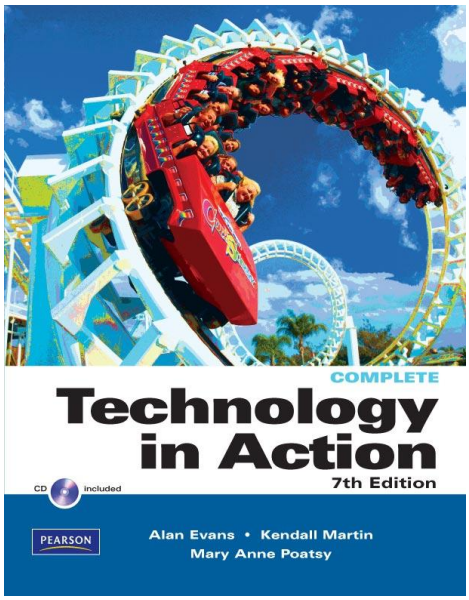


Technology in Action

Chapter 7

Networking:

Connecting Computing Devices

Chapter Topics

- Networking fundamentals
- Network architecture
- Network components
- Peer-to-peer networks
- Ethernet networks
- Power-line networks
- Configuring software
- Wireless security

Networking Fundamentals

- Computer network
  - Two or more computers connected together
  - Devices connected to networks: nodes
- Benefits of a network
  - Sharing resources and peripherals
  - Transferring files
  - Sharing of broadband connection with use of a router

Network Architecture

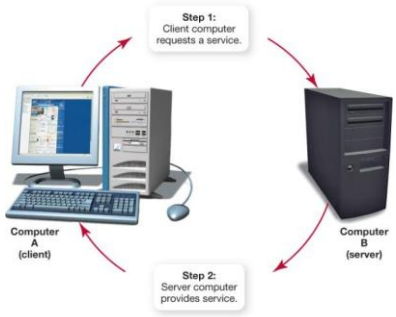
- Network designs
  - Locally administered
    - Peer-to-peer (P2P)
  - Centrally administered
    - Client/server

Peer-to-Peer Networks

- Nodes communicate with each other
  - Peers
- Share peripheral devices
- Common in home networks

Client/Server Networks

- Client computers
  - Users who make requests
- Server computers
  - Provide resources to clients
  - Central network control
- Internet
  - A large, multiserver, multiclient network



HANs and LANs

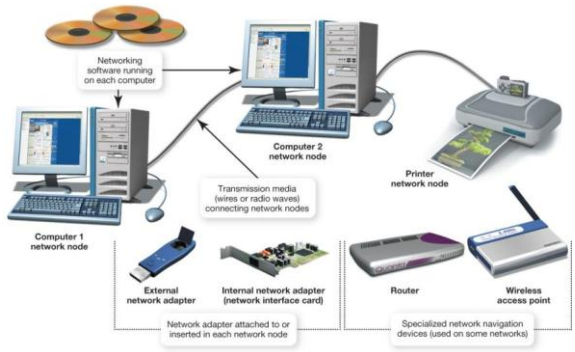
- Home area network (HAN)
  - Connects digital devices within a home
- Local area network (LAN)
  - Nodes are within a small geographic region
    - Schools
    - Small businesses

WANs and MANs

- Wide area network (WAN)
  - LANs connected over long distances
    - A few miles to thousands of miles
    - Uses telecommunications lines
- Metropolitan area network (MAN)
  - Provides access within a specific geographic region, such as a city

Network Components

- Transmission media
- Network communication devices
- Software



Transmission Media

- Provide communications channel between nodes
- Forms of media
  - Twisted pair cable
  - Coaxial cable
  - Fiber-optic cable
  - Radio waves (wireless)
- Bandwidth
  - Data transfer rate
  - Throughput

Network Adapters

- Devices connected to or installed in nodes
  - Network interface cards (NICs)
  - External or internal network adapters
- Enable communication between nodes

Network Navigation Devices

- Devices that help make data flow possible
- Routers
  - Route data between networks
- Switches
  - Receive data and retransmit it to nodes on the same network

Networking Software

- Peer-to-peer software
  - Built into operating systems that support networking
    - Windows
    - Mac OS
    - Linux

Networking Software

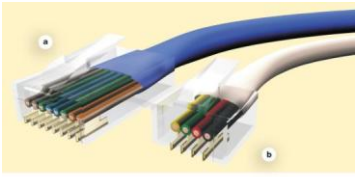
- Client/server software
  - Network operating system (NOS) software
    - Windows Server 2008
    - SUSE Linux Enterprise

Types of Peer-to-Peer Networks

- Wired Ethernet networks
- Wireless Ethernet networks
- Power-line networks

Wired Ethernet Networks

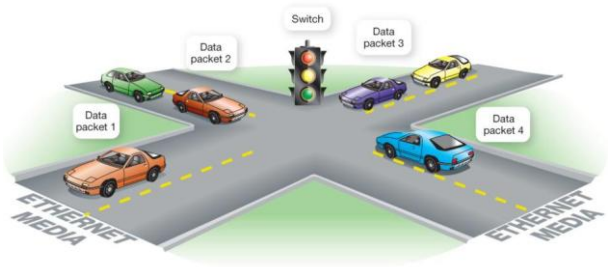
- Ethernet network adapters are used to connect nodes
  - NIC card
  - ExpressCard
  - USB adapter
- Computers are connected to each other using unshielded twisted pair cable



Ethernet Phone

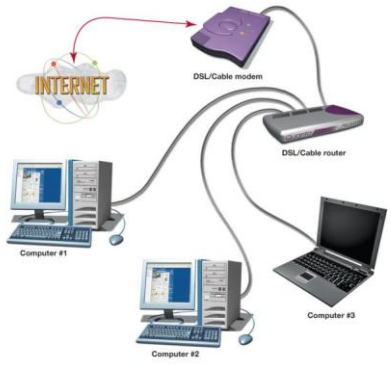
Ethernet Switches

- Keep track of data packets
- Amplify and retransmit signals
- Keep the network running efficiently



Ethernet Routers

- Transfer packets from one network to another
- Home Internet routers transfer data from the Internet to the home network
- Allows for network-ready devices such as network printers or network attached storage (NAS)

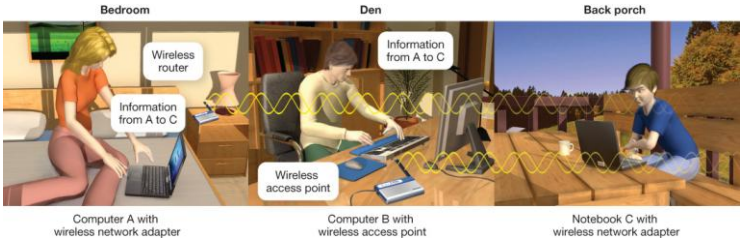


Wireless Ethernet Networks

- Ethernet networks that use radio waves instead of wires to connect nodes
- Based on the IEEE 802.11 standard, also known as Wi-Fi
- Each node requires a wireless network adapter
  - Transceivers

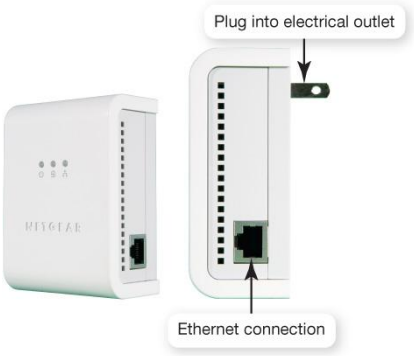
Wireless Access Point (WAP)

- Device added to a wireless network to extend the range of the network
- Must connect to either a switch, a router, or a node on the network



Power-Line Networks

- Computers are connected to a house's electrical wiring to create a network
- A power-line network adapter connects nodes to electrical outlets



Choosing a Peer-to-Peer Network

- Things to consider
  - Whether existing wiring is available
  - Whether you want wireless communications
  - How fast you want your network connection to be
  - How much money you can spend on your network

Comparing the Major Types of Home Networks				
	Wired Ethernet	**Power-Line**	**Wireless 802.11g**	**Wireless 802.11n**
Maximum data transfer rate (bandwidth)	100 Mbps to 1 Gbps	200 Mbps	54 Mbps	540 Mbps
Relative installation and equipment costs for networking two computers	$	$$	$	$$

Configuring Software for Your Home Network

- Windows Vista and later versions
  - Use wizards launched from Network and Sharing Center in Control Panel
- Before running wizards:
  1. Install network adapters on each node.
  2. For a wired network, plug all the cables into the router, network adapters, and so on.

Configuring Software for Your Home Network

3. Make sure your cable/DSL modem is connected to your router and the Internet.
4. Turn on your equipment in the following order:
   a. Cable/DSL modem
   b. Router
   c. All computers and peripherals (printers, scanners, and so on)

Networking Multiple Versions of Windows

- Set up Windows 7 and Vista machines first
  - Automatically detect other computers running Windows on network
  - Windows XP will need adjustment to see other versions of Windows
- Give each Windows computer a unique name
- Place all computers in the same workgroup

Configuring a Router to Connect to the Internet

- Contact ISP for special settings
- Access router from Web browser
- Enter username and password
- Use router's wizard to set up connection using settings and info provided by ISP
- Test Internet connection speed
  - Speedtest.net

Securing Wireless Networks

- Wireless network range doesn't stop at the property line
- Default device and network ID settings allow intruders to enter the network
- Internet bandwidth can be stolen
- Computers can be vulnerable to hacker intrusion and takeover

Securing Wireless Networks

- To secure a wireless network, do the following:
  - Change your network name (SSID)
  - Disable SSID broadcast
  - Change the default password on your router
  - Turn on security protocols
  - Implement media access control
  - Limit your signal range
  - Apply firmware upgrades

Chapter 7 Summary Questions

- What is a network, and what are the advantages of setting one up?

Chapter 7 Summary Questions

- What is the difference between a client/server network and a peer-to-peer network?

Chapter 7 Summary Questions

- What are the main hardware components of every network?

Chapter 7 Summary Questions

- What are the most common home networks?

Chapter 7 Summary Questions

- What are wired Ethernet networks, and how are they created?

Chapter 7 Summary Questions

- What are wireless Ethernet networks, and how are they created?

Chapter 7 Summary Questions

- How are power-line networks created, and are they a viable alternative to Ethernet networks?

Chapter 7 Summary Questions

- How do I configure my computer's software to set up a network?

Chapter 7 Summary Questions

- Why are wireless networks more vulnerable than wired networks, and what special precautions are required to ensure my wireless network is secure?