

Chapter 1

Introduction to Networking

It is important to be able to recognize and name the major components of a PC for the following three reasons:

- Computers are important network-building devices.
- Many networking devices are special-purpose computers, with many of the same parts as "normal" PCs.
- For you to view the online curriculum, your own computer must be in working order, which means that you might need to occasionally troubleshoot simple problems in your computer's hardware and software.

Concept Questions

Demonstrate your knowledge of these concepts by answering the questions in the Engineering Journal space provided.

1. The transistor and the integrated circuit made modern computers possible. Explain why.

The invention of a semiconductor transistor opened up many possibilities for making smaller, more reliable computers. Millions of transistors can now be placed on one small piece of semiconductor. Further microminiaturization of integrated circuits leads to widespread use of PCs in homes and businesses.

2. If your computer doesn't power up, what steps might you take to identify and correct the problem?
If your computer does not power up as expected, consider verifying the following:

- ⇒ **Power cord is plugged into wall socket.**
- ⇒ **Power switch is switched to the on (1) position.**
- ⇒ **Motherboard power inlet is securely fastened.**

3. Explain how to do the following:

A. Select the NIC card.

The network card selection should involve consideration of the following:

- **Bus type (PCI, ISA, EISA, and so on)**
- **Network topology (bus, ring, star)**
- **Medium type (UTP, STP, 10Base2, 10Base5, 10BaseF)**

- **Transport speed (1 Mbps, 4 Mbps, 10 Mbps, 16 Mbps, 100 Mbps, 1000 Mbps)**

B. Set the correct IP address.

The IP address selected should be on the same network or subnetwork as the other devices that need to be accessed. This should be a unique address that is not currently being used by any other nodes on the local network.

C. Adjust the display (if necessary).

The display can easily be changed by selecting the display icon from the control panel. Select the setting option and choose the desired resolution and color depth. Click Apply to reflect changes. Another way is to right-click the mouse and choose the properties window.

D. Install and set up the browser.

Use the installer program to install and configure your browser. Once installed, add any necessary browser plug-ins such as Flash or Shockwave. Choose your method of connectivity, usually dialup or local-area network (LAN). The first connection attempt after install will invoke the Internet Wizard Utility.

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or Chapter 1 of the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Third Edition, material for help.

ASCII (American Standard Code for Information Interchange)[md] An 8-bit code (7 bits plus parity) for character representation.

Backplane[md] Physical connection between an interface processor or card and the data buses and power distribution buses inside a Cisco chassis.

Backplane components[md] Backplane, interface, mouse port, network card, parallel port, and other miscellaneous ports.

Binary[md] The binary number system, or Base 2, is made up entirely of 0s and 1s. Computers use Base 2 to express IP addresses.

Bits[md] Each variable set by a computer is represented as being a 0 or a 1. These 0s and 1s represent a circuit being open or closed, or a capacitor being charged or uncharged. Each 0 and 1 is said to be a bit.

Bus[md] A collection of wires through which data is transmitted from one part of a computer to another. It connects all the internal computer components to the CPU. The Industry Standard Architecture (ISA) and the Peripheral Component Interconnect (PCI) are two types of buses.

Bytes[md] Term used to refer to a series of consecutive binary digits that are operated upon as a unit (for example, an 8-bit byte).

Capacitor[md] A capacitor consists of two conducting metal plates separated by an insulating material. Capacitors store energy in the form of electrostatic fields.

CD-ROM drive[md] A compact disk read-only memory drive; a device that can read information from a CD-ROM.

Central processing unit (CPU) [md] The part of a computer that controls all the other parts. It fetches instructions from memory and decodes them. This action may cause it to transfer data to or from memory or to activate peripherals to perform input or output.

Expansion slots[md] An opening in a computer where a circuit board can be inserted to add new capabilities to the computer.

Floppy disk drive[md] A disk drive that can read and write to floppy disks, usually in the 3 ½" 1.44 MB or 5 ¼" 1.2 MB format.

Hard disk drive[md] The device that reads and writes data on a hard disk. Two main types of drive interfaces are current in today's computers: the Integrated Drive Electronics (IDE) drive and the Small Computer System Interface (SCSI; pronounced *scuzzy*) drive. Usually referred to by interface type and capacity (MB or GB; for example, 10 GB SCSI drive).

Integrated circuit (IC) [md] A device made of semiconductor material; it contains many transistors and performs a specific task.

An interrupt request line (IRQ) [md] A signal informing a CPU that an event that needs its attention has occurred.

Light emitting diodes (LEDs) [md] A semiconductor device that emits light when a current passes through it.

Local-area network (LAN) [md] LANs consist of computers, network interface cards, networking media, network traffic control devices, and peripheral devices in a single building or geographically limited area. LANs make it possible for businesses that use computer technology to efficiently share items, such as files and printers, and to make communications such as e-mail possible. They tie together data, communications, computing, and file servers.

Microprocessor[md] A silicon chip that contains a CPU.

Monitor connector[md] The part of a video cable that plugs into a port or an interface. SVGA connectors are typically a 15-pin connector.

Motherboard [md] The main printed circuit board of a microcomputer.

Mouse port A port designed to connect a mouse to a PC.

Network[md] 1) Collection of computers, printers, routers, switches, and other devices that are able to communicate with each other over some transmission medium

Network card [md] 1) An expansion board inserted into a computer so that the computer can be connected to a network. 2) Board that provides network communication capabilities to and from a computer system. Also called an *adapter*.

NIC (network interface card) [md] Also called a *LAN adapter*, it plugs into a motherboard and provides a port to connect to the network. A NIC communicates with the network through a serial connection, and with the computer through a parallel connection. Each card requires an IRQ, an I/O address, and an upper memory address to work with DOS or Windows 95/98

Parallel port [md] An interface capable of transferring more than one bit simultaneously. It is used to connect external devices, such as printers.

PC components[md] Components found within a personal computer include the motherboard, video card, network adapter, hard drive, CPU, memory, sound card, CD-ROM drive, floppy drive, and power supply.

Personal computer subsystems [md] Subsystems of a personal computer include the system bus, CD-ROM drive, CPU, expansion cards, expansion slots, floppy disk drive, hard disk drive, motherboard, and power supply.

Power cord [md] A cord used to connect an electrical device to an electrical outlet to provide power to the device.

Power supply[md] The component that supplies power to a computer. The power supply converts AC power to DC and breaks it into the amounts needed by different devices.

Printed circuit boards (PCBs) [md] A thin plate on which chips (integrated circuits) and other electronic components are placed.

Protocol[md] 1) Formal description of a set of rules and conventions that govern how devices on a network exchange information. 2) Field within an IP datagram that indicates the upper layer (Layer 4) protocol sending the datagram.

Random-access memory (RAM) [md] Also known as read-write memory, RAM can have new data written into it and stored data read from it. A drawback of RAM is that it requires electrical power to maintain data storage.

Resistor [md] A device made of a material that opposes the flow of electric current.

Read-only memory (ROM) [md] Nonvolatile memory that can be read, but not written, by the microprocessor. ROM retains its contents even when the computer is turned off.

Serial port [md] An interface that can be used for serial communication in which only one bit is transmitted at a time.

Small, discrete components[md] Components that are usually found in a laptop. These components are smaller—the expansion slots become PCMCIA or PC slots, where NICs, modems, hard drives, and other useful devices, usually the size of a thick credit card, can be inserted into the PCMCIA slots along the perimeter.

Solder[md] A conductor that is made up a mixture of lead (Pb) and tin (Sn), and water with ions.

Sound card[md] An expansion card that handles all sound functions.

Subnetwork[md] In IP networks, a network sharing a particular subnet address. Subnetworks are networks arbitrarily segmented by a network administrator in order to provide a multilevel, hierarchical routing structure while shielding from the addressing complexity of attached networks. Sometimes called a subnet.

Subnetwork mask[md] A 32-bit address mask use in IP to indicate the bits of an IP address that are being used for the subnet address. Subnet masks filter the network portion of an address from the host portion.

System unit[md] The main part of a PC; the system unit includes the chassis, the microprocessor, the main memory, the bus, and the ports. It does not include the keyboard or the monitor, or any external devices connected to the computer.

Throughput[md] Rate of information arriving at, and possibly passing through, a particular point in a network system.

Transistor [md] A device that amplifies a signal or opens and closes a circuit.

Video card[md] A board that plugs into a PC to give it display capabilities.

Web browser [md]Graphic user interface (GUI)-based hypertext client application, such as Internet Explorer, Mosaic, and Netscape Navigator, used to access hypertext documents and other services located on innumerable remote servers throughout the WWW and Internet.

Wide-area networks (WANs) [md]Data communications networks that serve users across a broad geographic area and often use transmission devices provided by common carriers. Frame Relay, SMDS, and X.25 are examples of WAN technologies.

Wildcard mask [md]A 32-bit quantity used in conjunction with an IP address to determine which bits in an IP address should be ignored when comparing that address with another IP address. A wildcard mask is specified when setting up access lists.

Focus Questions

1. What are the major components of a PC?
Components found within a personal computer include the motherboard, video card, network adapter, hard drive, CPU, memory, sound card, CD-ROM drive, floppy drive, power supply
2. What is the information flow in an idealized computer?
Boot instructions—Stored in ROM until they are sent out.
Software applications—Stored in RAM after they are loaded.
RAM and ROM—Constantly talk to the CPU through the bus.
Application information—Stored in RAM while applications are being used.
Saved information—Flows from RAM to some form of storage device.
Exported information—Flows from RAM and the CPU, through the bus and expansion slots, to the printer, the video card, the sound card, or the network card.

3. What is the relationship of NICs to PCs?
The NIC enables hosts to communicate with a network and is, therefore, considered a key network component.

4. Describe the components of a PC compared to those of a laptop.
The main difference is that components in a laptop are smaller—the expansion slots become PCMCIA or PC slots, where NICs, modems, hard drives, and other useful devices, usually the size of a thick credit card can be inserted into the PCMCIA slots along the perimeter.

5. What is data throughput and how does it relate to digital bandwidth?
Throughput refers to the actual, measured bandwidth, at a specific time of day, using specific Internet routes, while downloading a specific file. The throughput is often far less than the maximum possible digital bandwidth of the medium that is being used.
6. What factors affect bandwidth and throughput? What units measure the quantity of information?
Some factors that determine throughput and bandwidth include the following:
- Internetworking devices**
 - Type of data being transferred**
 - Topology**
 - Number of users**
 - User's computer**
 - Server computer**
 - Power- and weather-induced outages**
 - Congestion**
7. How do binary numbers represent alphanumeric data?
Alphanumeric characters are converted to data that can travel across the internetwork. The data is put into a packet or a datagram that contains a network header with source and destination logical addresses. These addresses help network devices send the packets across the network along a dynamically chosen path. Each network device must put the packet into a frame. The frame includes a header with the physical address of the next directly connected device in the path.
- The frame must be converted into a pattern of 1s and 0s (bits) for transmission on the medium (usually a wire).**

CCNA Exam Review Questions

The following questions help you review for the CCNA exam. Answers appear in Appendix B, "CCNA Exam Review Questions Answer Key."

1. Which of the following best defines networking?
 - A. A set of rules or procedures that are either widely used or officially specified
 - B. A connection of computers, printers, and other devices for the purpose of communication
 - C. A set of rules that govern how computer workstations exchange information
 - D. A device that is connected to a computer to provide auxiliary functions

2. Which of the following terms refers to a connection of computers, printers, and other devices for the purpose of communication?
 - A. Peripheral
 - B. Network
 - C. Mainframe
 - D. Protocol

3. Which of the following terms is used in computing to refer to physical parts or equipment?
 - A. Hardware
 - B. Software
 - C. Protocol
 - D. Network

4. Which of the following terms is used in computing to refer to programs or applications?
 - A. Hardware
 - B. Software
 - C. Peripheral
 - D. Network

5. Which of the following terms refers to devices that are connected to a computer to provide auxiliary functions such as printing, added disk space, scanning, or CD-ROM?
 - A. Protocol
 - B. Software
 - C. Peripheral
 - D. Network

6. Why are individual PCs not efficient or cost effective for business applications?
 - A. Individual PC use requires businesses to duplicate equipment and resources.
 - B. It is difficult for businesses to communicate quickly or efficiently by using individual PCs.
 - C. It is difficult to provide management for operating individual PCs.
 - D. All of the above.

7. What is a standalone computer?
 - A. A computer that manages data efficiently
 - B. A computer that shares files and printers with other computers
 - C. A computer that operates independently from other computers
 - D. A computer that has a different operating system

8. What kind of computer operates independently from other computers?
 - A. Mainframe
 - B. PC
 - C. Mac
 - D. Standalone

9. Why did standalone computers become an inefficient and ineffective way for businesses to operate?
 - A. Businesses had to duplicate equipment and resources.
 - B. It was difficult to communicate quickly or efficiently by using standalone computers.
 - C. It was difficult to provide management for operating standalone computers.
 - D. All of the above.

10. What does the term protocol mean in computing terms?
 - A. A tool that allows Macintosh and PC computers to communicate with each other
 - B. A universal translator that allows different kinds of computers to share data
 - C. A description of a set of rules and conventions that govern how devices on a network exchange information
 - D. The language that all the computers on a network must use to communicate with each other

11. Which of the following best defines protocol?
 - A. A formal description of a set of rules and conventions
 - B. A device that is connected to a computer to provide auxiliary functions
 - C. A group of people who are assigned to work as a team
 - D. The connection of computers, printers, routers, and switches

12. What is a formal description of a set of rules and conventions called?
- A. Peripheral
 - B. Protocol
 - C. Standard
 - D. Network
13. Why are protocols important?
- A. By setting rules, protocols allow different types of computers to talk to each other.
 - B. By consolidating the industry, protocols save companies money.
 - C. By forming electronic islands, protocols bypass the sneaker net.
 - D. By using common carriers, protocols manage data efficiently.
14. What must all computers on a network be able to do for the network to operate properly?
- A. Print to a local printer
 - B. Connect to a telephone line
 - C. Use CD-ROMs
 - D. Speak the same language
15. A protocol allows which of the following to be linked into a network?
- A. Only PC terminals and workstations
 - B. Only Macintosh computers and peripherals
 - C. Only PCs to a mainframe
 - D. Any type of computer terminal or workstation