POINT-TO-POINT PROTOCOL

packetlife.net

PPP Components

Link Control Protocol (LCP)
Provides for the establishment, configuration, and maintenance of a PPP link. Protocol-independent options are negotiated by LCP.

Network Control Protocol (NCP)
A separate NCP is used to negotiate the configuration of each network layer protocol (such as IP) carried by PPP.

PPP Header

	8	16	24	32
	Address	Control	Protocol	

LCP Header

	8	16	24	32
	Code	Identifier	Length	

Authentication Protocols

Plaintext Authentication Protocol (PAP)
Original, obsolete authentication protocol which relies on the exchange of a plaintext key to authenticate peers (RFC 1334).

Challenge Handshake Authentication Protocol (CHAP)
Authenticates peers using the MD5 checksum of a pre-shared secret key (RFC 1994).

Extensible Authentication Protocol (EAP)
Provides MD5-based authentication similar to CHAP (RFC 3748). Could be expanded to support other EAP mechanisms as well.

General PPP Configuration

```
! Configure a peer account if authentication will be used
username peer-hostname password password

! Configure a local IP address pool if needed
ip pool name first-IP last-IP

interface Serial0/0
 ! Enable PPP encapsulation
 encapsulation ppp
 ! Enable CHAP and/or PAP for authentication
 ppp authentication { chap | pap } [ chap | pap ]
 ! Enable compression
 compress { predictor | stac }
 ! Enable peer IP address assignment (server side)
 peer default ip address { pool name | IP-address }
 ! Enable IP address negotiation (client side)
 ip address negotiated
```

Multilink PPP Configuration

```
! Create the multilink interface
interface Multilink1
 ip address IP-address subnet-mask
 ppp multilink group group

! Assign physical interfaces to the multilink group
interface Serial0/0
 encapsulation ppp
 ppp multilink group group
```

PPP Summary

Standard	RFC 1661
Interfaces	Asynchronous serial, synchronous serial, ISDN, HSSI

PPP Features
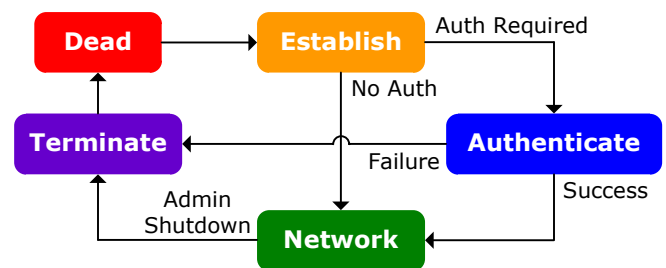
Protocol Multiplexing · Multiple NCPs

Optional Authentication · PAP/CHAP
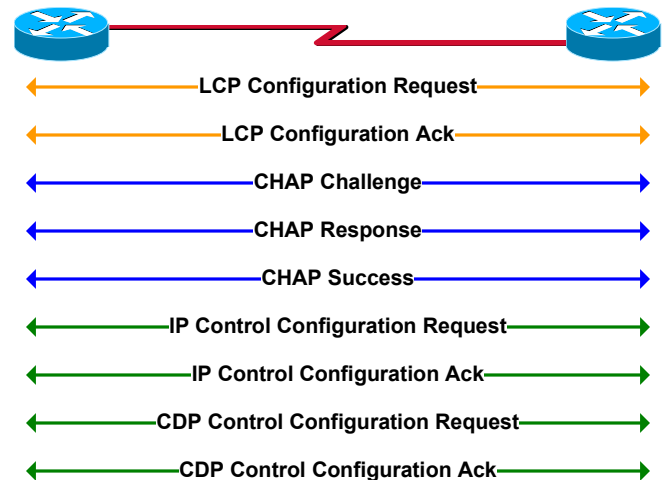
Optional Compression · Stacker/predictor

Loopback Detection · Provided by LCP

Load Balancing · Multilink PPP

Connection Phase Flowchart

PPP Connection Example

LCP Configuration Request
LCP Configuration Ack
CHAP Challenge
CHAP Response
CHAP Success
IP Control Configuration Request
IP Control Configuration Ack
CDP Control Configuration Request
CDP Control Configuration Ack

PPP Compression Algorithms

Stacker
Replaces repetitive data with symbols from a dynamic dictionary (more processor-intensive)

Predictor
Attempts to predict sequential data (more memory-intensive)

Troubleshooting

```
show ppp multilink
```

```
debug ppp authentication
```

```
debug ppp { negotiation | packet }
```

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v1.2