Wide-area Networking

- Metropolitan Area Networks (MANs) typically span from 3 to 30 miles and connect Local Area Networks (LANs)
- Wide Area Networks (WANs) connect MANs across longer distances, often hundreds of kilometers or more
- The infrastructure to build these is expensive, so organizations rent or lease it from telecommunications providers (common carriers)

1

WAN Characteristics

- Connections are low bandwidth, with speeds from 56 Kbps to 2 Mbps (the upper limit is always getting higher)
- A single WAN connection is usually shared by many LANs (or MANs)
- WANs cover a large geographical area
- WAN technologies include Point-to-Point Protocol (PPP), Asynchronous Transfer Mode (ATM), N-ISDN, B-ISDN, DSL and others

2

Circuit Switching

- The oldest and simplest WAN technology
- Uses the Public Switched Telephone Network (PSTN)
- This is the technology behind modems and dial-up accounts (still?) offered by ISPs
- The two basic types in use today are: POTS (Plain Old Telephony Service) and N-ISDN

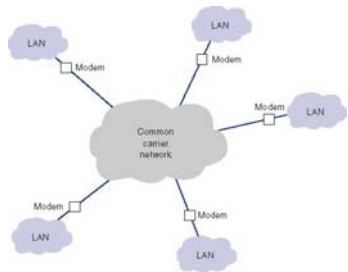
3

Circuit Switching Architecture (1/2)

- Uses a cloud architecture, meaning that users connect to a network and what happens inside of the network ``cloud'' is hidden from the user
- A user using a computer and a modem dials the number of a another computer and creates a temporary circuit between the two ends
- Once a call has been set up, a dedicated path between both communicating ends exists
- When the communications session is completed, the circuit is disconnected, i.e. the previously established path does not longer exist

4

Circuit Switching Architecture (2/2)



5

Circuit Switching Summary

- Advantages:
- Simple, flexible and inexpensive
- Disadvantages:
- Each connection goes through the regular telephone network on a different circuit path; quality cannot be guaranteed
- Data transmission rates are low, from 28.8 to 56 Kbps
- Alternative:
- Private dedicated circuit, leased from a provider for a user's exclusive use

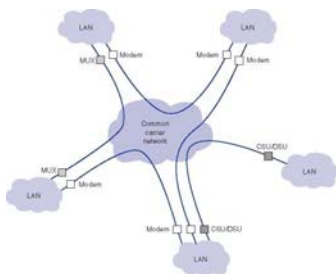
6

Private Dedicated Circuit Services (1/2)

- Dedicated circuits involve leasing circuits from common carriers to create point to point links between organizational locations
- These points are then connected together using special equipment such as routers and switches
- Dedicated circuits are billed at a flat fee per month for which the user has unlimited use of the circuit

7

Private Dedicated Circuit Services (2/2)



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