ACFC and PFC Handling During PPP Negotiation

Feature History

Release	Modification
12.2(7)	This feature was introduced.
12.2(15)B	This feature was integrated into Cisco IOS Release 12.2(15)B.

This document describes the ACFC and PFC Handling During PPP Negotiation feature and includes the following sections:

Feature Overview

Using the High-level data link (HDLC) Address and Control Field Compression (ACFC) and PPP Protocol Field Compression (PFC) Handling During PPP Negotiation feature you can control the negotiation and application of the Link Control Protocol (LCP) configuration options for HDLC address and control field compression (ACFC) and for PPP protocol field compression (PFC).

If ACFC is negotiated during PPP negotiation, Cisco routers may omit the HDLC header on links using HDLC encapsulation. If PFC is negotiated during PPP negotiation, Cisco routers may compress the PPP protocol field from two bytes to one byte.

The PPP commands described in this document allow ACFC and PFC to be disabled during PPP negotiation, thus allowing the HDLC framing and the protocol field to remain uncompressed.

Benefits

Prior to the introduction of the PPP commands described in this document, negotiation and use of PFC was entirely dependent upon the link type (synchronous or asynchronous) and was not under the independent control of a system administrator. The PPP commands described in this feature allow the system administrator to precisely control:

- When PPP negotiates the HDLC address and control field compression (ACFC) and PPP protocol field compression (PFC) options during initial LCP negotiations
- How the results of the PPP negotiation are applied

Restrictions

Using ACFC and PFC can result in minor gains in effective bandwidth because they reduce the amount of framing overhead for each packet. However, using ACFC or PFC changes the alignment of the network data in the frame, which in turn can impair the switching efficiency of the packets both at the local and remote ends of the connection. For these reasons, it is generally recommended that ACFC and PFC not be enabled without carefully considering the potential results.

Related Documents

- *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.2
- *Cisco IOS Wide-Area Networking Command Reference*, Release 12.2
- *Configuring Media-Independent PPP and Multilink PPP*

Supported Platforms

The ACFC and PFC Handling During PPP Negotiation feature is platform-independent and is supported on any Cisco networking device that supports PPP.

Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported by this feature.

MIBs

No new or modified MIBs are supported by this feature.

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

http://tools.cisco.com/ITDIT/MIBS/servlet/index

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

http://www.cisco.com/register

RFCs

- RFC1661- 6.5 *Protocol-Field-Compression (PFC)*
- RFC 1661- 6.6 *Address-and-Control-Field-Compression (ACFC)*
- RFC 1662 *PPP in HDLC-like Framing*

Prerequisites

PPP-in-HDLC Framing (RFC 1662)

Address and Control Field compression is only applicable to links that use PPP in HDLC-like framing as described by RFC 1662

Configuration Tasks

See the following sections for configuration tasks for the ACFC and PFC Handling During PPP Negotiation feature. Each task in the list is identified as either required or optional.

- Configuring ACFC Handling During PPP Negotiation, page 4 (optional)
- Configuring PFC Handling During PPP Negotiation, page 4 (optional)

Configuring ACFC Handling During PPP Negotiation

Use the following commands beginning in global configuration mode to configure ACFC handling during PPP negotiation:

	Command	Purpose
Step 1	`Router(config)# interface type slot/port`	Configures an interface type and enters interface configuration mode.
Step 2	`Router(config-if)# shutdown`	Shuts down the interface.
Step 3	`Router(config-if)# ppp acfc remote {apply | reject | ignore}`	Configures how the router handles the ACFC option in configuration requests received from a remote peer. • **apply**—ACFC options are accepted and ACFC may be performed on frames sent to the remote peer. • **reject**—ACFC options are explicitly ignored. • **ignore**—ACFC options are accepted, but ACFC is not performed on frames sent to the remote peer.
Step 4	`Router(config-if)# ppp acfc local {request | forbid}`	Configures how the router handles ACFC in its outbound configuration requests. • **request**—The ACFC option is included in outbound configuration requests. • **forbid**—The ACFC option is not sent in outbound configuration requests, and requests from a remote peer to add the ACFC option are not accepted.
Step 5	`Router(config-if)# no shutdown`	Reenables the interface.

Configuring PFC Handling During PPP Negotiation

Use the following commands beginning in global configuration mode to configure PFC handling during PPP negotiation:

	Command	Purpose
Step 1	`Router(config)# interface type slot/port`	Configures an interface type and enters interface configuration mode.
Step 2	`Router(config-if)# shutdown`	Shuts down the interface.
Step 3	`Router(config-if)# ppp pfc remote {apply | reject | ignore}`	Configures how the router handles the PFC option in configuration requests received from a remote peer. • **apply**—PFC options are accepted and PFC may be performed on frames sent to the remote peer. • **reject**—PFC options are explicitly ignored. • **ignore**—PFC options are accepted, but PFC is not performed on frames sent to the remote peer.

	Command	Purpose
Step 4	`Router(config-if)# ppp pfc local {request | forbid}`	Configures how the router handles PFC in its outbound configuration requests. • **request**—The PFC option is included in outbound configuration requests. • **forbid**—The PFC option is not sent in outbound configuration requests, and requests from a remote peer to add the PFC option are not accepted.
Step 5	`Router(config-if)# no shutdown`	Reenables the interface.

Verifying ACFC and PFC Handling During PPP Negotiation

Step 1 Enter the **show running-config interface** command. The following display shows ACFC being enabled on a synchronous serial interface:

```
Router# show running-config interface serial1/3

Building configuration...

Current configuration :303 bytes
!
.
.
.
 interface Serial1/3
  encapsulation ppp
  ppp acfc local request      <----
  ppp acfc remote apply       <----
.
.
.
```

Step 2 Enter the **debug ppp negotiation** command. The following displays ACFC enabled:

```
%LINK-3-UPDOWN:Interface Serial1/3, changed state to up
    Se1/3 PPP:Using default call direction
    Se1/3 PPP:Treating connection as a dedicated line
    Se1/3 PPP:Phase is ESTABLISHING, Active Open [0 sess, 1 load]
    Se1/3 LCP:O CONFREQ [Closed] id 4 len 12
    Se1/3 LCP:   MagicNumber 0x3025FBB3 (0x05063025FBB3)
    Se1/3 LCP:   ACFC (0x0802) ! The local router requests the ACFC option


    Se1/3 LCP:I CONFREQ [REQsent] id 7 len 12
    Se1/3 LCP:   MagicNumber 0x3026B1FC (0x05063026B1FC)
    Se1/3 LCP:   ACFC (0x0802) ! The romote peer requests the ACFC option
```

```
Se1/3 LCP:O CONFACK [REQsent] id 7 len 12
Se1/3 LCP:   MagicNumber 0x3026B1FC (0x05063026B1FC)
Se1/3 LCP:   ACFC (0x0802) ! The local router acknowledges the remote peer ACFC
                           request.


Se1/3 LCP:I CONFACK [ACKsent] id 4 len 12
Se1/3 LCP:   MagicNumber 0x3025FBB3 (0x05063025FBB3)
Se1/3 LCP:   ACFC (0x0802) ! The remote peer acknowledges the local ACFC request.
Se1/3 LCP:State is Open
```

Configuration Examples

This section provides the following configuration examples:

Configuring ACFC Handling During PPP Negotiation Examples

The following example shows how to configure the router to accept ACFC requests received from a remote peer and to perform ACFC on frames sent to the peer:

```
interface serial1/3
 shutdown
 ppp acfc remote apply
 no shutdown
```

The following example shows how to configure the router to explicitly ignore ACFC options received from a remote peer:

```
interface serial1/3
 shutdown
 ppp acfc remote reject
 no shutdown
```

The following example shows how to configure the router to accept ACFC options received from a remote peer, but not to perform ACFC on frames sent to the remote peer:

```
interface serial1/3
 shutdown
 ppp acfc remote ignore
 no shutdown
```

The following example shows how to configure a router to include the ACFC option in its outbound configuration requests:

```
interface serial1/3
 shutdown
 ppp acfc local request
 no shutdown
```

The following example shows how to configure a router to exclude the ACFC option from its configuration requests and to reject any requests from a remote peer to add the ACFC option:

```
interface serial1/3
 shutdown
 ppp acfc local forbid
 no shutdown
```

Configuring PFC Handling During PPP Negotiation Examples

The following example shows how to configure a router to accept PFC options received from a remote peer and to perform PFC on frames sent to the remote peer:

```
interface fastethernet0/0
 shutdown
 ppp pfc remote apply
 no shutdown
```

The following example shows how to configure a router to explicitly ignore the PFC option received from a remote peer:

```
interface fastethernet0/0
 shutdown
 ppp pfc remote reject
 no shutdown
```

The following example shows how to configure a router to accept the PFC option received from a remote peer, and to not perform PFC on frames sent to the remote peer:

```
interface fastethernet0/0
 shutdown
 ppp pfc remote ignore
 no shutdown
```

The following example shows how to configure a router to include the PFC option in its outbound configuration requests:

```
interface fastethernet0/0
 shutdown
 ppp pfc local request
 no shutdown
```

The following example shows how to configure a router to exclude the PFC option from its outbound configuration requests and to reject any request from a remote peer to add the PFC option:

```
interface fastethernet0/0
 shutdown
 ppp pfc local forbid
 no shutdown
```

Command Reference

This section documents new commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 command reference publications.

- **ppp acfc remote**
- **ppp acfc local**
- **ppp pfc remote**
- **ppp pfc local**

ppp acfc remote

To configure how the a router handles the HDLC address and control field compression (ACFC) option in configuration requests received from a remote peer, use the **ppp acfc remote** command in interface configuration mode. To disable this control, use the **no** form of this command.

ppp acfc remote {**apply** | **reject** | **ignore**}

no ppp acfc remote

Syntax Description

apply	ACFC options are accepted and ACFC may be performed on frames sent to the remote peer.
reject	ACFC options are explicitly ignored.
ignore	ACFC options are accepted, but ACFC is not performed on frames sent to the remote peer.

Defaults

ACFC handling is automatically selected based on the type of link. For asynchronous links, the router responds as if the **apply** keyword were selected and the router accepts ACFC options received from a remote peer and may perform ACFC on frames sent to the peer. For synchronous links, the router responds as if the **ignore** keyword were selected and ACFC options received from a remote peer are accepted, but ACFC is not performed on frames sent to the remote peer.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(7)	This command was introduced.
12.2(15)B	This command was integrated into Cisco IOS Release 12.2(15)B.

Usage Guidelines

Use this command to configure how a router responds to ACFC requests received from a remote peer.

Use the **no ppp acfc remote** command to restore the router to default ACFC handling. If you do not configure ACFC handling, or if you enter the **no ppp acfc remote** command, Cisco IOS selects the keyword depending on the link type.

Examples

The following example shows how to disable ACFC configuration options received from a remote peer:

```
ppp acfc remote reject
```

Related Commands

Command	Description
ppp acfc local	Configures how a router handles the ACFC option in configuration requests.
ppp pfc remote	Configures how a router handles the PFC option in configuration requests received from a remote peer.
ppp pfc local	Configure how a router handles the PFC option in configuration requests.

ppp acfc local

To configure how a router handles HDLC Address and Control Field Compression (ACFC) option in configuration requests, use the **ppp acfc local** command in interface configuration mode. To disable this control, use the **no** form of this command.

ppp acfc local {**request** | **forbid**}

no ppp acfc local

Syntax Description

request	The ACFC option is included in outbound configuration requests.
forbid	The ACFC option is not sent in outbound configuration requests, and requests from a peer to add the ACFC option are not accepted.

Defaults

ACFC handling is automatically selected based on the type of link. For asynchronous links, the router responds as if the **request** keyword were selected and the router includes the ACFC option in outbound configuration requests. For synchronous links, the router responds as if the **forbid** keyword were selected and the ACFC option is not sent out in configuration outbound requests and requests from a peer to add the ACFC option are not accepted.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(7)	This command was introduced.
12.2(15)B	This command was integrated into Cisco IOS Release 12.2(15)B.

Usage Guidelines

Use this command to configure how a router handles ACFC requests in its outbound configuration requests.

Use the **no ppp acfc local** command to restore the router to default ACFC handling. If you do not configure ACFC handling, or if you enter the **no ppp acfc local** command, Cisco IOS selects the keyword depending on the link type.

Examples

The following example shows how to configure a router to exclude ACFC options from its configuration requests:

```
ppp acfc local forbid
```

Related Commands

Command	Description
ppp acfc remote	Configures how the a router handles ACFC options received from a remote peer.
ppp pfc remote	Configures how a router handles the PFC option in configuration requests received from a remote peer.
ppp pfc local	Configures how a router handles the PFC option in configuration requests.

ppp pfc remote

To configure how a router handles the protocol field compression (PFC) option in configuration requests received from a remote peer, use the **ppp pfc remote** command in interface configuration mode. To disable this control, use the **no** form of this command.

ppp pfc remote {**apply** | **reject** | **ignore**}

no ppp pfc remote

Syntax Description

apply	PFC options are accepted and PFC may be performed on frames sent to the remote peer.
reject	PFC options are explicitly rejected.
ignore	PFC options are accepted, but PFC is not performed on frames sent to the remote peer.

Defaults

PFC handling is automatically selected based on the type of link. For asynchronous links, the router responds as if the **apply** keyword were selected and the router accepts PFC options received from a remote peer and PFC may be performed on frames sent to the remote peer. For synchronous links, the router responds as if the **ignore** keyword were selected and PFC options are accepted but PFC is not performed on frames sent to the remote peer.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(7)	This command was introduced.
12.2(15)B	This command was integrated into Cisco IOS Release 12.2(15)B.

Usage Guidelines

Use this command to configure how a router responds to PFC requests received from a remote peer.

Use the **no ppp pfc remote** command to restore the router to default PFC handling. If you do not configure ACFC handling, or if you enter the **no ppp pfc remote** command, Cisco IOS selects the keyword depending on the link type.

Examples

The following example shows how to configure a router to explicitly reject PFC options from a remote peer:

```
ppp pfc remote reject
```

Related Commands

Command	Description
ppp acfc remote	Configures how a router handles ACFC options received from a remote peer.
ppp acfc local	Configures how a router handles the ACFC option in configuration requests.
ppp pfc local	Configures how a router handles the PFC option in configuration requests.

ppp pfc local

To configure how a router handles the Protocol Field Compression (PFC) option in configuration requests, use the **ppp pfc local** command in interface configuration mode. To disable this control, use the **no** form of this command.

ppp pfc local {**request** | **forbid**}

no ppp pfc local

Syntax Description

request	The PFC option is included in outbound configuration requests.
forbid	The PFC option is not sent in outbound configuration requests, and requests from a peer to add the PFC option are not accepted.

Defaults

PFC handling is automatically selected based on the type of link. For asynchronous links, the router responds as if the **request** keyword were selected and the router includes the PFC option in outbound configuration requests. For synchronous links, the router responds as if the **forbid** keyword were selected and the PFC option is not sent out in outbound configuration requests and requests from a peer to add the PFC option are not accepted.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(7)	This command was introduced.
12.2(15)B	This command was integrated into Cisco IOS Release 12.2(15)B.

Usage Guidelines

Use this command to configure how a router handles PFC in its outbound configuration requests.

Use the **no ppp pfc local** command to restore the router to default PFC handling. If you do not configure PFC handling, or if you enter the **no ppp pfc local** command, Cisco IOS selects the keyword depending on the link type.

Examples

The following example shows how to configure a router to exclude the PFC option from its outbound configuration requests:

```
ppp pfc local forbid
```

Related Commands

Command	Description
ppp acfc remote	Configures how a router handles ACFC options received from a remote peer.

Command	Description
ppp acfc local	Configures how a router handles the ACFC option in configuration requests.
ppp pfc remote	Configures how a router handles the PFC option in configuration requests received from a remote peer.

Glossary

ACFC—Address and control field compression.

LCP—Link Control Protocol. Protocol that establishes, configures, and tests data-link connections for use by PPP.

HDLC—High-level data link control. Bit-oriented synchronous data link layer protocol developed by ISO. HDLC specifies a data encapsulation method on synchronous serial links using frame characters and checksums.

PFC—PPP Protocol Field Compression.