation.

**Note:** When the BBU discharge is disabled by the **backup-battery inhibit discharge command**, the BBU does not charge, even if it is connected to AC power. The BBU discharge must be enabled by the **backup-battery un-inhibit discharge command**, and the BBU connected to AC power, for the BBU to charge.

To enable the BBU discharge in a Cisco CG-OS router:

1. Connect the router to an AC power source.
2. Enter the **backup-battery un-inhibit discharge EXEC** command:

```
CGR1240# backup-battery un-inhibit discharge
```

See [backup-battery inhibit discharge, page 163](#).

## Enabling the BBU Discharge in a Cisco IOS Router

**Note:** Enable the BBU discharge—for example, if a BBU is in a disabled state after storage, shipping or transportation.

**Note:** When the BBU discharge is disabled by the **backup charge-discharge disable command**, the BBU does not charge, even if it is connected to AC power. The BBU discharge must be enabled by the **backup charge-discharge enable command**, and the BBU connected to AC power, for the BBU to charge.

To enable the BBU discharge in a Cisco IOS router:

1. Connect the router to an AC power source.
2. Enter the **backup charge-discharge enable EXEC** command:

```
CGR1240# battery charge-discharge enable
```

See [battery charge-discharge, page 164](#).

## Enabling the BBU Operation in a Cisco CG-OS Router

**Note:** Enable the BBU operation—for example, after a replacement BBU is placed in an installed and operational router.

To enable the BBU operation in a Cisco CG-OS router:

1. Connect the router to an AC power source.
2. Enter the **backup-battery enable EXEC** command:

```
CGR1240# backup-battery enable
```

See [backup-battery enable, page 162](#).

## Enabling the BBU Operation in a Cisco IOS Router

**Note:** You cannot enable the BBU operation using the CLI on routers using the Cisco IOS operating system. You can only enable the BBU operation using the CLI on routers using the Cisco CG-OS operating system.

## Working with the BBU in Transportation Mode

There are some discrepancies between the CLI commands and the NMS that could cause a BBU failure.

Two commands, `do no battery transportation-mode` and `do battery charge-discharge enable`, do not work from the NMS. The NMS reports the device configuration push was successful, and the re-registration was successful, however the settings remain unchanged on the router.

Ensure that when you are using a BBU that you make sure the configuration is correct using the CLI. For example:

```
CGR1240#[no] battery transportation-mode
```

When the router has the transportation-mode set, inhibit discharge is enabled when AC is ON and inhibit discharge is disabled when AC is OFF. So, effectively the battery can be charged, but does not discharge.

The transportation mode status is shown in the show platform battery output:

```
CGR1240#show platform battery
Battery level 2% (0:08), Charging (Transportation mode)
```

```
CGR1240#show platform battery unit
Battery pack state: Operational (Transportation mode)
```

Battery unit	0	1	2
Status .....	Charging	Empty	Empty
Charge and Discharge .....	enabled	enabled	enabled
Charge level .....	7 %	0 %	0 %
Capacity Remaining (mAh)	313	0	0
Full Charge Capacity (mAh)	5739	5739	5739
Voltage .....	10506	10222	10171
Current .....	845	0	0
Temperature .....	30	31	29
Firmware version .....	1224	1224	1224

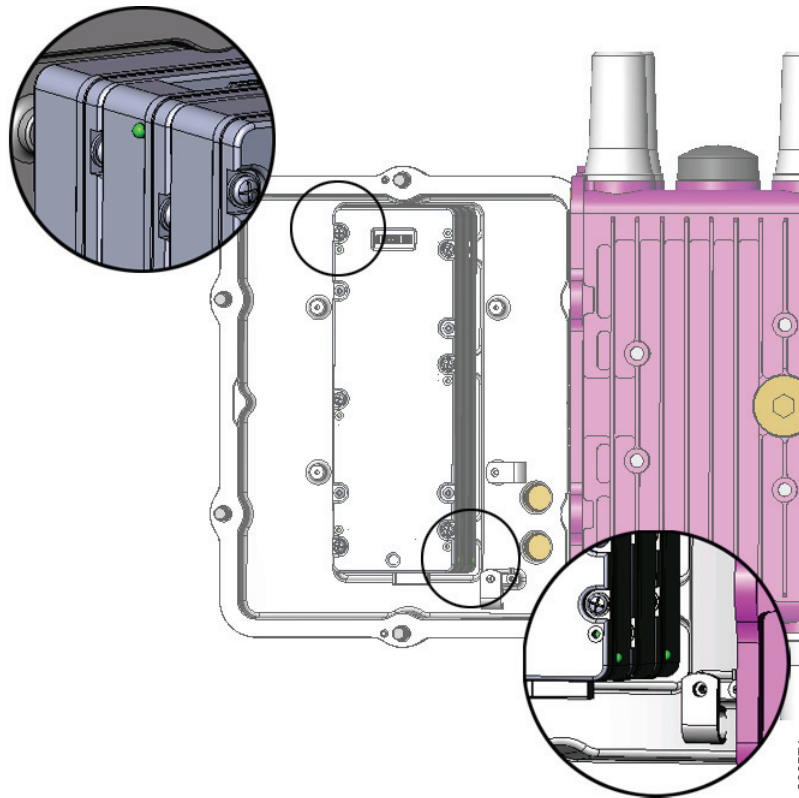
The transportation mode overrides the charge bit to enable it. Therefore, if the battery charge-discharge bit was previously disabled, it enables charge and the charge-discharge disable cli becomes redundant.

Transportation mode setting is persistent on system reload.

## Battery Backup Unit LED

The BBU features a single LED that indicates the status of the BBU when it is installed in the router.

**Figure 94 Battery Backup Unit LED Location**



LED	Color and State	Description
BBU	Green solid	Idle state
	Green blinking	Charging
	Amber blinking	Discharging (providing power to the system)
	Amber slow blinking	Disabled with the system software
	Red/green blinking	Initializing
	Red fast blinking	Resetting
	Red blinking	Bootloader mode
	Red slow blinking	Test mode
	Red solid	BBU failure
	Off	Disabled (disconnected from router or completely discharged)

## Related Commands

- [CG-OS Battery BBU Commands, page 161](#)
- [Cisco IOS BBU Commands, page 164](#)

---

## CG-OS Battery BBU Commands

This section describes the battery backup commands for routers using the Cisco CG-OS operating system, including:

- [backup-battery firmware upgrade, page 161](#)
- [show environment power, page 161](#)
- [backup-battery enable, page 162](#)
- [backup-battery disable, page 162](#)
- [backup-battery reset, page 162](#)
- [backup-battery hard-reset, page 162](#)
- [backup-battery inhibit discharge, page 163](#)
- [poweroff module number backup-battery, page 163](#)

### backup-battery firmware upgrade

**Note:** The **backup-battery firmware upgrade** command only works on routers using the Cisco CG-OS operating system.

To upgrade the BBU firmware, use the **backup-battery firmware upgrade** EXEC command in user EXEC mode:

```
CGR1240# backup-battery firmware upgrade
```

When this command is issued, the firmware upgrade is executed in the background and a syslog message is displayed when the upgrade is complete.

To view the status of the BBU firmware download during the upgrade process, use the **show environment power** EXEC command in user EXEC mode. See [show environment power, page 161](#).

### show environment power

**Note:** The **show environment power** command only displays both the power statistical data and the battery backup status on routers using the Cisco CG-OS operating system. The command only displays the power statistical data on routers using the Cisco IOS operating system.

To display the power statistical data and battery backup status, use the **show environment power** command in user EXEC mode:

```
CGR1240# show environment power
```

A sample output from this command is:

```
Power Supply Summary:
-----
AC Voltage: 116.00Volts
AC Current: 0.31Amps
DC Voltage: 11.98Volts
DC Current: 0.95Amps
Hotspot 1 temperature: 38.25C
Hotspot 2 temperature: 50.25C

Backup Battery Status:
-----
BBU State :
```

---

Backup Battery Not Present

The power supply summary section provides power data for the router and the backup battery status section provides status information on the BBU's presence.

## backup-battery enable

**Note:** The **backup-battery enable** command only works on routers using the Cisco CG-OS operating system.

To enable the BBU operation via the CLI, use the **backup-battery enable** command in user EXEC mode:

```
CGR1240# backup-battery enable
```

The default setting is the BBU becomes enabled when it is connected to the router BBU cable. The BBU automatically waits to detect that power is not being received from the AC power supply, and then begins to supply power to the router.

You can use the **backup-battery enable** command after a battery has been disabled and replaced in an installed and operational router, to reenable the replacement battery. When the BBU is enabled, the BBU LED appears on, and reflects the BBU operating state (idle, charging, discharging etc.).

Once the BBU is connected, the only way to disable is to use the **backup-battery disable** command. To enable the BBU again, issue the **backup-battery enable** command.

## backup-battery disable

**Note:** The **backup-battery disable** command only works on routers using the Cisco CG-OS operating system.

To disable the BBU operation via the CLI, use the **backup-battery disable** command in user EXEC mode:

```
CGR1240# backup-battery disable
```

The default setting is the BBU becomes enabled when it is connected to the router BBU cable. The BBU automatically waits to detect that power is not being received from the AC power supply, and then begins to supply power to the router.

You can use the **backup-battery disable** command to disable a battery that is in an installed and operational router, and needs to be replaced. When the BBU is disabled, the BBU LED appears off.

Once the BBU is connected, the only way to disable is to use the **backup-battery disable** command. To enable the BBU again, issue the **backup-battery enable** command.

## backup-battery reset

**Note:** The **backup-battery reset** command only works on routers using the Cisco CG-OS operating system.

To reset the BBU power (power off the BBU, then power it back on), use the **backup-battery reset** command in user EXEC mode:

```
CGR1240# backup-battery reset
```

This command is functional only when AC power is supplying power to the router. If you enter this command when the router is powered by the BBU, an error message is displayed.

This command resets all BBUs installed in the router.

## backup-battery hard-reset

**Note:** The **backup-battery hard-reset** command only works on routers using the Cisco CG-OS operating system.

To reset the BBU power (power off the BBU, then power it back on) while you cannot communicate with the BBU through the UART interface, use the **backup-battery hard-reset** command in user EXEC mode:

---

CGR1240# **backup-battery hard-reset**

This command resets all BBUs installed in the router.

## backup-battery inhibit discharge

**Note:** The **backup-battery inhibit discharge** command only works on routers using the Cisco CG-OS operating system.

**Note:** When the BBU discharge is disabled by the **backup-battery inhibit discharge** command, the BBU does not charge, even if it is connected to AC power. The BBU discharge must be enabled by the **backup-battery un-inhibit discharge** command, and the BBU connected to AC power, for the BBU to charge.

To disable the BBU automatic discharge feature, use the **backup-battery inhibit discharge** command in user EXEC mode. Use this command to disable the BBU automatic discharge when you disconnect the router from AC power, and want to prevent the BBU from automatically discharging; for example when you are shipping the router, or transporting it between locations. When the BBU discharge is disabled, the BBU LED displays the amber slow blinking state. Use the **backup-battery un-inhibit discharge** command to enable the BBU automatic discharge after disabling it.

The **backup-battery inhibit discharge** command has two effects:

- With AC power on, the BBU does not charge.
- With AC power off, the BBU does not power the router (the BBU does not discharge).

This command is functional only when the BBU is supplying power to the router. If you enter this command when the router is powered by AC power, an error message is displayed.

**Caution:** Entering the **backup-battery inhibit discharge** command disables the BBU discharge immediately. You are not prompted to confirm the command. If you enter this command when the router is operating on the network and powered by the BBU, the router will immediately power down and will no longer operate on the network.

To disable the BBU discharge feature:

1. Connect the router to an AC power source.
2. Enter the **backup-battery inhibit discharge** EXEC command:

```
CGR1240# backup-battery inhibit discharge
```

To reset the BBU to the default behavior (automatically begin discharging when the router is not receiving AC power) use the **backup-battery un-inhibit discharge** command:

1. Connect the router to an AC power source.
2. Enter the **backup-battery un-inhibit discharge** EXEC command:

```
CGR1240# backup-battery un-inhibit discharge
```

The **backup-battery un-inhibit discharge** command has two effects:

- With AC power on, the BBU charges.
- With AC power off, the BBU powers the router (the BBU discharges).

## poweroff module number backup-battery

**Note:** The **poweroff module number backup-battery** command only works on routers using the Cisco CG-OS operating system.

---

To configure the router to power off specific modules (including the integrated Ethernet switch) when the router switches to BBU power, use the **poweroff module *number* backup-battery** command in global configuration mode.

By default, all modules continue to operate normally when the router is powered by the BBU. Enter this command for each module that you want to automatically shut down.

Syntax	Description
<b>poweroff module <i>number</i> backup-battery</b>	Configures the router to power down the indicated module when the router switches to BBU power.  <i>number</i> —The number of module that is powered down: <ul style="list-style-type: none"><li>■ <b>2</b>: Ethernet switch module (all ports)</li><li>■ <b>3-6</b>: Module inserted in the slot with corresponding number. Slot numbering is described and illustrated in <a href="#">Router Hardware Description, page 9</a>.</li></ul>

To configure the router to shut down the Ethernet switch (all Ethernet ports) when the router is powered by the BBU, enter this command:

```
CGR1240 (config)# poweroff module 2 backup-battery
```

To configure the router to shut down the module installed in Slot 6 when the router is powered by the BBU, enter this command:

```
CGR1240 (config)# poweroff module 6 backup-battery
```

Use the **no** form of the command to reset a module to the default behavior: continue to operate normally when the router switches to BBU power. For example:

```
CGR1240 (config)# no poweroff module 2 backup-battery
```

For detailed information on configuring the router, including configuration modes and saving configurations, see the router software configuration guides on Cisco.com, at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs)

## Cisco IOS BBU Commands

- [battery charge-discharge, page 164](#)
- [show platform battery, page 165](#)
- [show environment power, page 170](#)

### battery charge-discharge

**Note:** The **battery charge-discharge** command only works on routers using the Cisco IOS operating system.

**Note:** When the BBU discharge is disabled by the **battery charge-discharge disable command**, the BBU does not charge, even if it is connected to AC power. The BBU discharge must be enabled by the **battery charge-discharge enable command**, and the **BBU connected to AC power, for the BBU to charge**.

To change the enabled status of the BBU automatic discharge feature, use the **battery charge-discharge** command in user EXEC mode. The command syntax is:

```
battery charge-discharge {enable | disable}
```

The default behavior of the BBU is to automatically begin discharging when the router is not receiving AC power.



---

Use the **battery charge-discharge disable** command to disable the BBU automatic discharge when you disconnect the router from AC power, and want to prevent the BBU from automatically discharging; for example when you are shipping the router, or transporting it between locations. When the BBU discharge is disabled, the BBU LED displays the amber slow blinking state. Use the **battery charge-discharge enable** command to enable the BBU automatic discharge after disabling it.

The **battery charge-discharge disable** command has two effects:

- With AC power on, the BBU does not charge.
- With AC power off, the BBU does not power the router (the BBU does not discharge).

This command is functional only when the BBU is supplying power to the router. If you enter this command when the router is powered by AC power, an error message is displayed.

**Caution:** Entering the **battery charge-discharge disable** command disables the BBU discharge immediately. You are not prompted to confirm the command. If you enter this command when the router is operating on the network and powered by the BBU, the router will immediately power down and will no longer operate on the network.

To reset the BBU to the default behavior (automatically begin discharging when the router is not receiving AC power), use the **battery charge-discharge enable** command.

The **battery charge-discharge enable** command has two effects:

- With AC power on, the BBU charges.
- With AC power off, the BBU powers the router (the BBU discharges).

To disable the BBU discharge feature:

1. Connect the router to an AC power source.
2. Enter the **battery charge-discharge disable** EXEC command:

```
CGR1240# battery charge-discharge disable
```

To enable the BBU discharge feature:

1. Connect the router to an AC power source.
2. Enter the **battery charge-discharge enable** EXEC command:

```
CGR1240# battery charge-discharge enable
```

## show platform battery

**Note:** The **show platform battery command** only works on routers using the Cisco IOS operating system.

To display battery data information, use the **show platform battery** command in user EXEC mode. The command syntax is:

```
show platform battery [brief | cable | details | short | sprom | unit]
```

## Syntax Description

brief	(Optional) Displays summary information about the battery charge level in percentage and hours:minutes format, as well as the battery charge state: <ul style="list-style-type: none"><li>■ Idle, if &gt; 85%</li><li>■ Charging, if voltage &gt; 10.5 V and charge value &lt; 85%.</li><li>■ Discharging, if battery is main source of power.</li><li>■ Empty, if battery is drained out of charge.</li></ul>
cable	(Optional) Displays details about the battery cable status: <ul style="list-style-type: none"><li>■ present = 0, in the command output means that a battery cable is not present.</li><li>■ present = 1, in the command output means that a battery cable is present.</li></ul>
details	(Optional) Displays troubleshooting information about the battery by presenting a range of summary information about the battery characteristics.
short	(Optional) Displays backup battery information in short format (formatted for a management device).
sprom	(Optional) Displays troubleshooting information based on the EEPROM details of the battery unit.
unit	(Optional) Displays a range of battery charge, capacity, and parameter information including: <ul style="list-style-type: none"><li>■ battery charge state and charge value/level in percent.</li><li>■ capacity (remaining and full charge).</li><li>■ voltage and current levels.</li><li>■ firmware version details.</li></ul>

The following are examples of the command, with sample output:

```
CGR1240# show platform battery
```

```
Battery is not present  
Battery pack state: Not available
```

The command output indicates a battery is not present.

```
CGR1240# show platform battery brief
```

```
Battery level 92% (12:27), Idle
```

The command output indicates that the battery is charged to a 92% level, has q2 hours and 27 minutes battery life available, and is in an idle state.

```
CGR1240# show platform battery cable
```

```
Status register 0x16  
Present ..... 1  
Ready state .. 1  
Ready bit .... 1  
Interrupt .... 0  
Reset ..... 0  
Power register 0x3F13  
AC ..... 1
```

The command output indicates that a battery cable is connected up (Present.....1). The output represents a well-connected functional cable.

```
CGR1240# show platform battery details
```

```
Battery pack state: Operational
```

```
Battery pack state: Operational
```

Battery unit	0	1	2
BatteryStatus .....	0x80	0xA0	0x80
UnitStatus .....	0x5830	0x4801	0x2802
BootloaderStatus .....	0xB	0xB	0xB
InterruptStatus .....	0x0	0x0	0x0
ChargeStatus .....	0xC010	0xC010	0xC010
ControlOverride .....	0x0	0x0	0x0
AbsoluteStateOfCharge ...	89 %	97 %	90 %
RelativeStateOfCharge ...	89 %	97 %	90 %
RemainingCapacity .. (mAh)	5124	5601	5221
FullChargeCapacity . (mAh)	5739	5739	5739
AverageTimeToEmpty . (min)	65535	65535	65535
AverageTimeToFull .. (min)	65535	65535	65535
RunTimeToEmpty .....	(min) 65535	65535	65535
AtRateTimeToFull ... (min)	65535	65535	65535
AtRateTimeToEmpty .. (min)	65535	65535	65535
AtRateOK .....	1	1	1
Voltage .....	(mV) 11669	11913	11721
Current .....	(mA) 0	0	0
AverageCurrent .....	(mA) 0	0	0
ChargingCurrent .....	(mA) 0	0	0
ChargingVoltage .....	(mV) 11669	11913	11721
CycleCount .....	1	6	6
ChargeAlarmWarning .....	128	160	128
HeaterAndStatusControl ...	0	0	0
HeaterTemperature ... ('C)	30	31	30
AmbientTemperature .. ('C)	29	30	29
Temperature .....	('C) 30	31	30
Firmware version .....	5213	5213	5213

```
UART delay stats rx=2772us, tx=23us
```

```
Total charge .....
```

```
Low level .....
```

```
Average time to empty (hh:mm) 12:28
```

```
Last time to empty readings ( 751 751 746 751 742 minutes )
```

```
Needs firmware upgrade .....
```

```
Firmware upgd failures .....
```

```
Power-off module when running on battery:
```

```
Module 3 .....
```

```
Module 4 .....
```

```
Module 5 .....
```

```
Module 6 .....
```

The command output has a range of battery status information including charge capacity, voltage and current levels, temperature, time data, and firmware information.

```
router# show platform battery short
```

```
AC power supply .....
```

```
Battery present .....
```

```
Battery ready .....
```

```
Number of battery units . 3
```

```
Time to empty .....
```

Unit#	Charge	Time to empty	State	Firmware	Charge and discharge
0	86 %	4:35	Idle	1224	enabled
1	82 %	4:26	Idle	1224	enabled
2	60 %	3:13	Idle	1224	enabled

The command output displays backup battery summary information in short format (formatted for a management device).

```
router# show platform battery sprom
```

```
Battery unit 0
SPROM:
Common block:
FRU Major Type : 0xAB05
FRU Minor Type : 0x0
OEM String     : Cisco Systems, Inc.
Product Number : CGR-BATT-4AH
Serial Number  : NVT17244415
Part Number    : 74-10147-02
Part Revision  : 01
Mfg Deviation  :
H/W Version   : 6.0
Mfg Bits      : 0
Engineer Use  : 0
snmp OID      : 1.9.12.3.1.9.91.12
Power Consump : 0
CLEI Code     :
VID           : V00
Battery specific block:
Vendor name    : NVT
Vendor product number : 1132-20D802-1CB
Vendor revision number : AAAA
Vendor sequence number : 7
Date code     : 06192013R6
Build version : R6
Output power max : 40
Input power max : 20
BBU chemistry  : Li-ion
Cells in series : 3
Firmware version : 3
Firmware revision : 5213
Min discharge temp : 0
Max discharge temp : 253
Min charging temp : 333
Max charging temp : 273
Output current max : 323
Output voltage max : 400

Battery unit 1
SPROM:
Common block:
FRU Major Type : 0xAB05
FRU Minor Type : 0x0
OEM String     : Cisco Systems, Inc.
Product Number : CGR-BATT-4AH
Serial Number  : ATL16240813
Part Number    : 74-10147-01
Part Revision  : A0
Mfg Deviation  :
H/W Version   : 0.0
Mfg Bits      : 0
Engineer Use  : 0
snmp OID      : 1.9.12.3.1.9.91.12
Power Consump : 0
```

---

```
CLEI Code      :
VID            : V01
Battery specific block:
Vendor name    : ATL
Vendor product number :
Vendor revision number : 0000
Vendor sequence number : 71
Date code     : 06162012R4A
Build version  : R4A
Output power max : 40
Input power max : 20
BBU chemistry  : Li-ion
Cells in series : 3
Firmware version : 3
Firmware revision : 2082
Min discharge temp : 1
Max discharge temp : 253
Min charging temp : 333
Max charging temp : 273
Output current max : 323
Output voltage max : 400
```

```
Battery unit 2
SPROM:
Common block:
FRU Major Type : 0xAB05
FRU Minor Type : 0x0
OEM String     : Cisco Systems, Inc.
Product Number : CGR-BATT-4AH
Serial Number  : ATL16240723
Part Number    : 74-10147-01
Part Revision  : A0
Mfg Deviation  :
H/W Version    : 0.0
Mfg Bits       : 0
Engineer Use   : 0
snmpOID        : 1.9.12.3.1.9.91.12
Power Consump  : 0
CLEI Code      :
VID            : V01
Battery specific block:
Vendor name    : ATL
Vendor product number :
Vendor revision number : 0000
Vendor sequence number : 25
Date code     : 06162012R4A
Build version  : R4A
Output power max : 40
Input power max : 20
BBU chemistry  : Li-ion
Cells in series : 3
Firmware version : 3
Firmware revision : 2082
Min discharge temp : 1
Max discharge temp : 253
Min charging temp : 333
Max charging temp : 273
Output current max : 323
Output voltage max : 400
```

The command output shows the EEPROM summary information for battery backup units 0, 1, and 2 that is used to troubleshoot the battery.

```
CGR1240# show platform battery unit
```

```
Battery pack state: Operational
```

Battery unit	0	1	2
Status .....	Idle	Full	Idle
Charge level .....	89 %	97 %	90 %
Capacity Remaining (mAh)	5124	5596	5221
Full Charge Capacity (mAh)	5739	5739	5739
Voltage .....	11673	11913	11721
Current .....	0	0	0
Temperature .....	30	31	30
Firmware version .....	5213	5213	5213

The command output displays a range of charge, capacity, and parameter information for battery backup units 0, 1, and 2. The firmware version is version 5219.

## show environment power

**Note:** The **show environment power** command only displays the power statistical data on routers using the Cisco IOS operating system. The command displays both the power statistical data and the battery backup status on routers using the Cisco CG-OS operating system.

To display the power statistical data, use the **show environment power** command in user EXEC mode:

```
CGR1240# show environment power
```

A sample output from this command is:

```
AC voltage ..... [V] 116.000
AC current ..... [A] 0.609
DC voltage ..... [V] 11.937
DC current ..... [A] 1.468
Hotspot#1 temperature ['C] 33
Hotspot#2 temperature ['C] 50
```

The command output has power supply summary information that provides power data for the router.

## BBU Technical Specifications

This section describes the specifications and standards supported by the BBU.

**Note:** For BBU connector and cable specifications, see [Connector and Cable Specifications, page 195](#).

- [Router Power Path Selection, page 170](#)
- [Discharge Conditions, page 171](#)
- [Charge Conditions, page 171](#)
- [Operating and Storage Temperatures, page 172](#)
- [Battery Life, page 172](#)

## Router Power Path Selection

During normal operation, the router is powered by the integrated AC power supply. The BBU enters discharge mode and begins providing power to the router when the AC power is interrupted outside a range of 85V to 250V for more than 20 ms. The BBU charges or discharges only; it does not support both simultaneously.

## Discharge Conditions

**Table 28 Battery Backup Unit–Discharging Specifications**

Discharge Conditions	Description
Power load	10 W
Duration	4 hours
Entry to discharge <sup>1</sup>	<ul style="list-style-type: none"> <li>■ BBU cable harness is installed</li> <li>■ AC power (range of 85V to 250V) not detected for more than 20 ms</li> <li>■ Remaining BBU capacity &gt;5%</li> <li>■ External ambient temperature is within -40 to 122° F (-40 to 50° C)</li> </ul>
Exit discharge <sup>2</sup>	<ul style="list-style-type: none"> <li>■ AC power restored in the range of 85V to 250V for more than 20 ms.</li> <li>■ Remaining BBU capacity &lt;5%</li> <li>■ External ambient temperature is outside ranging -40 to 122° F (-40 to 50° C)</li> </ul>
<sup>1</sup> All conditions met.	
<sup>2</sup> Any condition met and system is detected.	

## Charge Conditions

**Table 29 Battery Backup Unit–Charge Specifications**

Charge Conditions	Description
Power draw	No more than 20 W when charging
State of charge	No more than 90%
Entry to charging limit <sup>1</sup>	<ul style="list-style-type: none"> <li>■ BBU cable harness is installed</li> <li>■ Charge is enabled</li> <li>■ State of Charge (SOC) &lt;85%</li> <li>■ AC power detected in the range of 85V to 250V for more than 20 ms.</li> <li>■ External ambient temperature is within -4 to 104° F (-20 to 40° C)</li> </ul>
Exit charging <sup>2</sup>	<ul style="list-style-type: none"> <li>■ BBU cable harness not installed</li> <li>■ Charge is disabled</li> <li>■ AC power (range of 85V to 250V) not detected for more than 20 ms.</li> <li>■ External ambient temperature is outside ranging -4 to 104° F (-20 to 40° C)</li> </ul>
<sup>1</sup> All conditions met.	
<sup>2</sup> Any condition met and system is detected.	

## Operating and Storage Temperatures

**Table 30 Battery Backup Unit—Operating and Storage Temperatures**

BBU State	Local BBU Internal Temperature	External Ambient Temperature
Charging	+32 to 122° F (0 to 50° C)	-4 to 104° F (-20 to 40° C)
Discharging	-4 to 140° F (-20 to 60° C)	-40 to 122° F (-40 to 50° C)
Operation (Idle)	-4 to 185° F (-20 to 85° C)	-40 to 158° F (-40 to 70° C)
Storage and shipping	+14 to 113° F (-10 to 45° C) for 3 months maximum	Short-term: +14 to 113° F (-10 to 45° C) for 3 months maximum  Long-term: +27 to 77° F (-3 to 25° C) - 65% Relative Humidity - 40 to 90% SOC

## Battery Life

**Table 31 Battery Backup Unit – Battery Life**

Product ID	Battery Life	Charge-Discharge Cycles
CGR-BATT-4AH	5 years	500