

## PPP: Point-to-Point Protocol Overview

The Point-to-Point Protocol (PPP) provides a standard method for transporting multi-protocol datagrams over point-to-point links. PPP was originally emerged as an encapsulation protocol for transporting IP traffic between two peers. It is a data link layer protocol (layer 2 in the OSI model ) in the TCP-IP protocol suite over synchronous modem links, as a replacement for the non-standard layer 2 protocol SLIP. However, other protocols other than IP can also be carried over PPP, including DECnet and Novell's Internetwork Packet Exchange (IPX).

PPP is comprised of the following main components:

- Encapsulation: A method for encapsulating multi-protocol datagrams. The PPP encapsulation provides for multiplexing of different network-layer protocols simultaneously over the same link. The PPP encapsulation has been carefully designed to retain compatibility with most commonly used supporting hardware.
- Link Control Protocol: The LCP provided by PPP is versatile and portable to a wide variety of environment. The LCP is used to automatically agree upon the encapsulation format options, handle varying limits on sizes of packets, detect a looped-back link and other common misconfiguration errors, and terminate the link. Other optional facilities provided are authentication of the identity of its peer on the link, and determination when a link is functioning properly and when it is failing.
- Network Control Protocol: An extensible Link Control Protocol (LCP) for establishing, configuring, and testing and managing the data-link connections.
- Configuration: Easy and self configuration mechanisms using Link Control Protocol. This mechanism is also used by other control protocols such as Network Control Protocols (NCPs).

In order to establish communications over a point-to-point link, each end of the PPP link must first send LCP packets to configure and test the data link. After the link has been established and optional facilities have been negotiated as needed by the LCP, PPP must send NCP packets to choose and configure one or more network-layer protocols. Once each of the chosen network-layer protocols has been configured, datagrams from each network-layer protocol can be sent over the link.

The link will remain configured for communications until explicit LCP or NCP packets close the link down, or until some external event occurs (an inactivity timer expires or network administrator intervention).

### Protocol Structure - PPP (Point to Point Protocol) Frame

8	16	24	40bits	Variable	16 - 32 bits
Flag	Address	Control	Protocol	Information	FCS

- Flag - indicates the beginning or end of a frame, consists of the binary sequence 01111110.
- Address - contains the binary sequence 11111111, the standard broadcast address. (Note: PPP does not assign individual station addresses.)
- Control - contains the binary sequence 00000011, which calls for transmission of user data in an unsequenced frame.
- Protocol - identify the protocol encapsulated in the information field of the frame.
- Information - Zero or more octet(s), contain the datagram for the protocol specified in the protocol field.
- FCS - Frame Check Sequence (FCS) Field, normally 16 bits. By prior agreement, consenting PPP implementations can use a 32-bit FCS for improved error detection.