

Power Over Ethernet (PoE)

Provides information on the functionality and implementation of Power Over Ethernet to support network device connectivity.

- Power over Ethernet, on page 1
- Device detection and power allocations, on page 1
- Power budget calculation for router connected modules, on page 2
- Key considerations, on page 2
- Configure PoE using CLI, on page 3
- Verify PoE configuration, on page 3
- Debugging commands for PoE, on page 5

Power over Ethernet

Power over Ethernet (PoE) is a network technology which allows transmission of both power and data over a single Ethernet cable. It is typically used to power up devices such as Access Points, IP Cameras and IP Phones connected to the device's Ethernet port Gi0/0/0 as per IEEE 802.3AF and AT standards.

The total PoE available power budget is fixed as 15.4 W which is used entirely by Gi0/0/0 interface. When PoE is enabled, the router detects the connected devices and allocates power based on the device types.

Starting with Cisco IOS XE Release 26.1.1, Cisco Catalyst IR8140 Heavy Duty Series Routers can provide up to 30 W of power per port to connected devices over Ethernet.

Table 1: Feature History Table

Feature name	Release information	Feature description
Power over Ethernet Plus Support	Release 26.1.1	Cisco Catalyst IR8140 Heavy Duty Series Routers can provide up to 30 W of power per port to connected devices over Ethernet.

Device detection and power allocations

After the device detection:

- The router detects a Cisco pre-standard or an IEEE-compliant power device when the PoE is enabled and the connected device is not being powered by an AC adapter.
- The router determines the power requirement based on the power classification class of the connected device.
- The router checks the available power budget to decide if it can power the port or not.
- The router initially allocates a class max power when it detects a device and then powers it on.
- Further power negotiation happens using the Cisco Discovery Protocol (CDP) / Link Layer Discovery Protocol (LLDP) protocols.



Note During reloading the device, the PoE ports remain powered down until the unit reboots.

Power budget calculation for router connected modules

Starting with Cisco IOS XE Release 26.1.1, the IR8140H-P-K9 router calculates the power budget during system boot. The IR8140H-P-K9 supports 60 W of power supply.

To calculate power budget allocation for PoE:

Table 2: Power budget calculation

Module	Consumed Power
System reservation	15 W
SPA module (WPAN, LTE, etc.)	5 W
mSATA module	2.5 W
BBU	24 W

Key considerations

Starting with Cisco IOS XE Release 26.1.1 consider these points:

- You must avoid online insertion and removal of modules (OIR), on the router to avoid power unavailability issues and undefined behavior of the devices.
- The power budget is calculated only once during system boot-up, based on the connected modules at a given time.
- If you power down or power up a module after system boot, the power budget allocation does not change because it is fixed at boot time.

- To manage power reliably and prevent any shortages, ensure that modules are installed or removed only before booting the system.
- Replacing a module with another module of the same type after system boot, does not affect the power budget allocation because the system retains the original allocation.

Configure PoE using CLI

Follow this procedure to configure PoE or PoE+ for connected modules of IR8140H-P-K9 router.

Procedure

Step 1 Use the **configure terminal** command to enter the config mode.

Example:

```
Router#configure terminal
```

Step 2 Use the **interface** [*interface-id*] command to enter the interface id.

Example:

```
Router(config-if)#interface g0/0/0
```

Step 3 Use the **power inline** {**auto**|**never**} command to enable PoE.

Example:

```
Router(config-if)#power inline {auto|never}
```

What to do next

Verify the configuration.

Verify PoE configuration

Follow this procedure to verify PoE or PoE+ configuration for connected modules of R8140H-P-K9 router.

Procedure

Step 1 Use the **show power inline** command to verify PoE or PoE+ configuration for connected modules of router.

Example:

```
Router#show power inline
Available:15.4(w) Used:6.4(w) Remaining:9.0(w)

Interface Admin  Oper       Power   Device              Class Max
                            (Watts)
```

```
--------- ------ ---------- ------- ------------------- ----- ----
Gi0/0/0   auto   on         6.4     IP Phone 8845       2     15.4
```

Example:

```
Router#show power inline
Available:31.0(w)  Used:30.0(w)  Remaining:1.0(w)

Interface Admin  Oper       Power   Device              Class Max
                            (Watts)
--------- ------ ---------- ------- ------------------- ----- ----
Gi0/0/0   auto   on         30.0    WS-C3560CX-8PT-S    4     30.0
--------- ------ ---------- ---------- ---------- ------ -----
Totals:          1    on    30.0
```

Step 2 Use the **show power inline** [*interface-id*] command to display power of a particular interface.

Example:

```
Router#show power inline Gi0/0/0
```

Step 3 Use the **show power inline** [*interface-id*] **detail** command to display PoE status for a router for the specified interface.

Example:

```
Router#show power inline Gi0/0/0 detail
```

Step 4 Use the **show power** command to display power consumption.

Example:

```
Router#show power
Main PSU :
  Total Power Consumed: 24.19 Watts
  Configured Mode : N/A
  Current runtime state same : N/A
  PowerSupplySource : External PS
POE Module :
  Configured Mode : N/A
  Current runtime state same : N/A
  Total power available : 15.4 Watts
```

Example:

```
Router#show power
Main PSU :
    Total Power Consumed: 34.76 Watts
    Configured Mode : N/A
    Current runtime state same : N/A
    PowerSupplySource : External PS
POE Module :
    Configured Mode : N/A
    Current runtime state same : N/A
    Total power available : 31.0 Watts
```

Debugging commands for PoE

The list of commands for debugging PoE are given in the table:

Command	Description
Debug ilpower controller	Display PoE controller debug messages
Debug ilpower event	Display PoE event debug messages
Debug ilpower port	Display PoE port manager debug messages
Debug ilpower powerman	Display PoE power management debug messages
Debug ilpower cdp	Display PoE CDP debug messages
Debug ilpower registries	Display PoE registries debug messages
Debug ilpower scp	Display PoE scp debug messages