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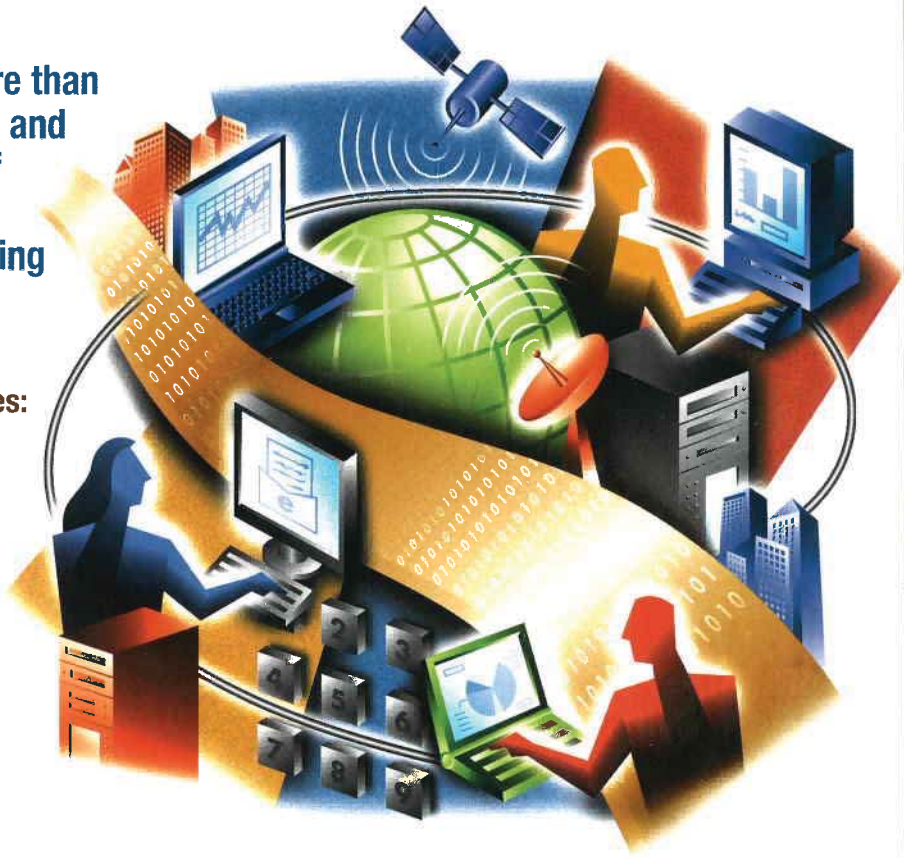

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HDLC (High-Level Data Link Control)

HDLC is a bit-oriented, link layer protocol for the transmission of data over synchronous networks. It is an ISO standard, but is a superset of IBM's SDLC (Synchronous Data Link Control) protocol. SDLC was the successful follow-up to the BISYNC communication protocol and was originally introduced with IBM SNA (Systems Network Architecture) products. Another name for HDLC is ADCCP (Advanced Data Communications Control Procedure), an ANSI standard, but HDLC is the widely accepted name for the protocol. There are some incompatibilities between SDLC and HDLC, depending on the vendor.

HDLC is bit oriented, meaning that the data is monitored bit by bit. Transmissions consist of binary data without any special control codes. Information in the frame contains control and response commands, however. HDLC supports full-duplex transmission in which data is transmitted in two directions at the same time, resulting in higher throughput. HDLC is suitable for point-to-point and multipoint (multidrop or one-to-many) connections. Subsets of HDLC are used to provide signaling and control data links for X.25, ISDN, and frame relay networks.

When an HDLC session is established, one station, called the *primary station*, is designated to manage the flow of data. The other station (or stations) is designated as the *secondary station*. The primary station issues commands, and the secondary stations issue responses. There are three possible connection methods, as shown in Figure H-1. The top two support either

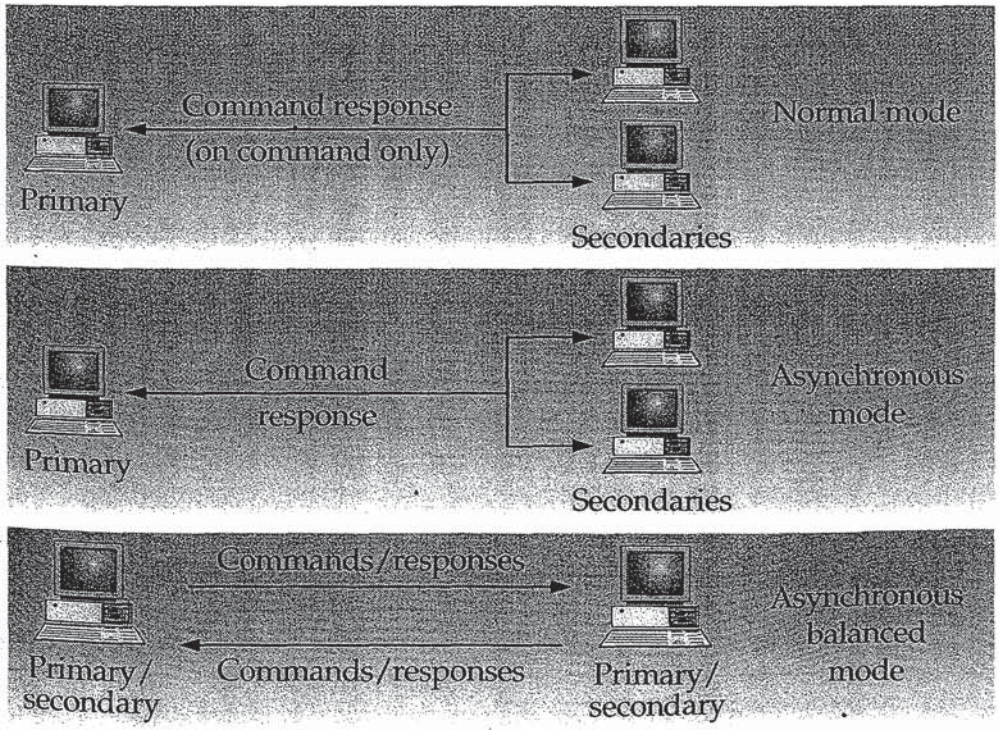

Figure H-1. *HDLC connection methods*

point-to-point connections between two systems, or *multipoint* connections between a primary station and two or more secondary stations:

- The normal mode is unbalanced because the secondary station can only transmit when permitted to do so by the primary station.
- The asynchronous mode is also unbalanced, but the secondary station may initiate a transmission on its own.
- The asynchronous balanced mode is designed for point-to-point connections between two computers over a duplex line. Each station can send commands and responses over its own line and receive commands and responses on the duplexed line. This is the mode used to connect stations to X.25 packet-switched networks.

The HDLC frame defines the structure for delivering data and command/response messages between communicating systems. The frame is pictured in Figure H-2 and described here:

- The Flag fields contain the bit sequence 01111110, which indicates the beginning and end of the HDLC frame. If any portion of the data in the frame contains more than five 1 bits, a *zero-bit insertion* technique inserts a 0 bit to ensure that data is not mistaken for a flag.
- The Address field generally contains the address of a secondary station. This field is normally 8 bits, but extended addressing is possible for multipoint connections that contain many different addresses. A broadcast address can also be inserted in the field to send messages to all stations in a multipoint connection.
- The Control field identifies the information contained in the frame as data, commands, or responses. Commands are sent by the primary station, and responses are sent by the secondary station. The control information can acknowledge frames, request retransmission of frames, or request a suspension of transmission, as well as other commands and responses.

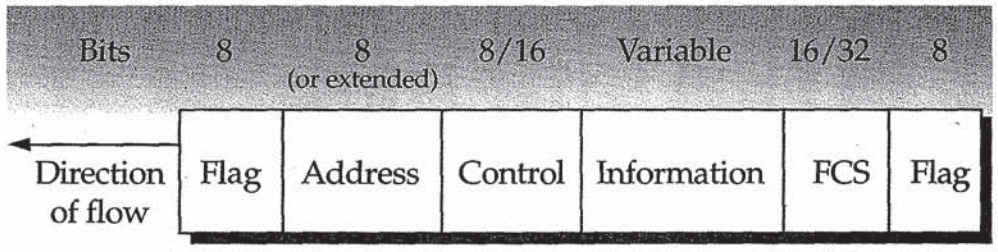

Figure H-2. *HDLC frame definition*

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