



BNG PPP Commands

This module describes the Cisco IOS XR software commands used to configure the PPP commands for Broadband Network Gateway (BNG) on the Cisco ASR 9000 Series Router. For details regarding the related configurations, refer to the *Cisco ASR 9000 Series Aggregation Services Router Broadband Network Gateway Configuration Guide*.

To use commands of this module, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using any command, contact your AAA administrator for assistance.

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ppp authentication (BNG)

To enable Challenge Handshake Authentication Protocol (CHAP), MS-CHAP, or Password Authentication Protocol (PAP), and to specify the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface, use the **ppp authentication** command in an appropriate configuration mode. To disable PPP authentication, use the **no** form of this command.

ppp authentication *protocol* [*protocol* [*protocol*]] {*list-name* | **default**}

Syntax Description

protocol Name of the authentication protocol used for PPP authentication. See [Table 1: PPP Authentication Protocols for Negotiation, on page 3](#) for the appropriate keyword. You may select one, two, or all three protocols, in any order.

list-name (Optional) Used with authentication, authorization, and accounting (AAA). Name of a list of methods of authentication to use. If no list name is specified, the system uses the default. The list is created with the **aaa authentication ppp** command.

default (Optional) Specifies the name of the list of methods created with the **aaa authentication ppp** command.

Command Default

PPP authentication is not enabled.

Command Modes

Interface configuration

Dynamic template configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.

Usage Guidelines

When you enable CHAP or PAP authentication (or both), the local router requires the remote device to prove its identity before allowing data traffic to flow. PAP authentication requires the remote device to send a name and a password, which is checked against a matching entry in the local username database or in the remote security server database. CHAP authentication sends a challenge message to the remote device. The remote device encrypts the challenge value with a shared secret and returns the encrypted value and its name to the local router in a response message. The local router attempts to match the remote device's name with an associated secret stored in the local username or remote security server database; it uses the stored secret to encrypt the original challenge and verify that the encrypted values match.

You can enable CHAP, MS-CHAP, or PAP in any order. If you enable all three methods, the first method specified is requested during link negotiation. If the peer suggests using the second method, or refuses the first method, the second method is tried. Some remote devices support only one method. Base the order in which you specify methods on the remote device's ability to correctly negotiate the appropriate method, and on the level of data line security you require. PAP usernames and passwords are sent as clear text strings, which can be intercepted and reused.

To enter the dynamic template configuration mode, run **dynamic-template** command in the Global Configuration mode.



Note If you use a *list-name* value that was not configured with the **aaa authentication ppp** command, then authentication does not complete successfully and the line does not come up.

[Table 1: PPP Authentication Protocols for Negotiation](#), on page 3 lists the protocols used to negotiate PPP authentication.

Table 1: PPP Authentication Protocols for Negotiation

Protocol	Description
chap	Enables CHAP on an interface.
ms-chap	Enables Microsoft's version of CHAP (MS-CHAP) on an interface.
pap	Enables PAP on an interface.

Enabling or disabling PPP authentication does not affect the ability of the local router to authenticate itself to the remote device.

MS-CHAP is the Microsoft version of CHAP. Like the standard version of CHAP, MS-CHAP is used for PPP authentication. In this case, authentication occurs between a personal computer using Microsoft Windows NT or Microsoft Windows 95 and a Cisco router or access server acting as a network access server.

Enabling or disabling PPP authentication does not affect the local router authenticating itself to the remote device.

Task ID	Task ID	Operations
	ppp	read, write
	aaa	read, write

Examples

In this example, CHAP is enabled on POS 0/4/0/1 and uses the authentication list MIS-access:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/4/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp authentication chap MIS-access
```

This is an example of configuring the **ppp authentication** command:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp authentication chap ms-chap pap
```

Related Commands

Command	Description
aaa authentication ppp	Specifies one or more AAA authentication methods for use on serial interfaces running PPP.
encapsulation	Sets the encapsulation method used by the interface.
username	Configures a new user with a username, establishes a password, and grants permissions for the user.

ppp chap

To enable a router calling a collection of routers to configure a common Challenge Handshake Authentication Protocol (CHAP) for PPP interfaces, use the **ppp chap** command in the dynamic template configuration mode. To disable this feature, use the **no** form of this command.

ppp chap **hostname** *chap_hostname*

Syntax Description	hostname	Sets the CHAP hostname.
	<i>chap_hostname</i>	Specifies the CHAP hostname.
Command Default	None	
Command Modes	Dynamic template configuration	
Command History	Release	Modification
	Release 4.2.0	This command was introduced.
Usage Guidelines	Use the dynamic-template type ppp command to enter the ppp dynamic template type configuration mode.	
Task ID	Task ID	Operation
	ppp	read, write

This is an example of configuring the **ppp chap** command in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp chap hostname host1
```

Related Commands	Command	Description
	ppp authentication (BNG), on page 2	Sets PPP link authentication method.

ppp ipcp

To set Internet Protocol Control Protocol (IPCP) negotiation options, use the **ppp ipcp** command in the dynamic template configuration mode. To disable this feature, use the **no** form of this command.

```
ppp ipcp [ dns { primary_ip_address secondary_ip_address } | mask peer_netmask_address |
peer-address { default peer_ipaddress | pool pool_name } | renegotiation ignore | wins
| primary_ipaddress | secondary_ipaddress ]
```

Syntax Description

dns	Configures the dns options.
<i>primary_ip_address</i>	Specifies the primary DNS IP addresses.
<i>secondary_ip_address</i>	Specifies the secondary DNS IP addresses.
mask	Specifies the IPv4 netmask to use for the peer.
<i>peer_netmask_address</i>	Specifies the peer netmask address.
peer-address	Specifies the change in peer-address configuration.
default	Specifies the default peer IP address.
<i>peer_ipaddress</i>	Specifies the peer IP address.
pool	Configures the pool options.
<i>pool_name</i>	Specifies the pool name.
renegotiation	Specifies the peer negotiation options.
wins	Specifies the WINS options.

Command Default

None

Command Modes

Dynamic template configuration

Command History

Release	Modification
Release 4.2.0	This command was introduced.

Usage Guidelines

Use the **dynamic-template type ppp** command to enter the ppp dynamic template type configuration mode.

Task ID

Task ID	Operation
ppp	read, write

Task ID	Operation
aaa	read, write

This is an example of configuring the **ppp ipcp** command in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp ipcp
```

Related Commands

Command	Description
ppp authentication (BNG), on page 2	Sets PPP link authentication method.

ppp lcp

To enable the link control protocol (LCP) on PPP interfaces, use the **ppp lcp** command in the dynamic template configuration mode. To disable this feature, use the **no** form of this command.

ppp lcp [**delay** *delay_seconds delay_milliseconds* | **renegotiation ignore**]

Syntax Description	delay	Sets the time to delay before starting active LCP negotiations.
	<i>delay_seconds</i>	Specifies the delay time in seconds. The value ranges from 0-255.
	<i>delay_milliseconds</i>	Specifies the delay time in milliseconds. The value ranges from 0-999.
	renegotiation	Specifies the peer renegotiation options.
	ignore	Specifies the number of attempts that can be ignored by the peer to renegotiate LCP.

Command Default None

Command Modes Dynamic template configuration

Command History	Release	Modification
	Release 4.2.0	This command was introduced.

Usage Guidelines Use the **dynamic-template type ppp** command to enter the ppp dynamic template type configuration mode.

Task ID	Task	Operation
	ppp	read, write
	aaa	read, write

This is an example of configuring the **ppp lcp** command in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp lcp delay 45 890
```

Related Commands

Command	Description
ppp authentication (BNG), on page 2	Sets PPP link authentication method.

ppp max-bad-auth (BNG)

To configure a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries, use the **ppp max-bad-auth** command in the appropriate configuration mode. To reset to the default of immediate reset, use the **no** form of this command.

ppp max-bad-auth *retries*

Syntax Description	<i>retries</i> Number of retries after which the interface is to reset itself. Range is from 0 to 10. Default is 0 retries.	
Command Default	<i>retries</i> : 0	
Command Modes	Interface configuration Dynamic template configuration	
Command History	Release	Modification
	Release 3.9.0	This command was introduced.
	Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
Usage Guidelines	The ppp max-bad-auth command applies to any interface on which PPP encapsulation is enabled. To enter the dynamic template configuration mode, run dynamic-template command in the Global Configuration mode.	
Task ID	Task ID	Operations
	ppp	read, write
	aaa	read, write

Examples

In this example, POS interface 0/3/0/1 is set to allow two additional retries after an initial authentication failure (for a total of three failed authentication attempts):

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp authentication chap
RP/0/RSP0/CPU0:router(config-if)# ppp max-bad-auth 3
```

This example shows how to allow two additional retries after an initial authentication failure in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure  
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1  
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp max-configure 5
```

ppp max-configure (BNG)

To specify the maximum number of configure requests to attempt (without response) before stopping the requests, use the **ppp max-configure** command in an appropriate configuration mode. To disable the maximum number of configure requests and return to the default, use the **no** form of this command.

ppp max-configure *retries*

Syntax Description

retries Maximum number of retries. Range is 4 through 20. Default is 10.

Command Default

retries: 10

Command Modes

Interface configuration
Dynamic template configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.

Usage Guidelines

Use the **ppp max-configure** command to specify how many times an attempt is made to establish a Link Control Protocol (LCP) session between two peers for a particular interface. If a configure request message receives a reply before the maximum number of configure requests are sent, further configure requests are abandoned.

To enter the dynamic template configuration mode, run **dynamic-template** command in the Global Configuration mode.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

This example shows a limit of four configure requests:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp max-configure 4
```

This example shows how a limit of four configure requests is specified in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure  
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1  
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp ipcp
```

Related Commands

Command	Description
ppp max-failure (BNG), on page 13	Configures the maximum number of consecutive CONFNAKs to permit before terminating a negotiation.

ppp max-failure (BNG)

To configure the maximum number of consecutive Configure Negative Acknowledgments (CONFNAKs) to permit before terminating a negotiation, use the **ppp max-failure** command in an appropriate configuration mode. To disable the maximum number of CONFNAKs and return to the default, use the **no** form of this command.

ppp max-failure *retries*

Syntax Description	<i>retries</i> Maximum number of CONFNAKs to permit before terminating a negotiation. Range is from 2 to 10. Default is 5.						
Command Default	<i>retries: 5</i>						
Command Modes	Interface configuration Dynamic template configuration						
Command History	<table><tr><th>Release</th><th>Modification</th></tr><tr><td>Release 3.9.0</td><td>This command was introduced.</td></tr><tr><td>Release 4.2.0</td><td>This command was supported in the dynamic template configuration mode for BNG.</td></tr></table>	Release	Modification	Release 3.9.0	This command was introduced.	Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
Release	Modification						
Release 3.9.0	This command was introduced.						
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.						
Usage Guidelines	To enter the dynamic template configuration mode, run dynamic-template command in the Global Configuration mode.						
Task ID	<table><tr><th>Task ID</th><th>Operations</th></tr><tr><td>ppp</td><td>read, write</td></tr><tr><td>aaa</td><td>read, write</td></tr></table>	Task ID	Operations	ppp	read, write	aaa	read, write
Task ID	Operations						
ppp	read, write						
aaa	read, write						

Examples

The **ppp max-failure** command specifies that no more than three CONFNAKs are permitted before terminating the negotiation:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp max-failure 3
```

This example shows how no more than three CONFNAKs are permitted before terminating the negotiation in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure  
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1  
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp max-failure 4
```

Related Commands

Command	Description
ppp max-configure (BNG), on page 11	Specifies the maximum number of configure requests to attempt (without response) before stopping the requests.

ppp ms-chap

To configure CHAP using the point-to-point protocol, use the **ppp ms-chap** command in the dynamic template configuration mode. To disable this feature, use the **no** form of this command.

ppp ms-chap hostname *chap_hostname*

Syntax Description	hostname	Sets the MS-CHAP hostname.
	<i>chap_hostname</i>	Specifies the name of the MS-CHAP hostname.

Command Default None

Command Modes Dynamic template configuration

Command History	Release	Modification
	Release 4.2.0	This command was introduced.

Usage Guidelines Use the **dynamic-template** command to enter the dynamic template configuration mode.

Task ID	Task ID	Operation
	ppp	read, write
	aaa	read, write

This is an example of configuring the **ppp ms-chap** command in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp ms-chap hostname host1
```

Related Commands	Command	Description
	ppp authentication (BNG), on page 2	Sets PPP link authentication method.

ppp timeout

To configure timeouts for PPP protocol, use the **ppp timeout** command in the dynamic template configuration mode. To disable this feature, use the **no** form of this command.

```
ppp timeout [ absolute absolute_minutes | authentication auth_seconds | retry retry_seconds ]
```

Syntax Description	absolute	Specifies the absolute timeout for a PPP session.
	authentication	Specifies the maximum wait time to receive an authentication response.
	retry	Specifies the maximum time to wait for a response during PPP negotiation.
	<i>absolute_minutes</i>	Specifies the absolute timeout in minutes. This value ranges from 0-70000000.
	<i>auth_seconds</i>	Specifies the authentication wait time in seconds. This value ranges from 3-30.
	<i>retry_seconds</i>	Specifies the retry timeout in seconds. This value ranges from 1-10.

Command Default None

Command Modes Dynamic template configuration

Command History	Release	Modification
	Release 4.2.0	This command was introduced.

Usage Guidelines Use the **dynamic-template** command to enter the dynamic template configuration mode.

Task ID	Task ID	Operation
	ppp	read, write
	aaa	read, write

This is an example of configuring the **ppp timeout** command in the dynamic template configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp timeout absolute 56
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp timeout authentication 4
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# ppp timeout retry 5
```


Related Commands

Command	Description
ppp authentication (BNG), on page 2	Sets PPP link authentication method.

show ppp interfaces (BNG)

To display PPP state information for an interface, use the **show ppp interfaces** command in EXEC mode.

show ppp interfaces [{**brief** | **detail**}] {**all** | *type interface-path-id* | **location node-id**}

Syntax Description	brief	(Optional) Displays brief output for all interfaces on the router, for a specific POS interface instance, or for all interfaces on a specific node.
	detail	(Optional) Displays detailed output for all interfaces on the router, for a specific interface instance, or for all interfaces on a specific node.
	<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
	<i>interface-path-id</i>	Physical interface or virtual interface.
	Note	Use the show interfaces command to see a list of all interfaces currently configured on the router.
		For more information about the syntax for the router, use the question mark (?) online help function.
	all	(Optional) Displays detailed PPP information for all nodes.
Command Default	No default behavior or values	
Command Modes	EXEC mode	
Command History	Release	Modification
	Release 3.9.0	This command was introduced.
	Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
	Release 5.3.2	The command was modified to include a new output display field, SRG-state , as part of geo redundancy support for PPPoE sessions in BNG router.
Usage Guidelines	There are seven possible PPP states applicable for either the Link Control Protocol (LCP) or the Network Control Protocol (NCP).	
	The command output displays a summary of the interface as it is in the PPP Interface Descriptor Block (IDB). The output includes the following information (where applicable):	

- Interface state
- Line protocol state
- Link Control Protocol (LCP) state
- Network Control Protocol (NCP) state
- Multilink PPP state
- Multilink PPP configuration
- Keepalive configuration
- Authentication configuration
- Negotiated MRUs
- Negotiated IP addresses

This command can display information for a single interface, all interfaces on a specified node, or all interfaces on the router.

Multilink PPP and POS are not supported for BNG Geo Redundancy.

Task ID	Task ID	Operations
	ppp	read

Examples

This example shows how to display PPP state information for a POS interface:

```
RP/0/RSP0/CPU0:router# show ppp interface POS 0/2/0/3

POS0/2/0/3 is up, line protocol is up
  LCP: Open
    Keepalives enabled (10 sec)
    Local MRU: 4470 bytes
    Peer MRU: 4470 bytes
  Authentication
    Of Us: CHAP (Completed as 'test-user')
    Of Peer: PAP (Completed as 'peer-user')
  CDPCP: Listen
  IPCP: Open
    Local IPv4 address: 55.0.0.1
    Peer IPv4 address: 55.0.0.2
    Peer DNS Primary: 55.0.0.254
    Peer DNS Secondary: 155.0.0.254
  IPV6CP: Open
    Local IPv6 address: fe80::3531:35ff:fe55:5747/128
    Peer IPv6 address: fe80::3531:35ff:fe55:4213/128
  MPLSCP: Stopped
```

This example shows how to display PPP state information for a POS interface that is running as a Layer 2 attachment circuit:

```
RP/0/0/CPU0:# show ppp interface POS0/2/0/2

POS0/2/0/2 is up, line protocol is up
  LCP: Open
    Running as L2 AC
```

This example shows how to display PPP state information for a multilink interface:

show ppp interfaces (BNG)

```
RP/0/RSP0/CPU0:router# show ppp interface Multilink 0/3/0/0/100

Multilink0/3/0/0/100 is up, line protocol is down
  LCP: Open
    SSO-State: Standby-Up
    Keepalives disabled
  IPCP: Open
    SSO-State: Standby-Up
    Local IPv4 address: 100.0.0.1
    Peer IPv4 address: 100.0.0.2
  IPV6CP: Open
    Local IPv6 address: fe80::3531:35ff:fe55:4600/128
    Peer IPv6 address: fe80::3531:35ff:fe55:3215/128
  Multilink
    Local MRRU: 1500 bytes
    Peer MRRU: 1500 bytes
    Local Endpoint Discriminator: 1234567812345678
    Peer Endpoint Discriminator: 1111222233334444
    MCMP classes: Local 4, Remote 2
    Member links: 2 active, 6 inactive (min-active 2)
      - Serial0/3/1/3/1 ACTIVE
      - Serial0/3/1/3/2 ACTIVE
      - Serial0/3/1/3/3 INACTIVE : LCP not negotiated
      - Serial0/3/1/3/4 INACTIVE : Mismatching peer endpoint
      - Serial0/3/1/3/5 INACTIVE : Mismatching peer auth name
      - Serial0/3/1/3/6 INACTIVE : MRRU option rejected by Peer
      - Serial0/3/1/3/7 INACTIVE : Mismatching local MCMP classes
      - Serial0/3/1/3/8 INACTIVE : MCMP option rejected by peer
```

This example shows how to display PPP state information for a serial interface:

```
RP/0/RSP0/CPU0:router# show ppp interface Serial 0/3/1/3/1

Serial0/3/1/3/1 is down, line protocol is down
  LCP: Open
    SSO-State: Standby-Up
    Keepalives enabled (10 sec)
    Local MRU: 1500 bytes
    Peer MRU: 1500 bytes
    Local Bundle MRRU: 1500 bytes
    Peer Bundle MRRU: 1500 bytes
    Local Endpoint Discriminator: 1234567812345678
    Peer Endpoint Discriminator: 1111222233334444
    Local MCMP Classes: Not negotiated
    Remote MCMP Classes: Not negotiated
  Authentication
    Of Us: CHAP (Completed as 'test-user')
    Of Peer: PAP (Completed as 'peer-user')
  Multilink
    Multilink group id: 100
    Member status: ACTIVE
```

This is a sample output of the **show ppp interfaces** command in the BNG router, having subscriber redundancy group (SRG) in geo redundancy enabled for PPPoE sessions:

```
RP/0/RSP0/CPU0:router# show ppp interfaces

Bundle-Ether2.1.pppoe16534 is down, line protocol is up
  SRG Role: Slave
  LCP: Open
```

```

    Keepalives enabled (60 sec, retry count 5)
    Local MRU: 1492 bytes
    Peer MRU: 65531 bytes
Authentication
  Of Peer: PAP (Completed as user1@domain.com)
  Of Us: <None>
IPCP: Open
  Local IPv4 address: 12.16.0.1
  Peer IPv4 address: 12.0.250.23
IPv6CP: Initial
  Local IPv6 address: fe80::
  Peer IPv6 address: fe80::

```

Table 2: show ppp interfaces Field Descriptions

Field	Description
Ack-Rcvd	Configuration acknowledgemt was received; waiting for peer to send configuration request.
Ack-Sent	Configuration acknowledgemt was sent; waiting for peer to respond to configuration request.
Authentication	Type of user authentication configured on the local equipment and on the peer equipment. Possible PPP authentication protocols are Challenge Handshake Authentication Protocol (CHAP), MS-CHAP, and Password Authentication Protocol (PAP).
Closed	Lower layer is up, but this layer is not required.
Closing	Shutting down due to local change.
Initial	Connection is idle.
IPCP	<p>IP Control Protocol (IPCP) state. The seven possible states that may be displayed are as follows:</p> <ul style="list-style-type: none"> • Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state. • Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent. • Closed—IPCP is not currently trying to negotiate. • Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. • Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered. • Stopping—A Terminate-Request has been sent and the Restart timer is running, but a IPCP-Ack has not yet been received. Req-Sent. • ACKsent—IPCP has received a request and has replied to it. • ACKrcvd—IPCP has received a reply to a request it sent. • Open—IPCP is functioning properly.

Field	Description
Keepalive	Keepalive setting and interval in seconds for echo request packets.
LCP	<p>Indicates the current state of LCP. The state of the LCP will report the following states:</p> <ul style="list-style-type: none"> • Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state. • Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent. • Closed—LCP is not currently trying to negotiate. • Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. • Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered. • Stopping—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Req-Sent. • ACKsent—LCP has received a request and has replied to it. • ACKrcvd—LCP has received a reply to a request it sent. • Open—LCP is functioning properly
Local IPv4 address	IPv4 address for the local interface.
Local MRU	Maximum receive unit. The maximum size of the information transported, in bytes, in the PPP packet received by the local equipment.
Open	Connection open.

Field	Description
OSICP	<p>Open System Interconnection Control Protocol (OSICP) state. The possible states that may be displayed are as follows:</p> <ul style="list-style-type: none"> • Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state. • Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent. • Closed—OSICP is not currently trying to negotiate. • Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. • Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered. • Stopping—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Req-Sent. • ACKsent—OSICP has received a request and has replied to it. • ACKrcvd—OSICP has received a reply to a request it sent. • Open—OSICP is functioning properly.
Peer IPv4 address	IPv4 address for the peer equipment.
Peer MRU	Maximum receive unit. The maximum size of the information transported, in bytes, in the PPP packet received by the peer equipment.
Req-Sent	Configuration request was sent; waiting for peer to respond.
Starting	This layer is required, but lower layer is down.
Stopped	Listening for a configuration request.
Stopping	Shutting down as a result of interactions with peer.

show ppp statistics

To display the statistics information for PPP interfaces, use the **show ppp statistics** command in EXEC mode.

show ppp statistics {**extended** | {**location***location*} | **interface** | {*interface-type**interface-path-id*} | **summary** | {**location***location*}}

Syntax Description	extended	Displays the extended PPP statistics across all interfaces.
	interface	Displays the PPP statistics for a single interface.
	summary	Displays aggregated PPP statistics across all interfaces.
	location	Displays the PPP statistics for interfaces at a location.
	<i>location</i>	Specifies the location details.
	<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
	<i>interface-path-id</i>	Physical interface or virtual interface.
		<p>Note Use the show interfaces command to see a list of all interfaces currently configured on the router.</p> <p>For more information about the syntax for the router, use the question mark (?) online help function.</p>
Command Default	None	
Command Modes	EXEC mode	
Command History	Release	Modification
	Release 4.2.0	This command was introduced.
Usage Guidelines	No specific guidelines impact the use of this command.	
Task ID	Task ID	Operation
	ppp	read

This example shows the output of the **show ppp statistics** command:

```
RP/0/RSP0/CPU0:router# show ppp statistics summary location 0/RSP0/CPU0
```


Thu Sep 6 06:38:17.668 DST

LCP

Packets	Sent	Received
Conf-Req	0	0
Conf-Ack	0	0
Conf-Nak	0	0
Conf-Rej	0	0
Term-Req	0	0
Term-Ack	0	0
Code-Rej	0	0
Proto-Rej	0	0
Echo-Req	0	0
Echo-Rep	0	0
Disc-Req	0	0

Line state brought up: 0

Keepalive Link Failures: 0

Authentication

Packets	Sent	Received
PAP		
Request	0	0
Ack	0	0
Nak	0	0
(MS-) CHAP		
Challenge	0	0
Response	0	0
Rep Success	0	0
Rep Fail	0	0

AAA authentication timeouts: 0

CDPCP

Packets	Sent	Received
Conf-Req	0	0
Conf-Ack	0	0
Conf-Nak	0	0
Conf-Rej	0	0
Term-Req	0	0
Term-Ack	0	0
Proto-Rej	0	0

IPCP

Packets	Sent	Received
Conf-Req	0	0
Conf-Ack	0	0
Conf-Nak	0	0
Conf-Rej	0	0
Term-Req	0	0
Term-Ack	0	0
Proto-Rej	0	0

IPCPIW

Packets	Sent	Received
Conf-Req	0	0
Conf-Ack	0	0
Conf-Nak	0	0
Conf-Rej	0	0
Term-Req	0	0
Term-Ack	0	0
Proto-Rej	0	0

IPv6CP

Packets	Sent	Received
Conf-Req	0	0
Conf-Ack	0	0
Conf-Nak	0	0
Conf-Rej	0	0
Term-Req	0	0
Term-Ack	0	0

show ppp statistics

```

Proto-Rej                0                0
MPLSCP
Packets                  Sent            Received
Conf-Req                 0                0
Conf-Ack                  0                0
Conf-Nak                   0                0
Conf-Rej                   0                0
Term-Req                   0                0
Term-Ack                   0                0
Proto-Rej                  0                0
OSICP
Packets                  Sent            Received
Conf-Req                 0                0
Conf-Ack                  0                0
Conf-Nak                   0                0
Conf-Rej                   0                0
Term-Req                   0                0
Term-Ack                   0                0
Proto-Rej                  0                0

```

Related Commands

Command	Description
show ppp interfaces (BNG), on page 18	Displays the PPP interfaces.
show ppp summary, on page 27	Displays the PPP summary.

show ppp summary

To display the summary information for the PPP interfaces, use the **show ppp summary** command in EXEC mode.

show ppp summary location *location*

Syntax Description	location Displays the PPP summary for interfaces at a location.
	<i>location</i> Specifies the location details.
Command Default	None
Command Modes	EXEC mode
Command History	Release Modification
	Release This command was introduced. 4.2.0
Usage Guidelines	No specific guidelines impact the use of this command.
Task ID	Task ID Operation
	ppp read

This example shows the output of the **show ppp summary** command for interfaces running PPP:

```
RP/0/RSP0/CPU0:router# show ppp summary location 0/5/CPU0
```

```
=====
Interfaces running PPP
=====
POS                      0
Serial                   200
PPPoE                   10000
Multilink Bundles       100
-----
Total                    10300

=====
CP FSM States
=====
```

Name	Total	Open	ACK sent	ACK rcvd	REQ sent	Stop-ping	Clos-ing	Stop-ped	Clos-ed	Start-ing	Initial
LCP	10300	10300	0	0	0	0	0	0	0	0	0
CDPCP	100	0	0	0	100	0	0	0	0	0	0
IPCP	10000	10000	0	0	0	0	0	0	0	0	0
IPv6CP	0	0	0	0	0	0	0	0	0	0	0
MPLSCP	0	0	0	0	0	0	0	0	0	0	0
OSICP	0	0	0	0	0	0	0	0	0	0	0

```

=====
LCP/Authentication Phases
=====
LCP Not Negotiated          100
Authenticating               0
Line held down               0
Line Up (Local Termination) 10200
Line Up (L2 Forwarded)      0
Line UP (VPDN Tunneled)     100

```

Related Commands

Command	Description
show ppp statistics, on page 24	Displays the PPP statistics.
show ppp interfaces (BNG), on page 18	Displays the PPP interfaces.