

1 What Is the Purpose of the Components Required for Successful Communications, and What Are Various Sending and Receiving Devices?

Computer communications describes a process in which two or more computers or devices transfer data, instructions, and information. Successful communications requires a sending device that initiates a transmission instruction, a communications device that connects the sending device to a communications channel, a communications channel on which the data travels, a communications device that connects the communications channel to a receiving device, and a receiving device that accepts the transmission of data, instructions, or information. All types of computers and mobile devices serve as sending and receiving devices in a communications system.

2 How Are Computer Communications Used?

Communications technologies include blogs, chat rooms, e-mail, fax, FTP, instant messaging, newsgroups, RSS, video conferencing, VoIP, Web, Web folders, and wikis. Users can send and receive wireless messages to and from smart phones, cell phones, handheld game consoles, and other mobile devices using text messaging, picture messaging and video messaging, and wireless instant messaging. People connect wirelessly to the Internet through a wireless Internet access point. A hot spot is a wireless network that provides Internet connections to mobile computers and devices. A cybercafé is a coffeehouse, restaurant, or other location that provides computers with Internet access. A global positioning system (GPS) analyzes signals sent by satellites to determine an earth-based receiver's geographic location. Many software products provide a means to collaborate, or work online with other users connected to a server. Groupware is software that helps groups of people work on projects or share information over a network. Voice mail allows someone to leave a voice message for one or more people. Web services describe standardized software that enables programmers to create applications that communicate with other remote computers.

3 What Are the Advantages of Using a Network and How Are LANs, MANs, and WANs Different?

A network is a collection of computers and devices connected together via communications devices and transmission media. Advantages of using a network include facilitating communications, sharing hardware, sharing data and information, sharing software, and transferring funds. Networks typically are classified as a local area network (LAN), which connects computers in devices in a limited geographical area; a metropolitan area network (MAN), which is a high-speed network that connects local area networks in a larger area, such as city or town; or a wide area network (WAN), which covers a large geographic area using a communications channel that combines many types of media.

4 How Are a Client/Server and Peer-to-Peer Networks Different, and How Does a P2P Network Work?

On a client/server network, one or more computers acts as a server, sometimes called a host computer, which controls access to network resources and provides a centralized storage area, while the other computers and devices on the network are clients that rely on the server for resources. A peer-to-peer network is a simple network that typically connects fewer than 10 computers that have equal responsibilities and capabilities. P2P is an Internet peer-to-peer network on which users access each other's hard disks directly and exchange files over the Internet.

5 How Are a Star Network, Bus Network, and Ring Network Different?

A network topology refers to the layout of computers and devices in a communications network. Three commonly used network topologies are the star, bus, and ring. On a star network, all computers and devices on the network connect to a central device, thus forming a star. A bus network consists of a single central cable to which all computers and other devices connect. On a ring network, a cable forms a closed loop (ring) with all computers and devices arranged along the ring.

6 What Are Various Network Communications Standards?

A network standard defines guidelines that specify the way computers access a medium, the type(s) of medium, the speeds on different types of networks, and the type of physical cable or wireless technology used. Network communications standards include the following. Ethernet specifies that no central computer or device on the network should control when data can be transmitted. Token ring requires devices to share or pass a special signal, called a token. TCP/IP divides data into packets. Wi-Fi identifies any network based on the 802.11 standards for wireless communications. Bluetooth uses short-range radio waves to transmit data. UWB specifies how two UWB devices use short-range radio waves to communicate at high speeds. IrDA transmits data wirelessly via infrared light waves. RFID uses radio signals for communications. WiMAX is a network standard developed by IEEE that specifies how wireless devices communicate over the air in a wide area. The Wireless Application Protocol (WAP) specifies how some mobile devices can display Internet content.

7 What Is the Purpose of Communications Software?

Communications software helps users establish a connection to another computer or network; manages the transmission of data, instructions, and information; and provides an interface for users to communicate with one another.

8 What Are Various Types of Lines for Communications over the Telephone Network?

The telephone network uses dial-up lines or dedicated lines. A dial-up line is a temporary connection that uses one or more analog telephone lines for communications. A dedicated line is an always-on connection established between two communications devices. Dedicated lines include the following. ISDN is a set of standards for digital transmission of data over standard copper telephone lines. DSL transmits at fast speeds on existing standard copper telephone wiring. FTTP, or Fiber to the Premises, uses fiber-optic cable to provide extremely high-speed Internet access to a user's physical permanent location. Two specific types of FTTP are FTTH (Fiber to the Home) and FTTB (Fiber to the Building). A T-carrier line is a long-distance digital telephone line that carries multiple signals over a single communications line. ATM is a service that carries voice, data, video, and multimedia at extremely high speeds.

9 What Are Commonly Used Communications Devices?

A communications device is hardware capable of transmitting data between a sending device and a receiving device. A dial-up modem converts digital signals to analog signals and analog signals to digital signals so that data can travel along analog telephone lines. A digital modem sends and receives data and information to and from a digital line. An ISDN modem transmits digital data to and from an ISDN line, while a DSL modem transmits digital data to and from a DSL line. A cable modem, sometimes called a broadband modem, is a digital modem that sends and receives digital data over the cable television network. A wireless modem uses the cell phone network to connect to the Internet wirelessly from mobile computers and devices. A network card enables a computer or device that does not have built-in networking capability to access a network. A wireless access point allows computers and devices to transfer data wirelessly. A router connects multiple computers or other routers together and transmits data to its correct destination on the network. A hub or switch is a device that provides a central point for cables in a network.

10 How Can a Home Network Be Set Up?

A home network connects multiple computers and devices in a home. An Ethernet network connects each computer to a hub with a physical cable. A home powerline cable network uses the same lines that bring electricity into the house. A phoneline network uses existing telephone lines in a home. Most home networks use a Wi-Fi network.

11 What Are Various Physical and Wireless Transmission Media?

Transmission media consist of materials or substances capable of carrying one or more signals. Physical transmission media use tangible materials to send communications signals. Twisted-pair cable consists of one or more twisted-pair wires bundled together. Coaxial cable consists of a single copper wire surrounded by at least three layers: an insulating material, a woven or braided metal, and a plastic outer coating. Fiber-optic cable consists of thin strands of glass or plastic that use light to transmit signals. Wireless transmission media send communications signals through the air or space. Infrared (IR) sends signals using infrared light waves. Broadcast radio distributes radio signals through the air over long and short distances. Cellular radio is a form of broadcast radio that is used widely for mobile communications. Microwaves are radio waves that provide a high-speed signal transmission. A communications satellite is a space station that receives microwave signals from an earth-based station, amplifies the signals, and broadcasts the signals back over a wide area.