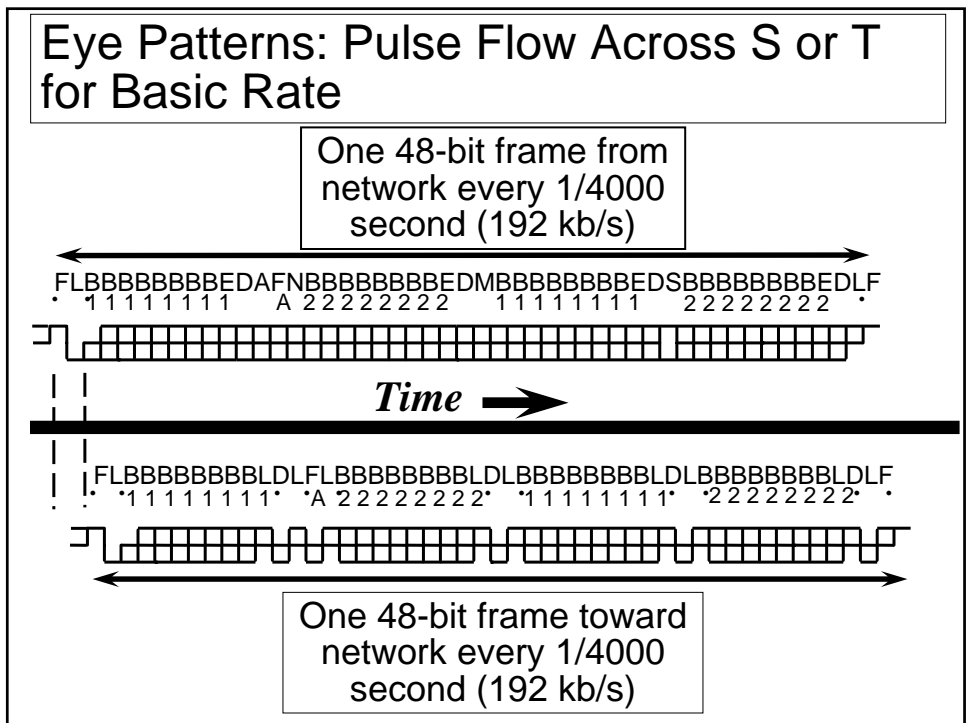
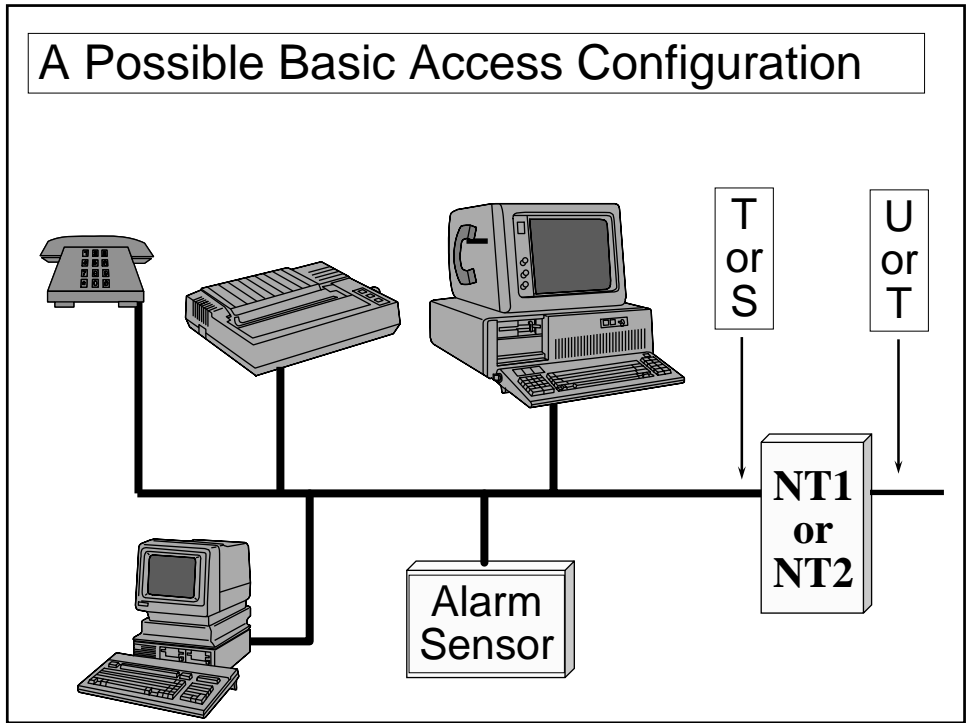


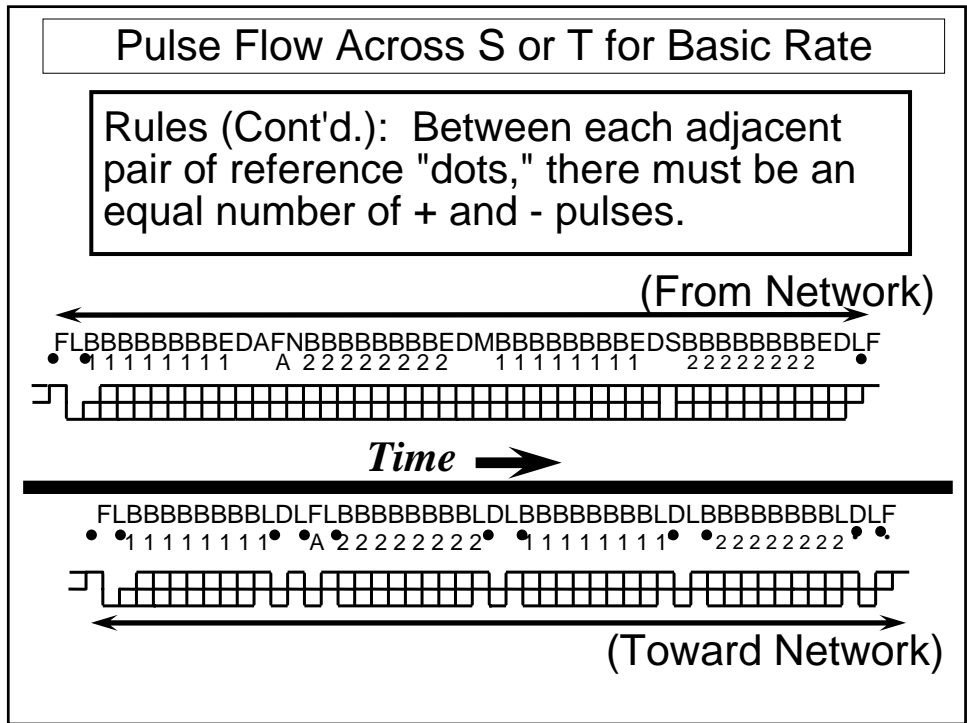
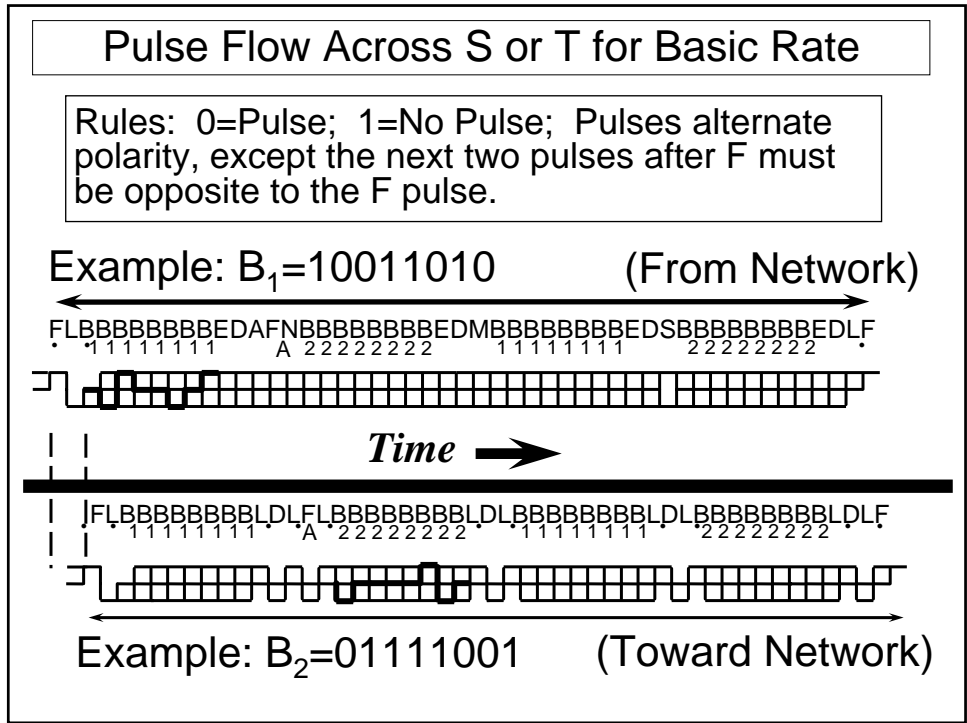
**SMU Course #: EETS 7315**

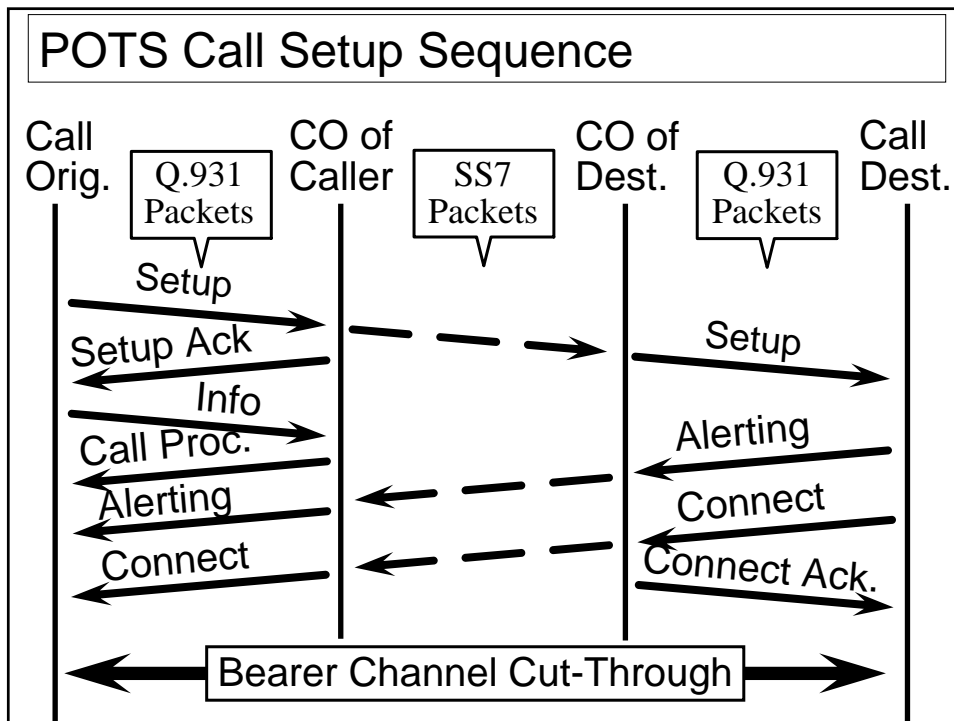
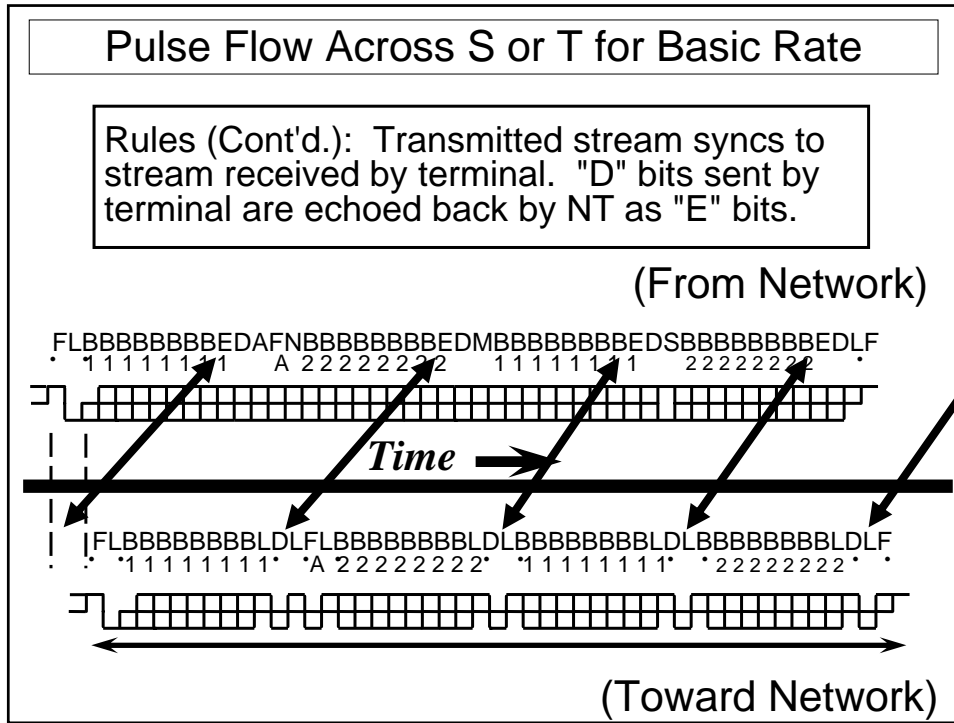
**DATA COMMUNICATIONS**  
Week #9 -- Dr. Baker

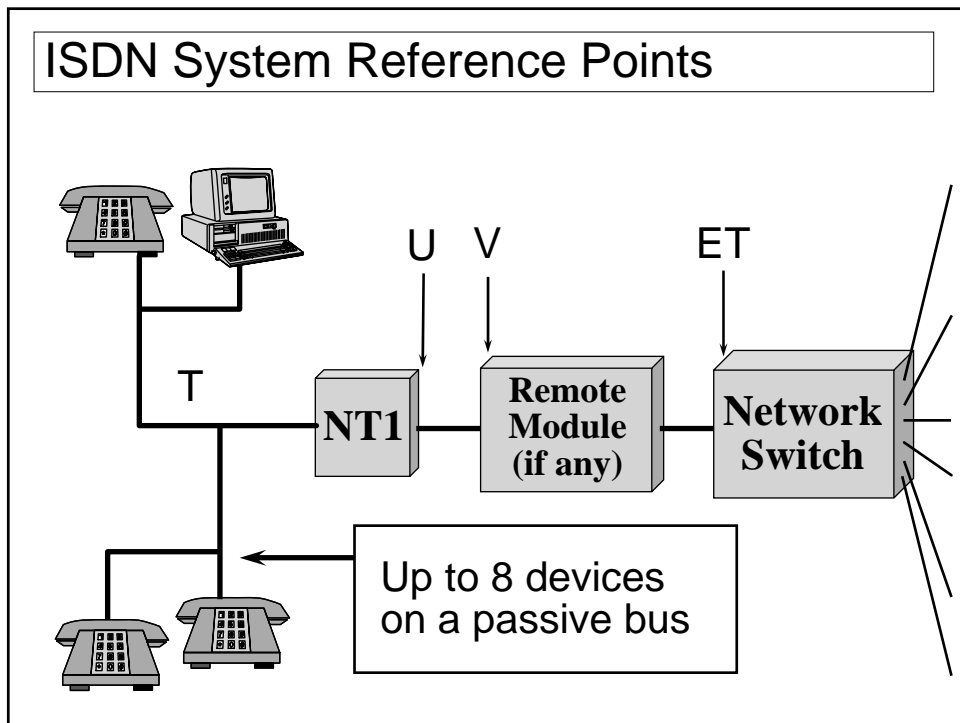
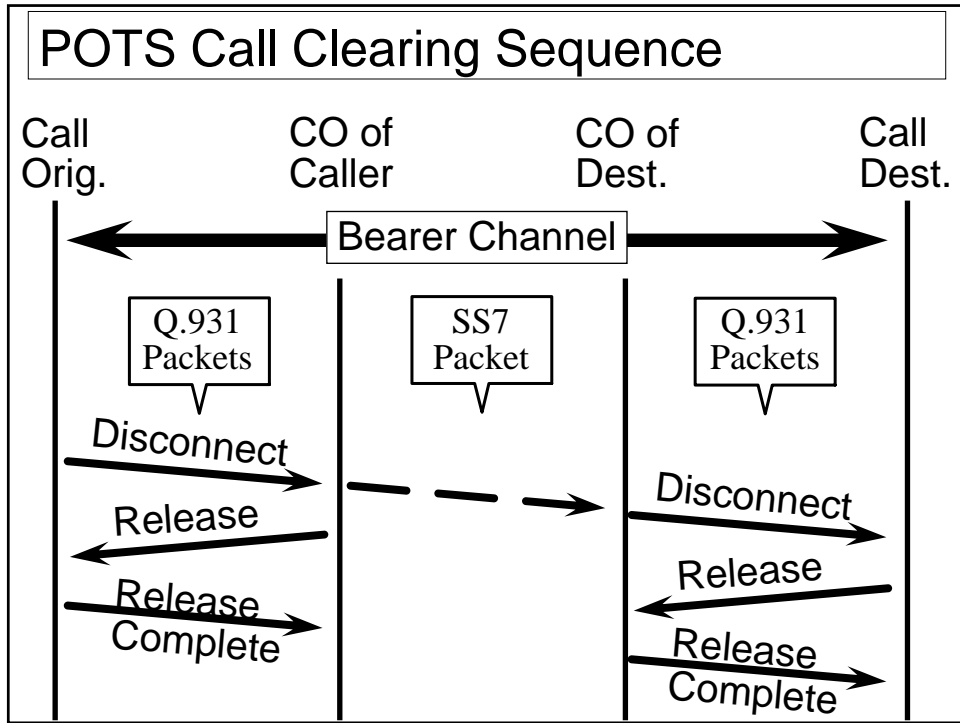
**Please Note:**

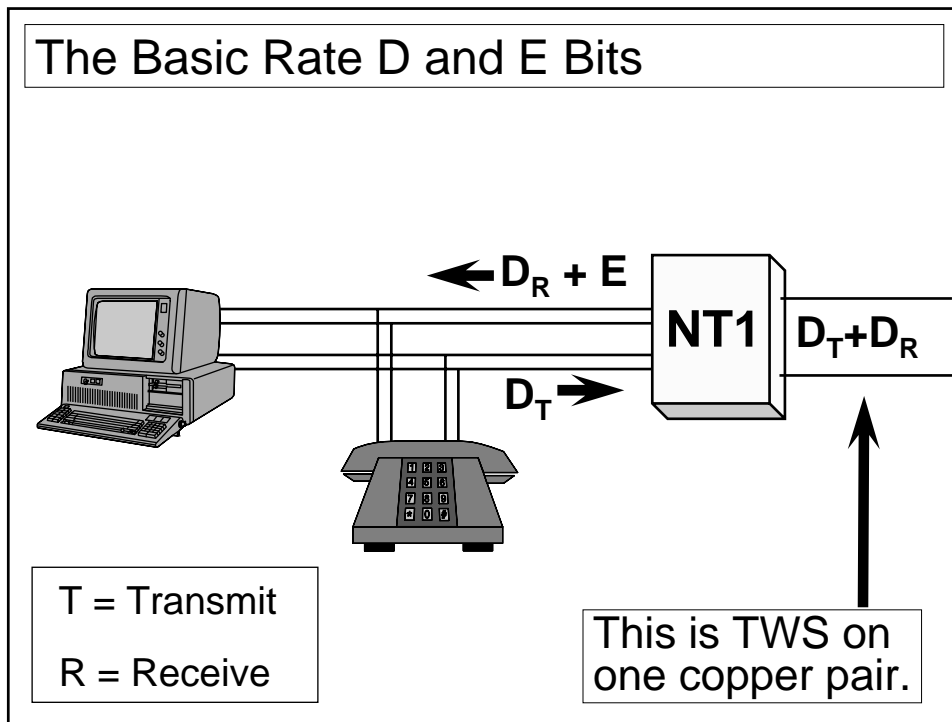
- Any S or T reference point can be either a basic access structure or a primary access structure.
- However, it is likely that the trunk between a PBX and a CO would not be basic.
- Any S or T reference point in the system can be a passive bus if it is a basic access structure.











### Perfect Scheduling Algorithm for Basic Access D Channel – 1

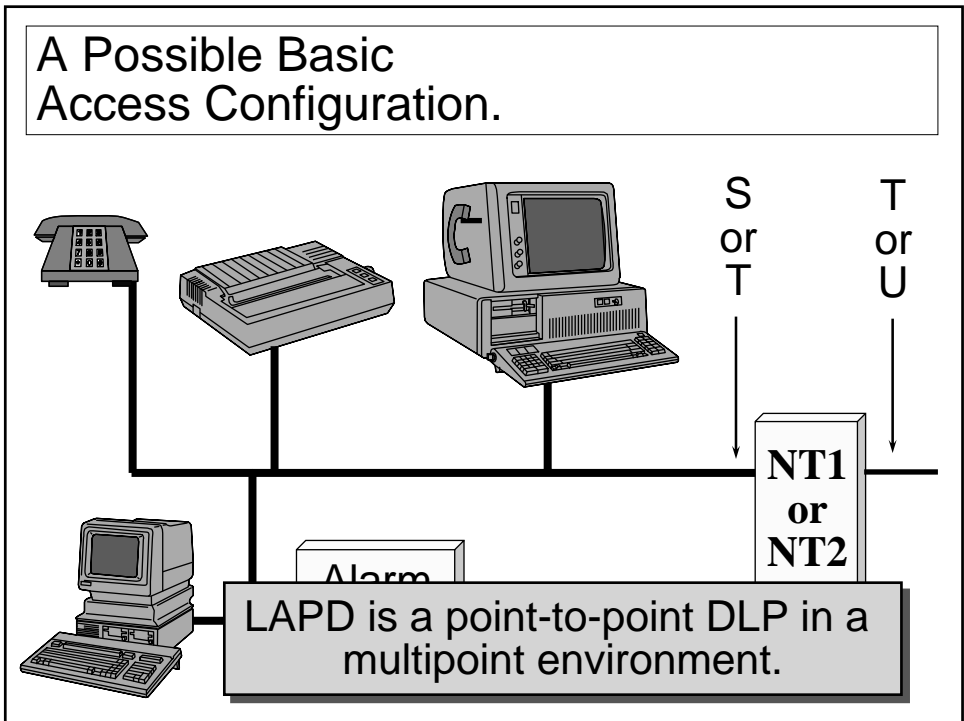
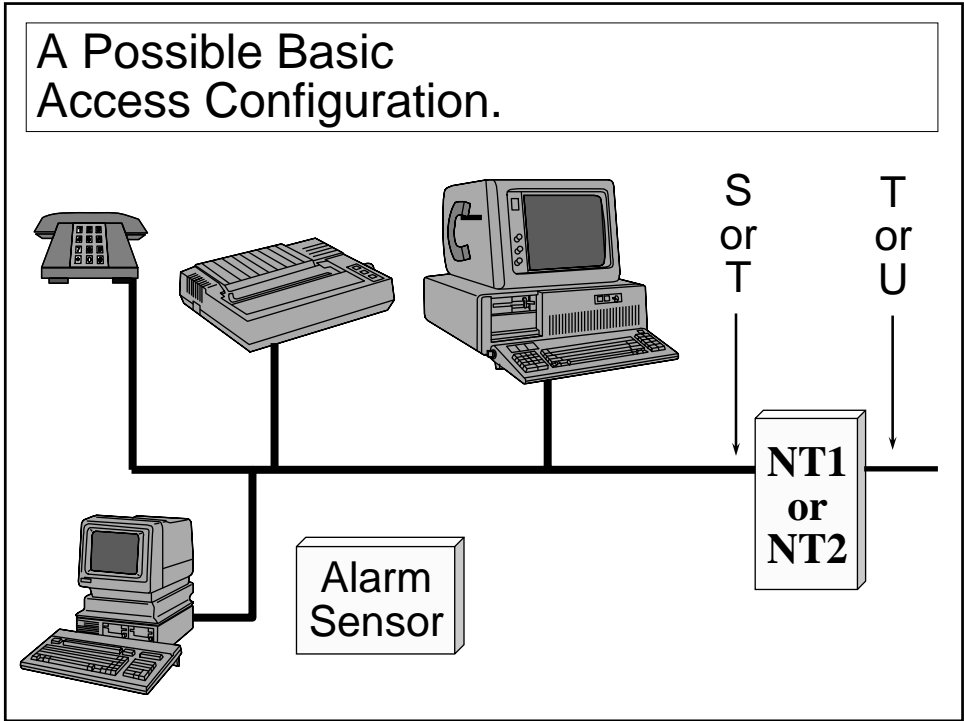
- Since we are dealing with HDLC, the line will be idle if there are 8 consecutive 1's.
- Each D bit sent by a terminal is reflected by the NT device in the form of an E bit.
- Each TE has a C counter that counts consecutive E = 1.

### Perfect Scheduling Algorithm for Basic Access D Channel–2

- If a terminal's C counter = 9 or more, the terminal may transmit a Q.931 packet in a LAPD frame.
- If a terminal's C counter = 11, the terminal may transmit an X.25 packet in a LAPD frame.

### Perfect Scheduling Algorithm for Basic Access D Channel – 3

- The E bits received by the TE are compared with the last D bit sent.
- If the bits are the same, the TE keeps sending.
- If the bits are different, the TE immediately stops and pouts.
- A pouting TE may send a Q.931 packet if C = 8, and X.25 if C = 10.

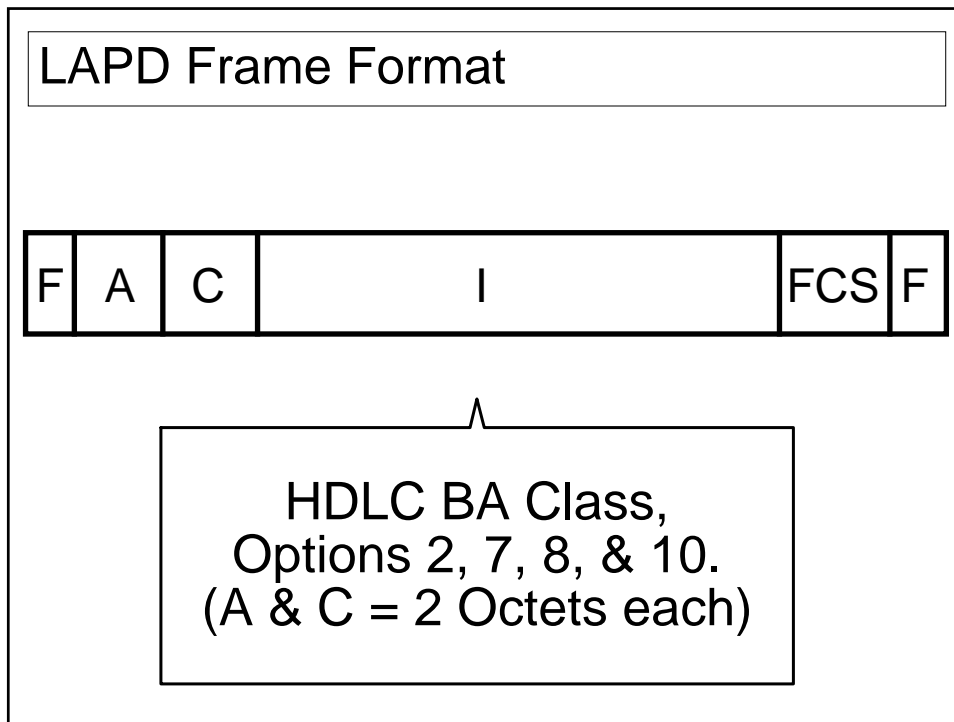


### How do we use BA Class in a multipoint environment?

- Remember, the DLP is between only two partners, so BA is O.K.
- One partner is the TE (device); the other is the SAP (software module).
- Split A field into two parts, one part for each communicating partner.

### LAPD

- Review: Bit rate issues do not exist above OSI Layer 1.
- The Data Link Protocol used in the D Channel is LAPD, a special version of HDLC, BA Class.
- LAPD is used in both Primary and Basic Access Structures.



Layer 3 of Narrowband ISDN

- Note that I.451 is identical to Q.931
- See handouts
- Example: A set-up message, as a minimum, will contain PD, LCRV, CRV, and MT, plus a mandatory Bearer Capability information element. Recent versions of Q.931 have added a Channel ID information element.

The text box contains information about Layer 3 of Narrowband ISDN. It lists three points: I.451 is identical to Q.931, refer to handouts, and an example of a set-up message containing PD, LCRV, CRV, MT, and Bearer Capability information elements, with a note that recent versions of Q.931 have added Channel ID information elements.

### Minimum content of the Bearer Capability Information Element

- Unique identifier
- Length code
- Coding standard
- Speech vs. unrestr. digital vs. 3.1 kHz audio vs. 7 kHz audio vs. video
- Circuit vs. packet mode
- Transfer rate

### Examples of ISDN Applications

- ANI (Account Number Identification)
- Sub-addressing & special signaling
- UUI (User-to-User Information)
- Ordering and canceling services
- Changing billing on a call
- Changing features from a different phone
- ACD (Automatic Call Distribution)
- Ubiquitous packet switching access

## New Topic

- LANs, etc.

## PANs

Working Definition: A Personal Area Network is a system for convenient interconnection between two or more data terminals associated with a person.

## LANs

Working Definition: A Local Area Network is a system for convenient interconnection between two or more data terminals within a contiguous property.

## CANs

Working Definition: A Campus Area Network is a system for convenient interconnection between two or more terminals or LANs within a contiguous property.

## MANs

Working Definition: A Metropolitan Area Network is a system for convenient interconnection between two or more terminals, LANs, or CANs within a geographic range that is limited by timing issues.

## WANs

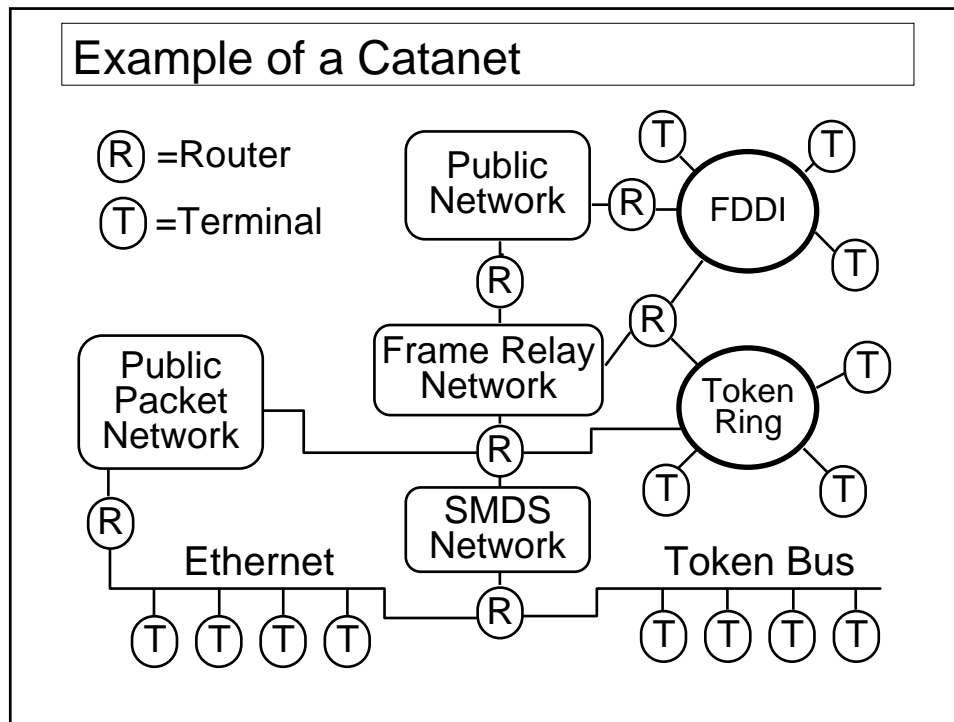
Working Definition: Data networks for worldwide transfer and distribution of data.

### Preliminary Comment #1

- Many types of networks can be used for transmission of local data, of which the PBX and CO are probably the most common.
- On a \$/bit/port basis, however, the PBX/CO are less cost effective than many other types of LANs.
- Our focus will be on the IEEE 802 LANs and MANs, plus ANSI's FDDI.

### Preliminary Comment #2

- All of the LANs/MANs we'll study in this course are defined in such a way as to be considered subnetworks; i.e., part of a larger networking scheme.
- That idea tends to be true for all networks, but even more so for LANs/MANs.
- A concatenation of subnetworks is sometimes called a catanet.



**LANs/MANs to be presented**

1. Ethernet & CSMA/CD (IEEE 802.3)
2. Token Bus (IEEE 802.4)
3. Token Ring (IEEE 802.5)
4. FDDI (ANSI X3T9.5)

## Some Ways to Classify LANs

- Type of Switching  
(All our LANs will use Bus Switching)
- Type of Signal  
(Baseband, Broadband, Carrierband, or Wireless)
- Type of Line Control  
(Which terminal gets to send next?)
- Type of Operation  
(Connection vs. Connectionless)

## Baseband LANs

- The term "baseband" refers to an unmodulated signal. A baseband LAN does not use modems. The digital pulses of voltage or light are sent directly into the medium.
  - Advantages: Cost
  - Disadvantages: Lower capacity, short range, metallic medium susceptible to electrical noise in the environment, no major branching permitted.

## Broadband LANs

- In the EE context, "Broadband" refers to a modulated carrier; i.e., modems are involved.
  - Advantages: Longer range, higher capacity (multiple carrier freq.), less susceptible to electrical environmental noise and echo, major branching O.K.
  - Disadvantage: Cost of modems.

## Carrierband LANs

- Carrierband is a compromise between baseband and broadband. Modems are used, but only one broadband channel is created, so the modems are cheaper.
  - Advantages: All of the advantages of broadband except that there is only one frequency channel.
  - Disadvantage: Capacity is lower than for broadband.

### Why IEEE/ANSI?

- LANs are not within the scope of the CCITT/ITU's traditional interests.
- IEEE Project 802 was underway before any other major standards organization realized the need.
- ANSI, of which IEEE is a part, is developing FDDI.
- ANSI and the ISO are rapidly advancing IEEE/ANSI work to the global arena.

### These LANs/MANs include only OSI Layers 1 & 2

