



Technology in Action

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Ninth Edition

Technology in Action

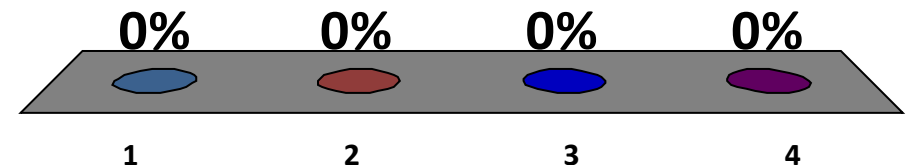
Chapter 7 Networking: Connecting Computing Devices

Chapter Topics

- Networking fundamentals
- Network architectures
- Network components
- Connecting to the Internet
- Home networks
- Configuring home network equipment
- Securing wireless networks
- Connecting devices to networks
- Configuring software for your home network

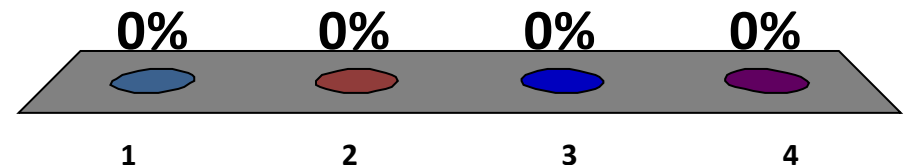
Which of the following is a network located in a home?

1. LAN
2. HAN
3. WAN
4. MAN



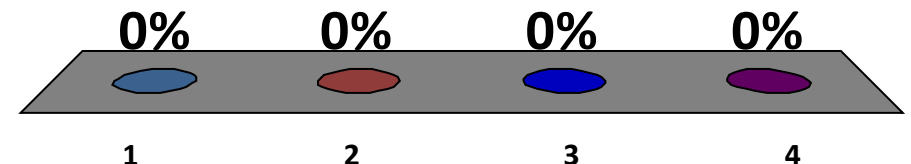
The benefits of setting up a home network include all but the following:

1. File sharing
2. Power sharing
3. Printer sharing
4. Connection sharing



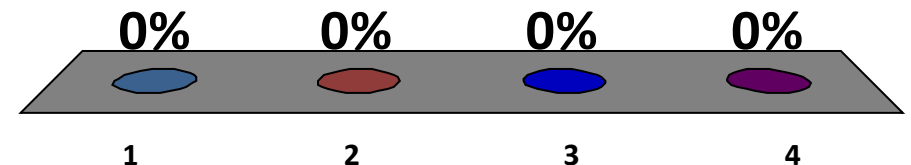
NIC stands for:

1. Network Interface Card
2. Network Internet Connection
3. Network Interface Connection
4. Networking Interaction Cable



Which of the following can be attached to a home network?

1. Game console
2. Printer
3. T.V.
4. All of the above



Networking Fundamentals

- A computer network is two or more computers connected via hardware and software
- A node is any device connected to a network
 - Peripheral (i.e. a printer)
 - Game console (i.e. a Wii)
 - Digital video recorder
 - Communications device (i.e. a modem)

Benefits of Computer Networking

- Facilitates resource sharing:
 - High-speed Internet connection
 - Peripheral devices such as printers
 - Sharing files



Disadvantages of Computer Networking

- Involves purchase of additional equipment
- Networks need to be administered
 - Installing new computers and devices
 - Monitoring the network's performance
 - Updating and installing new software
 - Configuring network security
- Benefits usually outweigh disadvantages

Network Architectures

- Network architecture refers to the design of a network
- Classified in two ways:
 - Manner in which they are controlled
 - Distance between their nodes

Networks Based on Administration

- Administered in one of two ways:
 - Local administration means that configuration and maintenance must be performed on each individual computer attached to network
 - Peer-to-peer network
 - Central administration means that tasks can be performed from one computer and affect other computers on the network
 - Client/server network

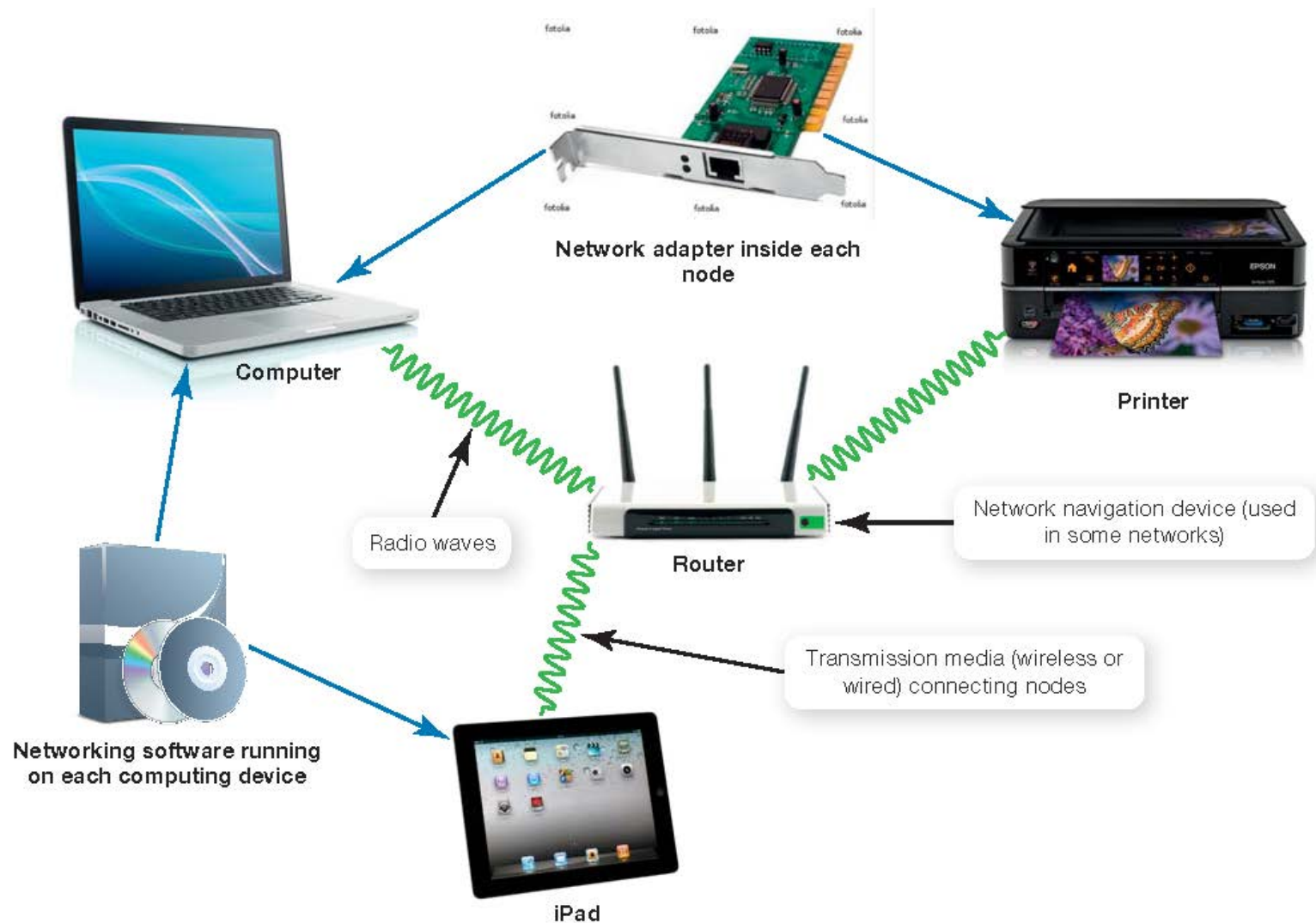
Networks Based on Distance

- Local area network (LAN) is a network where nodes are located within small geographic area
- Home area network (HAN) is a network located in a home
- Wide area network (WAN) is made up of LANs connected over long distances
- Metropolitan area network (MAN) is designed to provide access to specific geographic area such as a city

Network Components

- All networks must include:
 - Means of connecting nodes to network (cables or wireless technology)
 - Special devices that allow nodes to communicate with each other
 - Software that allows network to run

Network Components (cont.)



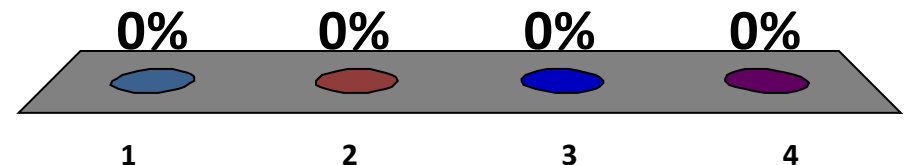
Transmission Media

- Establish a communications channel between nodes on network
 - Wireless networks use radio waves
 - Wired networks use cables to connect nodes
 - Twisted-pair cable
 - Coaxial cable
 - Fiber-optic cable



What type of connector is used with unshielded twisted-pair cable?

1. RJ-11
2. JR-11
3. RJ-45
4. JR-45



Data Transfer

- Data transfer rate
 - Maximum speed of data transmission between two nodes on a network
- Throughput
 - Actual speed of data transfer achieved
 - Always less than or equal to the data transfer rate

Network Adapters

- Devices connected to or installed in network nodes
- Enable nodes to communicate with each other and access the network
- Desktop and notebook computers sold today contain network adaptors
 - Network interface card (NIC)

Wireless Signals

- Might have decreased throughput
 - Interference from magnetic and electrical sources
 - Interference with other wireless networks
 - Building materials and metal
 - Distance from networking equipment
 - Process of coding signals

I know what can interfere with my wireless home network signal.

1. True
2. False



Network Navigation Devices

- Control the flow of data through a network
- Data sent in bundles called packets
- Router
 - Transfers packets between two or more networks
- Switch
 - Receives data packets and sends them to intended nodes on same network

Networking Software

- Home networks need operating system software that supports P2P networking
 - Windows
 - Mac OS X
 - Linux
- Client/server networks are controlled by specialized network operating system (NOS) software
 - Windows Server 2008 R2
 - SUSE Linux Enterprise Server

Connecting to the Internet

- Main reason for home network is to share an Internet connection
- Must purchase Internet access from Internet Service Providers (ISPs)
 - Specialized providers
 - Companies that provide other services
- Connection choices
 - Broadband uses high-speed data access
 - Dial-up uses conventional phone lines

Broadband Connections

- Broadband is often referred to as high-speed Internet with data transmission rate of 256 Kbps or greater
 - Digital subscriber line (DSL) uses same types of wiring as standard phone lines
 - Cable uses television's cable service provider
 - Fiber-optic service uses plastic or glass cables
 - Satellite broadband used in rural and mountain areas

Dial-Up Connections

- Many people still use dial-up connections
 - Unavailability of high speed service
 - Least costly way to connect to Internet
- Requires standard phone line and modem
 - Modem is device that converts (modulates) digital signals into analog signal that can travel over phone lines
 - Modem translate (demodulate) received analog signal back to digital signals

Connecting Away From Home

- Use a WiFi hotspot
 - WiFi is standard for wireless transmissions using radio waves
 - Notebooks, smartphones, game systems, and PMPs have wireless capability built in
- Sign up for 3G or 4G access with cell phone provider
 - Many devices such as iPads and notebooks are available with 3G or 4G capabilities

Choosing the Right Internet Connection Option

- Check to determine what broadband options are available
 - Local cable TV provider
 - Phone company
 - Satellite TV providers
- Check transfer rates
- Consult with friends and neighbors
- Consider what other services you want bundled such as phone or TV

Home Networks



- Setting up a home network allows everyone in the family to connect their computing devices whenever and wherever they desire

Ethernet Home Networks

- Uses Ethernet protocol as standard for network communication
- Current standards
 - Wired 802.3
 - Wireless 802.11
 - 802.11n features fastest data transfer rate
 - Devices using older 802.11 standards will still work with networks but will operate with slower data transfer rates

Home Network Cabling

- Unshielded twisted-pair (UTP) cable
 - Most popular cable for Ethernet networks
 - Composed of four pairs of wires that are twisted around each other to reduce electrical interference
- RJ-45 connectors have contacts for eight wires
- Cat 6 cable best choice for home networks

I know how to determine the type of cable used on my home network.

1. Yes
2. No

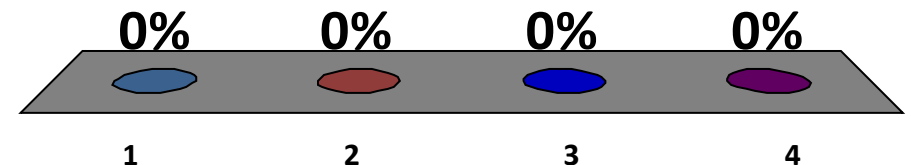


Wired and Wireless on One Network

- Ethernet network can support nodes on both wireless and wired connections
 - Connect portable devices wirelessly
 - Connect devices that stay in one location by wired connectivity for faster throughput

Which of the following should be turned on first when configuring a home network?

1. Modem
2. Router
3. Printer(s)
4. Computer(s)



Configuring Home Network Equipment

- Decide what nodes on network need to be connected wirelessly
- Decide which devices would benefit from wired connections
- Various types of equipment needed to configure home network

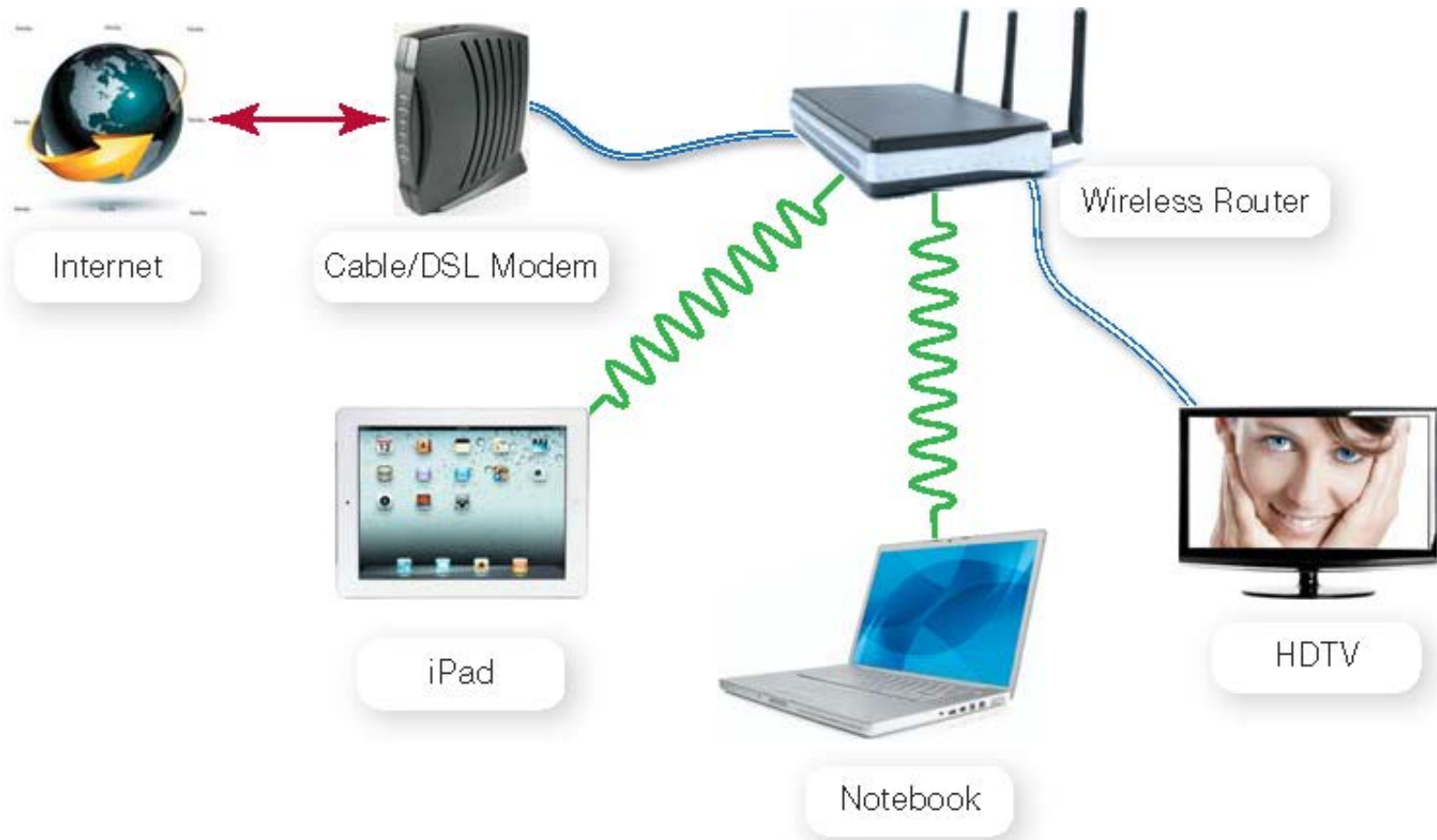
Routers and Switches: Moving Data Around Your Network

- Ethernet networks need network navigation devices to make them work
 - Router is needed to transfer packets of data between home network and the Internet
 - Switch is needed to route the data between nodes on the same network
- Devices for home networks called *routers* include integrated switches

Connecting Devices to Routers

- Most home networks have fewer than ten wireless devices connected
- Devices share bandwidth when connected to a router
- The more devices actively transmitting data, the smaller the portion of the bandwidth each device receives

Small Network with Wireless Router



I know how to secure my wireless home network.

1. True
2. False



Securing Wireless Networks

- Computers that connect to Internet must be secured from intruders
- Usually accomplished by using a firewall
 - Hardware or software solution
- Wireless networks present special vulnerabilities
- Configure network security before connecting nodes on your network

Securing Wireless Networks (cont.)

- Precautions to secure a wireless network
 - 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

Connecting Devices to Networks

- Many devices would benefit from being attached to network
 - Printers
 - Graphics tables
 - Entertainment devices (TVs, gaming systems)
 - Portable devices (smartphones, iPads)
 - Power monitoring devices

Connecting Computers

- Network adaptor is necessary to connect computing devices to network
- On Windows computer, use Device Manager
 - See which network adapter(s) are installed
 - Check whether adapter is working

Network-Ready Devices

- Can be connected directly to a router instead of computer on network
 - Blu-ray players
 - Televisions
 - Game consoles
- Many devices contain wireless and/or wired network adapters inside them

Digital Entertainment Devices on a Network

- Connect to network to access and share digital content
- Purchase (or obtain for free)
 - Movies
 - Videos
 - Music files
 - Gaming devices
- Streamed media is sent directly to device

Specialized Home Networking Devices

- Internet appliances provide easy access to Internet
 - Apple iPad
- Digital picture frames
- Security monitoring cameras



Configuring Software for Your Home Network

- Once hardware is installed, you need to configure operating system software
 - Use special Windows tools
 - Configuring Mac OS X is quick and easy
 - Configuring Linux is most complex

Windows Configuration

- Windows 7 automates setting up networks
- Before running any wizards:
 - Make sure there are network adapters on each node
 - For any wired connections, plug all the cables into the router, nodes, and so on
 - Make sure your broadband modem is connected to your router and that the modem is connected to the Internet

Windows Configuration (cont.)

- Turn on your equipment in the following order (allowing the modem and the router about one minute each to power up and configure):
 - Broadband modem
 - Router
 - All computers and peripherals (printers, scanners, etc.)

Windows Configuration (cont.)

- Open Network and Sharing Center from Control Panel
- With wired connection, you should be connected to home network automatically
- With wireless connection, click on Connect to a network option
 - Enter security pass phrase to connect

Mac Configuration

- Connecting Macs easier than with Windows
- Set up security for router with SSID and passphrase
- Network login screen appears with list of available networks
- Enter password and click Join

Wireless Node Configuration and Testing

- Know the SSID name of network and the security passphrase
- Once devices are connected, check Internet connection speed
- Sites on Internet allow you to test speed of downloading and uploading files
- Run test at several different times

Troubleshooting Network Problems

- Throughput decreases as device moves farther away from router
- Obstacles decrease throughput
- To increase throughput
 - Reposition node within same room
 - Move the device closer to the router
 - Adding a wireless range extender

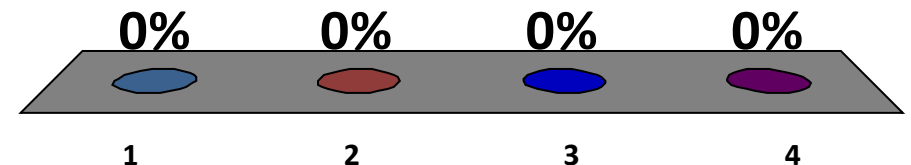
Which of the following transfers packets of data between two or more networks?

1. Switches
2. Routers



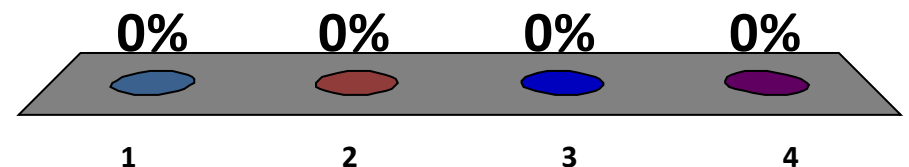
Which features the fastest wireless data transfer rate?

1. 802.11a
2. 802.11b
3. 802.11g
4. 802.11n



is the actual speed at which data is transferred on a network.

1. Data transfer rate
2. Throughput
3. Transmission time
4. Network transfer rate



Chapter 7 Summary Questions

1. What is a network, and what are the advantages/disadvantages of setting up one?

Chapter 7 Summary Questions

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

Chapter 7 Summary Questions

3. What are the main components of every network?

Chapter 7 Summary Questions

4. What are my options for connecting to the Internet?

Chapter 7 Summary Questions

5. Which type of network is most commonly found in the home?

Chapter 7 Summary Questions

6. What equipment and software do I need to build a network in my home?

Chapter 7 Summary Questions

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

Chapter 7 Summary Questions


8. Besides computers, what other devices can I connect to a home network?

Chapter 7 Summary Questions

9. How do I configure the software on my computer and set up other devices to get my network up and running?

Chapter 7 Summary Questions

10. What problems might I encounter when setting up a wireless network?



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