IT 4505
Section 2

Packet Network Architectures

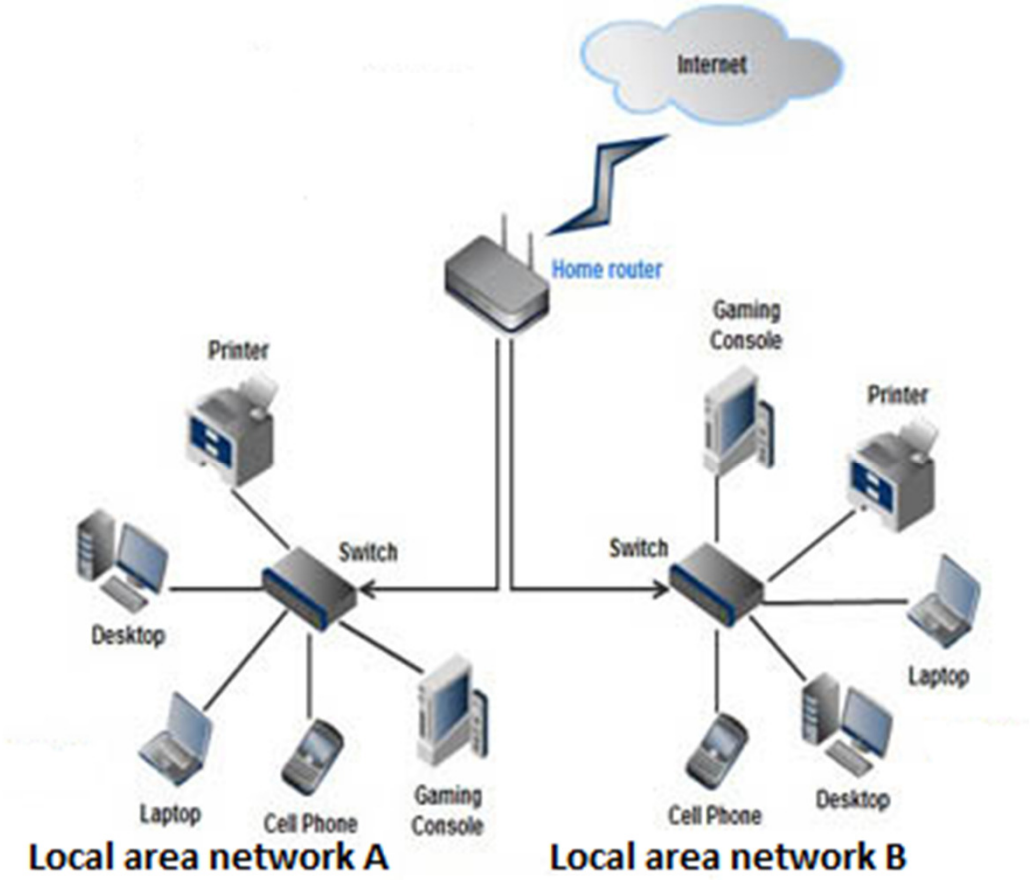
2.3 Types of Networks

- Local Area Networks (LANs)
- Wide Area Networks (WANs)
- Personal Area Networks (PANs)

2.3.2 Local Area Network

- A LAN is a network that is used for communicating among computer devices, usually within an office building or home
- LAN's enable the sharing of resources such as files or hardware devices that may be needed by multiple users
- Is limited in size, typically spanning a few hundred meters, and no more than a ....
- Is very fast, with speeds from 100 Mbps to 10 Gbps
- Requires very little wiring, typically a single cable connecting to each device
- Has lower cost compared to MAN's or WAN's

Local Area Network cont.



Local Area Network cont.

- LAN's can either be made wired or wireless.
  Twisted pair, coax or fiber optic cable can be used in wired LAN's.
- Nodes in a LAN are linked together with a certain *topology*.
  These topologies include:
  - Bus
  - Ring
  - Star
  - Branching tree
- A *node* is defined to be any device connected to the network.
  This could be a computer, a printer, router, ...
- A *Hub* is a networking device that connects multiple segments of the network together.

Local Area Network cont.

- Resource sharing in a LAN is accomplished with different *access methods*.

Multiple Access Methods:

- Fixed assignment (Channel partitioning)
  - Partition channel so each node gets a slice of the bandwidth
  - Essentially circuit switching – thus inefficient

    Examples: TDMA, FDMA, CDMA (all used in cellular env.)
- Contention-based (Random Access)
  - Nodes contends equally for bandwidth and recover from collisions

    Examples: Aloha, Ethernet, CSMA/CD
- Token-based or reservation-based
  - Take turns using the channel

    Examples: Token ring

Generations of LANs

Legacy LANs and IEEE Standards:

802.1 – Higher Level Interface Ad. Group

802.2 – Logical Link Control LAN Interface

802.3 – ***CSMA/CD Ethernet***

Interoperable LAN Sec.

802.4 – Token Bus

802.5 – ***Token Ring***

802.6 – MAN Broadband Net.

802.7 – Broadband Tech. Advisory Gp.

802.8 – Fiber Optics Tech.

802.9 – Integrated Services

802.10 - Former standard for security functions

802.11 – ***Wireles s LAN***

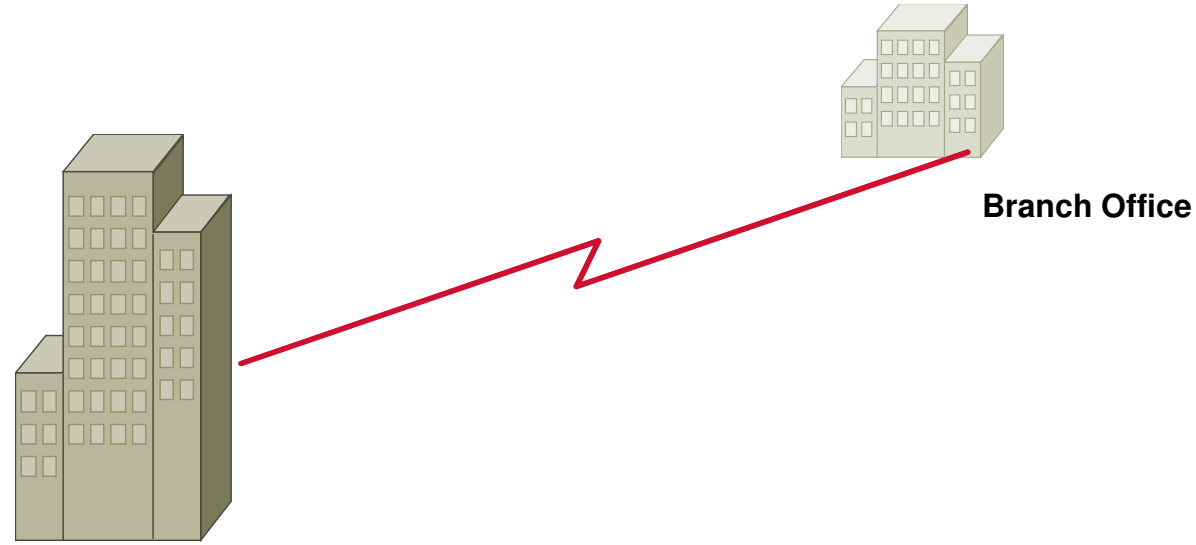
802.12 – Demand Priority

802.14 – Cable TV based

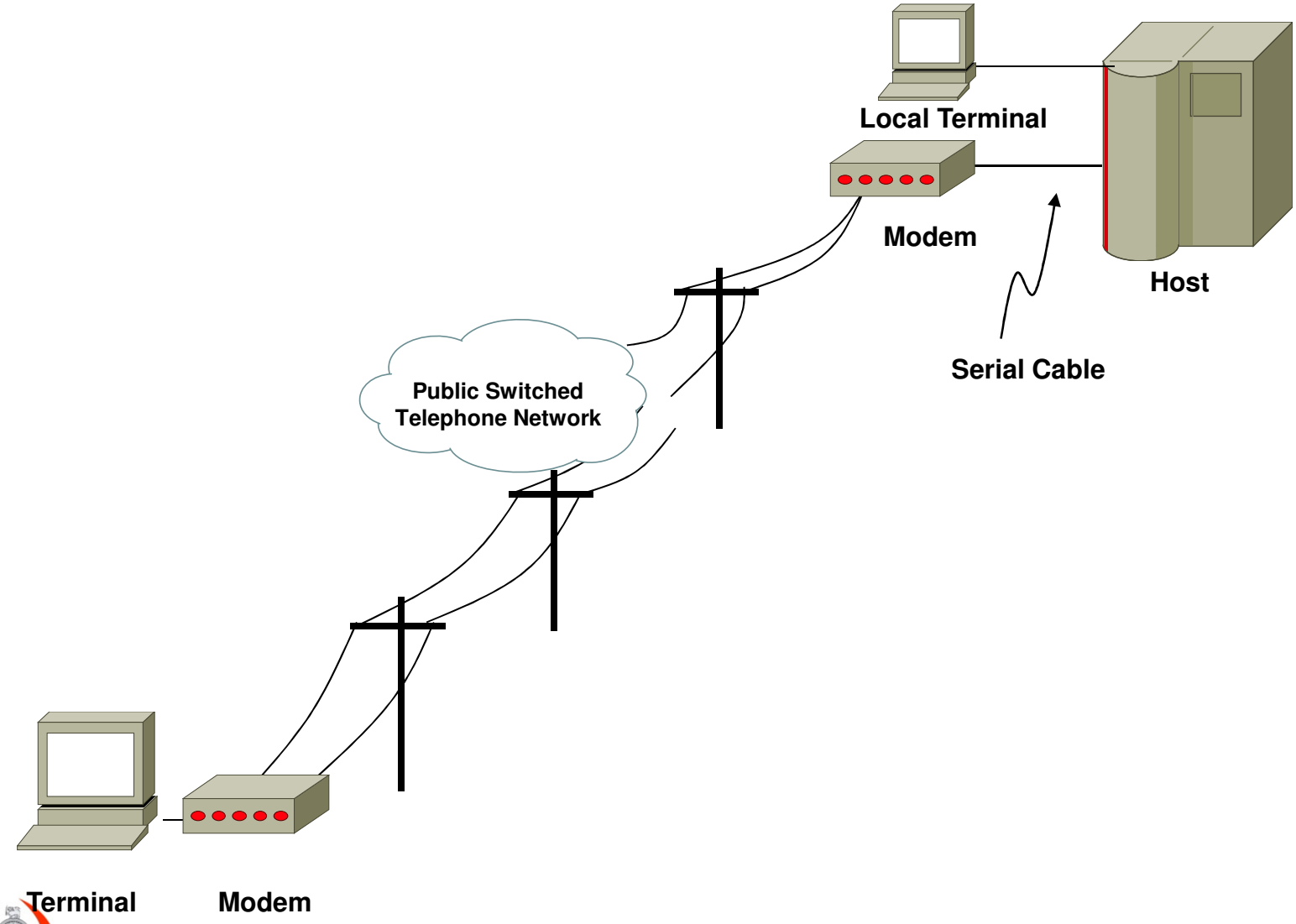
802.15 – Wireless Personal (WPAN)

2.3.3 Wide Area Network

- A network connecting two or more geographically separate locations
- Wide area network (WAN) involves a carrier or network service provider (NSP) to make the connectivity



Simplest type of WAN link

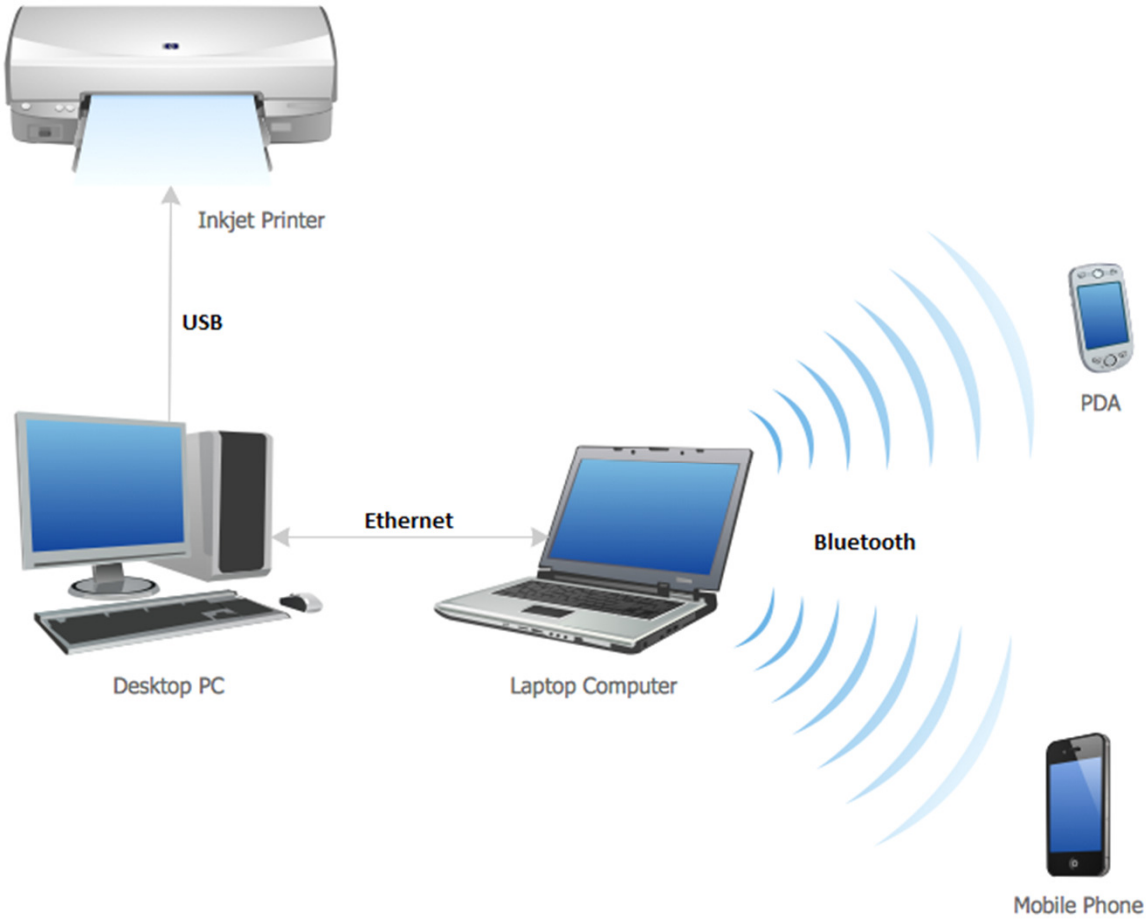


2.3.4 Personal Area Networks

- A **personal area network** (**PAN**) is a computer network used for communication among computer devices close to one person. The devices may or may not belong to the person in question. The reach of a PAN is typically a few meters. PANs can be used for communication among the personal devices themselves, or for connecting to a higher level network and the Internet.

- Personal area networks may be wired with computer buses such as USB and FireWire. A wireless personal area network (WPAN) can also be made possible with network technologies such as IrDA, Bluetooth, UWB, and ZigBee.

Personal Area Networks cont.



Personal Area Networks cont.

PAN Standards

802.15.1a: Bluetooth (2.4GHz at 1Mbps)

802.15.2: Coexistence of PANs with one another

802.15.3: High rate PAN (2.4GHz at 55 Mbps)

802.15.3a: Alternative high rate PAN for UWB (2.4GHz at 110 Mbps)

802.15.4: Low rate PAN - Zigbee

802.15.4a: Alternative low rate - low power UWB