

NETWORKING TECHNOLOGIES (II)

(October 20, 2010)

BUS3500 - Abdou Illia, Fall 2010

1

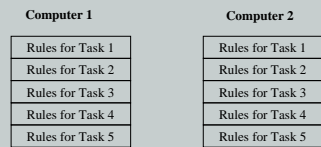
LEARNING GOALS

- Describe networking protocols and identify the major protocols used in business.
- Describe and contrast types of transmission techniques used in data networks and voice networks.

2

Protocols

- An agreed upon set of rules that govern communication in a network
- All computers on a network must use same protocol for effective communication
- Example of protocols:
 - TCP/IP suite
 - Ethernet
 - Token Ring



3

TCP/IP

- ❑ TCP/IP suite is named after its two main protocols: TCP and IP
- ❑ Transmission Control Protocol (TCP)
 - Provides a reliable data transfer service between two endpoints on a network
- ❑ Internet Protocol (IP)
 - Defines a delivery mechanism for packets of data sent between all systems on an Internet
- ❑ TCP/IP is the protocol suite for the Internet

Task	Sample protocols
Application	HTTP, FTP, SMTP
Transport	TCP, UDP
Internet	IP
Physical	Ethernet, Token Ring, PPP, Modem standards

4

Ethernet

- ❑ A set of rules for transmitting messages in LANs
- ❑ Most widely used protocol for LANs
- ❑ Uses a method called CSMA/CD* for wired LANs



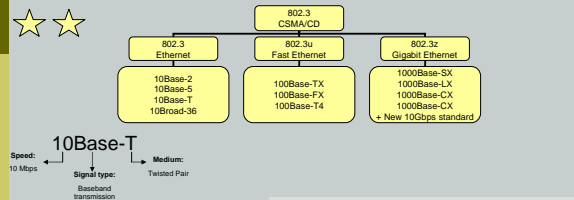
CSMA/CD*

- 1) All computers ("carriers") listen ("sense") for traffic on the LAN
- 2) If no traffic, computer that wishes to transmit may transmit
- 3) If collision occurs, computers must wait a random amount of time
- 4) The computer with smallest random number send again first.

* Carrier Sense Multiple Access with Collision Detection

5

Ethernet standards



- Speed: 100 Mbps
- Signal type: Baseband
- Distance: 100 m between Hub/Switch and node
- Uses CAT5 or better UTP with RJ-45 connectors
- Star topology: physical star, logical bus

100Base-TX

- 100Base-TX: Two Twisted-pairs of Category 5 UTP or STP
- 100Base-FX: Fiber-optic cabling using 2-strand cable
- 100Base-T4: Four Twisted-pairs of Category 3, 4, or 5 UTP
- 1000Base-CX: Uses Twinaxial cable
- 1000Base-LX: Uses single-mode Fiber-optic cable (5 km)
- 1000Base-T: 4 Twisted-pairs of Cat. 5 UTP in full-duplex

6

Token Ring

- Other set of rules for transmitting messages in LANs
- Only one node "talks" at a time
- A node only transmits when it receives a special packet called a "Token"
- Only one Token on the ring
- No collisions



7

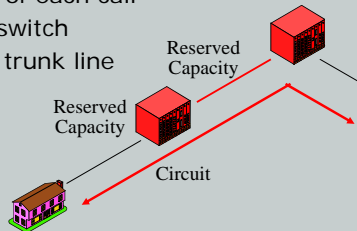
Transmitting Data in a Network

- Two major techniques:
 - Circuit switching network
 - Traditionally used for voice transmission
 - Packet switching network
 - Used for computer data transmission.

8

Circuit Switching

- Circuit capacity is reserved during duration of each call
- At each switch
- On each trunk line



9

Circuit Switching

- Nothing like congestion on the Internet
- Reserved Circuit Capacity is Expensive
 - Pay for it whether you use it or not
 - Good for voice, because conversations are fairly constant
 - Bad for data, because most data transmission is *bursty*; e.g., in World Wide Web, download, then stare at screen for a long time until next download

10

Packet-Switching

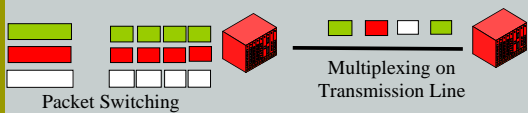
- Packet Switching
 - Large messages are broken into small pieces called *packets* (or *frames*)
 - Packets are short (averaging a few hundred bytes) because switches handle short messages efficiently



11

Packet-Switching

- Multiplexing
 - Packets from many conversations are mixed (*multiplexed*) over each trunk line

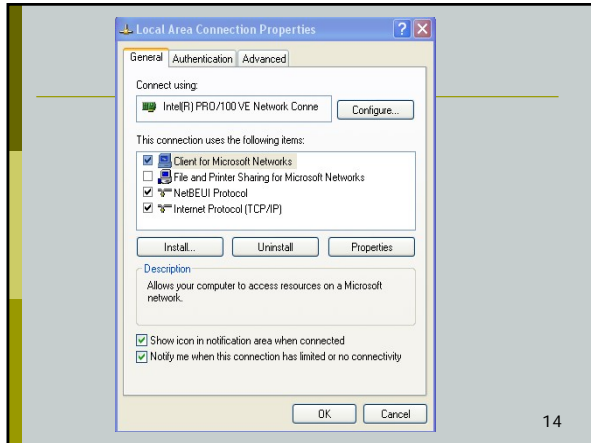


12

Summary Questions

	Book	Notes
1) (a) What is a protocol? (b) Name few protocols used in network.		
2) Could collisions occur in: (a) Ethernet LANs? (b) Token Ring LANs?		
3) (a) What is the maximum speed in a 100BaseTX Ethernet LAN? (b) What kind of transmission media it uses?		
4) Is Token Ring widely used?		
5) What kind of switching technique is traditionally used in: (a) data networks? (b) voice networks		
6) How do Circuit-Switching networks differ from Packet-Switching networks?		

13



14

Problem

- Four students share a dorm. They would like to set up a network in order to share programs and data files. Three of the students own PCs and the fourth student has a laptop computer.
 - a) What computing equipments they need to buy in order to set up the Ethernet network with a star topology?
 - b) Suppose that they decided to set up a P2P wired network. They have purchased a 10/100BASE-TX 4-port Ethernet hub at www.cdw.com. What kind of physical transmission media they need to buy?

15
