NEW PERSPECTIVES

Chapter 6
The Internet

Computer Concepts 2014

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6 Chapter Contents

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6 FastPoll True/False Questions
Answer A for True and B for False

- 060100 NAPs such as Earthlink and Comcast offer dial-up and cable Internet access.
- 060200 TCP, IP, UDP, HTTP, and FTP are examples of protocols used on the Internet.
- 060300 204.127.129.100 is an example of an IP address.
- 060400 .edu and .ca are examples of top-level domains.
- 060500 The Domain Name System stores IP addresses and their equivalent domain names.

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6 FastPoll True/False Questions
Answer A for True and B for False

- 060600 Utilities such as Ping and Traceroute help you gauge the speed of your Internet connection.
- 060700 10 Mbps is a narrowband Internet connection.
- 060800 Dial-up and DSL provide Internet access using telephone cabling.
- 060900 Cable Internet service is fast because it has lots of latency.
- 061000 WiMAX uses low-earth orbiting satellites to transport data to the Internet.

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6 FastPoll True/False Questions
Answer A for True and B for False

- 061100 Public Wi-Fi hotspots provide mobile Internet access.
- 061200 With mobile broadband, you can use a cell phone to set up a mobile Internet connection.
- 061300 Cloud computing uses distributed grid computing to predict weather.
- 061400 VoIP uses circuit switching technology to send analog data.
- 061500 SETI@home is a popular Wi-Fi service provider for non-business consumers.

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6 FastPoll True/False Questions
Answer A for True and B for False

- 061600 FTP makes it easy to anonymously use a search engine.
- 061700 BitTorrent is an Internet security protocol.
- 061800 Consumers should use port probes to encrypt data sent over the Internet.
- 061900 NATs are used by hackers to intercept packets traveling over the Internet.

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6 Section A: Internet Technology

➢ Background
➢ Internet Infrastructure
➢ Internet Protocols, Addresses, and Domains
➢ Connection Speed

6 Question

➢ 062100 One reason the Internet works is because TCP/IP offers a global addressing standard. Which one of the following is accurate in the context of Internet addresses?
   ➢ A. IPv6 addresses such as 204.127.129.1 are dedicated to educational institutions.
   ➢ B. Top level domains like EarthLink or AOL are adequate for most consumers.
   ➢ C. A domain name, such as amazon.com corresponds to a unique IP address.
   ➢ D. A dynamic IP address begins with www.

6 Background

➢ The ARPANET, created in 1969, connected computers at UCLA, Stanford Research Institute, University of Utah, and University of California at Santa Barbara
➢ Early Internet pioneers used primitive command-line user interfaces to send e-mail, transfer files, and run scientific calculations on Internet supercomputers
➢ With an estimated 500 million nodes and more than 2 billion users, the Internet is huge
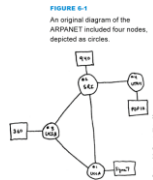

FIGURE 6-1
An original diagram of the ARPANET included four nodes, depicted as circles.

6 Internet Infrastructure

➢ The Internet is not owned or operated by any single corporation or government
➢ The Internet backbone is a network of high-capacity routers and fiber-optic communications links that provides the main routes for data traffic across the Internet
➢ Backbone links and routers are maintained by network service providers (NSPs)
➢ NSP equipment and links are tied together by network access points (NAPs)
➢ An Internet service provider (ISP) is a company that offers Internet access to individuals, businesses, and smaller ISPs
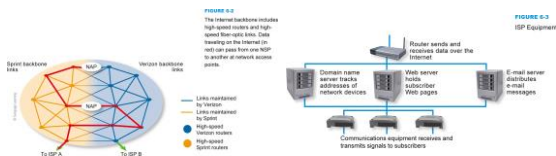
6 Internet Infrastructure

6 Internet Infrastructure

➢ To communicate with an ISP, your computer uses some type of communications device, such as a modem

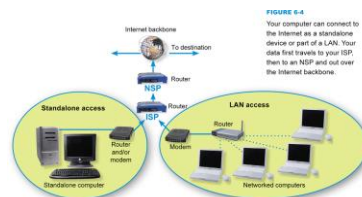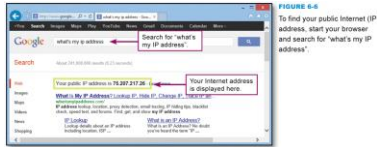## 6 Internet Protocols, Addresses, and Domains

➤ A computer can have a permanently assigned static IP address or a temporarily assigned dynamic IP address
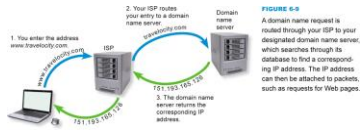

FIGURE 6-6
To find your public Internet (IP) address, start your browser and search for "what's my IP address".

6 Internet Protocols, Addresses, and Domains

➤ A domain name is a key component of Web page addresses and e-mail addresses

FIGURE 6-7
Domain names are part of the addresses for servers that handle e-mail and Web sites.

www.msu.edu/infotech   jbillings@msu.edu

Web address   E-mail address

6 Internet Protocols, Addresses, and Domains

FIGURE 6-9
A domain name request is routed through your ISP to your designated domain name server, which searches through its database to find a corresponding IP address. The IP address can then be attached to packets, such as requests for Web pages.

6 Internet Protocols, Addresses, and Domains

FIGURE 6-11
The first step in registering a domain name is to find out whether the name is currently in use or reserved for future use. If a domain name is not available, consider using a different top-level domain, such as biz instead of com. After you've found an available domain name, you can continue the registration process by filling out a simple online form.
○ You can learn more about selecting a domain name when you access this figure in your interactive eBook.

6 Connection Speed

➤ Data travels over the Internet at an incredible speed
➤ The elapsed time for data to make a round trip from point A to point B and back to point A is referred to as latency
  ➤ Ping
  ➤ Traceroute
➤ Upstream vs. downstream speed

6 Connection Speed

FIGURE 6-12
In this example, Traceroute is used to monitor an Internet connection between a small lakeside cabin in northern Michigan and the HotWired Web site. The satellite connection has extremely high latency and timed out before the Web site could be accessed. ○ Click to learn how to launch Ping and Traceroute from the Windows command line and interpret the results.

6 Connection Speed

- ➤ When upstream speeds differ from downstream speeds, you have an asymmetric Internet connection
- ➤ When upstream and downstream speeds are the same, you have a symmetric Internet connection
- ➤ Internet connection options
  - ➤ Fixed Internet access
  - ➤ Portable Internet access
  - ➤ Mobile Internet access

6 Connection Speed

FIGURE 6-13
Speed tests measure the average number of bits that are transmitted per second, whereas utilities such as Ping and Traceroute measure the time required for a packet to make a round trip from your computer and back ● Click to learn how to use Speedtest.net to compare the speed of your Internet connection with your ISP's advertised speed.

6 Section B: Fixed Internet Access

- ➤ Dial-up Connections
- ➤ DSL
- ➤ Cable Internet Service
- ➤ Satellite Internet Service
- ➤ Fixed Wireless Service
- ➤ Fixed Internet Connection Roundup

6 Question

- ➤ 062200 Although ISPs offer Internet access though dial-up, satellites, WiMAX, and DSL, cable Internet is currently the preferred access method. Why?
  - ➤ A. It is the least expensive.
  - ➤ B. It is the fastest and most widely available technology.
  - ➤ C. It has the highest latency.
  - ➤ D. It was the original Internet access technology.

6 Dial-up Connections

- ➤ A dial-up connection is a fixed Internet connection that uses a voiceband modem and telephone lines to transport data between your computer and your ISP
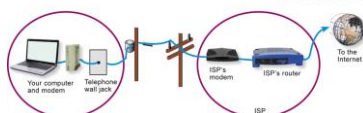
FIGURE 6-14
When you use a dial-up connection to access the Internet, your data travels over local telephone lines to your ISP, which sends it onto the Internet.

6 Dial-up Connections

- ➤ A voiceband modem converts the signals from your computer into audible analog signals that can travel over telephone lines
- ➤ Modem speed is measured in bits per second

FIGURE 6-15
When you transmit data, your voiceband modem modulates the signal that carries your data. A modem at the other end of the transmission demodulates the signal.

6 DSL

- DSL is a high-speed, digital, always-on Internet access technology that runs over standard phone lines
- The speed of a DSL connection varies
  - DSL modem
  - DSL filter
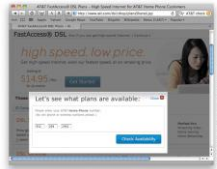
FIGURE 6-17
To find out if DSL is available in your area, check with local carriers and national carriers, such as AT&T.

6 DSL

FIGURE 6-16
Voice and data signals travel over DSL to a special device at the local telephone switching station, where they are divided and routed to an ISP or to the regular telephone network.

Data routed to the Internet

Data

Voice

DSL line

Local telephone switching station

Voice calls routed to land lines

FIGURE 6-18
A DSL modem connects your computer to a telephone wall jack. You can plug the modem into your computer's USB or Ethernet port.

6 Cable Internet Service

- Cable Internet service is a means of distributing always-on broadband Internet access over the same infrastructure that offers cable television service
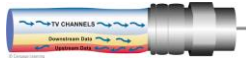
FIGURE 6-20
A CATV cable has enough bandwidth to support TV channels and data flowing downstream as well as data flowing upstream.

TV CHANNELS
Downstream Data
Upstream Data

6 Cable Internet Service

- Cable modems convert your computer's signal into one that can travel over the CATV network
- Always-on connection
- DOCSIS-compliant cable modems

FIGURE 6-21
If your home has only one CATV cable outlet, you might need to use a splitter to link it to your cable modem and television. If you have multiple cable outlets, you can connect your cable modem directly to any one of them.

Television or set-top box

Cable wall jack

Cable splitter

Cable modem

6 Satellite Internet Service

- Satellite Internet service distributes always-on, high-speed asymmetric Internet access by broadcasting signals to and from a personal satellite dish
- A satellite modem is a device that modulates data signals from a computer into a frequency band that can be carried to the satellite dish where it is converted to another frequency, amplified, and transmitted

6 Fixed Wireless Service

- Fixed wireless Internet service broadcasts signals in order to offer Internet access to large areas
  - WiMAX
  - A WiMAX system transmits data to and from WiMAX antennas mounted on towers
  - Under ideal conditions, WiMAX can transmit data at 70 Mbps

FIGURE 6-23
A WiMAX tower broadcasts signals over a wide area. Subscribers close to the tower can use non-line-of-sight modems to pick up the signal.

6 Fixed Internet Connection Roundup

FIGURE 6-24
Fixed Internet Access Options

	Dial-up	DSL	Cable	Satellite	WiMAX
Download speed (max.)	56 Kbps	384 Kbps–6 Mbps	5–50 Mbps	1–1.5 Mbps	70 Mbps
Upload speed (max.)	33 Kbps	128 Kbps–6 Mbps	256 Kbps–10 Mbps	100–256 Kbps	70 Mbps
Download speed (actual)	44 Kbps	2–5 Mbps	3–10 Mbps	400–800 Kbps	1–5 Mbps
Latency	100–200 ms	10–20 ms	10–20 ms	1–3 seconds	10–50 ms
Short video (72 MB) download	4 hours	5 minutes	3.2 minutes	24 minutes	6.4 minutes
Requirements	Telephone line, ISP, voiceband modem	Computer located within 3 miles of local telephone switch, DSL modem	CATV service that provides Internet access; cable modem	Clear view of southern sky; satellite dish and modem	WiMAX modem, line-of-sight to WiMAX tower for distances > 3 miles
Monthly fee	$	$$	$$	$$	$$
Installation cost	$0	$	$	$$	$
Always-on	N	Y	Y	Y	Y

6 Section C: Portable and Mobile Internet Access

- ➤ Internet to Go
- ➤ Wi-Fi Hotspots
- ➤ Portable and Mobile WiMAX
- ➤ Portable Satellite Service
- ➤ Cellular Data Service

6 Question

- ➤ 062300 What is the difference between portable Internet access and mobile Internet access?
  - ➤ A. With portable access you cannot work online while moving very far.
  - ➤ B. Mobile access is less expensive than portable access.
  - ➤ C. Portable access requires cables, whereas mobile access does not.
  - ➤ D. Portable access requires a cell phone, whereas mobile access requires a notebook computer.

6 Internet To Go

- ➤ Portable Internet access can be defined as the ability to easily move your Internet service from one location to another

FIGURE 6-25
Using mobile Internet access, you can find the location of the nearest coffee shop.

- ➤ Mobile Internet access offers a continuous Internet connection as you are walking or riding in a bus, car, train, or plane

6 Wi-Fi Hotspots

- ➤ A Wi-Fi hotspot is an area in which the public can access a Wi-Fi network that offers Internet service
- ➤ Wi-Fi does not typically provide acceptable mobile Internet access because you can only remain connected within range of the network's hotspot

FIGURE 6-27
When connecting to a new network, Windows gives you an opportunity to turn file sharing off. If the network is private and secure, you can leave file sharing on, but if the network is public or unsecured, then select the option to disable sharing.

6 Portable and Mobile WiMAX

- ➤ WiMAX can be used as a portable technology because Internet access is available to subscribers anywhere within a tower's coverage area

FIGURE 6-28
WiMAX modems are easy to transport and can be plugged in anywhere within the coverage area of a WiMAX tower.

- ➤ You use the same Internet service provider whether you are at home or on the road
- ➤ Mobile WiMAX

6 Portable Satellite Service

FIGURE 6-29
A vehicle-mounted satellite dish can be deployed from a control panel inside the vehicle. As with fixed satellite service, however, latency becomes a factor for real-time applications such as videoconferencing, streaming movies, and online gaming.
● See how it works.

6 Cellular Data Services

➢ Using cell phone technology to access the Internet offers mobility that is not yet possible with most of today's wired or wireless computer network technologies

FIGURE 6-30
The advantages of WAP-enabled devices include their portability and low price. The disadvantage is their small, low-res screens. Although various schemes for scrolling over a full-sized Web page have been tried, most WAP users stick to Web sites specially designed for small screens.

6 Cellular Data Services

➢ 4G technology provides peak data rates of 100 Mbps while a device is in motion, or 1 Gbps rates when a device is stationary
➢ WAP (Wireless Application Protocol) is a communications protocol that provides Internet access from handheld devices
➢ For the real Internet, cellular service providers offer data services, sometimes referred to as mobile broadband
➢ Most cellular service providers offer wireless modems for broadband data access

6 Cellular Data Services

➢ MiFi is a brand name for a compact, mobile, wireless router offered by Novatel Wireless
➢ Some cell phones, such as the Droids and iPhones, can act as a Wi-Fi hotspot by becoming the router for a wireless network
  ➢ Tethering
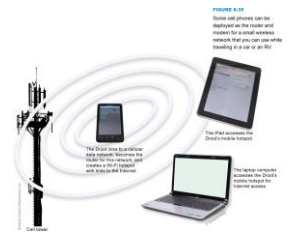
6 Section D: Internet Services

➢ Cloud Computing
➢ Real-Time Messaging
➢ Voice over IP
➢ Forums, Wikis, Blogs, and Tweets
➢ Grid Computing
➢ FTP
➢ File Sharing Networks

6 Question

➢ 062400 On the Internet, application protocols provide consumers with many useful services. Which one of the following correctly describes an Internet-based application protocol?
  ➢ A. Chat and Instant messaging use Internet VoIP protocol.
  ➢ B. Files can be shared over the Internet using FTP or BitTorrent protocols.
  ➢ C. Cloud protocols such as SETI control distributed processing grids.
 ➢ D. P2P is used to encrypt personal information to keep it private.

6 Cloud Computing

➤ Cloud computing depends on a grid of servers, storage devices, and protocols that offer Internet-accessible computing services ranging from consumer-level media sharing to office productivity applications and complex corporate data processing
  ➤ Software as a Service (SaaS)

6 Cloud Computing

FIGURE 6-37
With a SkyDrive account, you can store your data on a cloud-based server and access it from any device. You can also specify files and folders on your local computer that can be accessed remotely from SkyDrive.
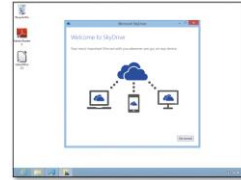
6 Real-Time Messaging

➤ A networked-based, real-time messaging system allows people to exchange short messages while they are online
  ➤ Instant messaging (IM)
  ➤ Chat

FIGURE 6-38
IM client software displays windows for typing and viewing messages.

6 Voice over IP

➤ VoIP (Voice over Internet Protocol) or Voice over IP, is a technology in which a broadband Internet connection is used to place telephone calls instead of the regular phone system
➤ If you want to set up free computer-to-computer VoIP, you and the people you communicate with can download and install freeware or open source VoIP clients

FIGURE 6-39
You can test your Internet connection to determine if it is suitable for VoIP by connecting to Web sites such as myspeed.visualware.com.
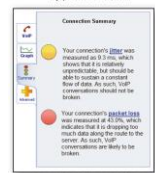
6 Forums, Wikis, Blogs, and Tweets

➤ An Internet forum is a Web-based online discussion site where participants post comments to discussion threads
➤ A wiki allows participants to modify posted material
➤ A blog (short for Web log) is similar to an online diary; it is maintained by one person and contains a series of entries on one or more topics
➤ A tweet is a short message of 140 characters or less, posted to the Twitter Web site

6 Forums, Wikis, Blogs, and Tweets

FIGURE 6-41
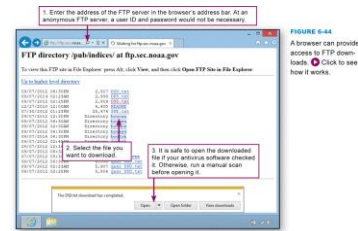Twitter is the platform for short messages called tweets.
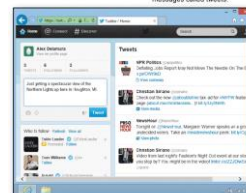
6 Grid Computing

➢ A grid computing system is a network of computers harnessed together to perform processing tasks
  ➢ SETI@home project

FIGURE 6-42
A distributed grid uses a diverse variety of computers as generic and equal resources.

A server running grid management software farms out pieces of a problem to computers in the grid.

Computers in the grid run grid client software and send results back to the server.
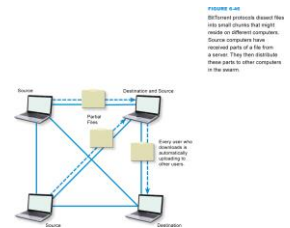
6 FTP

6 FTP

6 File Sharing Networks

➢ File sharing, sometimes called P2P file sharing, allows users to obtain files from other users located anywhere on the Internet
➢ BitTorrent is a file sharing protocol that distributes the role of file server across a collection of dispersed computers

6 Section E: Internet Security

➢ Intrusion Attempts
➢ Securing Ports
➢ NAT
➢ Virtual Private Networks

6 Question

➢ 062500 Protecting your computer from Internet-based intrusions is an important aspect of computer security. Which one of the following is NOT a useful security technique?
  ➢ A. Setting up NAT on a router
  ➢ B. Activating firewall software
  ➢ C. Checking the status of software ports
  ➢ D. Activating your computer's file sharing options

6 Intrusion Attempts

➤ An intrusion is any access to data or programs by hackers, criminals, or other unauthorized persons
➤ A communications port is the doorway that allows a computer to exchange data with other devices
➤ A port probe (or port scan) uses automated software to locate computers that have open ports and are vulnerable to unauthorized access

6 Intrusion Attempts

FIGURE 6-48
Your computer's ports are most secure if they don't even appear to exist when probed using a port scanner. ● Use your interactive eBook to see how ShieldsUP! checks your computer's ports and learn what the results mean.

6 Securing Ports

FIGURE 6-49
To configure a Windows computer for Automatic Updates, use the Security Center option in the Control Panel.
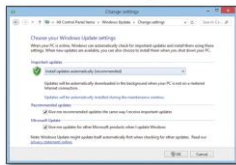
6 Securing Ports

➤ A firewall is software or hardware designed to filter out suspicious packets attempting to enter or leave a computer
➤ Sharing printers or files on a LAN or the Internet requires open ports so the data can be transferred to and from your computer

FIGURE 6-51
When you turn off file sharing and network discovery, the ports used for those activities are closed to potential intruders.
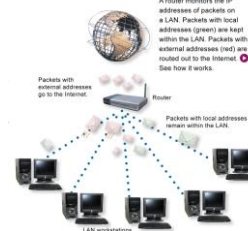
6 NAT

➤ Routers are intended to work within LANs to monitor and direct packets being transported from one device to another
➤ A routable IP address is one that can be accessed by packets on the Internet
➤ A private IP address is a non-routable IP address that can be used within a LAN, but not for Internet data transport
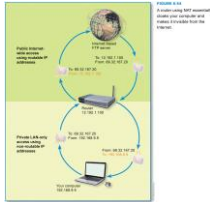
6 NAT

FIGURE 6-52
A router monitors the IP addresses of packets on a LAN. Packets with local addresses (green) are kept within the LAN. Packets with external addresses (red) are routed out to the Internet. ● See how it works.

6 NAT

➢ Network address translation (NAT) is the process your router uses to keep track of packets and their corresponding private or public IP addresses

6 Virtual Private Networks

➢ It is possible to secure remote connections by setting up virtual private network (VPN) access to a remote access server in the corporate office

➢ Access to a VPN is usually by invitation only; employees who need to access a VPN are given the necessary instructions, addresses, and passwords to make connections

6 Virtual Private Networks

FIGURE 6-55
A personal VPN offers security for the data that you transmit from public Wi-Fi hotspots.

6 What Do You Think?

➢ 063100 Does it seem plausible that your government would attempt to shut down the Internet to curtail civil unrest?
   ➢ A. Yes   B. No   C. Not sure

➢ 063200 Do you use the Internet to access political news?
   ✴ A. Yes   B. No   C. Not sure

➢ 063300 Should your government have legal power to shut down the Internet?
   ➢ A. Yes   B. No   C. Not sure

➢ 063400 Have you experienced an Internet outage that lasted longer than 24 hours?
   ➢ A. Yes   B. No   C. Not sure

NEW PERSPECTIVES

Chapter 6 Complete

Computer Concepts 2014