MUST

Wisdom & Virtue

MIRPUR UNIVERSITY OF SCIENCE AND TECHNOLOGY (MUST), MIRPUR

DEPARTMENT OF SOFTWARE ENGINEERING

Computer Networks

Lecture [6]: Network Types, Peer-Peer and Client Server Networks

Engr. Samiullah Khan

(Lecturer)

Topics discussed in Today's Lectures

- Small Peer-to-Peer Networks
- Client/Server Network
- Networking Hardware
- Protocols

MAN

- **Metropolitan Area Network (MAN)**
  - A high-speed network that connects LANs in a metropolitan / city area such as a city or town
  - Handles the bulk of communications activity across that region
  - Typically includes one or more LANs, but covers a smaller geographic area than a WAN.
    - Usually managed by a group of users or by a single network provider that sells the service to the users
  - Telephone companies, cable television operators, and other organizations provide users with connections to the MAN

HAN

- **Home Area Network (HAN)**
  - Small scale network and found mainly in the home
  - Connects computers and entertainment appliances
  - Connects a person's digital devices, from multiple computers & their peripheral devices, such as a printer to telephones, DVDs, televisions, home security systems, "smart" appliances, and other digital devices that are wired into the network

CAN

- **Campus Area Network (CAN)**
  - Follows the same principles as a LAN only on a larger and more diversified scale
  - A LAN in one large geographic area connecting resources related to the same organization
  - Each department shares the LAN
  - With a CAN, different campus offices and organizations can be linked together
  - Some university departments or organizations might be linked to the CAN even though they already have their own separate LANs

PAN

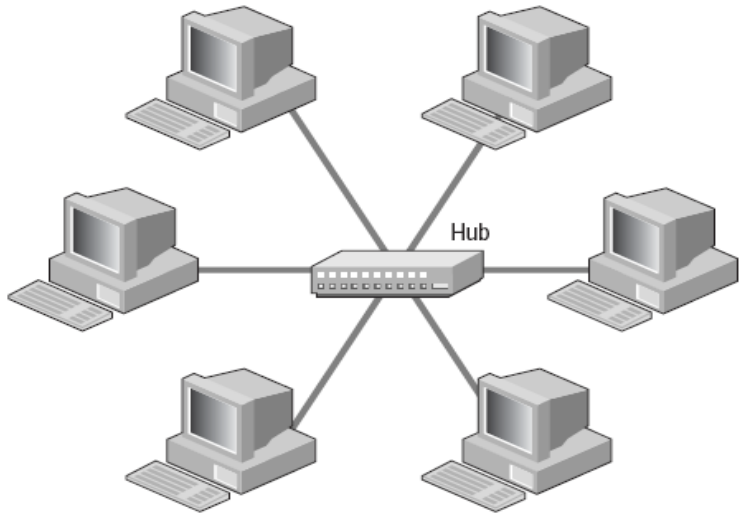
- **Personal Area Network (PAN)**
  - Very small scale network ranging radius of less than 2 meters
  - Example: connection between a Bluetooth earpiece and a smartphone.
  - Cell phones, PDAs, MP3 players i.e. Bluetooth
  - PANs can be used for communication among the personal devices themselves (intra-personal communication)
  - A PAN may also be carried over wired computer buses such as USB

BAN

- **Body Area Network (BAN)**
  - BAN typically refers to medical sensors with wireless connectivity placed on, embedded in, or carried near the human body
  - BANs are used for tracking or supporting biomedical functions (for example, a pacemaker with wireless capabilities).
  - Pacemakers send electrical pulses to help your heart beat at a normal rate and rhythm

Small Peer-to-Peer Networks

- You can build a simple, small network without using the complex & expensive equipment used in large networks
- Often called a peer-to-peer network, each computer can communicate with any other computer on the network



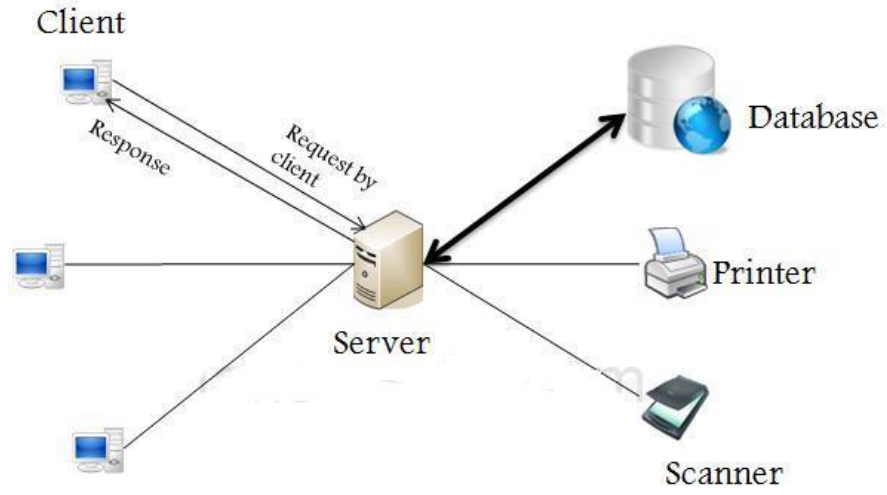
Peer-to-Peer Network

Small Peer-to-Peer Networks

- Peer-to-peer networks are easy to install and maintain
- This network is the obvious choice for a network in home or small office
- You can set up this network yourself, without buying an expensive server
  - Without paying for the services of a network administrator to install & manage the network
- Computers connected to the Internet communicate directly with each other and share files

Client/Server Network

- In an environment with more than 10-15 computers, a peer-to-peer network begins to become more trouble than its worth
  - Computers start to slow down
  - You can never find the file you are looking for
  - Non-existent of security
- Solution: switch to a client-server network by bringing in a dedicated server to handle the load
- The server is called "dedicated" because it is optimized to serve requests from the "client" computers quickly



Client/Server Network

- **Server** is simply a computer that is running a software that enables it to serve specific requests from other computers (clients)
- For example, you can set up a:
  - File server that becomes a central storage place for your network
  - Print server that takes in print jobs and sends them to a printer
- A server, like any computer, consists of two parts, the hardware and the software

Client/Server Network

A server in Client-Server Network provides many benefits including:

- **Optimization**: Server hardware is designed to serve requests from clients quickly
- **Centralization:** Files are in one location for easy administration
- **Security:** Multiple levels of permissions can prevent users from doing damage to files
- **Redundancy and Back-up:** Data can be stored in redundant ways making for quick restore in case of problems

Networking Hardware

Network Adapter cards:

- Expansion cards that provide the physical connection between each computer and the network
- The card installs into a slot on your computer, just like a sound card or modem card
- Some newer computers have a network adapter already built into the system

Networking Hardware

Network Hub

- The central connection point for network cables that connect to computers or other devices on a network
- The hub has several network cable jacks or ports that you use to connect network cables to computers
- The hub contains circuitry that enables each computer to communicate with any other computer connected to the hub

PROTOCOLS

- A protocol is synonymous with rule.
- It consists of a set of rules that govern data communications.
- It determines:
  - What is communicated
  - How it is communicated
  - When it is communicated
- The key elements of a protocol are syntax, semantic and timing

PROTOCOLS

Syntax

- Structure or format of the data
- Indicates how to read the bits - field description

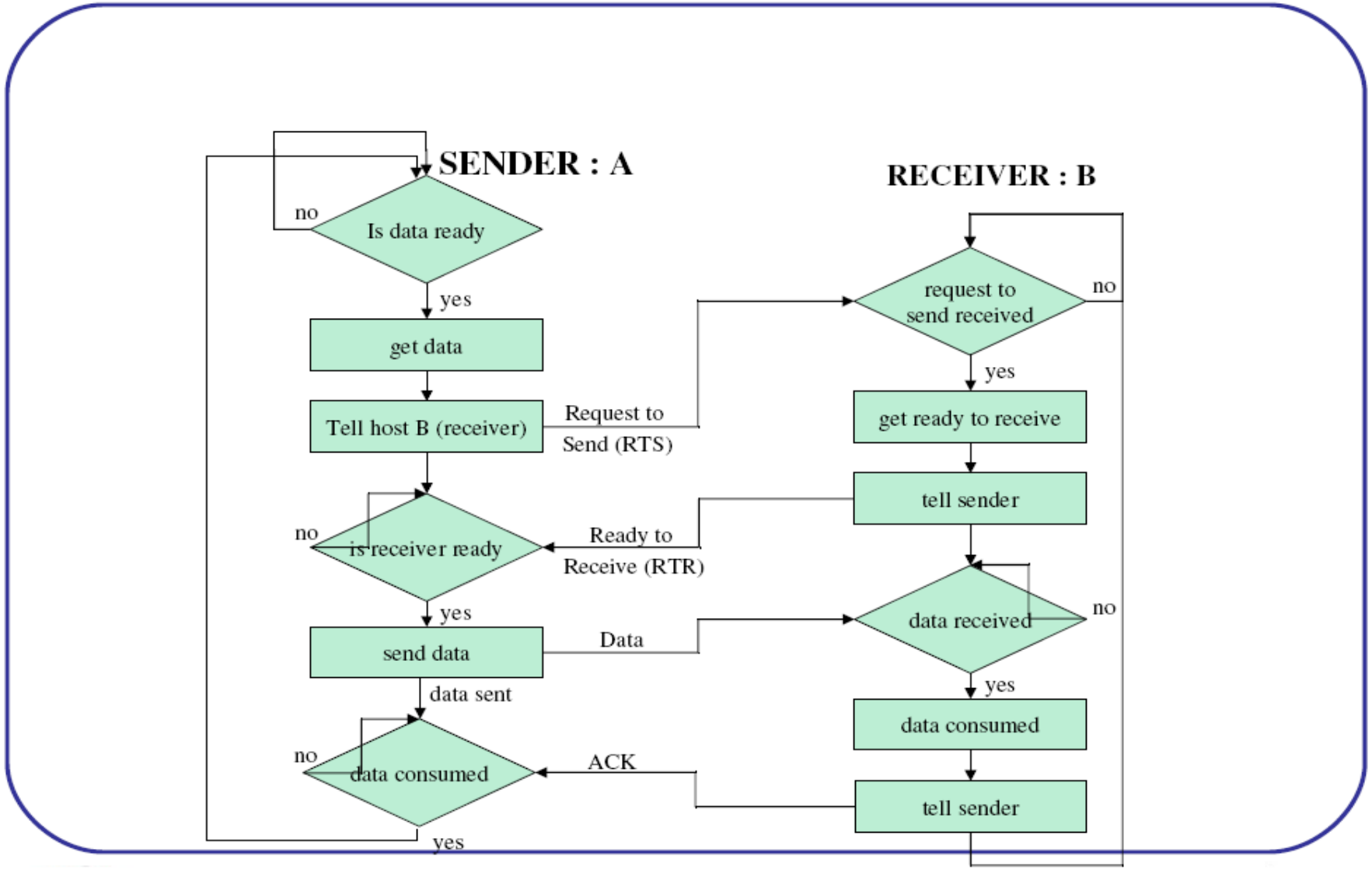
Semantics

- Interprets the meaning of the bits
- Knows which fields define what action

Timing

- What and When data should be sent
- Speed at which data should be sent or speed at which it is being received

Simple message exchange Protocol Flow-chart



References

Chapter 1

Data Communication and Networking (5th Edition)
By Behrouz A. Forouzan

THANKS