CHAPTER 21

Point-to-Point Protocol

This chapter describes the level of support that Cisco ANA provides for PPP, as follows:

Technology Description

PPP

PPP (RFC 1661) originally emerged as an encapsulation protocol for transporting IP traffic over point-to-point links. PPP also established standards for the assignment and management of IP addresses, octet-synchronous (asynchronous) encapsulation, use of an HDLC-like framing protocol (RFC 1662), bit-synchronous encapsulation, use of HDLC protocols, network protocol multiplexing, link configuration, link quality testing, error detection, and option negotiation for such capabilities as network layer address and data compression negotiation.

PPP supports these functions by providing an extensible Link Control Protocol (LCP) and a family of Network Control Protocols (NCPs) to negotiate optional configuration parameters and facilities.

POS

Packet over SONET/SDH (PoS) is a data link (Layer 2) technology that uses PPP (RFC 1661) in HDLC-like framing (RFC 1662) encapsulation over SONET/SDH framing. The PoS interface supports SONET/SDH-level alarm processing, performance monitoring, synchronization, and protection switching, which enables seamless interoperation with existing SONET infrastructures and provides the capability to migrate to IP+Optical networks without the need for legacy SONET infrastructures.

PPPoA

Point-to-Point Protocol over ATM (PPPoA, RFC 2364) is a protocol for encapsulating PPP frames for transmission over an ATM network. It offers standard PPP features and supports the VC-MUX and LLC based encapsulation. It is used mainly by DOCSIS and DSL carriers.

PPPoE

Point-to-Point Protocol over Ethernet (PPPoE, RFC 2516) is a protocol for encapsulating PPP frames inside Ethernet frames. It is used mainly with DSL services where individual users connect to the DSL modem over Ethernet and in plain Metro Ethernet networks.

PPPoFR

Point-to-Point Protocol over Frame Relay (PPPoE, RFC 1973) is a protocol for encapsulating PPP frames for transmission across Frame Relay connections. The traditional usage of this interface has been on dial-in access servers, to support multiple PPP dial-in clients terminating their connection on a single interface running IP.

Multilink PPP

Multilink PPP (also referred to as MP, MPPP, MLP, or Multilink) provides a method for spreading traffic across multiple physical WAN links while providing packet fragmentation and reassembly, proper sequencing, multivendor interoperability, and load balancing on inbound and outbound traffic. MPPP allows packets to be fragmented. These fragments are sent simultaneously over multiple point-to-point links to the same remote address. The multiple physical links come up in response to a user-defined load threshold. This load can be measured on just inbound traffic, on just outbound traffic, or on either; however, it cannot be measured on the combined load of both inbound and outbound traffic.

Information Model Objects (IMOs)

This section describes the following IMOs:

- PPP Encapsulation (IVcBasedEncapsulation)
- Multilink PPP Interface (IMLPPP)

PPP Encapsulation

The data link layer PPP Encapsulation object is bound by its Containing Termination Points attribute to an ATM/Frame Relay VC Multiplexer object. It is accessed primarily by a network layer object, such as the IP Interface bound by its Contained Connection Termination Points attribute.

Table 21-1 PPP Encapsulation (IVcBasedEncapsulation)

Attribute Name	Attribute Description	Scheme	Polling Interval
Virtual Connection	Virtual connection, if applicable (ATM Virtual Connection, Frame Relay Virtual Connection, or Virtual LAN Interface)	Any	Configuration
Binding Information	Binding information (*User Name*, and so on)	Any	Configuration
Binding Status	Binding status (*Not Bound, Bound*)	Any	Configuration
IANA Type	Internet Assigned Numbers Authority (IANA) type of the sublayer	N/A	N/A
Containing Termination Points	Underlying termination points (connection or physical)	Any	N/A
Contained Connection Termination Points	Bound connection termination points	Any	N/A

Multilink PPP Interface

The Multilink PPP Interface object models a multilink PPP bundle, which is a named virtual interface with multiple member links.

Table 21-2 Multilink PPP Interface (IMLPPP)

Attribute Name	Attribute Description	Scheme	Polling Interval
InterfaceName	The interface name (for example, *Multilink*).	Product	Configuration
GroupNumber	The numerical group ID of the multilink bundle (for example, *8*).	Product	Configuration
MTU	The Maximum Transmission Unit for the bundle link.	Product	Configuration
FragmentDelay	The maximum realtime delay (in milliseconds) between each fragment.	Product	Configuration
FragmentDisable	Indicates whether the multilink fragmentation function is disabled (*true*) or enabled (*false*).	Product	Configuration
FragmentMaximum	The maximum number of fragments allowed per packet.	Product	Configuration
FragmentSize	The maximum size of each fragment.	Product	Configuration
Interleave	Indicates whether the fragment interleaving function is enabled (*true*) or disabled (*false*).	Product	Configuration

Table 21-2 Multilink PPP Interface (IMLPPP)

Attribute Name	Attribute Description	Scheme	Polling Interval
KeepaliveTime	The keepalive timeout value (in milliseconds) for the member links.	Product	Configuration
KeepaliveRetry	The number of times to attempt keepalive before timing out.	Product	Configuration
MinimumConfigured Link	Minimum number of member interfaces configured to participate in a multilink PPP bundle.	Product	Configuration
MaximumConfigure dLink	Maximum number of member interfaces configured to participate in a multilink PPP bundle.	Product	Configuration
LocalMRRU	The Maximum Received Reconstructed Unit (in bytes) for the local links.	Product	Configuration
RemoteMRRU	The Maximum Received Reconstructed Unit (in bytes) for the remote links.	Product	Configuration
LoadThreshold	The threshold percentage of bandwidth usage at which to add member links and increase the bandwidth of the bundle interface (or delete member links and decrease capacity). Values range from *1* (unloaded) to *255* (fully loaded) and correspond to a percentage of total use (for example, a value of *191* represents a threshold of 75% of total usage).	Product	Configuration
LCPStatus	The Link Control Protocol status code (values *1* through *11*).	Product	Configuration
AdminStatus	The administrative status of the bundle (*Down*, *Testing*, *Up*).	Product	Configuration
OperStatus	The operational status of the bundle (*Down*, *Testing*, *Up*).	Product	Configuration

Vendor-Specific Inventory and IMOs

There are no vendor-specific inventory or IMOs for this technology.

Network Topology

Cisco ANA performs discovery of PPP topologies by searching for the local IP subnet in any one-hop-away remote sides of the PPP interfaces. In particular, it compares the local and remote IP subnets gathered from the upper IP Network layers.

Service Alarms

The following alarms are supported for this technology:

- MLPPP Down Due To Flapping
- MLPPP Down Flapping Update
- MLPPP Down Flapping Proxy
- MLPPP Down Due To Admin Down
- MLPPP Down Due To Oper Down
- MLPPP Up

For detailed information about alarms and correlation, see the *Cisco Active Network Abstraction 3.7 User Guide*.