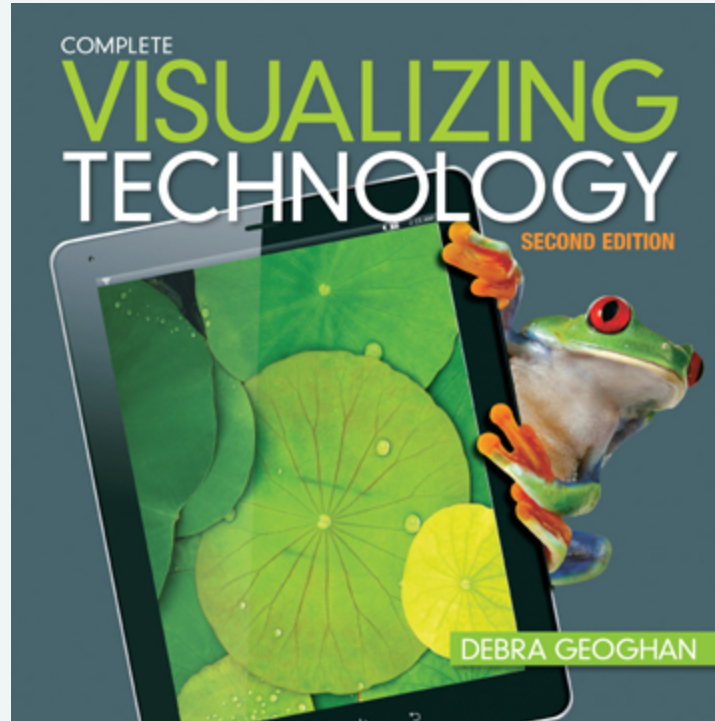


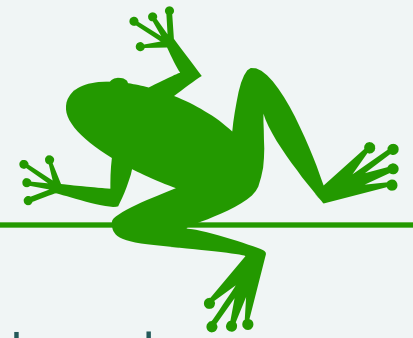
PowerPoint Presentation to Accompany



Chapter 9

Networks & Communications

Objectives



1. Discuss the importance of computer networks.
2. Compare different types of LANs and WANs.
3. List and describe the hardware used in both wired and wireless networks.
4. List and describe the software and protocols used in both wired and wireless networks.
5. Explain how to protect a network.

Objective 1: Overview

From Sneakernet to Hotspots

1. Define computer network and network resources
2. Discuss the importance of computer networks
3. Differentiate between peer-to-peer networks and client-server networks

Key Terms

- Client
- Client-server network
- Computer network
- Homegroup
- Network resource
- Peer-to-peer network
- Server
- Workgroup

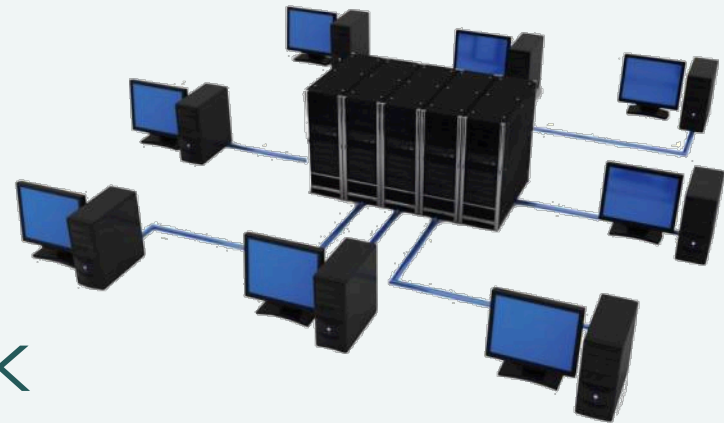
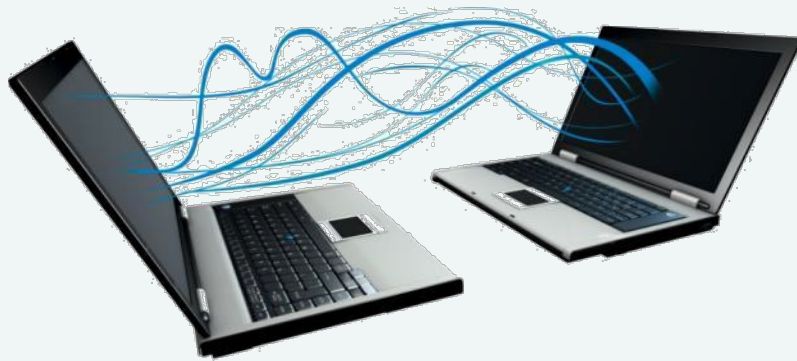


Computer Networks

- Computer network
 - Two or more computers
 - Share resources
 - Save time
 - Save money
 - Increase productivity
- Homegroup
 - Simple networking feature
 - Used to network a group of Windows computers
- Network resources
 - Software
 - Hardware
 - Files

Computer Network Types

- Peer-to-peer (P2P)
 - Each computer is equal



- Client-server network
 - At least one central server

Computer Network Types

Peer-to-Peer (P2P)

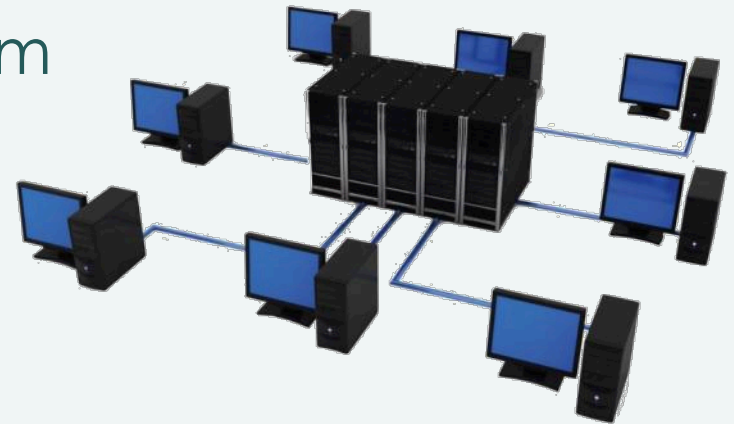
- Each device can share resources
- No centralized authority
- Each computer belongs to workgroup
- Do not need to connect to the Internet
- Most found in homes and small businesses
- Simplest type of network
- Do not need network operating system
- All computers must be on to access resources



Computer Network Types

Client-Server Network

- At least one server at its center
- Centralize network management, resources, and security
- Users log in and granted access based on login
- Server
 - Multiuser computer system
 - Network operating system
- Clients
 - PCs
 - Other devices





Select a computer network that you use (school, home, work). Is this a P2P or client-server network? How do you connect to it? What resources do you access/share on this network?

Objective 2: Overview

LANs and WANs

1. Compare different types of networks
2. Differentiate between small and large networks

Key Terms

- CAN
- Cellular network
- Ethernet
- LAN
- MAN
- PAN
- SAN
- Topology
- VPN
- WAN
- WLAN



Small Networks

- LAN (local area network)
 - All connected devices or nodes located in the same physical location
- PAN (personal area network)
 - Also called piconet
 - Devices connected via Bluetooth
- WLAN (wireless LAN)
 - Uses WiFi to transmit data

Large Networks

- WAN (wide area network)
 - Spans multiple locations
 - Connects multiple LANs over dedicated lines using routers
- VPN (virtual private network)
 - Private network through the public network (Internet)
 - Remote users access a LAN securely without dedicated lines

Large Networks

- CAN (campus area network)
 - Hybrid of LANs and WANs
 - Connected using routers
- MAN (metropolitan area network)
 - Covers a single geographic area
- SAN (storage area network)
 - Network between data storage devices and servers
- Cellular networks
 - Use cell towers
 - Transmit voice and data over long distances

Ethernet

- Defines the way data is transmitted over LAN
- Transmits signals
 - Twisted-pair cable
 - Fiber-optic cable
 - WiFi
 - Speeds ranging from 10 Mbps to 10 Gbps
- Most home networks use 100 Mbps Ethernet

Topology

- Physical layout of a LAN
- Common configurations
 - Bus
 - Ring
 - Star
- Modern LANs use star topology
 - Every node attached to central device





Make a list of networks that you use. Include home, cellular, work, and school networks. Label each as LAN, WAN, or one of the others described in this article. List the devices you use to connect to each. What resources do you access?

Objective 3: Overview

The Networking Hardware Store

1. List and describe the hardware used in wired networks
2. List and describe the hardware used in wireless networks

Key Terms

- Ad hoc network
- Firewall
- Infrastructure wireless network
- Modem
- Network adapter
- ONT
- Router
- Switch
- WAP



Hardware Used in Networks

- Network hardware
 - Physical devices needed to create the network
- Network adapter
 - Communications device
 - Establishes connection with network

Network Adapters

Wired

- Each device on a network must have network adapter
- Most PCs come with built-in Ethernet adapter
 - RJ-45
 - Plugs into wall jack, switch, router, or modem



Network Adapters

Wireless

- WiFi networks use the IEEE802.11 standards
- USB wireless adapters
 - Easy connection to devices without a built-in adapter
 - WiFi Alliance certifies wireless devices
- WLAN (wireless local area network)
 - Ad hoc network
 - Two wireless devices connect directly
- Infrastructure wireless network
 - Devices connect through a wireless access point



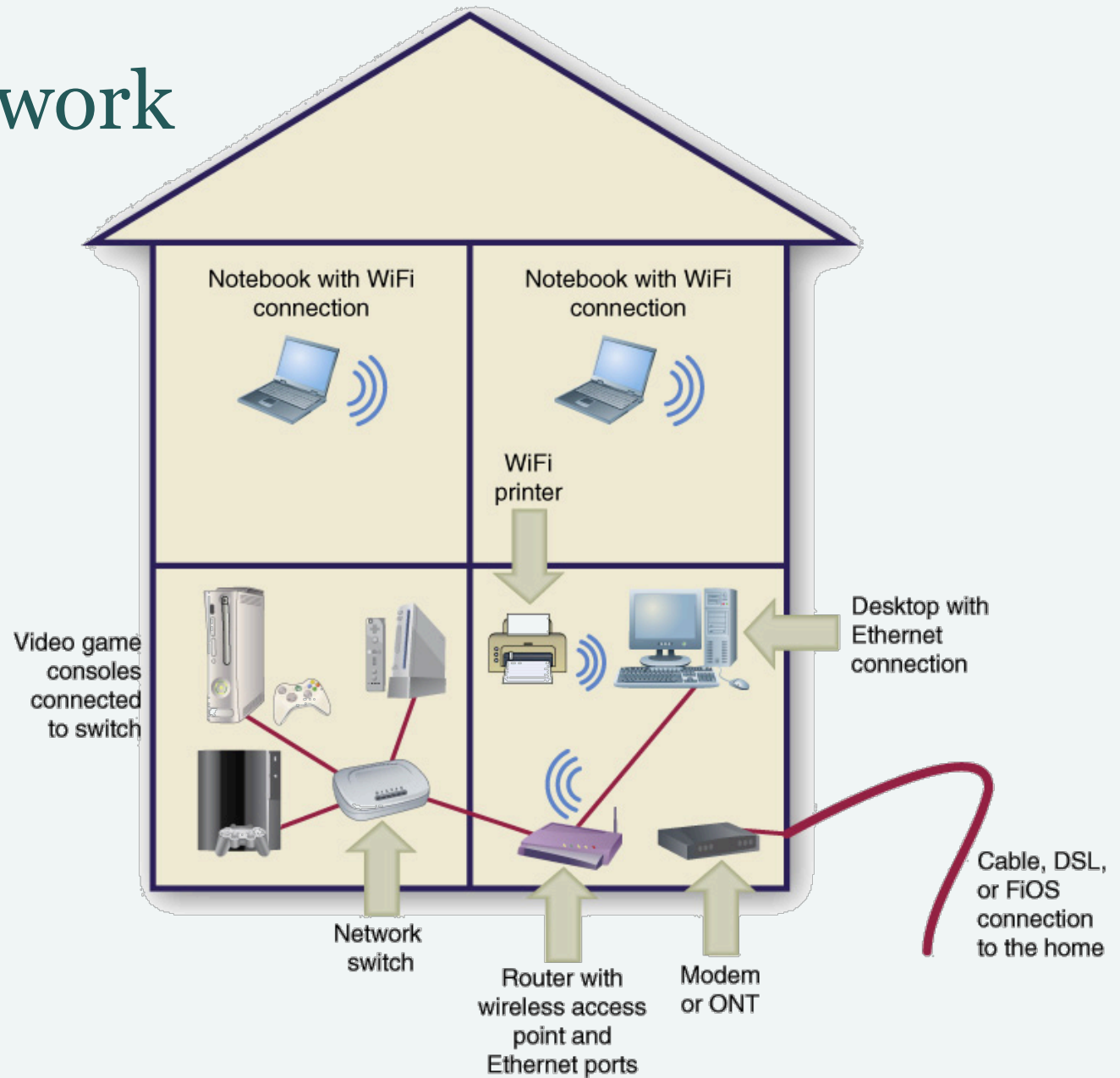
Network Adapters

Wired		Wireless	
Pros	Cons	Pros	Cons
<ul style="list-style-type: none">• Maximum speed 1,000 Mbps or 1 Gbps• FastEthernet is 100 Mbps• Less interference• More secure working environment	<ul style="list-style-type: none">• Lack of portability	<ul style="list-style-type: none">• Portability	<ul style="list-style-type: none">• Cannot reach the 1 Gbps speed• Prone to interference• Buildings and distance can slow or prevent connection• Needs to be configured with strong security settings

Network Hardware

- Modem
 - Traditional dial-up connection
- Digital modem
 - Cable and DSL
- ONT (optical network terminal)
 - Used by FTTH
- Router
 - Connects two or more networks
- Switch
 - Connects multiple devices on LAN
- WAP (wireless access point)
 - Allows wireless devices to join network
- Firewall
 - Blocks unauthorized access to network

Home Network





Open the Network Connections window as described in this article. What adapters are installed on your computer? What type of networks do they connect to? Which of them are connected now? Include a screen shot in the window.

Objective 4: Overview

The Softer Side

1. List and describe the software used in both wired and wireless networks
2. List and describe the protocols used in both wired and wireless networks

Key Terms

- Domain
- IP
- NOS
- Protocol
- TCP
- TCP/IP protocol stack

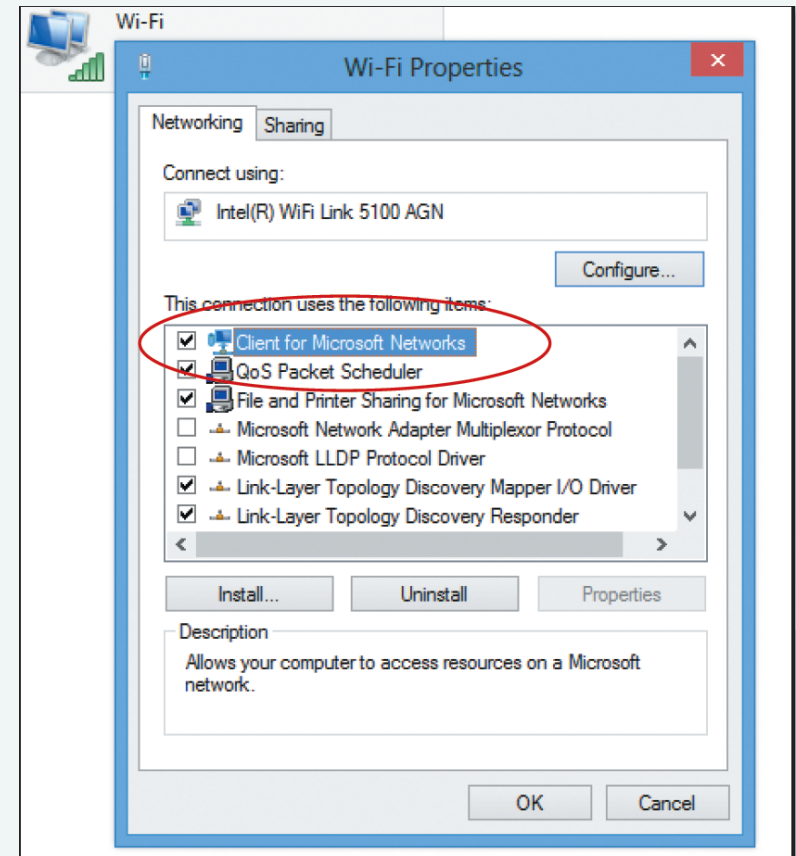


Software Used in Networks

- Software and protocols
 - Allow networks to communicate
- Networks work because of:
 - Network operating systems
 - Communication software
 - Protocols make a network work

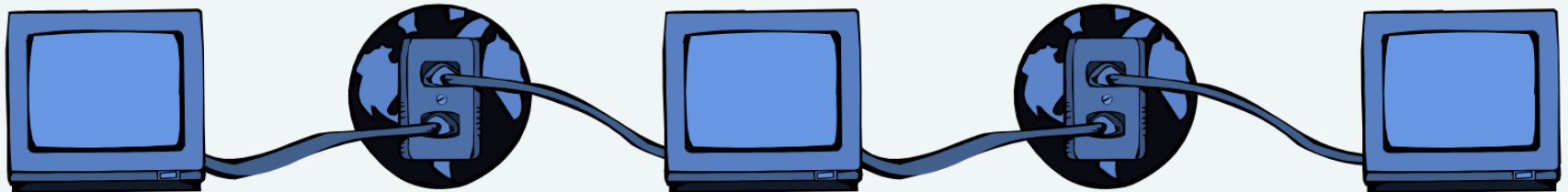
P2P Software

- P2P networks
 - No special software required
- Operating systems have networking capabilities built-in
 - Windows – Client for Microsoft Networks
- Allow remote access of files and printers on a network



Client-Server Software

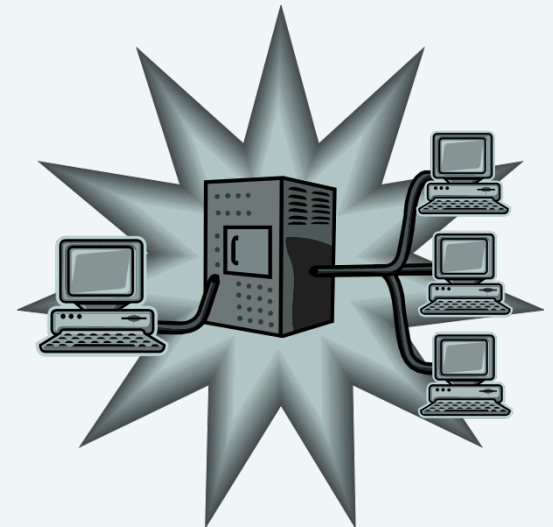
- Both client software and server software are needed on a client-server network
 - Client software makes requests
 - Server software fulfills them
- Microsoft Server OS
 - Windows clients do not need any special client software for file and print services



Client-Server Software

Domain Controller

- Domain
 - Group of clients and servers
 - Controlled by one central security database
 - Domain controller
- Log in to the domain once to access all the servers in the domain
- Clients log in to a server and request access to resources



Client-Server Software

Client Software

- Special client software needed by some servers
 - Example – Web browser
 - Email client
 - Access your e-mail
 - FTP client
 - Download files
 - Database client
 - Bank transaction
 - HTTP client
 - Web page



Client-Server Software

Server Software

- Server software or network operating system (NOS)
 - Multiuser OS
 - Controls the software and hardware on a network
 - Centralizes resources and security
 - Provides services
- Servers classified by type of services they provide
- Common services
 - File and print
 - E-mail
 - Database
 - Web
 - Chat
 - Audio/video
 - Applications

Network Protocols

PROTOCOL	FUNCTION
TCP (transmission control protocol)	Assuring that data packets are transmitted reliably
IP (Internet protocol)	Addressing and routing packets to their destination
HTTP (hypertext transfer protocol)	Requesting/delivering Web pages
FTP (file transfer protocol)	Transferring files between computers
POP (post office protocol)	Receiving email
SMTP (simple mail transfer protocol)	Sending email
DHCP (dynamic host configuration protocol)	Requesting/receiving an IP address from a DHCP server
DNS (domain name system)	Resolving a domain name such as www.ebay.com to an IP address



Make a list of networks that you use. Include home, cellular, work, and school networks. List the software clients that you use to connect to each. What resources do you access? Do you use different clients to access different resources?

Objective 5: Overview

Protecting Your Network

1. Explain how to protect a network using software, strong passwords, firewalls, and maintenance

Key Terms

- Piggybacking
- Wardriving



Network Protection

Layer 1 Hardware-based firewall via router

Layer 2 Strong passwords

**Layer 3 Software-based firewall, antivirus and
antimalware**

Layer 4 Keep system up-to-date and secure


Networking Ethics

- Piggybacking
 - Using an open wireless network connection without permission
- Wardriving
 - Driving around locating wireless access points





List the criteria for a strong password.



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