Using Multilink PPP over Dialer Interface Links

This module contains conceptual information and configuration tasks for using Multilink PPP over dialer interface links. Multilink PPP is a method used to reduce latency and jitter for real-time traffic.

This module was first published on May 2, 2005, and last updated on May 2, 2005.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for Using Multilink PPP over Dialer Interface Links" section on page 11.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Contents

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Prerequisites for Using Multilink PPP over Dialer Interface Links

- Be familiar with the concepts in the "Reducing Latency and Jitter for Real-Time Traffic Using Multilink PPP" module.
- Multilink uses first-in first out (FIFO) queuing for queuing and interleaving packets. Other queuing mechanisms such as low latency queuing (LLQ), weighted fair queuing (WFQ), and class-based weighted fair queuing (CBWFQ) can be used. If you want to use one of these alternative mechanisms, enable it before configuring Multilink.

Restrictions for Using Multilink PPP over Dialer Interface Links

- Route/switch processing (RSP) is not recommended when using Multilink PPP over dialer interface links.

Information About Using Multilink PPP over Dialer Interface Links

Dialer Profiles

The dialer profiles implementation of dial-on-demand routing (DDR) is based on a separation between logical and physical interface configuration. Dialer profiles also allow the logical and physical configurations to be bound together dynamically on a per-call basis.

Dialer profiles are advantageous in the following situations:

- When you want to share an interface (ISDN, asynchronous, or synchronous serial) to place or receive calls.
- When you want to change any configuration on a per-user basis.
- When you want to maximize ISDN channel usage using the Dynamic Multiple Encapsulations feature to configure various encapsulation types and per-user configurations on the same ISDN B channel at different times according to the type of call.
- When you want to bridge to many destinations, and for avoiding split horizon problems.

Most routed protocols are supported; however, International Organization for Standardization Connectionless Network Service (ISO CLNS) is not supported.

If you decide to configure dialer profiles, you must disable validation of source addresses for the routed protocols you support.

MQC and Multilink PPP over Dialer Interface Links

Before using Multilink PPP over dialer interface links, a traffic policy (also known as a policy map) must be created. (See the "Prerequisites" section on page 3.) Policy maps are created using the Modular Quality of Service (QoS) Command-Line Interface (CLI) (MQC).

The MQC is a CLI structure that allows users to create traffic policies (policy maps) and attach these policy maps to interfaces. A policy map contains a traffic class and one or more QoS features. A traffic class is used to classify traffic. The QoS features in the traffic policy determine how to treat the classified traffic.

How to Configure Multilink PPP over Dialer Interface Links

Configuring Multilink PPP over Dialer Interface Links

Prerequisites

Before proceeding with this task, you must create a policy map. The policy map contains the configuration parameters used to apply the specific quality of service feature to the network traffic. To create a policy map, use the MQC. See the "MQC and Multilink PPP over Dialer Interface Links" section on page 3.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface dialer** *dialer-rotary-group-number*
4. **ip address** *ip-address mask* [**secondary**]
5. **ip unnumbered** *type number*
6. **encapsulation** *encapsulation-type*
7. **dialer pool** *number*
8. **dialer in-band** [**no-parity** | **odd-parity**]
9. **service-policy output** *policy-map-name*
10. **service-policy input** *policy-map-name*
11. **ppp authentication** {*protocol1* [*protocol2...*]} [**if-needed**] [*list-name* | **default**] [**callin**] [**one-time**] [**optional**]
12. **ppp chap hostname** *hostname*
13. **ppp chap password** *secret*
14. **ppp multilink** [**bap**]
15. **ppp multilink fragment delay** *milliseconds* [*microseconds*]
16. **ppp multilink interleave**
17. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface dialer** *dialer-rotary-group-number* **Example:** `Router(config)# interface dialer 1`	Defines a dialer rotary group and enters interface configuration mode. • Enter the dialer rotary group number.
Step 4	**ip address** *ip-address mask* [**secondary**] **Example:** `Router(config-if)# ip address 10.10.100.1 255.255.255.0`	Sets a primary IP address for an interface. This command can also set the optional secondary IP address for an interface. • Enter the primary IP address (and, optionally, the secondary IP address).
Step 5	**ip unnumbered** *type number* **Example:** `Router(config-if)# ip unnumbered ethernet 0`	(Optional) Enables IP processing on a serial interface without assigning an explicit IP address to the interface. • Enter the type and number of another interface on which the router has an assigned IP address. It cannot be another unnumbered interface.
Step 6	**encapsulation** *encapsulation-type* **Example:** `Router(config-if)# encapsulation ppp`	Sets the encapsulation method used by the interface. • Enter the encapsulation method. For this feature, enter **ppp**.
Step 7	**dialer pool** *number* **Example:** `Router(config-if)# dialer pool 3`	(Optional) Specifies which dialing pool to use to connect to a specific destination subnetwork. • Enter the dialing pool number.
Step 8	**dialer in-band** [**no-parity** | **odd-parity**] **Example:** `Router(config-if)# dialer in-band`	(Optional) Specifies that dial-on-demand routing (DDR) is to be supported.
Step 9	**service-policy output** *policy-map-name* **Example:** `Router(config-if)# service-policy output policy1`	Attaches the previously created QoS traffic policy (policy map). The policy map evaluates and applies QoS features for traffic *leaving* the interface. • Enter the policy map name.

	Command or Action	Purpose
Step 10	**service-policy input** *policy-map-name* **Example:** `Router(config-if)# service-policy input policy1`	Attaches the previously created QoS traffic policy (policy map). See the "Prerequisites" section on page 3. The policy map evaluates and applies QoS features for traffic *entering* the interface. • Enter the policy map name.
Step 11	**ppp authentication** {*protocol1* [*protocol2...*]} [**if-needed**] [*list-name* | **default**] [**callin**] [**one-time**] [**optional**] **Example:** `Router(config-if)# ppp authentication chap`	Enables at least one Point-to-Point Protocol (PPP) authentication protocol and specifies the order in which the protocols are selected on the interface. • Enter the PPP authentication protocol to be used.
Step 12	**ppp chap hostname** *hostname* **Example:** `Router(config-if)# ppp chap hostname ISPCorp`	Creates a pool of dialup routers that all appear to be the same host when authenticating with Challenge Handshake Authentication Protocol (CHAP). • Enter the name sent in the CHAP challenge.
Step 13	**ppp chap password** *secret* **Example:** `Router(config-if)# ppp chap password 7`	Enables a router calling a collection of routers that do not support this command (such as routers running older Cisco IOS software images) to configure a CHAP secret password to use in response to challenges from an unknown peer. • Enter the secret password used to compute the response value for any CHAP challenge from an unknown peer.
Step 14	**ppp multilink** [**bap**] **Example:** `Router(config-if)# ppp multilink`	Enables multilink on an interface.
Step 15	**ppp multilink fragment delay** *milliseconds* [*microseconds*] **Example:** `Router(config-if)# ppp multilink fragment delay 20`	Specifies a maximum size in units of time for packet fragments on a Multilink PPP (MLP) bundle. • Enter the maximum amount of time, in milliseconds.
Step 16	**ppp multilink interleave** **Example:** `Router(config-if)# ppp multilink interleave`	Enables interleaving of packets among the fragments of larger packets on a multilink bundle.
Step 17	**end** **Example:** `Router(config-if)# end`	(Optional) Exits interface configuration mode.

Associating the Dialer Interface with a BRI

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **dialer pool-member** *number* [**priority** *priority*] [**min-link** *minimum*] [**max-link** *maximum*]
5. **dialer rotary-group** *interface-number*
6. **ppp multilink** [**bap**]
7. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface bri 1`	Configures a BRI interface and enters interface configuration mode. • Enter port, connector, or interface card number.
Step 4	**dialer pool-member** *number* [**priority** *priority*] [**min-link** *minimum*] [**max-link** *maximum*] **Example:** `Router(config-if)# dialer pool-member 3`	(Optional) Configures a physical interface to be a member of a dialer profile dialing pool. • Enter the dialer profile dialing pool number.
Step 5	**dialer rotary-group** *interface-number* **Example:** `Router(config-if)# dialer rotary-group 1`	(Optional) Includes a specified interface in a dialer rotary group. • Enter the number of the dialer interface (defined in Step 4) in whose rotary group this interface is to be included.
Step 6	**ppp multilink** [**bap**] **Example:** `Router(config-if)# ppp multilink`	Enables Multilink on an interface.
Step 7	**end** **Example:** `Router(config-if)# end`	(Optional) Exits interface configuration mode.

Verifying the Multilink PPP over Dialer Interface Link Configuration

SUMMARY STEPS

1. **enable**
2. **show interfaces** [*type number*] [*first*] [*last*] [**accounting**]
3. **show ppp multilink** [**active** | **inactive** | **interface** *bundle-interface* | [**username** *name*] [**endpoint** *endpoint*]]
4. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show interfaces** [*type number*] [*first*] [*last*] [**accounting**] **Example:** `Router# show interfaces`	(Optional) Displays statistics for all interfaces configured on the router or access server.
Step 3	**show ppp multilink** [**active** | **inactive** | **interface** *bundle-interface* | [**username** *name*] [**endpoint** *endpoint*]] **Example:** `Router# show ppp multilink`	(Optional) Displays bundle information for the multilink bundles.
Step 4	**exit** **Example:** `Router# exit`	(Optional) Exits privileged EXEC mode.

Configuration Examples for Using Multilink PPP over Dialer Interface Links

Example: Configuring Multilink PPP over Dialer Interface Links

The following is an example of configuring Multilink PPP over a dialer interface link:

```
Router> enable
Router# configure terminal
Router(config)# interface dialer 1
```

```
Router(config-if)# ip address 10.10.100.1 255.255.255.0
Router(config-if)# encapsulation ppp
Router(config-if)# dialer pool 3
Router(config-if)# service-policy output policy1
Router(config-if)# service-policy input policy1
Router(config-if)# ppp authentication chap
Router(config-if)# ppp chap hostname ISPCorp
Router(config-if)# ppp chap password 7
Router(config-if)# ppp multilink
Router(config-if)# ppp multilink fragment delay 20
Router(config-if)# ppp multilink interleave
Router(config-if)# end
```

Example: Associating the Dialer Interface with a BRI

The following is an example of associating the dialer interface with a BRI:

```
Router> enable
Router# configure terminal
Router(config)# interface bri 1
Router(config-if)# dialer pool-member 3
Router(config-if)# ppp multilink
Router(config-if)# end
```

Example: Verifying the Multilink PPP over Dialer Interface Link Configuration

You can verify the Multilink PPP over dialer interface link configuration by using one or more of the following **show** commands:

- **show interfaces**
- **show ppp multilink**

The following section provides sample output of the **show ppp multilink** command only. For sample output of the other commands, see the appropriate Cisco IOS Release 12.3 T command reference publication.

show ppp multilink Command Output Example

The following is an example of the **show ppp multilink** command output. In this example, one multilink bundle called 7206-2 is on the system. This bundle has one member link.

```
Router# show ppp multilink

Dialer2, bundle name is 7206-2
  Username is 7206-2
  Endpoint discriminator is 7206-2
  Bundle up for 00:00:10, 1/255 load
  Receive buffer limit 12000 bytes, frag timeout 1500 ms
    0/0 fragments/bytes in reassembly list
    0 lost fragments, 0 reordered
    0/0 discarded fragments/bytes, 0 lost received
    0x0 received sequence, 0x0 sent sequence
  Member links:1 (max not set, min not set)
    BR2/0:1, since 00:00:09
```

Where to Go Next

To use Multilink PPP over Frame Relay, see the "Using Multilink PPP over Frame Relay" module.

To use Multilink PPP over ATM links, see the "Using Multilink PPP over ATM Links" module.

To use Multilink PPP over serial interface links, see the "Using Multilink PPP over Serial Interface Links" module.

Additional References

The following sections provide references related to Multilink PPP over dialer interface links.

Related Documents

Related Topic	Document Title
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS Quality of Service Solutions Command Reference*
LLQ, WFQ, CBWFQ, PQ, CQ, FIFO and other queueing mechanisms	"Configuring Weighted Fair Queueing" module
MQC	"Applying QoS Features Using the MQC" module
Dialer profiles and DDR	"Preparing to Configure DDR" module
Multilink PPP configuration information	"Configuring Media-Independent PPP and Multilink PPP" module
Multilink PPP overview module	"Reducing Latency and Jitter for Real-Time Traffic Using Multilink PPP" module
Multilink PPP over Frame Relay	"Using Multilink PPP over Frame Relay" module
Multilink PPP over ATM links (including ATM interfaces and ATM PVCs)	"Using Multilink PPP over ATM Links" module
Multilink PPP over serial interface links	"Using Multilink PPP over Serial Interface Links" module

Standards

Standard	Title
No new or modified standards are supported, and support for existing standards has not been modified.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 1990	The PPP Multilink Protocol (MP)
RFC 2686	Multiclass Extension to Multilink PPP (MCML)

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 Using Multilink PPP over Dialer Interface Links

Table 1 lists the release history for this feature.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS 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 Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for Using Multilink PPP over Dialer Interface Links

Feature Name	Software Releases	Feature Configuration Information
Distributed Link Fragmentation and Interleaving Over Leased Lines	12.2(8)T	The Distributed Link Fragmentation and Interleaving over Leased Lines feature extends distributed link fragmentation and interleaving functionality to leased lines. This feature was extensively rewritten from the perspective of using Multilink PPP for link fragmentation and interleaving over dialer interface links. The following sections provide information about this feature: • Information About Using Multilink PPP over Dialer Interface Links, page 2 • How to Configure Multilink PPP over Dialer Interface Links, page 3
Distributed Link Fragmentation and Interleaving for Frame Relay and ATM Interfaces on Cisco 7500 Series Routers	12.2(4)T	The Distributed Link Fragmentation and Interleaving (dLFI) for Frame Relay and ATM Interfaces on Cisco 7500 Series Routers feature extends link fragmentation and interleaving functionality to VIP-enabled Cisco 7500 series routers. This feature was extensively rewritten from the perspective of using Multilink PPP for link fragmentation and interleaving over dialer interface links. The following sections provide information about this feature: • Information About Using Multilink PPP over Dialer Interface Links, page 2 • How to Configure Multilink PPP over Dialer Interface Links, page 3