

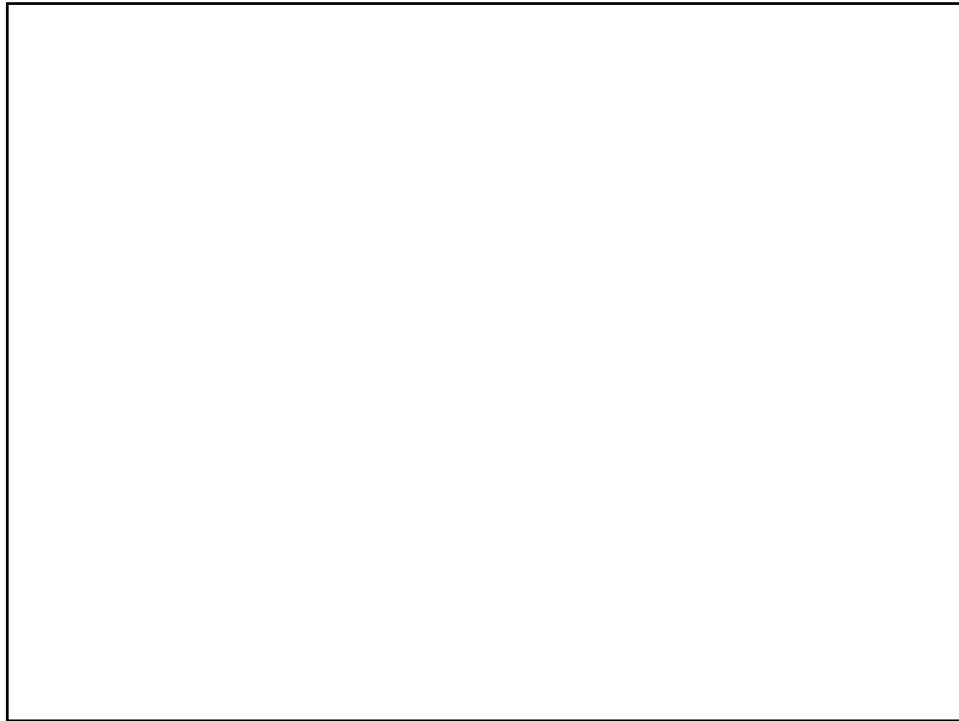
SMU Course #: EETS 7315

DATA COMMUNICATIONS

Week #6 -- Dr. Baker

Multiplexers

- TDM (classical "dumb")
- Smart TDM ("statistical" multiplexers)
- Switching TDM



New Topics:

- Switches as OSI Relays
- Multiplexers
- Spoofing

Definition of Layer 1 Switching a.k.a. Circuit Switching

- Any switch that sets up a fixed relationship between its input and output channel ports, such that every bit into the input channel port comes out the output channel port for the duration of the session, is a Layer 1 Switch.
- Examples: Time Division Multiplexers, Statistical Multiplexers, Concentrators, T1 Channel Banks, Concentrators, Central Offices, PBXs.

Layer 2 Switching (a.k.a. Bus Switching)

- Many digital systems utilize multipoint circuits in which every bit inserted into the bus appears at multiple exit points.
- Bus switching is the basis for directing data to a specific TE on a bus by setting an address field in the frame.
- All terminals "hear" every message, but they receive only those messages that match their respective specific address.

Layer 3 Switching
(a.k.a. Receive & Forward Switching)

- Remember, autonomous routing decisions can only be made in Layer 3.
- Many systems can route "on the fly" as data passes from node to node.
- Message switching systems and X.25 packet switching systems are examples.
- Routing can be delegated to layer 2 if the route is constant. Example: Frame Relay
- We will examine X.25 & Frame Relay later.

Definition: Spoofing
A Hoax or Deception

- As it applies to Data Communications, Spoofing is a technique in which two devices are programmed to deceive other devices to improve operation
- (See Cahoots: A two-party conspiracy)

Spoofing Example 1
Satellite Data Throughput

- Transfer Rate of Information Bits (TRIB)
a.k.a. Payload Throughput =
$$\frac{\text{Long-term information bits sent}}{\text{Time to get them sent and acknowledged}}$$
- For satellites, the window must be raised to keep TRIB high, avoiding window delay.
- If the window cannot be made sufficiently high to avoid window delay, then spoofing is used.

Spooing Example 2 Credit Authorization Network Cost

- Network uses SDLC, tunneling through a packet network.
- H-PAD spoofs the Host; T-PAD spoofs the terminal.
- Network cost saving of over 100-to-1.

Spooing Example 3 Multiplexer Buffer Delay

- To avoid overflow, large statistical multiplexers can require very large buffers.
- This results in buffer delays that can exceed protocol time-out settings and slow employee productivity.
- Spooing allows the system to operate as if there were no buffer delay.
- What new problem does spooing create?