Glossary

10/100 A short reference to an Ethernet NIC or switch port that supports speed of 10 Mbps and 100 Mbps.

10/100/1000 A short reference to an Ethernet NIC or switch port that supports speeds of 10 Mbps, 100 Mbps, and 1000 Mbps (that is, 1 Gbps).

10BASE-T The 10-Mbps baseband Ethernet specification using two pairs of twisted-pair cabling (Categories 3, 4, or 5): One pair transmits data and the other receives data. 10BASE-T, which is part of the IEEE 802.3 specification, has a distance limit of approximately 100 m (328 feet) per segment.

100BASE-T A name for the IEEE Fast Ethernet standard that uses two-pair copper cabling, a speed of 100 Mbps, and a maximum cable length of 100 meters.

1000BASE-T A name for the IEEE Gigabit Ethernet standard that uses four-pair copper cabling, a speed of 1000 Mbps (1 Gbps), and a maximum cable length of 100 meters.

802.1Q The IEEE standardized protocol for VLAN trunking.

802.11a The IEEE standard for wireless LANs using the U-NII spectrum, OFDM encoding, and speeds of up to 54 Mbps.

802.11b The IEEE standard for wireless LANs using the ISM spectrum, DSSS encoding, and speeds of up to 11 Mbps.

802.11g The IEEE standard for wireless LANs using the ISM spectrum, OFDM or DSSS encoding, and speeds of up to 54 Mbps.

802.11n The IEEE standard for wireless LANs using the ISM spectrum, OFDM encoding, and multiple antennas for single-stream speeds up to 150 Mbps.

A

AAA Authentication, authorization, and accounting. Authentication confirms the identity of the user or device. Authorization determines what the user or device is allowed to do. Accounting records information about access attempts, including inappropriate requests.

AAA server A server that holds security information and provides services related to user login, particularly authentication (is the user who they say they are), authorization (once authenticated, what do we allow the user to do), and accounting (tracking the user).

access interface A LAN network design term that refers to a switch interface connected to end-user devices, configured so that it does not use VLAN trunking.

access layer In a campus LAN design, the switches that connect directly to endpoint devices (servers, user devices), and also connect into the distribution layer switches.

access link In Frame Relay, the physical serial link that connects a Frame Relay DTE device, usually a router, to a Frame Relay switch. The access link uses the same physical layer standards as do point-to-point leased lines.

access point A wireless LAN device that provides a means for wireless clients to send data to each other and to the rest of a wired network, with the AP connecting to both the wireless LAN and the wired Ethernet LAN.

accounting In security, the recording of access attempts. *See* AAA.

address block A set of consecutive IPv4 addresses. The term is most often used for a classless prefix as defined by CIDR, but can also refer to any subnet or IPv4 network.

adjacent-layer interaction The general topic of how on one computer, two adjacent layers in a networking architectural model work together, with the lower layer providing services to the higher layer.

administrative distance In Cisco routers, a means for one router to choose between multiple routes to reach the same subnet when those routes were learned by different routing protocols. The lower the administrative distance, the better the source of the routing information.

ADSL Asymmetric digital subscriber line. One of many DSL technologies, ADSL is designed to deliver more bandwidth downstream (from the central office to the customer site) than upstream.

all-nodes multicast address A specific IPv6 multicast address, FF02::1, with link-local scope, used to send packets to all devices on the link that support IPv6.

all-routers multicast address A specific IPv6 multicast address, FF02::2, with link-local scope, used to send packets to all devices that act as IPv6 routers on the local link.

anycast address An address shared by two or more hosts that exist in different parts of the network, so that by design, the routers will forward packets to the nearest of the two servers, allowing clients to communicate with the nearest such server, not caring which particular server with which the client communicates.

ARP Address Resolution Protocol. An Internet protocol used to map an IP address to a MAC address. Defined in RFC 826.

ARP table A list of IP addresses of neighbors on the same VLAN, along with their MAC addresses, as kept in memory by hosts and routers.

ARPANET The first packet-switched network, first created around 1970, which served as the predecessor to the Internet.

asymmetric A feature of many Internet access technologies, including DSL, cable, and modems, in which the downstream transmission rate is higher than the upstream transmission rate.

asynchronous The lack of an imposed time ordering on a bit stream. Practically, both sides agree to the same speed, but there is no check or adjustment of the rates if they are slightly different. However, because only 1 byte per transfer is sent, slight differences in clock speed are not an issue.

authentication In security, the verification of the identity of a person or a process. *See* AAA.

authorization In security, the determination of the rights allowed for a particular user or device. *See* AAA.

autonegotiation An IEEE standard mechanism (802.3u) with which two nodes can exchange messages for the purpose of choosing to use the same Ethernet standards on both ends of the link, ensuring that the link functions and functions well.

autonomous system An internetwork in the administrative control of one organization, company, or governmental agency, inside which that organization typically runs an interior gateway protocol (IGP).

autosummarization A routing protocol feature in which the a router that sits at the boundary between different classful networks will automatically advertise a route for one entire classful network into the other classful network, and vice versa.

auxiliary port A physical connector on a router that is designed to be used to allow a remote terminal, or PC with a terminal emulator, to access a router using an analog modem.

B

back-to-back link A serial link between two routers, created without CSU/DSUs, by connecting a DTE cable to one router and a DCE cable to the other. Typically used in labs to build serial links without the expense of an actual leased line from the telco.

bandwidth A reference to the speed of a networking link. Its origins come from earlier communications technology in which the range, or width, of the frequency band dictated how fast communications could occur.

basic service set (BSS) In wireless LANs, a WLAN with a single access point.

binary mask An IPv4 subnet mask written as a 32-bit binary number.

bitwise Boolean AND A Boolean AND between two numbers of the same length in which the first bit in each number is ANDed, and then the second bit in each number, and then the third, and so on.

Boolean AND A math operation performed on a pair of one-digit binary numbers. The result is another one-digit binary number. 1 AND 1 yields 1; all other combinations yield a 0.

boot field The low-order 4 bits of the configuration register in a Cisco router. The value in the boot field in part tells the router where to look for a Cisco IOS image to load.

broadcast address Generally, any address that represents all devices, and can be used to send one message to all devices. In Ethernet, the MAC address of all binary 1s, or FFFF.FFFF.FFFF in hex. For IPv4, *see* subnet broadcast address.

broadcast domain A set of all devices that receive broadcast frames originating from any device within the set. Devices in the same VLAN are in the same broadcast domain.

broadcast frame An Ethernet frame sent to destination address FFFF.FFFF.FFFF, meaning that the frame should be delivered to all hosts on that LAN.

broadcast subnet When subnetting a Class A, B, or C network, the one subnet in each classful network for which all subnet bits have a value of binary 1. The subnet broadcast address in this subnet has the same numeric value as the classful network's network-wide broadcast address.

bus A common physical signal path composed of wires or other media across which signals can be sent from one part of a computer to another.

C

cable Internet An Internet access technology that uses a cable TV (CATV) cable, normally used for video, to send and receive data.

CDP Cisco Discovery Protocol. A media- and protocol-independent device-discovery protocol that runs on most Cisco-manufactured equipment, including routers, access servers, and switches. Using CDP, a device can advertise its existence to other devices and receive information about other devices on the same LAN or on the remote side of a WAN.

CDP neighbor A device on the other end of some communications cable that is advertising CDP updates.

CIDR Classless inter-domain routing. An RFC-standard tool for global IP address range assignment. CIDR reduces the size of Internet routers' IP routing tables, helping deal with the rapid growth of the Internet. The term *classless* refers to the fact that the summarized groups of networks represent a group of addresses that do not conform to IPv4 classful (Class A, B, and C) grouping rules.

CIDR mask Another term for a prefix mask, one that uses prefix or CIDR notation, in which the mask is represented by a slash (/) followed by a decimal number.

CIDR notation *See* prefix notation.

circuit switching A generic reference to network services, typically WAN services, in which the provider sets up a (Layer 1) circuit between two devices, and the provider makes no attempt to interpret the meaning of the bits. *See also* packet switching.

classful addressing A concept in IPv4 addressing that defines a subnetted IP address as having three parts: network, subnet, and host.

classful IP network An IPv4 Class A, B, or C network; called a classful network because these networks are defined by the class rules for IPv4 addressing.

classful routing protocol Does not transmit the mask information along with the subnet number, and therefore must consider Class A, B, and C network boundaries and perform autosummarization at those boundaries. Does not support VLSM.

classless addressing A concept in IPv4 addressing that defines a subnetted IP address as having two parts: a prefix (or subnet) and a host.

classless inter-domain routing The name of an RFC that defines several important features related to public IPv4 addressing: a global address assignment strategy to keep the size of IPv4 routing tables smaller, and the ability to assign public IPv4 addresses in sizes based on any prefix length.

classless prefix A range of public IPv4 addresses as defined by with CIDR.

classless prefix length The mask (prefix length) used when defining a classless prefix.

classless routing protocol An inherent characteristic of a routing protocol, specifically that the routing protocol does send subnet masks in its routing updates, thereby removing any need to make assumptions about the addresses in a particular subnet or network, making it able to support VLSM and manual route summarization.

CLI Command-line interface. An interface that enables the user to interact with the operating system by entering commands and optional arguments.

clock rate The speed at which a serial link encodes bits on the transmission medium.

clock source The device to which the other devices on the link adjust their speed when using synchronous links.

clocking The process of supplying a signal over a cable, either on a separate pin on a serial cable or as part of the signal transitions in the transmitted signal, so that the receiving device can keep synchronization with the sending device.

code integrity A software security term that refers to how likely that the software (code) being used is the software supplied by the vendor, unchanged, with no viruses or other changes made to the software.

codec Coder-decoder. An integrated circuit device that transforms analog voice signals into a digital bit stream and then transforms digital signals back into analog voice signals.

collapsed core design A campus LAN design in which the design does not use a separate set of core switches in addition to the distribution switches—in effect collapsing the core into the distribution switches.

collision domain A set of network interface cards (NIC) for which a frame sent by one NIC could result in a collision with a frame sent by any other NIC in the same collision domain.

command-line interface *See* CLI.

configuration archive An IOS concept by which some IOS file system is defined as a place to store configuration archives of a Cisco router or switch, allowing automatic and manual archive, and easier restore.

configuration mode A part of the Cisco IOS Software CLI in which the user can type configuration commands that are then added to the device's currently used configuration file (running-config).

configuration register In Cisco routers, a 16-bit, user-configurable value that determines how the router functions during initialization. In software, the bit position is set by specifying a hexadecimal value using configuration commands.

connected The single-item status code listed by a switch **show interfaces status** command, with this status referring to a working interface.

connected route On a router, an IP route added to the routing table when the router interface is both up and has an IP address configured. The route is for the subnet that can be calculated based on the configured IP address and mask.

connection establishment The process by which a connection-oriented protocol creates a connection. With TCP, a connection is established by a three-way transmission of TCP segments.

console port A physical socket on a router or switch to which a cable can be connected between a computer and the router/switch, for the purpose of allowing the computer to use a terminal emulator and use the CLI to configure, verify, and troubleshoot the router/switch.

contiguous network A network topology in which subnets of network X are not separated by subnets of any other classful network.

convergence The time required for routing protocols to react to changes in the network, removing bad routes and adding new, better routes so that the current best routes are in all the routers' routing tables.

core design A campus LAN design that connects each access switch to distribution switches, and distribution switches into core switches, to provide a path between all LAN devices.

core layer In a campus LAN design, the switches that connect the distribution layer switches, and to each other, to provide connectivity between the various distribution layer switches.

CPE Customer premises equipment. Any equipment related to communications that is located at the customer site, as opposed to inside the telephone company's network.

crossover cable An Ethernet cable that swaps the pair used for transmission on one device to a pair used for receiving on the device on the opposite end of the cable. In 10BASE-T and 100BASE-TX networks, this cable swaps the pair at pins 1,2 to pins 3,6 on the other end of the cable, and the pair at pins 3,6 to pins 1,2 as well.

CSMA/CD Carrier sense multiple access with collision detection. A media-access mechanism in which devices ready to transmit data first check the channel for a carrier. If no carrier is sensed for a specific period of time, a device can transmit. If two devices transmit at once, a collision occurs and is detected by all colliding devices. This collision subsequently delays retransmissions from those devices for some random length of time.

CSU/DSU Channel service unit/data service unit. A device that understands the Layer 1 details of serial links installed by a telco and how to use a serial cable to communicate with networking equipment such as routers.

D

data VLAN A VLAN used by typical data devices connected to an Ethernet, like PCs and servers. Used in comparison to a Voice VLAN.

DCE Data communications equipment. From a physical layer perspective, the device providing the clocking on a WAN link, typically a CSU/DSU, is the DCE. From a packet-switching perspective, the service provider's switch, to which a router might connect, is considered the DCE.

decimal mask An IPv4 subnet mask written in dotted decimal notation; for example, 255.255.255.0.

de-encapsulation On a computer that receives data over a network, the process in which the device interprets the lower-layer headers and, when finished with each header, removes the header, revealing the next-higher-layer PDU.

default gateway/default router On an IP host, the IP address of some router to which the host sends packets when the packet's destination address is on a subnet other than the local subnet.

default mask The mask used in a Class A, B, or C network that does not create any subnets; specifically, mask 255.0.0.0 for Class A networks, 255.255.0.0 for Class B networks, and 255.255.255.0 for Class C networks.

default route On a router, the route that is considered to match all packets that are not otherwise matched by some more specific route.

demarc The legal term for the demarcation or separation point between the telco's equipment and the customer's equipment.

denial of service (DoS) A type of attack whose goal is to cause problems by preventing legitimate users from being able to access services, thereby preventing the normal operation of computers and networks.

device hardening A security term referring to whatever activities one might do to secure a device or type of device, for instance, by securing login access to a router or switch, and using ACLs to limit what users can login to a router or switch.

DHCP Dynamic Host Configuration Protocol. A protocol used by hosts to dynamically discover and lease an IP address, and learn the correct subnet mask, default gateway, and DNS server IP addresses.

DHCP client Any device that uses DHCP protocols to ask to lease an IP address from a DHCP server, or to learn any IP settings from that server.

DHCP relay agent The name of the router IOS feature that forwards DHCP messages from client to servers by changing the destination IP address from 255.255.255.255 to the IP address of the DHCP server.

DHCP server Software that waits for DHCP clients to request to lease IP addresses, with the server assigning a lease of an IP address as well as listing other important IP settings for the client.

directed broadcast address *See* subnet broadcast address.

discontiguous network A network topology in which a subnets of network X are separated by subnets of some other classful network.

distance vector The logic behind the behavior of some interior routing protocols, such as RIP. Distance vector routing algorithms call for each router to send its entire routing table in each update, but only to its neighbors. Distance vector routing algorithms can be prone to routing loops but are computationally simpler than link-state routing algorithms.

distribution layer In a campus LAN design, the switches that connect to access layer switches as the most efficient means to provide connectivity from the access layer into the other parts of the LAN.

DNS Domain Name System. An application layer protocol used throughout the Internet for translating host names into their associated IP addresses.

DNS Reply In the Domain Name System (DNS), a message sent by a DNS server to a DNS client in response to a DNS Request, identifying the IP address assigned to a particular hostname or fully qualified domain name (FQDN).

DNS Request In the Domain Name System (DNS), a message sent by a DNS client to a DNS server, listing a hostname or fully qualified domain name (FQDN), asking the server to discover and reply with the IP address associated with that hostname or FQDN.

dotted-decimal notation (DDN) The format used for IP version 4 addresses, in which four decimal values are used, separated by periods (dots).

DSL Digital subscriber line. Public network technology that delivers high bandwidth over conventional telco local-loop copper wiring at limited distances. Typically used as an Internet access technology, connecting a user to an ISP.

DSL modem A device that connects to a telephone line, using DSL standards, to transmit and receive data to/from a telco using DSL.

DTE Data terminal equipment. From a Layer 1 perspective, the DTE synchronizes its clock based on the clock sent by the DCE. From a packet-switching perspective, the DTE is the device outside the service provider’s network, typically a router.

dual stack A mode of operation in which a host or router runs both IPv4 and IPv6.

duplex mismatch On opposite ends of any Ethernet link, the condition in which one of the two devices uses full-duplex logic and the other uses half-duplex logic, resulting in unnecessary frame discards and retransmissions on the link.

duplicate address detection (DAD) A term used in IPv6 to refer to how hosts first check whether another host is using a unicast address before the first host uses that address.

E

E1 Similar to a T1, but used in Europe. It uses a rate of 2.048 Mbps and 32 64-kbps channels, with 1 channel reserved for framing and other overhead.

EIGRP Enhanced Interior Gateway Routing Protocol. An advanced version of IGRP developed by Cisco. Provides superior convergence properties and operating efficiency and combines the advantages of link-state protocols with those of distance vector protocols.

EIGRP version 6 The version of the EIGRP routing protocol that supports IPv6, and not IPv4.

enable mode A part of the Cisco IOS CLI in which the user can use the most powerful and potentially disruptive commands on a router or switch, including the ability to then reach configuration mode and reconfigure the router.

encapsulation The placement of data from a higher-layer protocol behind the header (and in some cases, between a header and trailer) of the next-lower-layer protocol. For example, an IP packet could be encapsulated in an Ethernet header and trailer before being sent over an Ethernet.

encryption Applying a specific algorithm to data to alter the appearance of the data, making it incomprehensible to those who are not authorized to see the information.

error detection The process of discovering whether a data link level frame was changed during transmission. This process typically uses a Frame Check Sequence (FCS) field in the data link trailer.

error disabled An interface state on LAN switches that can be the result of one of many security violations.

error recovery The process of noticing when some transmitted data was not successfully received and resending the data until it is successfully received.

escalate In the context of troubleshooting methods, a defined business process by which the person assigned to troubleshoot a problem can move the problem on to another worker, in cases in which the original worker cannot solve the problem, or the problem has a large impact and needs more attention.

Ethernet A series of LAN standards defined by the IEEE, originally invented by Xerox Corporation and developed jointly by Xerox, Intel, and Digital Equipment Corporation.

Ethernet address A 48-bit (6-byte) binary number, usually written as a 12-digit hexadecimal number, used to identify Ethernet nodes in an Ethernet network. Ethernet frame headers list a destination and source address field, used by the Ethernet devices to deliver Ethernet frames to the correct destination.

Ethernet frame A term referring to an Ethernet data link header and trailer, plus the data encapsulated between the header and trailer.

Ethernet link A generic term for any physical link between two Ethernet nodes, no matter what type of cabling is used.

Ethernet over MPLS (EoMPLS) A term referring specifically to how a service provider can create an Ethernet WAN service using an MPLS network. More generally, a term referring to Ethernet WAN services.

Ethernet port A generic term for the opening on the side of any Ethernet node, typically in an Ethernet NIC or LAN switch, into which an Ethernet cable can be connected.

EtherType Jargon that shortens the term *Ethernet Type*, which refers to the Type field in the Ethernet header. The Type field identifies the type of packet encapsulated inside an Ethernet frame.

EUI-64 Literally, a standard for an extended unique identifier that is 64 bits long. Specifically for IPv6, a set of rules for forming the a 64-bit identifier, used as the interface ID in IPv6 addresses, by starting with a 48-bit MAC address, inserting FFFE (hex) in the middle, and inverting the seventh bit.

extended access list A list of IOS **access-list** global configuration commands that can match multiple parts of an IP packet, including the source and destination IP address and TCP/UDP ports, for the purpose of deciding which packets to discard and which to allow through the router.

extended ping An IOS command in which the **ping** command accepts many other options besides just the destination IP address.

exterior gateway protocol (EGP) A routing protocol that was designed to exchange routing information between different autonomous systems.

F

Fast Ethernet The common name for all the IEEE standards that send data at 100 megabits per second.

filter Generally, a process or a device that screens network traffic for certain characteristics, such as source address, destination address, or protocol, and determines whether to forward or discard that traffic based on the established criteria.

firewall A device that forwards packets between the less secure and more secure parts of the network, applying rules that determine which packets are allowed to pass, and which are not.

flash memory A type of read/write permanent memory that retains its contents even with no power applied to the memory, and uses no moving parts, making the memory less likely to fail over time.

floating static route A static IP route that uses a higher administrative distance that other routes, typically routes learned by a routing protocol. As a result, the router will not use the static route if the routing protocol route has been learned, but then use the static route if the routing protocol fails to learn the route.

flood/flooding The result of the LAN switch forwarding process for broadcasts and unknown unicast frames. Switches forward these frames out all interfaces, except the interface in which the frame arrived. Switches also flood multicasts by default, although this behavior can be changed.

flow control The process of regulating the amount of data sent by a sending computer toward a receiving computer. Several flow control mechanisms exist, including TCP flow control, which uses windowing.

forward To send a frame received in one interface out another interface, toward its ultimate destination.

forward acknowledgment A process used by protocols that do error recovery, in which the number that acknowledges data lists the next data that should be sent, not the last data that was successfully received.

forward route From one host’s perspective, the route over which a packet travels from that host to some other host.

four-wire circuit A line from the telco with four wires, composed of two twisted-pair wires. Each pair is used to send in one direction, so a four-wire circuit allows full-duplex communication.

frame A term referring to a data link header and trailer, plus the data encapsulated between the header and trailer.

Frame Check Sequence A field in many data link trailers used as part of the error-detection process.

Frame Relay An international standard data link protocol that defines the capabilities to create a frame-switched (packet-switched) service, allowing DTE devices (typically routers) to send data to many other devices using a single physical connection to the Frame Relay service.

full duplex Generically, any communication in which two communicating devices can concurrently send and receive data. In Ethernet LANs, the allowance for both devices to send and receive at the same time, allowed when both devices disable their CSMA/CD logic.

full mesh A network topology in which more than two devices can physically communicate and, by choice, all pairs of devices are allowed to communicate directly.

G

Gigabit Ethernet The common name for all the IEEE standards that send data at 1 gigabit per second.

global routing prefix An IPv6 prefix that defines an IPv6 address block made up of global unicast addresses, assigned to one organization, so that the organization has a block of globally unique IPv6 addresses to use in its network.

global unicast address A type of unicast IPv6 address that has been allocated from a range of public globally unique IP addresses, as registered through IANA/ICANN, its member agencies, and other registries or ISPs.

H

half duplex Generically, any communication in which only one device at a time can send data. In Ethernet LANs, the normal result of the CSMA/CD algorithm that enforces the rule that only one device should send at any point in time.

HDLC High-Level Data Link Control. A bit-oriented synchronous data link layer protocol developed by the International Organization for Standardization (ISO).

head end The upstream, transmit end of a cable TV (CATV) installation.

header In computer networking, a set of bytes placed in front of some other data, encapsulating that data, as defined by a particular protocol.

history buffer In a Cisco router or switch, the function by which IOS keeps a list of commands that the user has used in this login session, both in EXEC mode and configuration mode. The user can then recall these commands for easier repeating or making small edits and issuing similar commands.

hop count The metric used by the RIP routing protocol. Each router in an IP route is considered a hop, so for example, if two other routers sit between a router and some subnet, that router would have a hop count of two for that route.

host Any device that uses an IP address.

host address The IP address assigned to a network card on a computer.

hostname The alphanumeric name of an IP host.

host part A term used to describe a part of an IPv4 address that is used to uniquely identify a host inside a subnet. The host part is identified by the bits of value 0 in the subnet mask.

host route A route with a /32 mask, which by virtue of this mask represents a route to a single host IP address.

HTML Hypertext Markup Language. A simple document-formatting language that uses tags to indicate how a given part of a document should be interpreted by a viewing application, such as a web browser.

HTTP Hypertext Transfer Protocol. The protocol used by web browsers and web servers to transfer files, such as text and graphic files.

hub A LAN device that provides a centralized connection point for LAN cabling, repeating any received electrical signal out all other ports, thereby creating a logical bus. Hubs do not interpret the electrical signals as a frame of bits, so hubs are considered to be Layer 1 devices.

I

IANA The Internet Assigned Numbers Authority (IANA). An organization that owns the rights to assign many operating numbers and facts about how the global Internet works, including public IPv4 and IPv6 addresses. *See also* ICANN.

ICANN The Internet Corporation for Assigned Names and Numbers. An organization appointed by IANA to oversee the distributed process of assigning public IPv4 and IPv6 addresses across the globe.

ICMP Internet Control Message Protocol. A TCP/IP network layer protocol that reports errors and provides other information relevant to IP packet processing.

ICMP echo reply One type of ICMP message, created specifically to be used as the message sent by the **ping** command to test connectivity in a network. The **ping** command expects to receive these messages from other hosts, after the **ping** command first sends an ICMP echo request message to the host.

ICMP echo request One type of ICMP message, created specifically to be used as the message sent by the **ping** command to test connectivity in a network. The **ping** command sends these messages to other hosts, expecting the other host to reply with an ICMP echo reply message.

IEEE Institute of Electrical and Electronics Engineers. A professional organization that develops communications and network standards, among other activities.

IEEE 802.11 The IEEE base standard for wireless LANs.

IEEE 802.1Q The IEEE-standard VLAN trunking protocol. 802.1Q includes the concept of a native VLAN, for which no VLAN header is added, and a 4-byte VLAN header is inserted after the original frame's Type/Length field.

IEEE 802.2 An IEEE LAN protocol that specifies an implementation of the LLC sublayer of the data link layer.

IEEE 802.3 A set of IEEE LAN protocols that specifies the many variations of what is known today as an Ethernet LAN.

IETF The Internet Engineering Task Force. The IETF serves as the primary organization that works directly to create new TCP/IP standards.

inactivity timer For switch MAC address tables, a timer associated with each entry that counts time upward from 0 and is reset to 0 each time a switch receives a frame with the same MAC address. The entries with the largest timers can be removed to make space for additional MAC address table entries.

inside global For packets sent to and from a host that resides inside the trusted part of a network that uses NAT, a term referring to the IP address used in the headers of those packets when those packets traverse the global (public) Internet.

inside local For packets sent to and from a host that resides inside the trusted part of a network that uses NAT, a term referring to the IP address used in the headers of those packets when those packets traverse the enterprise (private) part of the network.

interior gateway protocol (IGP) *See* interior routing protocol.

interior routing protocol A routing protocol designed for use within a single organization.

Internetwork Operating System The operating system (OS) of Cisco routers and switches, which provides the majority of a router's or switch's features, with the hardware providing the remaining features.

intrusion detection system (IDS) A security function that examines more complex traffic patterns against a list of both known attack signatures and general characteristics of how attacks can be carried out, rating each perceived threat and reporting the threats.

intrusion prevention system (IPS) A security function that examines more complex traffic patterns against a list of both known attack signatures and general characteristics of how attacks can be carried out, rating each perceived threat, and reacting to prevent the more significant threats.

IOS Cisco Internetwork Operating System Software that provides the majority of a router's or switch's features, with the hardware providing the remaining features.

IOS feature set A set of related features that can be enabled on a router to enable certain functionality. For example, the Security feature set would enable the capability to have the router act as a firewall in the network.

IOS File System (IFS) A file system created by a Cisco device that uses IOS.

IOS image A file that contains the IOS.

IP Internet Protocol. The network layer protocol in the TCP/IP stack, providing routing and logical addressing standards and services.

IP address (IP version 4) In IP version 4 (IPv4), a 32-bit address assigned to hosts using TCP/IP. Each address consists of a network number, an optional subnetwork number, and a host number. The network and subnetwork numbers together are used for routing, and the host number is used to address an individual host within the network or subnetwork.

IP address (IP version 6) In IP version 6 (IPv6), a 128-bit address assigned to hosts using TCP/IP. Addresses use different formats, commonly using a routing prefix, subnet, and interface ID, corresponding to the IPv4 network, subnet, and host parts of an address.

IP network *See* classful IP network.

IP packet An IP header, followed by the data encapsulated after the IP header, but specifically not including any headers and trailers for layers below the network layer.

IP routing table *See* routing table.

IP subnet Subdivisions of a Class A, B, or C network, as configured by a network administrator. Subnets allow a single Class A, B, or C network to be used instead of multiple networks, and still allow for a large number of groups of IP addresses, as is required for efficient IP routing.

IP version 4 Literally, the version of the Internet Protocol defined in an old RFC 791, standardized in 1980, and used as the basis of TCP/IP networks and the Internet for over 30 years.

IP version 6 A newer version of the Internet Protocol defined in RFC 2460, as well as many other RFCs, whose creation was motivated by the need to avoid the IPv4 address exhaustion problem.

IPv4 address exhaustion The process by which the public IPv4 addresses, available to create the Internet, were consumed through the 1980s until today, with the expectation that eventually the world would run out of available IPv4 addresses.

IPv6 neighbor table The IPv6 equivalent of the ARP table. A table that lists IPv6 addresses of other hosts on the same link, along with their matching MAC addresses, as typically learned using Neighbor Discovery Protocol (NDP).

ISL Inter-Switch Link. A Cisco-proprietary protocol that maintains VLAN information as traffic flows between switches and routers.

ISO International Organization for Standardization. An international organization that is responsible for a wide range of standards, including many standards relevant to networking. The ISO developed the OSI reference model, a popular networking reference model.

K

keepalive A proprietary feature of Cisco routers in which the router sends messages on a periodic basis as a means of letting the neighboring router know that the first router is still alive and well.

known unicast frame An Ethernet frame whose destination MAC address is listed in a switch's MAC address table, so the switch will forward the frame out the one port associated with that entry in the MAC address table.

L

L2PDU Layer 2 protocol data unit. Often called a frame. The data compiled by a Layer 2 protocol, including Layer 2 header, encapsulated high-layer data, and Layer 2 trailer.

L3PDU Layer 3 protocol data unit. Often called a packet. The data compiled by a Layer 3 protocol, including Layer 3 headers and the encapsulated high-layer data, but not including lower-layer headers and trailers.

L4PDU Layer 4 protocol data unit. Often called a segment. The data compiled by a Layer 4 protocol, including Layer 4 headers and encapsulated high-layer data, but not including lower-layer headers and trailers.

Layer 3 protocol A protocol that has characteristics like OSI Layer 3, which defines logical addressing and routing. IPv4 and IPv6 are Layer 3 protocols.

Layer 3 switch *See* multilayer switch.

learning The process used by switches for discovering MAC addresses, and their relative location, by looking at the source MAC address of all frames received by a bridge or switch.

leased line A serial communications circuit between two points, provided by some service provider, typically a telephone company (telco). Because the telco does not sell a physical cable between the two endpoints, instead charging a monthly fee for the ability to send bits between the two sites, the service is considered to be a leased service.

lightweight access point A wireless AP that communicates with wireless clients but must rely on and communicate through a wireless LAN controller into the wired part of the network.

link-local address A type of unicast IPv6 address that represents an interface on a single data link. Packets sent to a link-local address cross only that particular link and are never forwarded to other subnets by a router. Used for communications that do not need to leave the local link.

link-local scope With IPv6 multicasts, a term that refers to the parts (scope) of the network to which a multicast packet can flow, with link-local referring to the fact that the packet stays on the subnet in which it originated.

link state A classification of the underlying algorithm used in some routing protocols. Link-state protocols build a detailed database that lists links (subnets) and their state (up, down), from which the best routes can then be calculated.

link-state advertisement (LSA) In OSPF, the name of the data structure that resides inside the LSDB and describes in detail the various components in a network, including routers and links (subnets).

link-state database (LSDB) In OSPF, the data structure in RAM of a router that holds the various LSAs, with the collective LSAs representing the entire topology of the network.

LLC Logical Link Control. The higher of the two data link layer sublayers defined by the IEEE. Synonymous with IEEE 802.2.

LLDP Link Layer Discovery Protocol. An IEEE standard protocol (IEEE 802.1AB) that defines messages, encapsulated directly in Ethernet frames so they do not rely on a working IPv4 or IPv6 network, for the purpose of giving devices a means of announcing basic device information to other devices on the LAN. It is a standardized protocol similar to Cisco Discovery Protocol (CDP).

local broadcast IP address IPv4 address 255.255.255.255. A packet sent to this address is sent as a data link broadcast, but only flows to hosts in the subnet into which it was originally sent. Routers do not forward these packets.

local loop A line from the premises of a telephone subscriber to the telephone company CO.

local username A username (with matching password), configured on a router or switch. It is considered local because it exists on the router or switch, and not on a remote server.

log message A message generated by any computer, but including Cisco routers and switches, for which the device OS wants to notify the owner or administrator of the device about some event.

logical address A generic reference to addresses as defined by Layer 3 protocols that do not have to be concerned with the physical details of the underlying physical media. Used mainly to contrast these addresses with data link addresses, which are generically considered to be physical addresses because they differ based on the type of physical medium.

login banner In a Cisco router or switch, a text message that the router/switch displays for the user during the login process.

M

MAC Media Access Control. The lower of the two sublayers of the data link layer defined by the IEEE. Synonymous with IEEE 802.3 for Ethernet LANs.

MAC address A standardized data link layer address that is required for every device that connects to a LAN. Ethernet MAC addresses are 6 bytes long and are controlled by the IEEE. Also known as a *hardware address*, a *MAC layer address*, and a *physical address*.

MAC address table A table of forwarding information held by a Layer 2 switch, built dynamically by listening to incoming frames and used by the switch to match frames to make decisions about where to forward the frame.

MD5 hash A specific mathematical algorithm intended for use in various security protocols. In the context of Cisco routers and switches, the devices store the MD5 hash of certain passwords, rather than the passwords themselves, in an effort to make the device more secure.

message of the day One type of login banner that can be defined on a Cisco router or switch.

metric A unit of measure used by routing protocol algorithms to determine the best route for traffic to use to reach a particular destination.

microsegmentation The process in LAN design by which every switch port connects to a single device, with no hubs connected to the switch ports, creating a separate collision domain per interface. The term's origin relates to the fact that one definition for the word "segment" is "collision domain," with a switch separating each switch port into a separate collision domain or segment.

modem Modulator-demodulator. A device that converts between digital and analog signals so that a computer can send data to another computer using analog telephone lines. At the source, a modem converts digital signals to a form suitable for transmission over analog communication facilities. At the destination, the analog signals are returned to their digital form.

Modified EUI-64 *See* EUI-64.

multicast IP address A class D IPv4 address. When used as a destination address in a packet, the routers collectively work to deliver copies of the one original packet to all hosts who have previously registered to receive packets sent to that particular multicast address.

multilayer switch A LAN switch that can also perform Layer 3 routing functions. The name comes from the fact that this device makes forwarding decisions based on logic from multiple OSI layers (Layers 2 and 3).

multimode A type of fiber-optic cabling with a larger core than single-mode cabling, allowing light to enter at multiple angles. Such cabling has lower bandwidth than single-mode fiber but requires a typically cheaper light source, such as an LED rather than a laser.

N

name resolution The process by which an IP host discovers the IP address associated with a hostname, often involving sending a DNS request to a DNS server, with the server supplying the IP address used by a host with the listed hostname.

name server A server connected to a network that resolves network names into network addresses.

named access list An ACL that identifies the various statements in the ACL based on a name, rather than a number.

NAT Network Address Translation. A mechanism for reducing the need for globally unique IP addresses. NAT allows an organization with addresses that are not globally unique to connect to the Internet, by translating those addresses into public addresses in the globally routable address space.

NAT overload Another term for Port Address Translation (PAT). One of several methods of configuring NAT, in this case translating TCP and UDP flows based on port numbers in addition to using one or only a few inside global addresses.

neighbor In routing protocols, another router with which a router decides to exchange routing information.

Neighbor Advertisement (NA) A message defined by the IPv6 Neighbor Discovery Protocol (NDP), used to declare to other neighbors a host’s MAC address. Sometimes sent in response to a previously received NDP Neighbor Solicitation (NS) message.

Neighbor Discovery Protocol (NDP) A protocol that is part of the IPv6 protocol suite, used to discover and exchange information about devices on the same subnet (neighbors). In particular, it replaces the IPv4 ARP protocol.

Neighbor Solicitation (NS) A message defined by the IPv6 Neighbor Discovery Protocol (NDP), used to ask a neighbor to reply with a Neighbor Advertisement, which lists the neighbor’s MAC address.

network A collection of computers, printers, routers, switches, and other devices that can communicate with each other over some transmission medium.

network address *See* network number.

network broadcast address In IPv4, a special address in each classful network that can be used to broadcast a packet to all hosts in that same classful network. Numerically, the address has the same value as the network number in the network part of the address and all 255s in the host octets-—for example, 10.255.255.255 is the network broadcast address for classful network 10.0.0.0.

network ID A number that identifies an IPv4 network, using a number in dotted-decimal notation (like IP addresses); a number that represents any single Class A, B, or C IP network.

network interface card (NIC) A computer card, sometimes an expansion card and sometimes integrated into the motherboard of the computer, that provides the electronics and other functions to connect to a computer network. Today, most NICs are specifically Ethernet NICs, and most have an RJ-45 port, the most common type of Ethernet port.

network number A number that uses dotted-decimal notation like IP addresses, but the number itself represents all hosts in a single Class A, B, or C IP network.

network part The portion of an IPv4 address that is either 1, 2, or 3 octets/bytes long, based on whether the address is in a Class A, B, or C network.

network route A route for a classful network.

Network Time Protocol (NTP) A protocol used to synchronize time-of-day clocks so that multiple devices use the same time of day, which allows log messages to be more easily matched based on their timestamps.

networking model A generic term referring to any set of protocols and standards collected into a comprehensive grouping that, when followed by the devices in a network, allows all the devices to communicate. Examples include TCP/IP and OSI.

next-hop router In an IP route in a routing table, part of a routing table entry that refers to the next IP router (by IP address) that should receive packets that match the route.

NIC *See* network interface card.

NTP client Any device that attempts to use the Network Time Protocol (NTP) to synchronize its time by adjusting the local device’s time based on NTP messages received from a server.

NTP client/server mode A mode of operation with the Network Time Protocol (NTP) in which the device acts as both an NTP client, synchronizing its time with some servers, and as an NTP server, supplying time information to clients.

NTP server Any device that uses Network Time Protocol (NTP) to help synchronize time-of-day clocks for other devices by telling other devices its current time.

NTP synchronization The process with the Network Time Protocol (NTP) by which different devices send messages, exchanging the devices' current time-of-day clock information and other data, so that some devices adjust their clocks to the point that the time-of-day clocks list the same time (often accurate to at least the same second).

NVRAM Nonvolatile RAM. A type of random-access memory (RAM) that retains its contents when a unit is powered off.

O

ordered data transfer A networking function, included in TCP, in which the protocol defines how the sending host should number the data transmitted, defines how the receiving device should attempt to reorder the data if it arrives out of order, and specifies to discard the data if it cannot be delivered in order.

OSI Open System Interconnection reference model. A network architectural model developed by the ISO. The model consists of seven layers, each of which specifies particular network functions, such as addressing, flow control, error control, encapsulation, and reliable message transfer.

OSPF Open Shortest Path First. A popular link-state IGP that uses a link-state database and the Shortest Path First (SPF) algorithm to calculate the best routes to reach each known subnet.

OSPF version 2 The version of the OSPF routing protocol that supports IPv4, and not IPv6, and has been commonly used for over 20 years.

OSPF version 3 The version of the OSPF routing protocol that originally supported only IPv6, and not IPv4, but now supports IPv4 through the use of address family configuration.

outgoing interface In an IP route in a routing table, part of a routing table entry that refers to the local interface out which the local router should forward packets that match the route.

outside global With source NAT, the one address used by the host that resides outside the enterprise, which NAT does not change, so there is no need for a contrasting term.

overlapping subnets An (incorrect) IP subnet design condition in which one subnet's range of addresses includes addresses in the range of another subnet.

P

packet A logical grouping of bytes that includes the network layer header and encapsulated data, but specifically does not include any headers and trailers below the network layer.

packet switching A generic reference to network services, typically WAN services, in which the service examines the contents of the transmitted data to make some type of forwarding decision. This term is mainly used to contrast with the WAN term *circuit switching*, in which the provider sets up a (Layer 1) circuit between two devices and the provider makes no attempt to interpret the meaning of the bits.

partial mesh A network topology in which more than two devices could physically communicate but, by choice, only a subset of the pairs of devices connected to the network is allowed to communicate directly.

passive interface With a routing protocol, a router interface for which the routing protocol is enabled on the interface, but for which the routing protocol does not send routing protocol messages out that interface.

patch cable An Ethernet cable, usually short, that connects from a device's Ethernet port to a wall plate or switch. With wiring inside a building, electricians prewire from the wiring closet to each cubicle or other location, with a patch cable connecting the short distance from the wall plate to the user device.

PDU Protocol data unit. An OSI term to refer generically to a grouping of information by a particular layer of the OSI model. More specifically, an L*x*PDU would imply the data and headers as defined by Layer *x*.

periodic update With routing protocols, the concept that the routing protocol advertises routes in a routing update on a regular periodic basis. This is typical of distance vector routing protocols.

ping An Internet Control Message Protocol (ICMP) echo message and its reply; ping often is used in IP networks to test the reachability of a network device.

pinout The documentation and implementation of which wires inside a cable connect to each pin position in any connector.

port In TCP and UDP, a number that is used to uniquely identify the application process that either sent (source port) or should receive (destination port) data. In LAN switching, another term for switch interface.

Port Address Translation (PAT) A NAT feature in which one inside global IP address supports over 65,000 concurrent TCP and UDP connections.

port number A field in a TCP or UDP header that identifies the application that either sent (source port) or should receive (destination port) the data inside the data segment.

port security A Cisco switch feature in which the switch watches Ethernet frames that come in an interface (a port), tracks the source MAC addresses of all such frames, and takes a security action if the number of different such

MAC addresses is exceeded.

PPP Point-to-Point Protocol. A protocol that provides router-to-router and host-to-network connections over synchronous point-to-point and asynchronous point-to-point circuits.

prefix In IPv6, this term refers to the number that identifies a group of IPv6 addresses. An IPv6 subnet identifier.

prefix length In IPv6, the number of bits in an IPv6 prefix.

prefix mask A term to describe an IPv4 subnet mask when represented as a slash (/) followed by a decimal number. The decimal number is the number of binary 1s in the mask.

prefix notation (IP version 4) A shorter way to write a subnet mask in which the number of binary 1s in the mask is simply written in decimal. For example, /24 denotes the subnet mask with 24 binary 1 bits in the subnet mask. The number of bits of value binary 1 in the mask is considered to be the prefix length.

private addresses IP addresses in several Class A, B, and C networks that are set aside for use inside private organizations. These addresses, as defined in RFC 1918, are not routable through the Internet.

private IP network Any of the IPv4 Class A, B, or C networks as defined by RFC 1918, intended for use inside a company but not used as public IP networks.

problem isolation The part of the troubleshooting process in which the engineer attempts to rule out possible causes of the problem until the root cause of the problem can be identified.

product authorization key (PAK) During the IOS licensing process, the number that Cisco assigns a customer giving the customer the right to enable an IOS feature set on one of that customer’s routers of a particular model series (chosen at the time the PAK was purchased).

protocol data unit (PDU) A generic term referring to the header defined by some layer of a networking model, and the data encapsulated by the header (and possibly trailer) of that layer, but specifically not including any lower-layer headers and trailers.

Protocol Type field A field in a LAN header that identifies the type of header that follows the LAN header. Includes the DIX Ethernet Type field, the IEEE 802.2 DSAP field, and the SNAP protocol Type field.

PSTN Public switched telephone network. A general term referring to the variety of telephone networks and services in place worldwide. Sometimes called *POTS*, or *plain old telephone service*.

PTT Post, telephone, and telegraph. A government agency that provides telephone services. PTTs exist in some areas outside of North America and provide both local and long-distance telephone services.

public IP address An IP address that is part of a registered network number, as assigned by an Internet Assigned Numbers Authority (IANA) member agency, so that only the organization to which the address is registered is allowed to use the address. Routers in the Internet should have routes allowing them to forward packets to all the publicly registered IP addresses.

public IP network Any IPv4 Class A, B, or C network assigned for use by one organization only, so that the addresses in the network are unique across the Internet, allowing packets to be sent through the public Internet using the addresses.

Q

quartet A term used in this book, but not in other references, to refer to a set of four hex digits in an IPv6 address.

R

RAM Random-access memory. A type of volatile memory that can be read and written by a microprocessor.

Regional Internet Registry An organization (five globally) that receives allocations of public IPv4 addresses from IANA, and then manages that address space in their major geographic region, performing public address allocations to ISPs and assignments directly to companies that use the addresses.

resident subnet Each IP subnet contains a number of unicast IP addresses; that subnet is the resident subnet for each of those addresses; that is, the subnet in which those addresses reside.

resolve In the context of troubleshooting methods, the part of the process by which you fix the root cause of a problem so that the problem no longer exists.

reverse route From one host's perspective, for packets sent back to the host from another host, the route over which the packet travels.

RFC Request For Comments. A document used as the primary means for communicating information about the TCP/IP protocols. Some RFCs are designated by the Internet Architecture Board (IAB) as Internet standards, and others are informational. RFCs are available online from numerous sources, including http://www.rfc-editor.org.

RIP Routing Information Protocol. An interior gateway protocol (IGP) that uses distance vector logic and router hop count as the metric. RIP version 2

(RIPv2) replaced the older RIP version 1 (RIPv1), with RIPv2 providing more features, including support for VLSM.

RIR *See* Regional Internet Registry.

RJ-45 A popular type of cabling connector used for Ethernet cabling. It is similar to the RJ-11 connector used for telephone wiring in homes in the United States. RJ-45 allows the connection of eight wires.

ROM Read-only memory. A type of nonvolatile memory that can be read but not written to by the microprocessor.

ROMMON A shorter name for ROM Monitor, which is a low-level operating system that can be loaded into Cisco routers for several seldom-needed maintenance tasks, including password recovery and loading a new IOS when flash memory has been corrupted.

root cause A troubleshooting term that refers to the reason why a problem exists, specifically a reason for which, if changed, the problem would either be solved or changed to a different problem.

routed protocol A protocol that defines packets that can be routed by a router. Examples of routed protocols include IPv4 and IPv6.

Router Advertisement (RA) A message defined by the IPv6 Neighbor Discovery Protocol (NDP), used by routers to announce their willingness to act as an IPv6 router on a link. These can be sent in response to a previously received NDP Router Solicitation (RS) message.

router ID (RID) In OSPF, a 32-bit number, written in dotted-decimal notation, that uniquely identifies each router.

Router Solicitation (RS) A message defined by the IPv6 Neighbor Discovery Protocol (NDP), used to ask any routers on the link to reply, identifying the router, plus other configuration settings (prefixes and prefix lengths).

routing protocol A set of messages and processes with which routers can exchange information about routes to reach subnets in a particular network. Examples of routing protocols include the Enhanced Interior Gateway Routing Protocol (EIGRP), the Open Shortest Path First (OSPF) protocol, and the Routing Information Protocol (RIP).

routing table A list of routes in a router, with each route listing the destination subnet and mask, the router interface out which to forward packets destined to that subnet, and as needed, the next-hop router’s IP address.

routing update A generic reference to any routing protocol’s messages in which it sends routing information to a neighbor.

running-config file In Cisco IOS switches and routers, the name of the file that resides in RAM memory, holding the device’s currently used configuration.

S

same-layer interaction The communication between two networking devices for the purposes of the functions defined at a particular layer of a networking model, with that communication happening by using a header defined by that layer of the model. The two devices set values in the header, send the header and encapsulated data, with the receiving devices interpreting the header to decide what action to take.

SCP Secure Copy Protocol. A method to securely copy files that uses the authentication and encryption services of SSH; can be used to copy files to/from Cisco devices.

Secure Shell (SSH) A TCP/IP application layer protocol that supports terminal emulation between a client and server, using dynamic key exchange and encryption to keep the communications private.

segment In TCP, a term used to describe a TCP header and its encapsulated data (also called an *L4PDU*). Also in TCP, the process of accepting a large chunk of data from the application layer and breaking it into smaller pieces that fit into TCP segments. In Ethernet, a segment is either a single Ethernet cable or a single collision domain (no matter how many cables are used).

segmentation The process of breaking a large piece of data from an application into pieces appropriate in size to be sent through the network.

serial cable A type of cable with many different styles of connectors used to connect a router to an external CSU/DSU on a leased-line installation.

serial interface A type of interface on a router, used to connect to some types of WAN links, particularly leased lines and Frame Relay access links.

setup mode An option on Cisco IOS switches and routers that prompts the user for basic configuration information, resulting in new running-config and startup-config files.

SFTP SSH File Transfer Protocol. A file transfer protocol that assumes a secure channel, such as an encrypted SSH connection, which then provides the means to transfer files over the secure channel.

shared Ethernet An Ethernet that uses a hub, or even the original coaxial cabling, that results in the devices having to take turns sending data, sharing the available bandwidth.

shortest path first (SPF) algorithm The name of the algorithm used by link-state routing protocols to analyze the LSDB and find the least-cost routes from that router to each subnet.

single mode A type of fiber-optic cabling with a narrow core that allows light to enter only at a single angle. Such cabling has a higher bandwidth than multimode fiber but requires a light source with a narrow spectral width (such as a laser).

sliding windows For protocols such as TCP that allow the receiving device to dictate the amount of data the sender can send before receiving an acknowledgment—a concept called a *window*—a reference to the fact that the mechanism to grant future windows is typically just a number that grows upward slowly after each acknowledgment, sliding upward.

solicited-node multicast address A type of IPv6 multicast address, with link-local scope, used to send packets to all hosts in the subnet that share the same value in the last six hex digits of their unicast IPv6 addresses. Begins with FF02::1:FF00:0/104.

Source NAT The type of Network Address Translation (NAT) used most commonly in networks (as compared to destination NAT), in which the source IP address of packets entering an inside interface is translated.

Spanning Tree Protocol (STP) A protocol that uses the Spanning Tree algorithm, allowing a switch to dynamically work around loops in a network topology by creating a spanning tree. Switches exchange bridge protocol data unit (BPDU) messages with other switches to detect loops and then remove the loops by blocking selected switch interfaces.

standard access list A list of IOS global configuration commands that can match only a packet's source IP address, for the purpose of deciding which packets to discard and which to allow through the router.

star topology A network topology in which endpoints on a network are connected to a common central device by point-to-point links.

startup-config file In Cisco IOS switches and routers, the name of the file that resides in NVRAM memory, holding the device's configuration that will be loaded into RAM as the running-config file when the device is next reloaded or powered on.

stateful DHCPv6 A term used in IPv6 to contrast with stateless DHCP. Stateful DHCP keeps track of which clients have been assigned which IPv6 addresses (state information).

stateless address autoconfiguration (SLAAC) A feature of IPv6 in which a host or router can be assigned an IPv6 unicast address without the need for a stateful DHCP server.

stateless DHCPv6 A term used in IPv6 to contrast with stateful DHCP. Stateless DHCP servers don't lease IPv6 addresses to clients. Instead, they supply other useful information, such as DNS server IP addresses, but with no need to track information about the clients (state information).

static route An IP route on a router created by the user configuring the details of the route on the local router.

STP Shielded twisted-pair. This type of cabling has a layer of shielded insulation to reduce electromagnetic interference (EMI).

straight-through cable In Ethernet, a cable that connects the wire on pin 1 on one end of the cable to pin 1 on the other end of the cable, pin 2 on one end to pin 2 on the other end, and so on.

subinterface One of the virtual interfaces on a single physical interface.

subnet Subdivisions of a Class A, B, or C network, as configured by a network administrator. Subnets allow a single Class A, B, or C network to be used instead of multiple networks, and still allow for a large number of groups of IP addresses, as is required for efficient IP routing.

subnet address *See* subnet number.

subnet broadcast address A special address in each IPv4 subnet, specifically the largest numeric address in the subnet, designed so that packets sent to this address should be delivered to all hosts in that subnet.

subnet ID (IPv4) *See* subnet number.

subnet ID (IPv6) The number that represents the IPv6 subnet. Also known as the IPv6 prefix, or more formally as the subnet router anycast address.

subnet ID (prefix ID) *See* subnet number

subnet mask A 32-bit number that numerically describes the format of an IP address, by representing the combined network and subnet bits in the address with mask bit values of 1, and representing the host bits in the address with mask bit values of 0.

subnet number In IPv4, a dotted-decimal number that represents all addresses in a single subnet. Numerically, the smallest value in the range of numbers in a subnet, reserved so that it cannot be used as a unicast IP address by a host.

subnet part In a subnetted IPv4 address, interpreted with classful addressing rules, one of three parts of the structure of an IP address, with the subnet part uniquely identifying different subnets of a classful IP network.

subnet router anycast address A special anycast address in each IPv6 subnet, reserved for use by routers as a way to send a packet to any router on the subnet. The address’s value in each subnet is the same number as the subnet ID.

subnet zero An alternative term for zero subnet. *See* zero subnet.

subnetting The process of subdividing a Class A, B, or C network into smaller groups called subnets.

switch A network device that filters, forwards, and floods Ethernet frames based on the destination address of each frame.

switched Ethernet An Ethernet that uses a switch, and particularly not a hub, so that the devices connected to one switch port do not have to contend to use the bandwidth available on another port. This term contrasts with *shared Ethernet*, in which the devices must share bandwidth, whereas switched Ethernet provides much more capacity, as the devices do not have to share the available bandwidth.

symmetric A feature of many Internet access technologies in which the downstream transmission rate is the same as the upstream transmission rate.

synchronous The imposition of time ordering on a bit stream. Practically, a device will try to use the same speed as another device on the other end of a serial link. However, by examining transitions between voltage states on the link, the device can notice slight variations in the speed on each end and can adjust its speed accordingly.

syslog A syslog server takes system messages from network devices and stores these messages in a database. The syslog server also provides reporting capabilities on these system messages. Some can even respond to select system messages with certain actions such as emailing and paging.

syslog server A server application that collects syslog messages from many devices over the network, and provides a user interface so that IT administrators can view the log messages to troubleshoot problems.

T

T1 A line from the telco that allows transmission of data at 1.544 Mbps, with the ability to treat the line as 24 different 64-kbps DS0 channels (plus 8 kbps of overhead).

TCP Transmission Control Protocol. A connection-oriented transport layer TCP/IP protocol that provides reliable data transmission.

TCP/IP Transmission Control Protocol/Internet Protocol. A common name for the suite of protocols developed by the U.S. Department of Defense in the 1970s to support the construction of worldwide internetworks. TCP and IP are the two best-known protocols in the suite.

telco A common abbreviation for telephone company.

Telnet The standard terminal-emulation application layer protocol in the TCP/IP protocol stack. Telnet is used for remote terminal connection, enabling users to log in to remote systems and use resources as if they were connected to a local system. Telnet is defined in RFC 854.

TFTP Trivial File Transfer Protocol. An application protocol that allows files to be transferred from one computer to another over a network, but with only a few features, making the software require little storage space.

three-tier design *See* core design.

trace Short for traceroute. A program available on many systems that traces the path that a packet takes to a destination. It is used mostly to troubleshoot routing problems between hosts.

traceroute A program available on many systems that traces the path that a packet takes to a destination. It is used mostly to debug routing problems between hosts.

trailer In computer networking, a set of bytes placed behind some other data, encapsulating that data, as defined by a particular protocol. Typically, only data link layer protocols define trailers.

transparent bridge The name of a networking device that was a precursor to modern LAN switches. Bridges forward frames between LAN segments based on the destination MAC address. Transparent bridging is so named because the presence of bridges is transparent to network end nodes.

trunk In campus LANs, an Ethernet segment over which the devices add a VLAN header that identifies the VLAN in which the frame exists.

trunk interface A switch interface configured so that it operates using VLAN trunking (either 802.1Q or ISL).

trunking Also called VLAN trunking. A method (using either the Cisco ISL protocol or the IEEE 802.1Q protocol) to support multiple VLANs, allowing traffic from those VLANs to cross a single link.

trunking administrative mode The configured trunking setting on a Cisco switch interface, as configured with the **switchport mode** command.

trunking operational mode The current behavior of a Cisco switch interface for VLAN trunking.

twisted-pair Transmission medium consisting of two insulated wires, with the wires twisted around each other in a spiral. An electrical circuit flows over the wire pair, with the current in opposite directions on each wire, which significantly reduces the interference between the two wires.

two-tier design *See* collapsed core design.

U

UDP User Datagram Protocol. Connectionless transport layer protocol in the TCP/IP protocol stack. UDP is a simple protocol that exchanges datagrams without acknowledgments or guaranteed delivery.

unicast address Generally, any address in networking that represents a single device or interface, instead of a group of addresses (as would be represented by a multicast or broadcast address).

unicast IP address An IP address that represents a single interface. In IPv4, these addresses come from the Class A, B, and C ranges.

unique local address A type of IPv6 unicast address meant as a replacement for IPv4 private addresses.

universal device identifier (UDI) A number that Cisco assigns to each router to uniquely identify the router's type and unique serial number, for the purpose of enabling the IOS software licensing process to work.

universal image The Cisco IOS universal image contains all feature sets for the specific device for which it was made. The administrator just needs to license and enable the specific features he or she desires.

unknown unicast frame An Ethernet frame whose destination MAC address is not listed in a switch's MAC address table, so the switch must flood the frame.

up and up Jargon referring to the two interface states on a Cisco IOS router or switch (line status and protocol status), with the first "up" referring to the line status and the second "up" referring to the protocol status. An interface in this state should be able to pass data link frames.

update timer The time interval that regulates how often a routing protocol sends its next periodic routing updates. Distance vector routing protocols send full routing updates every update interval.

URI Uniform Resource Identifier. The formal and correct term for the formatted text used to refer to objects in an IP network. This text is commonly called a URL or a web address. For example, http://www.certskills.com/blog is a URI that identifies the protocol (HTTP), hostname (www.certskills.com), and web page (blog).

URL Uniform Resource Locator. The widely popular terms for the formatted text used to refer to objects in an IP network. For example, http://www.certskills.com/blog is a URL that identifies the protocol (HTTP), host name (www.certskills.com), and web page (blog).

user mode A mode of the user interface to a router or switch in which the user can type only nondisruptive EXEC commands, generally just to look at the current status, but not to change any operational settings.

UTP Unshielded twisted-pair. A type of cabling, standardized by the Telecommunications Industry Association (TIA), that holds twisted pairs of copper wires (typically four pair) and does not contain any shielding from outside interference.

V

variable-length subnet mask (VLSM) The capability to specify a different subnet mask for the same Class A, B, or C network number on different subnets. VLSM can help optimize available address space.

virtual circuit (VC) In packet-switched services like Frame Relay, VC refers to the ability of two DTE devices (typically routers) to send and receive data directly to each other, which supplies the same function as a physical leased line (leased circuit), but doing so without a physical circuit. This term is meant as a contrast with a leased line or leased circuit.

virtual LAN (VLAN) A group of devices, connected to one or more switches, with the devices grouped into a single broadcast domain through switch configuration. VLANs allow switch administrators to separate the devices connected to the switches into separate VLANs without requiring separate physical switches, gaining design advantages of separating the traffic without the expense of buying additional hardware.

virtual private network (VPN) The process of securing communication between two devices whose packets pass over some public and unsecured network, typically the Internet. VPNs encrypt packets so that the communication is private, and authenticate the identity of the endpoints.

VLAN *See* virtual LAN.

VLAN configuration database The name of the collective configuration of VLAN IDs and names on a Cisco switch.

VLAN interface A configuration concept inside Cisco switches, used as an interface between IOS running on the switch and a VLAN supported inside the switch, so that the switch can assign an IP address and send IP packets into that VLAN.

VLAN Trunking Protocol (VTP) A Cisco-proprietary messaging protocol used between Cisco switches to communicate configuration information about the existence of VLANs, including the VLAN ID and VLAN name.

voice VLAN A VLAN defined for use by IP Phones, with the Cisco switch notifying the phone about the voice VLAN ID so that the phone can use 802.1Q frames to support traffic for the phone and the attached PC (which uses a data VLAN).

VoIP Voice over IP. The transport of voice traffic inside IP packets over an IP network.

VTP *See* VLAN Trunking Protocol.

VTP client mode One of three VTP operational modes for a switch with which switches learn about VLAN numbers and names from other switches, but which does not allow the switch to be directly configured with VLAN information.

VTP server mode One of three VTP operational modes. Switches in server mode can configure VLANs, tell other switches about the changes, and learn about VLAN changes from other switches.

VTP transparent mode One of three VTP operational modes. Switches in transparent mode can configure VLANs, but they do not tell other switches about the changes, and they do not learn about VLAN changes from other switches.

W

web server Software, running on a computer, that stores web pages and sends those web pages to web clients (web browsers) that request the web pages.

well-known port A TCP or UDP port number reserved for use by a particular application. The use of well-known ports allows a client to send a TCP or UDP segment to a server, to the correct destination port for that application.

Wi-Fi Alliance An organization formed by many companies in the wireless industry (an industry association) for the purpose of getting multivendor certified-compatible wireless products to market in a more timely fashion than would be possible by simply relying on standardization processes.

wide-area network (WAN) A part of a larger network that implements mostly OSI Layer 1 and 2 technology, connects sites that typically sit far apart, and uses a business model in which a consumer (individual or business) must lease the WAN from a service provider (often a telco).

wildcard mask The mask used in Cisco IOS ACL commands and OSPF and EIGRP **network** commands.

window Represents the number of bytes that can be sent without receiving an acknowledgment.

wired LAN A local-area network (LAN) that physically transmits bits using cables, often the wires inside cables. A term for local-area networks that use cables, emphasizing the fact that the LAN transmits data using wires (in cables) instead of wireless radio waves. *See also* wireless LAN.

wireless LAN A local-area network (LAN) that physically transmits bits using radio waves. The name "wireless" compares these LANs to more traditional "wired" LANs, which are LANs that use cables (which often have copper wires inside).

wireless LAN Controller (WLC) A device that cooperates with wireless lightweight access points (LWAP) to create a wireless LAN by performing some control functions for each LWAP and forwarding data between each LWAP and the wired LAN.

WLAN client A wireless device that wants to gain access to a wireless access point for the purpose of communicating with other wireless devices or other devices connected to the wired internetwork.

Z

zero subnet For every classful IPv4 network that is subnetted, the one subnet whose subnet number has all binary 0s in the subnet part of the number. In decimal, the zero subnet can be easily identified because it is the same number as the classful network number.