Notes on PPP

On a Local Area Network (LAN) **I**nternet **P**rotocol (IP) packets are transmitted using the media access protocol for that LAN. The **P**oint to **P**oint **P**rotocol (PPP) is a Data Link layer protocol that supports the Internet Protocol (and other protocols) over a point to point connections. Most commonly PPP is used to provide Internet Protocol packet delivery over dialup lines.

PPP provides several services:

- Framing to identify the start and end of IP packets.
- Error detection
- Address allocation
- A means of negotiating link control options.
- Ability to bring lines up and down.
- A means of negotiating Network Layer options.

The **L**ink **C**ontrol **P**rotocol (LCP) is part of PPP used to control the link. There are 11 LCP packet types that can be used to establish, configure, test or terminate a connection.

The **N**etwork **C**ontrol **P**rotocol (NCP) is used to configure the protocol operating at the network level. One of the functions of NCP is to dynamically assign an IP address to the host that is connecting.

The frame format for PPP is very similar to the **H**igh-level **D**ata **L**ink **C**ontrol (HDLC) protocol. PPP adds a short header and a trailer to the IP packet.

Flag 01111110	Address 11111111	Control 00000011	Protocol	Payload	Checksum	Flag 01111110
size 1	1	1	1 or 2	variable	2 or 4	1

PPP is a Data Link layer protocol. When PPP is run over a phone line, the physical layer is usually RS-232. While the data link layer considers a byte to be 8 bits, the physical layer is also sending a start bit, parity bit and stop bit to make 11 bits per byte.

An overview of the PPP operation can be described as a Finite State Diagram.
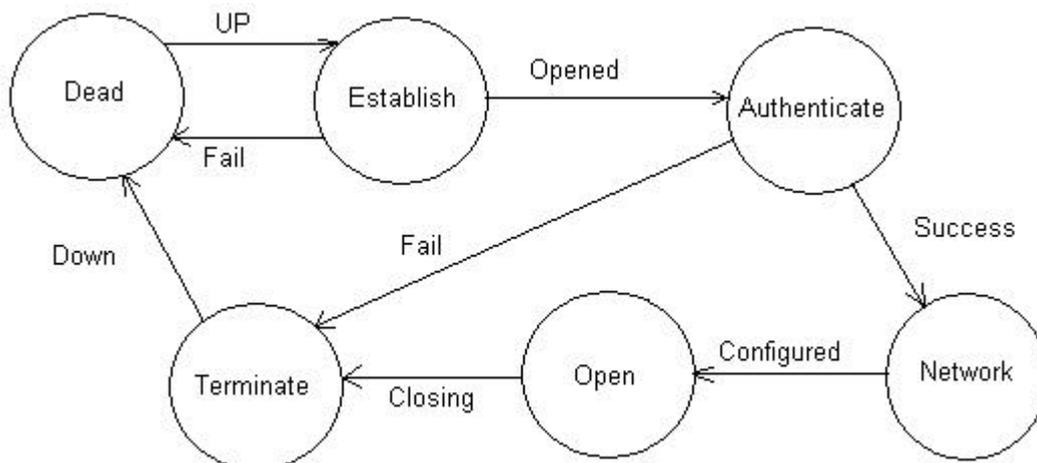
- **Dead**
  - The link necessarily begins and ends with this phase. When an external event (such as

carrier detection or network administrator configuration) indicates that the physical-layer is ready to be used, PPP will proceed to the Link Establishment phase.

- **Link Establishment Phase**
  - The Link Control Protocol (LCP) is used to establish the connection through an exchange of Configure packets.
- **Authentication Phase**
  - On some links it may be desirable to require a peer to authenticate itself before allowing network-layer protocol packets to be exchanged.
- **Network-Layer Protocol Phase**
  - Once PPP has finished the previous phases, each network-layer protocol (such as IP, IPX, or AppleTalk) must be separately configured by the appropriate Network Control Protocol (NCP).
- **Open State**
  – PPP carries the network-layer protocol packets in this state.
- **Link Termination Phase**
  - LCP is used to close the link through an exchange of Terminate packets. When the link is closing, PPP informs the network-layer protocols so that they may take appropriate action. After the exchange of Terminate packets, the implementation should signal the physical-layer to disconnect in order to enforce the termination of the link.

PPP is an Internet standard. It is described in detail in RFC1661 and further refined in RFC1662 and RFC1663. These **R**equest **F**or **C**omments are created by the Internet Engineering Task Force and can be found at http://www.ietf.org/rfc/

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