

Local Area Network

Networks

● Advantages:

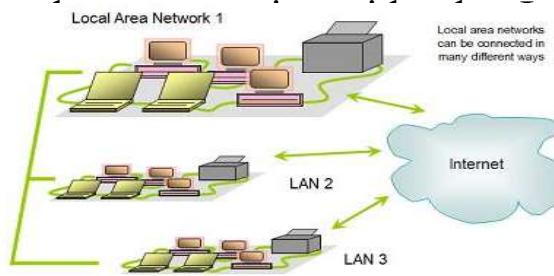
- Enable people to work together
- Reduce costs from sharing networked hardware and software
- Increase productivity by sharing data
- Provide access to a wide range of services and specialized peripheral devices

● Disadvantages:

- Unavailable resources when network malfunctions
- More vulnerable to unauthorized access than stand alone computers
- Susceptible to an increased number of worms, Trojan horses, and blended threats

Local Area Network (LAN)

- Network of computers located in a single location, like a home, school, or office building



3

Characteristics of a LAN?

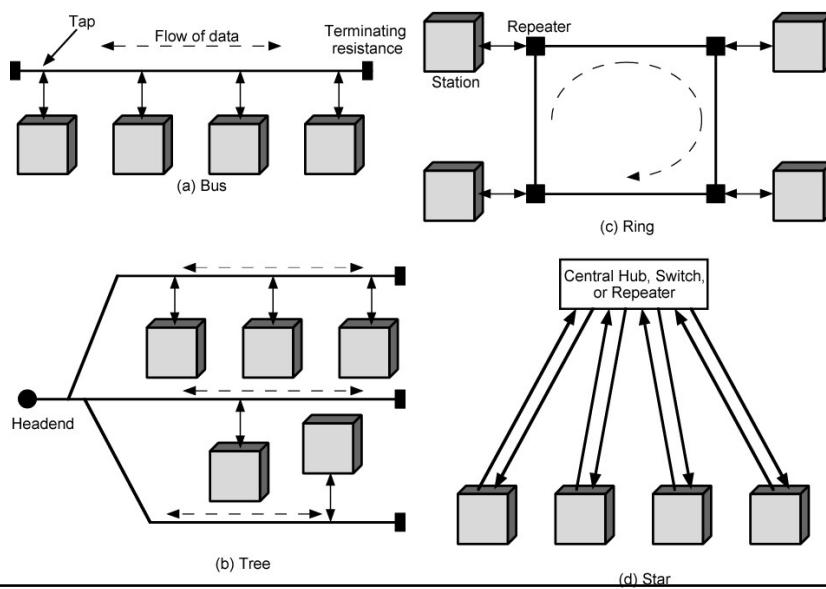
- Local area network
- Relatively limited in size
- Computers connected in small areas
- Same office
- True peer-to-peer
- Can support limited number of nodes

4

Network Topology

- Star
- Hierarchical
- Mesh
- Bus
- Ring
- Hybrid

LAN Topologies



Bus and Tree

- Multipoint medium
- Transmission propagates throughout medium
- Heard by all stations
 - Need to identify target station
 - Each station has unique address
- Full duplex connection between station and tap
 - Allows for transmission and reception
- Need to regulate transmission
 - To avoid collisions
 - To avoid hogging
 - Data in small blocks - frames
- Terminator absorbs frames at end of medium

Star Network

- Usage
 - Centralized processing or communication
- Pros
 - Expansion
 - Implementation
 - No limit to no. and length of arms
- Cons
 - Single point of failure
 - Overload of master during peak traffic

Hierarchical Network

- Usage
 - Distributed processing
- Tree structure with a root
- pro
 - No single point of failure

Mesh Network

- Web structure
- Usage
 - Public telephone system
- Pro
 - Alternative communication route
- Con
 - Line cost

Bus Network

- Usage
 - Date entry or office environment
- Pros
 - Independent between nodes
 - High reliability
- Cons
 - Limited number of attached device
 - Hard to locate the problems

Ring Network

- Usage
 - Manufacturing
- Pros
 - Less attenuation
 - Error control
 - Network management
- Cons
 - Failing of a node

LAN Characteristics

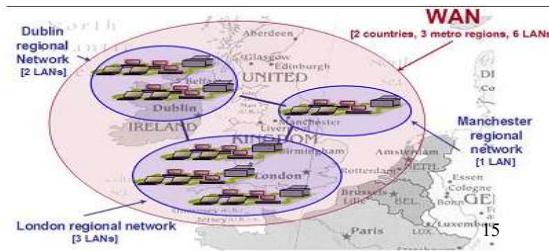
- Limited distance within a few miles
- High data rate - 2 to 1000Mbps
- Low error rate
- Good response time
- Private owned
- No regulation
- Share hardware, software, and data files

Standards

- IEEE 802.2: LLC protocol
- IEEE 802.3: CSMA/CD baseband bus
- IEEE 802.4: token passing bus
- IEEE 802.5 token passing ring
- Fiber Distributed Data Interface (FDDI) Standard

Wide Area Network (WAN)

- Network over a large area like a city, a country, or multiple countries
 - Connects multiple LANs together
- Generally utilizes different and much more expensive networking equipment than LANs
- The internet is the most popular WAN



Types of WANs

- Campus Area Network – limited geographic area
- Metropolitan Area Network – towns and cities
- Home Area Network – home setups
- Global Area Network – uses satellites to link networks
- Storage Area Network – stores large amounts of data

16

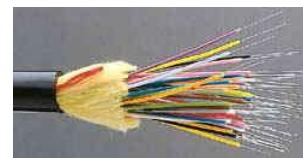
Wiring in Computer Networks

There are many different wires and cables that are used to create a network

- ⦿ Ethernet cable - often used to connect computers



- ⦿ Fiber optic cable – used by much of the internet to send data quickly over long distances underground



- ⦿ Phone or cable TV lines – connect LAN to an **internet service provider (ISP)**

17

Wired Network

- A wired network uses cables to connect network devices
- Wired networks are fast, secure, and simple to configure
- Devices tethered to cables have limited mobility

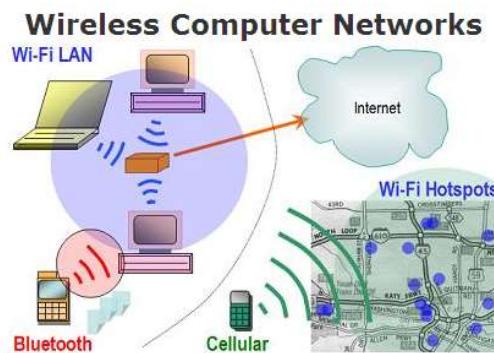
18

Wireless Networking

- ◎ A network is considered wireless when data is transmitted from one device to another without cables or wires
- ◎ Tend to be slower than wired networks
- ◎ Have more security issues
- ◎ Common wireless terms:
 - > **Wi-Fi** - common standard technology for building home networks and other LANs
 - > **Hotspots** – many businesses use Wi-Fi technology to allow the public an access point to a wireless network
 - > **Bluetooth** – allows handhelds, cell phones, and other peripherals to communicate over short ranges

19

Wireless Networking...Cont'd



20