

Power Over Ethernet

Effective Cisco IOS XE Release 3.16S, the Cisco ASR-920-12SZ-IM Aggregation Services Router supports Power over Ethernet (PoE). PoE is the ability for any LAN switching infrastructure to provide power over a copper Ethernet cable to an endpoint or powered device.

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Prerequisites for PoE

- Cisco ASR-920-12SZ-IM Aggregation Services Router supports multiple variants of power supplies. When using the AC power supplies, approximately 180 watts is used for PoE functionality, which can be shared by all eight available copper Ethernet ports.
- PoE is applicable only on the following ports: Gi0/0/0 to Gi 0/0/7
- When using DC power supplies, PoE is supported only if the input feed to the power-supply is 48 volts.

Restrictions for PoE

- Configuring a port as a static port pre-provisions power for that port. This power is deducted from the central power pool. It is, therefore, advisable to configure a port as an auto port.
- PoE does not support interface modules (IMs).
- The system allocates 180 W of static power. However, if a component or device tries to draw power over 180 W, the Cisco ASR-920-12SZ-IM Router silently reloads.

Information About PoE

The Cisco ASR-920-12SZ-IM Router uses the inline power as well as a global pool of power to power the modules, fans and other subsystems in the router. This power is alloted to all the powered devices detected on a first-come-first-serve basis. However, but if many devices are connected, and a new device is added to

the system, the system may run out of power to allot to the new device. Over-subscription of power could also result in tripping the power supplies and bringing down modules or even the entire router. In such cases, PoE can manage power allocation.

Note In the Cisco ASR-920-12SZ-IM Router, the dual power supplies function in redundant power mode.

PoE supports the following two modes of operations:

- Automatic—The automatic mode supports POE, POE+, and UPoE power negotiations up to the maximum power specified by the these different standards. UPoE is a Cisco proprietary standard, which can draw up to 60 W of power and supports LLDP negotiations. To enable UPoE mode, ensure that LLDP is not only enabled globally but also at the port level.
- Four-Pair Forced—This mode is enabled through the command line interface and can be used for third-party PoE devices that may need more than 30 Watts of power, but are not expected to have the Layer-2 power negotiation protocol, such as LLDP.

Installing the PoE License

To install or upgrade a license by using the **license install** command, you must have already received the license file from the Cisco Product License Registration portal at www.cisco.com/go/license (or you already backed up the license by using the **license save** command).

```
Router# license install bootflash:upoe.lic
Installing licenses from "bootflash:upoe.lic"
Installing...Feature:UPOE...Successful:Not Supported
1/1 licenses were successfully installed
0/1 licenses were existing licenses
0/1 licenses were failed to install

Router(config)# license feature upoe
```

For more information on installing licenses, see Configuring the Cisco IOS Software Activation Feature.

PoE License

PoE can be enabled only through the PoE license. As the PoE ports are controlled by the Port License, you must enable the PoE Port License as well as the PoE license to use this feature. Once you install the PoE license and enable the feature, the router attempts to detect and classify PoE on those PoE ports that are in ADMIN_UP state and the link state in DOWN state.

How to Configure the PoE

Procedure

Step 1 In the global config mode, select the interface to configure.

Example:

```
Router(config)# interface gigabitethernet 0/0/1
```

Step 2 To determine how inline power is applied to the device on the specified port, use the power inline command:

Example:

```
Router(config-if)# power inline
```

Use one of the following options with the above command:

auto—Enables the device discovery protocol and applies power to the device, if found.

four-pair—Enables the four-pair mode.

never—Disables the device discovery protocol and stops supplying power to the device.

police—Enables inline power policing; optional if entering the no form of the command. Default is disabled.

static—High priority PoE interface. The Cisco ASR-920-12SZ-IM Router preallocates power to the interface, even when nothing is connected, guaranteeing that there will be power for the interface. You can specify the maximum wattage that is allowed on the interface using the **power inline static max value** command. If you do not specify a wattage, the switch preallocates the hardware-supported maximum value of 60 W. If the switch does not have enough power for the allocation, the command will fail, after which you must execute the **shut/no shut** command to initiate the detection of the powered device.

max—(Optional) This parameter configures the maximum power that a powered device can draw.

Step 3 If the interfaces tries to draw more power than negotiated through LLDP, the **power inline police action errdisable** command sets the port to errdisable mode.

Example:

```
Router(config-if)# power inline police action errdisable
```

Step 4 Exit the configuration mode by running:

Example:

```
Router(config-if)# end
Router(config)# end
Router#
```

Verifying the PoE Configuration

- The following is a sample output of the **show power** command:

```
Router# show power
Power Summary Maximum
(in Watts) Used Available
---------------------- ---- ---------
Inline Power 0.0 180
```

- The following is a sample output of the **show power inline** command:

```
Router# show power inline
Available:180.0(w)  Used:15.4(w)  Remaining:164.6(w)
Interface Admin  Oper       Power   Device              Class Max
                            (Watts)
--------- ------ ---------- ------- ------------------ ----- ----
Gi0/0/0   auto   on         15.4    Ieee PD            0     60.0
Gi0/0/1   auto   off        0.0     n/a                n/a   60.0
Gi0/0/2   auto   off        0.0     n/a                n/a   60.0
Gi0/0/3   auto   off        0.0     n/a                n/a   60.0
Gi0/0/4   auto   off        0.0     n/a                n/a   60.0
Gi0/0/5   auto   off        0.0     n/a                n/a   60.0
Gi0/0/6   auto   off        0.0     n/a                n/a   60.0
Gi0/0/7   auto   off        0.0     n/a                n/a   60.0
Router# show power inline GigabitEthernet 0/0/0
Interface Admin  Oper       Power   Device              Class Max
                            (Watts)
--------- ------ ---------- ------- ------------------ ----- ----
Gi0/0/0   auto   on         15.4    Ieee PD            0     60.0
Router# show power inline gigabitethernet 0/0/0 detail
Interface: Gi0/0/0
Inline Power Mode: auto
Operational status: off
Device Detected: no
Device Type: n/a
IEEE Class: n/a
Discovery mechanism used/configured: Ieee
Police: off
Power Allocated
Admin Value: 60.0
Power drawn from the source: 0.0
Power available to the device: 0.0
Actual consumption
Measured at the port: 0.0
Maximum Power drawn by the device since powered on: 0.0
Absent Counter: 0
Over Current Counter: 0
Short Current Counter: 0
Invalid Signature Counter: 0
Power Denied Counter: 0
```

- The following is a sample output for port policing using the **show power inline police** commands:

```
Router# show power inline police
Available:180.0(w)  Used:15.4(w)  Remaining:164.6(w)
Interface Admin  Oper       Admin      Oper       Cutoff Oper
          State  State      Police     Police     Power  Power
--------- ------ ---------- ---------- ---------- ------ -----
Gi0/0/0   auto   on         none       n/a        n/a    0.0
Gi0/0/1   auto   off        none       n/a        n/a    n/a
Gi0/0/2   auto   off        none       n/a        n/a    n/a
Gi0/0/3   auto   off        none       n/a        n/a    n/a
Gi0/0/4   auto   off        none       n/a        n/a    n/a
Gi0/0/5   auto   off        none       n/a        n/a    n/a
Gi0/0/6   auto   off        none       n/a        n/a    n/a
Gi0/0/7   auto   off        none       n/a        n/a    n/a
--------- ------ ---------- ---------- ---------- ------ -----
Totals:                                                  0.0
Router# show power inline police GigabitEthernet 0/0/1
Interface Admin  Oper       Admin      Oper       Cutoff Oper
          State  State      Police     Police     Power  Power
--------- ------ ---------- ---------- ---------- ------ -----
Gi0/0/1   auto   on         errdisable ok         17.2   16.7
```

Debugging the PoE Configuration

- Use the following command to troubleshoot the PoE Configuration

```
Router# debug inline power
```

- Use the following commands to verify if the PoE license is enabled:

```
Router# show license detail
Index: 1 Feature: UPOE Version: 1.0
License Type: Permanent
License State: Active, Not in Use
License Count: Non-Counted
License Priority: Medium
Store Index: 0
Store Name: Primary License Storage
Index: 2 Feature: advancedmetroipaccess Version: 1.0
License Type: Permanent
License State: Active, Not in Use, EULA accepted
Evaluation total period: 8 weeks 4 days
Evaluation period left: 8 weeks 4 days
Period used: 0 minute 0 second
License Count: Non-Counted
License Priority: Low
Store Index: 0
Store Name: Built-In License Storage
Index: 3 Feature: metroaccess Version: 1.0
License Type: Permanent
License State: Active, Not in Use, EULA accepted
Evaluation total period: 8 weeks 4 days
Evaluation period left: 8 weeks 3 days
Period used: 0 minute 36 seconds
License Count: Non-Counted
License Priority: Low
Store Index: 2
Store Name: Built-In License Storage
Index: 4 Feature: metroipaccess Version: 1.0
License Type: Permanent
License State: Active, Not in Use, EULA accepted
Evaluation total period: 8 weeks 4 days
Evaluation period left: 8 weeks 4 days
Period used: 0 minute 0 second
License Count: Non-Counted
License Priority: Low
Store Index: 1
Store Name: Built-In License Storage
Router# show license feature
Feature name Enforcement Evaluation Subscription Enabled RightToUse
advancedmetroipaccess yes yes no no no
metroipaccess yes yes no no no
metroaccess no yes no no no
atm yes yes no no no
oc3 yes yes no no no
oc12 yes yes no no no
1588 yes yes no no no
1GEupgradelicense yes no no no no
10GEupgradelicense yes no no no no
12portGE4port10GE yes no no no no
gps yes no no no no
upoe yes no no no no
ipsec yes no no no no
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases

Standards

Standard	Title
802.3af	The original IEEE 802.3af-2003 PoE standard provides up to 15.4 W of DC power to each device.
802.3at	The updated IEEE 802.3at-2009 PoE standard also known as PoE+ or PoE plus, provides up to 25.5 W of power. The 2009 standard prohibits a powered device from using all four pairs for power.

MIBs

MIB	MIBs Link
• POWER-ETHERNET-MIB • CISCO-POWER-ETHERNET-MIB	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
There are no new RFCs for this feature.	—

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Power Over Ethernet

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note The table below lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1: Feature Information for Phrase Based on Module Title

Feature Name	Releases	Feature Information
Power Over Ethernet	Cisco IOS-XE Release 3.16.0S	In this release, this feature was introduced on the Cisco ASR-920-12SZ-IM Aggregation Services Router.