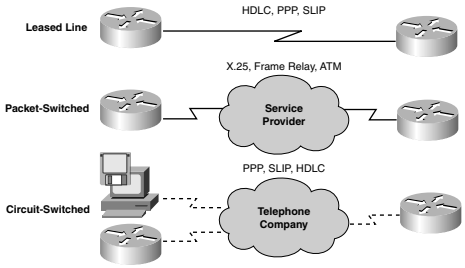
Layer 2 Encapsulation Protocols



High-level data link control (HDLC) is the default encapsulation type on point-to-point dedicated links and circuit-switched connections. HDLC should be used for communication between Cisco devices.

Point-to-Point Protocol (PPP) provides connections between devices over several types of physical interfaces, such as asynchronous serial, HSSI, ISDN, and synchronous. PPP works with several network layer protocols, including IP and IPX. PPP uses PAP and CHAP for basic security.

X.25/Link Access Procedure, Balanced (LAPB) defines connections between DTE and DCE for remote terminal access. LAPB is a data link layer protocol specified by X.25.

Frame Relay is the industry-standard switched data link layer protocol. Frame Relay (based on X.25) can handle multiple virtual circuits.

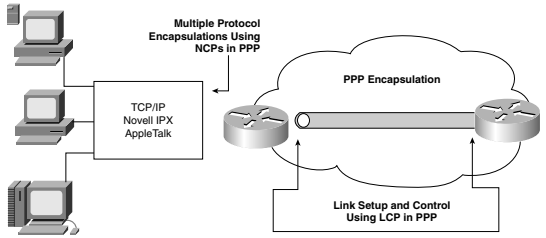
Asynchronous Transfer Mode (ATM) is the international standard for cell relay using fixed-length (53-byte) cells for multiple service types. Fixed-length cells allow hardware processing, which greatly reduces transit delays. ATM takes advantage of high-speed transmission media, such as E3, T3, and SONET.

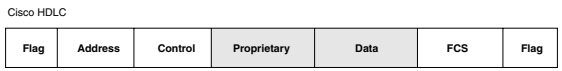
WAN Concepts and Terminology Summary

- WANs connect devices across broad geographic regions. Companies use WANs to connect various sites.
- Leased-line or point-to-point connections provide a dedicated connection.
- Circuit-switched connections provide a dedicated circuit path for the duration of the call. Circuit switching is best for sporadic WAN usage.
- Packet-switched connections use virtual circuits to provide end-to-end connectivity.
- The five serial standards supported by Cisco devices are EIA/TIA-232, EIA/TIA-449, V.35, X.21, and EIA/TIA-530.
- Typical WAN protocols include HDLC, PPP, SLIP, and ATM.

Configuring HDLC and PPP Encapsulation

HDLC is a data link protocol used on synchronous serial data links. HDLC cannot support multiple protocols on a single link because it lacks a mechanism to indicate which protocol it is carrying.





The Cisco version of HDLC uses a proprietary field that acts as a protocol field. This field makes it possible for a single serial link to accommodate multiple network-layer protocols. Cisco's HDLC is a point-to-point protocol that can be used on leased lines between two Cisco devices. PPP should be used when communicating with non-Cisco devices.

To change the encapsulation back to HDLC from some other protocol, use the following command from interface configuration mode:

```
Router(config-if)#encapsulation hdlc
```

PPP Encapsulation

PPP uses a Network Control Protocol (NCP) component to encapsulate multiple protocols and uses Link Control Protocol (LCP) to set up and negotiate control options on the data link.