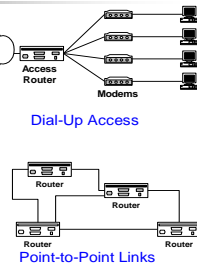


## Point-to-Point DLC protocols

### Point-to-Point (serial) links

- Many data link connections are point-to-point serial links:
  - Dial-in or DSL access connects hosts to access routers
  - Routers are connected by high-speed point-to-point links
- Here, IP hosts and routers are connected by a serial cable
- Data link layer protocols for point-to-point links are simple:
  - Main role is encapsulation of IP datagrams
  - No media access control needed



### High-level data link control (HDLC) Point to Point Protocol (PPP)

- Suppose IICT is connected to the Internet, right?
- So what WAN protocol do you use to connect to the Internet?
- Chances are, that if you have a E1 or T1 leased line to the Internet or a private network between locations, you use one of these three WAN Protocols: HDLC, PPP, Frame-relay or Ethernet.
- Let's explore the differences and similarities of these protocols.
- HDLC is actually the default protocol on all Cisco serial interfaces.

- These protocols take your username and password to ensure that you are allowed access to the network you are dialing in to.



### High-Level Data Link Control (HDLC)

Within HDLC there are three types of stations defined:

- Primary Station** - this completely controls all data link operations issuing commands from secondary stations and has the ability to hold separate sessions with different stations.
- Secondary Station** - this can only send responses to one primary station. Secondary stations only talk to each other via a Primary station.
- Combined Station** - this can transmit and receive commands and responses from one other station.

- The Link Access Procedure-Balanced (LAP-B) and Link Access Procedure D-channel (LAP-D) protocols are subsets of HDLC.



LAPB: Ensures that frames are error free and in the right sequence.

### ■ Link Access Procedure, Balanced (LAPB)

- Implements the data link control protocol derived from HDLC that ensures that frames are error free and in the correct sequence.
- LAPB is specified in ITU-T Recommendation X.25 and ISO/IEC 7776.

### Data Link Layer Protocol : LAPD

- ISDN standards are constructed using the Open System Interconnection seven-layer reference model.
- Layer 2 (data link) protocol for the D channel(called Link Access Procedure-D) is used to convey messages over common D channel.
- The LAPD and higher layer protocols handle the handshaking (commands and responses), signaling, and control for all of the voice and data calls that are setup through the ISDN D channel.
- Each user is assigned a Logical Channel Number(LCN) and bandwidth is divided accordingly.

- The two types of variable - sized framing are:

- Character-oriented framing
- Bit - oriented framing

#### Character - Oriented Framing

- In character - oriented framing, data is transmitted as a sequence of bytes, from an 8-bit coding system like ASCII.



#### Bit-oriented framing

In bit-oriented framing, data is transmitted as a sequence of bits that can be interpreted in the upper layers both as text as well as multimedia data.

