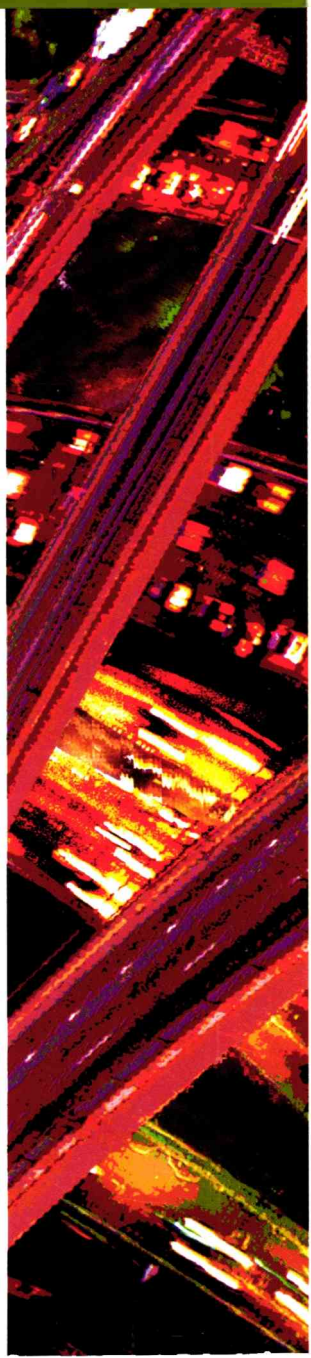
Internetworking Terms and Acronyms



CISCO SYSTEMS

Internetworking Terms and Acronyms

Corporate Headquarters:
P.O. Box 3075
1525 O'Brien Drive
Menlo Park, California 94026 USA
415 326-1941
800 553-NETS

Customer Order Number: DOC-TA13
Text Part Number: 78-1086-01

Introduction

In the business world, the age of the standalone computer is rapidly coming to an end. Computer networks are simply too useful to do without. Using a LocalTalk network, Macintosh users in Marketing can share product bulletins, data sheets, and slide presentations. Digital minicomputer users in Accounting can access a common database of customer information via DECnet. In Engineering, Sun workstation users can share product specifications using TCP/IP over Ethernet. And, in Manufacturing, IBM devices attached to a Token Ring network can process real-time data on material availability and fill orders sent in over serial links from remote offices.

This glossary attempts to gather and define the terms and acronyms of internetworking. As with any young technical field where firm definitions have yet to be standardized, many internetworking terms have several meanings. Where possible, multiple definitions and acronym expansions are presented. Few products are defined, because these tend to have a shorter life than the technologies they represent. And, since acronyms are often better known than their expansions, terms in this glossary are typically listed under their acronyms, rather than by their acronym expansions. A concerted attempt has been made to define all acronyms used as part of the definitions. Multiword terms are alphabetized as if spaces did not exist.

We hope that this glossary adds to your understanding of internetworking technologies and specific Cisco terms. Suggestions for new terms or acronyms and their associated definitions can be submitted via electronic mail to cs@cisco.com. We look forward to hearing from you!

Numerics

1Base5 See *StarLAN.*

10Base2 IEEE 802.3 specification, similar to Ethernet, using thin coaxial cable that runs at 10 Mbps, and with a distance limit of 185 meters per segment. Also called *Cheapernet.*

10Base5 IEEE 802.3 baseband physical layer specification, similar to Ethernet, using thick coaxial cable, running at 10 Mbps, and with a distance limit of 500 meters per segment.

10BaseT IEEE 802.3 specification, using unshielded twisted pair wiring and running at 10 Mbps.

10Broad36 IEEE 802.3 broadband specification, using thick coaxial cable and running at 10 Mbps.

24th channel signaling See *A&B bit signaling.*

4B/5B local fiber FDDI physical media that is also used for ATM; supports speeds of up to 100 Mbps over multimode fiber.

500-CS Cisco Systems communication server with up to 10 MB of memory, an Ethernet network interface, and 8 or 16 asynchronous ports.

8B/10B local fiber Fiber channel physical media; supports speeds up to 149.76 Mbps over multimode fiber.

A

A&B bit signaling Procedure used in most T1 transmission facilities where one bit from every sixth frame of each of 24 T1 subchannels is used for carrying supervisory signaling information.

AAL ATM Adaptation Layer. Fully independent of the physical layer, this ATM layer converts higher-layer information, such as data packets, into ATM cells for transmission across the ATM network. At the receiving end, the AAL converts the cells back into the higher-layer information.

AARP probe packets Packets asking if a randomly selected node ID is being used by another node in a nonextended AppleTalk network. If not, the sending node uses the node ID. If so, it chooses a different ID and sends more AARP probe packets.

ABM Asynchronous Balanced Mode. An HDLC (and derivative protocol) communication mode supporting peer-oriented point-to-point communications between two stations, where either station can initiate transmission.

abstract syntax A data structure description that is independent of hardware structures and encodings.

access-group Cisco interface subcommand that applies an access list to an interface.

access list A list kept by Cisco routers to control access to or from the router for a number of services (for example, to restrict packets with a certain IP address from leaving a particular interface on the network server).

access method Software within an SNA processor that controls the flow of information through a network. Generally, the way that network devices access the network medium.

accounting management One of five categories of network management defined by ISO for management of OSI networks. Accounting management subsystems are responsible for collecting network data relating to resource usage. See also *configuration management*, *fault management*, *performance management*, and *security management*.

ACF Advanced Communications Function. A group of SNA products that provide distributed processing and resource sharing.

ACF/NCP Advanced Communications Function/Network Control Program. The primary SNA network control program. ACF/NCP resides in the communications controller and interfaces with the SNA access method in the host processor to control network communications.

ACK Abbreviation for acknowledgment. ACKs are typically sent from one network device to another to acknowledge that some event (for example, receipt of a message) has occurred.

ACSE Association Control Service Element. An OSI convention used to establish, maintain, or terminate a connection between two applications.

active hub A multiported device that amplifies LAN transmission signals.

active monitor A device responsible for managing a Token Ring. It makes sure, for example, that tokens are not lost or that frames do not circulate indefinitely. A network node is selected to be the active monitor if it has the highest MAC address on the ring. See also *ring monitor* and *standby monitor*.

adapter A PC board, usually installed inside a computer system, that provides network communication capabilities to and from that computer system. The term *adapter* often is used interchangeably with *NIC*.

adaptive routing See *dynamic routing.*

ADCCP Advanced Data Communications Control Protocol. An ANSI standard bit-oriented data-link-control protocol.

address Data structure used to identify a unique entity, such as a particular process or network location.

addressed call mode A mode that permits control signals and commands to establish and terminate calls in V.25bis.

address mask Bit combination used to describe which portion of an address refers to the subnet and which part refers to the host.

address resolution Generally, a method for resolving differences between computer addressing schemes. Address resolution usually specifies a method for mapping OSI reference model Layer 3 (network) addresses to Layer 2 (link or media-specific) addresses.

adjacency A relationship formed between selected neighboring routers and end nodes for the purpose of exchanging routing information. Adjacency is based upon the use of a common media segment.

adjacent nodes In SNA, nodes that are connected to a given node with no intervening nodes. In DECnet and OSI, adjacent nodes are nodes that share a common segment (Ethernet, FDDI, Token Ring).

administrative distance A rating of the trustworthiness of a routing information source. In Cisco routers, administrative distance is expressed as a numerical value between 0 and 255 (the higher the value, the lower the trustworthiness rating).

ADPCM Adaptive Differential Pulse Code Modulation. Process by which the high statistical correlation between consecutive voice samples is used to create a variable quantizing scale. ADPCM can encode analog voice samples into high (toll) quality digital signals.

ADSU ATM Data Service Unit (DSU). A DSU used to access an ATM network via High-speed Serial Interface (HSSI).

advertising A method through which routers maintain lists of usable routes by sending routing or service updates within specified rates of time.

AFI Authority Frame Identifier. Specifies the format of the initial domain identifier (IDI) in the initial domain part (IDP) of an OSI NSAP.

agent Generally, software that processes queries and returns replies on behalf of an application. In network management systems, agents reside in all managed devices and report the values of specified variables to management stations. In Cisco's hardware architecture, an agent is an individual processor card that provides one or more media interfaces.

AGS Advanced Gateway Server. Cisco nine-slot bridge/router.

AGS+ Advanced Gateway Server Plus. Cisco nine-slot bridge/router with a ciscoBus switching complex. Five of the slots connect to the ciscoBus.

AIS Alarm Indication Signal. In T1, an all-ones signal transmitted in lieu of the normal signal to maintain transmission continuity and to indicate to the receiving terminal that there is a transmission fault that is located either at, or upstream from, the transmitting terminal.

alarm A message notifying an operator or administrator of a network problem.

a-law The CCITT companding standard used in the conversion between analog and digital signals in PCM systems. A-law is employed primarily in European telephone networks and is similar to the North American *mu-law* standard.

alert In NetView, a problem record sent to a network operator that warrants action at the control point.

algorithm Well-defined rule or process for arriving at a solution to a problem.

alias An alternative name used to identify an entity.

alignment error In IEEE 802.3 networks, an error that occurs when a received frame's total number of bits is not divisible by eight. Alignment errors usually are caused by frame damage due to collisions.

ALOHA An access control technique for transmission media systems that permits multiple stations to transmit simultaneously. In the ALOHA system, stations transmit whenever they have data to send and unacknowledged transmissions are repeated.

AM Amplitude Modulation. A modulation technique whereby information is conveyed through the amplitude of the carrier signal.

amplitude The maximum value of an analog or digital waveform.

analog transmission Signal transmission over wires or through the air in which information is conveyed through variation of some combination of signal amplitude, frequency, and phase.

ANSI American National Standards Institute. The coordinating body for voluntary standards groups within the United States. ANSI is a member of the International Organization for Standardization (ISO).

API Application Programming Interface. A specification of function-call conventions that defines an interface to a service.

Apollo Domain Proprietary network protocol suite developed by Apollo Computer for communication on proprietary Apollo networks.

APPC Advanced Peer-to-Peer Communications. An IBM SNA peer-to-peer communications scheme that lets SNA applications communicate directly with peer SNA applications.

APPI Advanced Peer-to-Peer Internetworking. An open-standard IP-architecture for SNA peer-to-peer networking.

APPI Forum An open forum for vendors, users, and analysts formed to define and develop open systems solutions for SNA peer-to-peer networking.

AppleTalk A series of related communications protocols introduced and maintained by Apple Computer. Two phases currently exist: Phase I and Phase II. Phase II, which includes support for internetworks, is the most recent version.

application layer Layer 7 of the OSI reference model. The application layer is implemented by various network applications, including electronic mail, file transfer, and terminal emulation.

applique A mounting plate containing connector hardware for attachment to the network. Appliques translate communication signals from a network interface into signals expected by the communication standard of choice (such as RS-232 or V.35).

APPN Advanced Peer-to-Peer Networking. An IBM SNA facility that provides distributed processing based on Type 2.1 network nodes and LU 6.2.

ARCnet Attached Resource Computer Network. A 2.5-Mbps token bus LAN developed in the late 1970s and early 1980s by Datapoint Corporation. ARCnet's primary characteristics are simplicity, ease of use, and relative lack of expense.

area A logical set of ISO CLNS-based, DECnet-based, or OSPF-based segments connected by routers.

ARM Asynchronous Response Mode. An HDLC communication mode involving one primary and at least one secondary, where either the primary or one of the secondaries can initiate transmissions.

ARP Address Resolution Protocol. An Internet protocol used to bind an IP address to Ethernet/802.2 addresses. Defined in RFC 826.

ARPA Agency that evolved into DARPA. See *DARPA*.

ARPANET A landmark packet-switching network developed in the early 1970s by BBN and funded by ARPA (and later DARPA). The ARPANET evolved into the *Internet*, and the term ARPANET was officially retired in 1990.

ARQ Automatic Repeat Request. Communication technique whereby the receiver detects errors and requests retransmissions.

AS Autonomous System. A collection of networks under a common administration sharing a common routing strategy. An autonomous system must be given a unique 16-bit number that is assigned by the DDN Network Information Center (NIC).

ASCII American Standard Code for Information Interchange. An eight-bit code for character representation; includes seven bits plus parity.

ASM-CS Cisco A chassis-based communication server with up to 16 MB of memory and up to 112 asynchronous ports. This communication server can have Ethernet, Token Ring, or synchronous serial network interfaces.

ASN.1 Abstract Syntax Notation One. An OSI language for describing data types in a manner independent of particular computer structures and representation techniques. International Organization for Standardization, International Standard 8824, December 1987. See also *BER*.

asynchronous transmission Operation of a network system wherein events occur without precise clocking. In such systems, individual characters are usually encapsulated in control bits called *start* and *stop* bits, which designate the beginning and ending of characters.

ATDM Asynchronous Time Division Multiplexing. A method of sending information in which normal time division multiplexing (TDM) is used, except that time slots are allocated as needed rather than preassigned to specific transmitters.

ATG Address Translation Gateway. A Cisco DECnet routing software function that allows a router to route multiple, independent DECnet networks and to establish a user-specified address translation for selected nodes between networks.

ATM Asynchronous Transfer Mode. The CCITT standard for *cell relay* wherein information for multiple types of services (voice, video, data) is conveyed in small, fixed-size cells. Also, a BISDN transfer mode wherein an accelerated version of asynchronous time division multiplexing (ATDM) is used to move multiple streams of information across a communication channel.

attenuation Loss of communication signal energy.

AUI Attachment Unit Interface. An IEEE 802.3 cable connecting the MAU (Media Access Unit) to the networked device. The term AUI also can be used to refer to the host back-panel connector to which an AUI cable might attach. Also called *transceiver cable.*

authority zone Associated with DNS, an authority zone is a section of the domain-name tree for which one name server is the authority.

automatic call reconnect Feature permitting automatic call rerouting away from a failed trunk line.

autonomous confederation A group of autonomous systems (ASs) that trust their own network reachability/routing information more than they trust that received from other ASs or confederations.

autonomous switching Feature on Cisco routers that provides faster packet processing by allowing the ciscoBus to switch packets independently without interrupting the system processor.

autonomous system See *AS*.

B

backbone network A network acting as a primary conduit for traffic that is often both sourced from, and destined for, other networks.

back channel A channel used for sending data in the opposite direction as the primary channel. Back channels are frequently used to send control information. Using back channels, information can still be delivered even though the primary channel may be malfunctioning. Also called *backward channel* or *reverse channel.*

backdoor route Route to a nonlocal network specified by an IGP that should be used by a border router. Cisco routers allow specification of backdoor routes using a variation of the network router subcommand.

back end A node or software program that provides services to a front end. See also *client* and *server.*

backoff The (usually random) retransmission delay enforced by contention media access control protocols after a node that wanted to transmit sensed carrier on the physical medium.

back pressure Propagation of network congestion information upstream through an internetwork.

backward channel See *back channel.*

backward learning Process through which information is surmised by assuming symmetrical network conditions. For example, assume node A receives a packet from node B through intermediate host C. A backward learning routing algorithm will then assume that A can optimally reach B through node C.

balanced configuration In HDLC, a point-to-point network configuration with two combined stations.

balun Balanced, unbalanced. Device used for matching impedance between a balanced and an unbalanced line, usually twisted pair and coaxial cable.

bandwidth The difference between the highest and lowest frequencies available for network signals. The term is also used to describe the rated throughput capacity of a given network medium or protocol.

bandwidth reservation In circuit-switched lines, a feature in which call bandwidth can be reserved for high-bandwidth or high-priority calls.

BARRNet Bay Area Regional Research Network. A network serving the San Francisco Bay Area. BARRNet's backbone is composed of four University of California campuses (Davis, Berkeley, Santa Cruz, and San Francisco), Stanford University, Lawrence Livermore National Lab, and NASA Ames Research Center.

baseband Characteristic of a network technology where only one carrier frequency is used. Baseband can be contrasted with broadband, where multiple carrier frequencies are used. Ethernet is an example of a baseband network. Also called *narrowband*.

basic rate interface See *BRI*.

baud A unit of signaling speed equal to the number of discrete conditions or signal events per second. Baud is synonymous with bits per second if each signal event represents exactly one bit.

BBN Bolt, Beranek, and Newman, Inc. A Massachusetts company responsible for the development and maintenance of the ARPANET (and later, Internet) core gateway system.

B channel In ISDN, a full-duplex, 64-Kbps channel employed to send user data.

beacon A signal from an IBM Token Ring device indicating a serious problem with the ring, such as a broken cable. Beacon frames contain the address of the assumed down station.

Bellcore An organization that performs research and development on behalf of the RBOC.

Bellman-Ford routing algorithm See *distance vector routing algorithm.*

BER Basic Encoding Rules. Rules for encoding data units described in ASN.1. Also, *bit error rate*, or the ratio of received bits that are in error.

BERT Bit Error Rate Tester. A device that determines the bit error rate on a given communications channel.

best-effort delivery A characteristic of network systems that do not use a sophisticated acknowledgment system to guarantee reliable delivery of information.

BGP Border Gateway Protocol. An interdomain routing protocol that is a potential replacement for EGP (Exterior Gateway Protocol). BGP is defined by RFC 1105, which was jointly authored by a Cisco employee and an IBM employee.

big-endian A method of storing or transmitting data in which the most significant bit or byte is presented first. See also *little-endian.*

binary A numbering system characterized by ones and zeros (1=on, 0=off).

binary synchronous communication See *BSC.*

biphase coding Bipolar coding scheme originally developed for use in Ethernet. Clocking information is embedded into and recovered from the synchronous data stream without the need for separate clocking leads. The biphase signal contains no DC energy.

bipolar Electrical characteristic denoting a circuit with both negative and positive polarity. Contrast with *unipolar.*

BISDN Broadband ISDN. Communication standards being developed by the CCITT to handle high-bandwidth applications such as video. BISDN will use ATM technology over SONET-based transmission circuits to provide data rates of 155 Mbps to 622 Mbps and beyond. See also *BRI, ISDN,* and *PRI.*

bisync See *BSC.*

bit Binary digit. Units used in the binary numbering system. Can be 0 or 1.

bit error rate Percentage of transmitted bits received in error.

BITNET Because It's Time Network. A low-cost, low-speed academic network consisting primarily of IBM mainframes and 9600-bps leased lines. Remote job entry (RJE) is the primary means for performing work on this network, which recently merged with CSNET (Computer and Science Network) to form CREN (Corporation for Research and Educational Networking).

bit-oriented protocol Class of link-layer communication protocols that can transmit frames without regard for frame content. Compared with byte-oriented protocols, bit-oriented protocols are more efficient and more reliable, and they provide full-duplex operation.

bit rate The speed at which bits are transmitted, usually expressed in bits per second (bps).

black hole Routing term for an area of the internetwork where packets enter but do not emerge, due to adverse conditions or poor system configuration within a portion of the network.

blocking In a switching system, a condition in which no paths are available to complete a circuit. The term is also used to describe a situation in which one activity cannot begin until another has been completed.

block multiplexer channel An IBM-style channel that implements the FIPS-60 channel, a U.S. channel standard. This channel is also referred to as the OEMI channel and the 370 block multiplexer, or block mux, channel.

BNC connector Standard connector used to connect IEEE 802.3 10Base2 coaxial cable to a transceiver.

BOCs Bell Operating Companies. The local telephone companies that existed (prior to deregulation, under which AT&T was ordered by the courts to divest itself) in each of the seven U.S. regions. See also *RBOC*.

BootP A protocol that is used by a network node to determine the IP address of its Ethernet interfaces, in order to effect network booting.

Boot PROM Boot Programmable Read-Only Memory. A chip mounted on a printed circuit board used to provide executable boot instructions to a computer device.

border gateway A router that communicates with routers in other autonomous systems (ASs).

boundary function A capability of SNA subarea nodes to provide protocol support for attached peripheral nodes. Typically found in IBM 3745 devices.

BPDU Bridge Protocol Data Units. A spanning-tree protocol *hello* packet. See also *PDU*.

BRI The ISDN (Integrated Services Digital Network) interface composed of two B channels and one D channel for circuit-switched communication of voice, data and video. See also *BISDN* and *ISDN*.

bridge A device that connects and passes packets between two network segments. Bridges operate at Layer 2 of the OSI reference model (the data-link layer) and are insensitive to upper-layer protocols.

bridge-group Cisco bridging subcommand that assigns network interfaces to a particular spanning-tree group. Bridge-groups may be IEEE 802.1- or DEC-compatible.

bridge number A number that identifies each bridge in a source-route-bridged LAN. Parallel bridges must have a different bridge number.

broadband As contrasted with baseband, a transmission system that multiplexes multiple independent signals onto one cable. In telecommunications terminology, any channel having a bandwidth greater than a voice-grade channel (4 kHz). In LAN terminology, a coaxial cable on which analog signaling is used. Also called *wideband*.

broadcast A message sent to all network destinations.

broadcast address An address reserved for sending to all stations on a network simultaneously.

broadcast search Propagation of a search request to all network nodes if the location of a resource is unknown to the requester. See also *directed search*.

broadcast storm Undesirable network event in which many broadcasts are sent all at once, using substantial network bandwidth and, typically, causing network time-outs.

BSC Binary Synchronous Communication. A character-oriented data-link protocol for half-duplex applications. Usually referred to simply as *bisync*.

buffer A storage area used for handling data in transit. Buffers often are used to compensate for differences in processing speed between network devices. Bursts of data can be stored in buffers until they can be handled by slower processing devices.

bus and tag channel The original IBM channel developed in the 1960s incorporating copper multiwire technology. Capable of operating at 4.5 Mbps with a distance limitation of 125 meters. See also *parallel channel*.

bus topology Linear LAN architecture in which transmissions from network stations propagate the length of the medium and are received by all other stations.

bypass mode Operating mode on FDDI and Token Ring networks where an interface has deinserted from the ring.

byte Generic term used to refer to a series of consecutive binary digits that are operated upon as a unit; for example, an 8-bit byte.

byte-oriented protocol Class of data-link communications protocols that use a specific character from the user character set to delimit frames. These protocols have largely been replaced by bit-oriented protocols.

byte reversal The process of storing numeric data with the least-significant byte first. Used for integers and addresses on devices with Intel microprocessors.

C

cable A transmission medium of wires or optical fibers wrapped in a protective cover.

call priority Priority assigned to each origination port in circuit-switched systems. This priority defines the order in which calls are reconnected. Call priority also defines which calls can or cannot be placed during a bandwidth reservation.

call setup time The time required to establish a switched call between DTE devices.

carrier A signal suitable for modulation by another signal containing information to be transmitted.

catenet A network in which hosts are connected to diverse networks, which themselves are connected with routers. The Internet is a prominent example of a catenet.

CATV Cable Television. Formerly called *Community Antenna Television*, a communication system where multiple channels of programming material are transmitted to homes using broadband coaxial cable.

CBDS Connectionless Broadband Data Service. Synonym for *SMDS*. High-speed, packet-switched, datagram-based WAN networking technology.

CCITT Consultative Committee for International Telegraph and Telephone. An international organization that develops communications standards such as Recommendation X.25.

CCS Common Channel Signaling. A signaling system used by many telephone networks that separates signaling information from user data.

cell The basic unit for ATM switching and multiplexing. Each cell consists of a five-byte header and 48 bytes of payload.

cell relay Network technology based on the use of small, fixed-size packets, or *cells*. Cells contain identifiers that specify the data stream to which they belong. Because the cells are fixed length, they can be processed and switched in hardware at very high speeds. Cell relay is the basis for many high-speed network protocols, including IEEE 802.6, DQDB, the SMDS Interface Protocol, and ATM.

cellular radio A technology that uses radio transmissions to access the phone-company network. Service is provided in a particular cell (area) by a low-power transmitter.

centrex An improved PBX that also provides direct inward dialing and automatic number identification of the calling PBX. Refers to a specific AT&T telephone system product.

CEPT Conference Europeéne des Postes et Telecommunications. An association of the 26 European PTTs that recommends communication specifications to the CCITT.

CERFnet California Education and Research Foundation Network. TCP/IP-based network in Southern California connecting many higher-education centers; designed to advance science and education through communications.

CGS Compact Gateway Server. Cisco two-slot modular bridge/router.

chaining SNA concept in which RUs (Request/response units) are grouped together for the purpose of error recovery.

channel A communication path. Multiple channels can be multiplexed over a single cable in certain environments. The term also is used to describe the specific path between large computers and attached peripherals.

channel attached Pertaining to attachment of devices directly by data channels (I/O channels) to a computer.

CHAOSnet A network protocol developed at MIT and used primarily by the artificial intelligence (AI) community.

CHAP Challenge Handshake Authentication Protocol. A security feature that prevents unauthorized access to devices running the feature (such as Cisco communication servers). CHAP is only supported on lines using PPP encapsulation.

Cheapernet Industry term used to refer to the IEEE 802.3 10Base2 standard or the cable specified in that standard. *Thinnet*, which is also used to describe this standard, specifies a less expensive, thinner version of Ethernet cable.

checksum A method for checking the integrity of transmitted data. A checksum is an integer value computed from a sequence of octets through a series of arithmetic operations. The value is recomputed at the receiving end and compared for verification.

choke packet Packet sent to a transmitter to tell it that congestion exists and that it should reduce its sending rate.

CICS Customer Information Control System. An IBM application subsystem allowing transactions entered at remote terminals to be processed concurrently by user applications.

circuit A communications link between two or more points.

circuit switching Switching system in which a dedicated physical circuit path must exist between sender and receiver for the duration of the "call." Used heavily in the phone-company network, circuit switching often is contrasted with *contention* and *token passing* as a channel-access method, and with *message switching* and *packet switching* as a switching technique.

Cisco 3000 Cisco two-port multiprotocol router with Flash memory in a fixed-configuration system. Uses a 20-MHz 68EC030 microprocessor.

Cisco 4000 Cisco router/bridge with NVRAM and Flash memory, three interface modules, and a 68030 CPU that runs at 25 MHz.

ciscoBus Half-a-gigabit-per-second proprietary bus technology developed and marketed for high-speed switching by Cisco Systems, Inc.

ciscoBus controller See *switch processor.*

CiscoWorks A comprehensive set of SNMP-based applications for monitoring, administering, and managing Cisco internetworks.

class of service See *COS.*

client A node or software program (front-end device) that requests services from a *server.* See also *back end* and *server.*

client-server computing Term used to describe distributed processing (computing) network systems in which transaction responsibilities are divided into two parts: client (front end) and server (back end). Both terms (client and server) can be applied to both software programs or actual computing devices. See also *peer-to-peer computing.*

CLNP/CLNS Connectionless Network Protocol/Connectionless Network Service. An OSI network-layer protocol/service that does not require a circuit to be established before data is transmitted. CLNP is the OSI equivalent of IP.

cluster controller Generally, an intelligent device that provides the connections for a cluster of terminals to a data link. In SNA, a programmable device that controls the I/O operations of attached devices. Typically, an IBM 3174 or 3274 device.

CMI Coded Mark Inversion. A CCITT line coding technique specified for the fourth-level CCITT multiplex signal. Also used in DS-1 level systems.

CMIP/CMIS Common Management Information Protocol/Common Management Information Services. OSI network management protocol/service interface created and standardized by ISO for managing heterogeneous networks.

CMNS Connection-Mode Network Service. Extends local X.25 switching to a variety of media (Ethernet, FDDI, Token Ring).

CMOT CMIP Over TCP. Use of the OSI network management protocol (CMIP) over an Internet (TCP/IP) protocol stack.

CMT Connection Management. An FDDI process that handles the transition of the ring through its various states (off, active, connect, and so on), as defined by the X3T9.5 specification.

CO Central Office. A local telephone company office to which all local loops in a given area connect and in which circuit switching of subscriber lines occurs.

coaxial cable A cable consisting of a hollow outer cylindrical conductor that surrounds a single inner wire conductor. Two types of coaxial cable are currently used for local area networks: 50-ohm cable, which is used for digital signaling, and 75-ohm cable, which is used for analog signaling and high-speed digital signaling.

CODEC Coder-Decoder. A device that typically uses pulse code modulation to transform analog voice into a digital bit stream and vice versa.

coding Electrical techniques used to convey binary signals.

common carrier A licensed, private utility company that supplies communication services to the public at regulated prices.

common channel signaling Exclusive use of a specified channel to carry signaling information for all other channels in the group.

communication Transmission of information.

communication controller In SNA, a subarea node (such as an IBM 3745 device) that contains an NCP.

communication server A communications processor that connects asynchronous devices to a LAN or WAN through network and terminal emulation software.

communications line The physical link (such as wire or a telephone circuit) that connects one or more devices to another.

community In SNMP, a logical group of managed devices and NMSs in the same administrative domain.

companding A contraction derived from the opposite processes called *compression* and *expansion*. Part of the PCM process whereby analog signal sample values are logically rounded to discrete scale-step values on a nonlinear scale. The decimal step number is then coded in its binary equivalent prior to transmission. The process is reversed at the receiving terminal using the same nonlinear scale.

compression Running a data set through an algorithm that reduces the space/bandwidth required to store/transmit the data set. See also *expansion* and *companding*.

concentrator A device that serves as the hub of a star-topology network. Also, sometimes used to refer to a device that contains multiple modules of network and internetwork equipment. See also *hub*.

configuration management One of five categories of network management defined by ISO for management of OSI networks. Configuration management subsystems are responsible for detecting and determining the network's state. See also *accounting management*, *fault management*, *performance management*, and *security management*.

congestion Excessive network traffic.

connectionless Term used to describe data transfer without the existence of a virtual circuit.

connection-oriented Term used to describe data transfer after establishment of a virtual circuit.

CONP Connection-Oriented Network Protocol. An OSI protocol providing connection-oriented operation to upper-layer protocols. See also *CMNS*.

console Data Terminal Equipment (DTE) through which commands are entered into a host.

contention Access method in which network devices compete for the right to access the physical medium. See also *token passing* and *circuit switching*.

convergence The ability of (and speed with which) a group of internetworking devices running a specific routing protocol agree on the internetwork's topology after a change in network topology.

conversation In SNA, an LU 6.2 session between two transaction programs.

core gateway The primary routers in the Internet. Core gateways are maintained by the Internet Network Operations Center at BBN.

COS Corporation for Open Systems. An organization that promulgates the use of OSI protocols through conformance testing, certification, and related activities.

Also, *class of service*. An indication of how an upper-layer protocol wants a lower-layer protocol to treat its messages. In SNA subarea routing, COS definitions are used by subarea nodes to determine the optimal route to establish a given session. A COS definition comprises a virtual route number and a transmission priority field. Also called *type of service*.

COSINE Corporation for Open Systems Interconnection Networking in Europe. A European project financed by the European Community (EC) to build a communication network between scientific and industrial entities in Europe.

count to infinity A problem that can occur in routing algorithms that are slow to converge, in which routers sequentially increment the hop count to particular networks until (typically) some arbitrary limit is imposed.

CP Control Point. Element in an SNA device that manages device resources. It can provide services to other devices.

CPE Customer Premises Equipment. Terminating equipment, such as terminals, phones, and modems, supplied by the phone company, installed at customer sites, and connected to the phone company network.

CPT Cisco Protocol Translator. Cisco product, based on its C chassis, that translates (acts as a gateway) between diverse protocols.

CRC Cyclic Redundancy Check. An error-checking technique in which the frame recipient calculates a remainder by dividing frame contents by a prime binary divisor and compares the calculated remainder (which itself is often called a CRC) to a value stored in the frame by the sending node.

CREN Corporation for Research and Educational Networking. The result of a merger of BITNET and CSNET.

cross talk Interfering energy transferred from one circuit to another.

CSA Canadian Standards Association. Agency within Canada that certifies products to Canadian national safety standards.

CSC-1R Cisco single-port 68030-based Token Ring interface card that operates at 4 Mbps or 16 Mbps.

CSC-2R Cisco dual-port 68030-based Token Ring interface card that operates at 4 Mbps or 16 Mbps.

CSC/3 Cisco 30-MHz MC68020-based processor card. See also *route processor.*

CSC/4 Cisco MC68040-based (25 MHz) processor card with 16 MB of DRAM; see also *route processor.*

CSC-C2CTR Cisco high-speed Token Ring interface card with two or four ports.

CSC-CCTL2 Second-generation and faster ciscoBus controller; a bit-slice processor that administers activity and controls traffic and switching across the high-speed ciscoBus.

CSC-ENVM Cisco environmental monitor card for the AGS+ chassis that monitors power supply voltage and temperature conditions to ensure appropriate system shutdown in the event of anomalous system conditions (high voltage or temperature).

CSC-FCIT Cisco FDDI interface card with translational bridging capability.

CSC-MC Cisco memory card containing 32 kilobytes of memory. The CSC-MC supplies nonvolatile configuration information to the Cisco router.

CSC-MC+ Cisco memory card containing NVRAM to store configuration information and Flash EPROM technology to store operating system software.

CSC-MCI Cisco Multiport Communications Interface. A Cisco router interface card that provides zero, one, or two Ethernet ports and zero, one, or two serial ports.

CSC-MEC Cisco interface card with either two, four, or six Ethernet ports.

CSC-R16 Cisco interface card supporting either 4- or 16-Mbps Token Ring.

CSC-SCI Cisco interface card supporting one, two, or four synchronous serial interface ports with transmission rates of up to 4 Mbps each.

CSLIP Compressed Serial Link Internet Protocol. A protocol that minimizes traffic and speed throughput on SLIP lines.

CSMA/CD Carrier Sense Multiple Access with Collision Detection. A channel access mechanism wherein devices wishing to transmit first check the channel for a carrier. If no carrier is sensed for some period of time, devices can transmit. If two devices transmit at once, a *collision* occurs and is detected by all colliding devices, which subsequently delays their retransmissions for some random length of time. CSMA/CD access is used by Ethernet and IEEE 802.3.

CSNET Computer Science Network. A large internetwork consisting primarily of universities, research institutions, and commercial concerns. CSNET has merged with BITNET to form CREN.

CSNP Complete Sequence Number PDUs sent by the designated router in an OSPF network to maintain database synchronization.

CSU Channel Service Unit. A digital interface device that connects end-user equipment to the local digital telephone loop.

CTS Clear To Send. A circuit in the RS-232 specification that is activated when the DCE is ready to accept data from the DTE.

cycles per second See *Hertz*.

Cyclic Redundancy Check See *CRC*.

D

D4 framing Framing format used on most existing 1.544-Mbps facilities.

DARPA Defense Advanced Research Projects Agency. A government agency that funded research and experimentation with the DARPA Internet.

DARPA Internet See *Internet*.

DAS Dual-Attached Station. Also known as a Class A station, a DAS is a device attached to both FDDI rings. If the primary ring breaks, the station can use the secondary ring.

data channel In SNA, a device that connects a processor and main storage with peripherals. See also *channel*.

data flow control layer Layer 5 of the SNA architectural model. The data flow control layer processes requests and responses that are exchanged between session partners.

datagram A logical grouping of information sent as a network-layer unit over a transmission medium without prior establishment of a virtual circuit. The terms *packet*, *frame*, *segment*, and *message* are also used to describe logical information groupings at various layers of the OSI reference model and in various technology circles. IP datagrams are the primary information units in the Internet.

data link control layer Layer 2 in the SNA architectural model.

data link layer Layer 2 of the OSI reference model. This layer takes a raw transmission facility and transforms it into a channel that appears, to the network layer, to be free of transmission errors. Its main services are addressing, error detection, and flow control.

DATANET 1 A major Netherlands PSN.

DATAPAC A large Canadian PSN.

Datapak Packet-switched public network in the Nordic countries.

data sink Network equipment that accepts data transmissions.

data stream All data transmitted through a communications line in a single read or write operation.

Datex-l Circuit-switched public network in Germany.

Datex-p Packet-switched public network in Germany.

DCA Defense Communications Agency. U.S. Government organization responsible for DDN networks such as MILNET.

DCE Data Communications Equipment (EIA expansion) or Data Circuit-Terminating Equipment (CCITT expansion). The devices and connections of a communications network that connect the communication circuit with the end device (data terminal equipment). A modem can be considered DCE.

D channel Full-duplex, 16-Kbps (basic rate) or 64-Kbps (primary rate) ISDN channel.

DDN Defense Data Network. The MILNET and associated parts of the Internet that connect military installations.

DDN X.25 U.S. DoD standard protocol very similar to X.25; used for connections to the DDN.

DDR Dial-on-Demand Routing. A technique whereby a router can automatically initiate and close a circuit-switched session. DDR permits routing over ISDN or phone lines using an external ISDN terminal adaptor (TA) or modem. The router communicates to the TA what numbers to dial using the V.25bis protocol.

deadlock Unresolved contention for the use of a resource. In APPN, when two elements of a process each wait for action by or a response from the other before they resume the process.

DECnet A group of communications products (including a protocol suite) developed and supported by Digital Equipment Corporation. The most recent iteration is DECnet Phase V, which is largely based on the OSI protocols.

DECnet routing Introduced in DECnet Phase III, Digital's proprietary routing scheme. In DECnet Phase V, DECnet completed its transition to OSI routing protocols (ES-IS and IS-IS).

dedicated line A communications line that is not switched. When the line is not owned by the user, the term *leased line* is more common.

de facto standard A standard by usage rather than official decree; a default standard.

default route Routing table entry that is used to direct any frames for which a next hop is not explicitly listed in the routing table.

de jure standard A standard by official decree.

delay The time between the initiation of a transaction by a sender and the first response received by the sender. Also, the time required to move a packet from source to destination over a given path.

demarc Demarcation point between carrier equipment and private telephone equipment (CPE).

demodulation Process of returning a modulated signal to its original form. Modems perform demodulation by taking an analog signal and returning it to its original (digital) form.

demultiplex To separate from a common input into multiple output streams.

DES Data Encryption Standard. Standard cryptographic algorithm developed by the U.S. National Bureau of Standards.

designated router A designated OSPF router generates a link state advertisement for a multiaccess network and has other special responsibilities in the running of the protocol. In OSPF, each multiaccess network that has at least two attached routers has a designated router. The designated router is elected by the OSPF Hello Protocol. The designated router concept enables a reduction in the number of adjacencies required on a multiaccess network. This in turn reduces the amount of routing protocol traffic and the size of the topological database.

destination address Address of a receiving network device.

device An entity that can access a network. Used interchangeably with *node*.

dial backup Feature supported by Cisco routers that provides protection against WAN down time by allowing the network administrator to configure a backup serial line through a circuit-switched connection.

dial-on-demand routing Cisco routing feature that provides on-demand network connections in an environment using the Public Switched Telephone Network (PSTN).

dial-up line Communications circuit that is established by a switched-circuit connection using the telephone network.

differential encoding Digital encoding technique whereby a binary value is denoted by a signal change rather than a particular signal level.

differential Manchester encoding Digital coding scheme where a mid-bit-time transition is used for clocking, and a transition at the beginning of each bit time denotes a zero. The coding scheme used by IEEE 802.5/Token Ring networks.

Dijkstra's algorithm A shortest-path routing algorithm that iterates on length of path to determine a shortest-path spanning tree. Commonly used in link-state routing algorithms. See also *distance vector routing algorithm* and *link-state routing algorithm*.

DIN connector Deutsche Industrie Norm (German Industrial Standard) connector. A connector on a network processor panel that connects an FDDI module to an external optical bypass switch.

directed search A search request sent to a specific node known to contain a resource. A directed search is used to determine the continued existence of the resource and to obtain routing information specific to the node.

directory services Services that help network devices locate service providers.

distance vector routing algorithm Also called *Bellman-Ford routing algorithm*. A class of routing algorithms that iterate on the number of hops in a route to find a shortest-path spanning tree. 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 their routing counterparts, link-state routing algorithms. See also *link-state routing algorithm* and *Dijkstra's algorithm*.

distortion delay Problem with a communication signal resulting from nonuniform transmission speeds of the components of a signal through a transmission medium.

distributed computing (processing) See *client-server computing*.

DLC Data Link Control layer. SNA layer responsible for transmission of data between two nodes over a physical link.

DLCI Data Link Connection Identifier. A Frame Relay value that identifies a logical connection.

DNA Digital Network Architecture. Digital Equipment Corporation's network architecture. *DECnet* is the term used to refer to products (including communications protocols) that embody DNA.

DNS Domain Name System. Distributed name system used in the Internet.

DoD Department of Defense. United States government organization that is responsible for the nation's defense. The DoD has frequently funded communication protocol development.

domain In the Internet, a portion of a name hierarchy tree. In SNA, an SSCP and the resources it controls. In IS-IS, a logical set of networks. "Domain" refers to a networking system developed by Apollo Computer (now a part of Hewlett-Packard) for use in its engineering workstations.

DOMPAC A large French Guiana PSN.

downlink station See *ground station.*

DQDB Distributed Queue Dual Bus. Communication protocol proposed by IEEE 802.6 committee for use in MANs.

drop A point on a multipoint channel where a connection to a networked device is made.

drop cable Generally, a short cable that connects a network device (such as a computer) to a physical medium. A type of *AUI.*

DS-0 A single 64-Kbps channel of a DS-1 digital facility.

DS-1 Digital (transmission) System 1, or Digital Signal level 1. Term used to refer to the 1.44-Mbps (U.S.) or 2.108-Mbps (Europe) digital signal carried on a T1 facility.

DS-1/DTI Domestic trunk interface circuit to be used for DS-1 applications with 24 trunks.

DS-3 Digital (transmission) System 3, or Digital Signal level 3. Term used to refer to the 44-Mbps digital signal carried on a T3 facility.

DS-4 Digital Signal level 4. Bell System terminology for the 274.176 Mbps signal.

DSP Domain Specific Part. That part of the CLNS address that contains an area identifier, a station identifier, and a selector byte.

DSR Data Set Ready. An RS-232-C interface circuit that is activated when the DCE is powered up and ready for use.

DSU Data Service Unit. A device used in digital transmission for connecting data terminal equipment (DTE), such as a router, to a digital transmission circuit (DTC) or service.

DSX-1 Cross-connection point for DS-1 signals.

DTE Data Terminal Equipment. The part of a data station that serves as a data source, destination, or both, and that provides for the data communications control function according to protocols. DTE includes computers, protocol translators, and multiplexers.

DTMF Dual Tone Multifrequency. Use of two simultaneous voice-band tones for dialing (such as touch tone).

DTR Data Terminal Ready. An RS-232-C circuit that is activated to let the DCE know when the DTE is ready to send and receive data.

dual-homed station A device attached to multiple FDDI rings. Dual homing provides redundancy.

Dual IS-IS See *Integrated IS-IS*.

DXI Data Exchange Interface. The interface between a router and a special DSU that can perform segmentation and reassembly.

dynamic address resolution Use of an address resolution protocol to determine and store address information on demand.

dynamic routing Routing that adjusts automatically to network topology or traffic changes. Also called *adaptive routing*.

E

E.164 CCITT recommendation for international telecommunication numbering, especially ISDN, BISDN, and SMDS. An evolution of normal telephone numbers.

E3 The highest transmission rate generally available in the European digital infrastructure (34 Mbps).

E & M signaling Standard signaling method used over interoffice and toll trunks.

EARN European Academic Research Network. European network connecting universities and research institutes.

EBCDIC Extended Binary Coded Decimal Interchange Code. An 8-bit character code developed by IBM for data representation in their large mainframe computer systems.

E channel 64-Kbps ISDN circuit-switching control channel.

echoplex A mode in which keyboard characters are echoed on a terminal screen upon return of the appropriate signal from the other end of the line to indicate that the characters were received correctly.

ECMA European Computer Manufacturers Association. A group of European computer vendors that have done substantial OSI standardization work.

EDI Electronic Data Interchange. The electronic communication of operational data such as orders and invoices between organizations.

EDIFACT Electronic Data Interchange for Administration, Commerce, and Transport. A data exchange standard administered by the United Nations to be a multi-industry EDI standard.

EGP Exterior Gateway Protocol. An Internet protocol for exchanging routing information between autonomous systems. Documented in RFC 904.

EIA Electronic Industries Association. A group that specifies electrical transmission standards. Their best-known standard is EIA-232-C.

electronic mail Widely used network application in which mail messages are transmitted electronically between end users over various types of networks using various network protocols.

EMA Enterprise Management Architecture. Digital's network management architecture, based on the OSI network management model.

EMI Electromagnetic Interference. Interference by electromagnetic signals that can cause reduced data integrity and increased error rates on transmission channels.

emulation mode Function of a network control program that enables it to perform activities equivalent to those performed by a transmission control unit. For example, with the CiscoWorks network management product, NetView's PU2 emulates the IBM 3274.

EN End Node. An APPN end system that supports end-user applications. ENs do not provide routing services. ENs rely on their directly connected network node (NN) for APPN services.

encapsulation The wrapping of data in a particular protocol header. For example, Ethernet data is wrapped in a specific Ethernet header before network transit. Also, a method of bridging dissimilar networks where the entire frame from one network is simply enclosed in the header used by the link-layer protocol of the other network.

encapsulation bridging Carries Ethernet frames from one router to another across disparate media, such as serial and FDDI lines. Contrast with *translational bridging*.

encoder A device that modifies information into the required transmission format.

encryption The application of a specific algorithm to data so as to alter the appearance of the data to make it incomprehensible to those who might attempt to "steal" the information. The process of decryption applies the algorithm in reverse to restore the data to its original appearance.

end node See *EN*.

end system Generally, an end-user device on a network. Also, a nonrouting host or node in an OSI network.

enterprise network A (usually large, diverse) network connecting most major points in a company. Differs from WAN in that it is typically private and contained within a single organization.

entity Generally, an individual, manageable network device.

EOT End of Transmission. Generally, a character that signifies the end of a logical group of characters or bits.

equalization A technique used to compensate for communications channel distortions.

error control A technique for assuring that transmissions from a source are received at the destination without errors.

error-correcting code A code having sufficient intelligence and incorporating sufficient signaling information to enable the detection and correction of many errors at the receiver.

error-detecting code A code that can detect transmission errors through analysis of received data based on their adherence to appropriate structural guidelines.

ESCON channel Enterprise Systems CONnection. An IBM 17-Mbps channel for attaching mainframes to peripherals, such as storage devices, backup units, and network interfaces. This channel incorporates fiber channel technology. The ESCON channel replaces the bus and tag channel, which uses copper multiwire technology.

ES-IS End System to Intermediate System. OSI protocol that defines how *end systems* (hosts) announce themselves to *intermediate systems* (routers).

ESnet Energy Sciences network. A multinational internetwork.

Ethernet A baseband LAN specification invented by Xerox Corporation and developed jointly by Xerox, Intel, and Digital Equipment Corporation. Ethernet networks operate at 10 Mbps using CSMA/CD to run over coaxial cable. Ethernet is similar to a series of standards produced by IEEE referred to as IEEE 802.3.

EtherTalk AppleTalk protocols running on Ethernet.

ETSI European Telecommunication Standards Institute. Organization created by the European PTTs and the EC (European Community) to propose telecommunications standards for Europe.

EUnet European UNIX network designed to provide interconnection and electronic mail services that began as an extension to USENET.

Euronet A networking scheme proposed by the European common market countries.

event Network message indicating operational irregularities in physical elements of a network or a response to the occurrence of a significant task, typically the completion of a request for information.

EXEC Cisco term used to designate software that interprets commands on Cisco products.

expansion The process of running a compressed data set through an algorithm that restores the data set to its original size. See also *compression* and *companding*.

expedited delivery Generally, an option set by a specific protocol layer telling other protocol layers (or the same protocol layer in another network device) to handle specific data more rapidly.

explicit route In SNA, a route from a source subarea to a destination subarea, as specified by a list of subarea nodes and transmission groups that connect the two.

explorer frame Frame sent out by a networked device in a source-route bridging environment to determine the optimal route to another networked device.

exterior gateway protocol Any internetwork protocol used to exchange routing information between autonomous systems. Not to be confused with EGP, which is a particular instance of an exterior gateway protocol.

F

fan-out unit Device that allows multiple devices on a network to communicate using a single network attachment.

fast switching Cisco-supported feature whereby a route cache is used to expedite packet switching through a router.

fault management One of five categories of network management defined by ISO for management of OSI networks. Fault management attempts to ensure that network faults are detected and controlled. See also *accounting management*, *configuration management*, *performance management*, and *security management*.

FCC Federal Communications Commission. A government agency that supervises, licenses, and controls electronic and electromagnetic transmission standards.

FCS Frame Check Sequence. HDLC term adopted by subsequent link layer protocols and referring to extra characters added to a frame for error control purposes.

FDDI Fiber Distributed Data Interface. An ANSI-defined standard specifying a 100-Mbps token-passing network using fiber-optic cable. Uses a dual-ring architecture to provide redundancy.

FDDI II The proposed ANSI standard to enhance FDDI. FDDI II will provide isochronous transmission for connectionless data circuits and connection-oriented voice and video circuits.

FDM Frequency Division Multiplexing. A technique whereby information from multiple channels can be allocated bandwidth on a single wire based on frequency.

FEP Front End Processor. Device or board that provides network interface capabilities for a networked device. In SNA, typically an IBM 3745 device.

fiber-optic cable Thin, flexible, medium capable of conducting modulated light transmission. Compared with other transmission media, fiber-optic cable is more expensive, not susceptible to electromagnetic interference, and capable of higher data rates.

FID4 Format Indicator 4. One of several formats that an SNA transmission header (TH) can use. An FID4 TH encapsulates messages between SNA subarea nodes that are capable of supporting virtual and explicit routes, as well as transmission groups.

file transfer One of the most popular network applications, whereby files can be moved from one network device to another.

filter Generally, a process or device that screens incoming information for certain characteristics, allowing a subset of that information to pass through. A function in CiscoWorks (Cisco's network-management product) that limits the data CiscoWorks receives for transfer to NetView.

firmware Software instructions set permanently or semipermanently in ROM.

flapping Routing problem where the advertised route between two nodes alternates (flaps) back and forth between two paths due to a network problem that causes intermittent interface failures.

Flash EPROM A PROM (Programmable Read-Only Memory) technology developed by Intel and licensed to other semiconductor companies, Flash EPROM is nonvolatile storage that can be electrically erased in the circuit and reprogrammed. Used in Cisco routers to allow downline loading and subsequent nonvolatile retention of software images.

flash update A routing update sent asynchronously in response to a change in the network topology. Normal routing updates are sent at fixed intervals.

flooding Routing technique by which routing information received by a routing device is sent out each of that device's interfaces except (usually) the interface on which the information was received.

flow control A technique for ensuring that a transmitting entity does not overwhelm a receiving entity. In IBM networks, this technique is called *pacing*.

FNC Federal Networking Council. Group responsible for assessing and coordinating U.S. federal agency networking needs.

FOIRL Fiber-Optic Inter-Repeater Link. Fiber-optic signaling methodology based on the IEEE 802.3 fiber-optic specification.

forward channel The communications path carrying information from the call initiator to the called party.

forwarding The process of sending a frame toward its ultimate destination by an internetworking device.

Fourier transform Technique used to evaluate the importance of various frequency cycles in a time series pattern.

fragment A piece of a larger packet that has been broken down to smaller units.

fragmentation The process of breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.

frame A logical grouping of information sent as a link-layer unit over a transmission medium. The terms *packet*, *datagram*, *segment*, and *message* are also used to describe logical information groupings at various layers of the OSI reference model and in various technology circles.

Frame Relay A protocol used across the interface between user devices (for example, hosts and routers) and network equipment (for example, switching nodes). Frame Relay is more efficient than X.25, the protocol for which it is generally considered a replacement.

frequency Measured in Hertz (Hz), the number of cycles of an alternating current signal per unit time.

front end A node or software program that requests services of a back end. See also *client* and *server.*

FST/IP Fast Sequenced Transport encapsulation for source-route bridging on IP networks.

FTAM File Transfer, Access, and Management. An OSI application developed for network file exchange and management.

FTP File Transfer Protocol. An IP application protocol for transferring files between network nodes.

full duplex A capability for simultaneous transmission of data in both directions.

Fuzzball Digital's LSI-11 computer system running IP gateway software. The NSFnet used these systems as backbone packet switches.

G

G.703 CCITT electrical and mechanical specification for connection between telco equipment and DTE.

gateway In the IP community, an older term referring to a routing device. Today, the term *router* is used to describe nodes that perform this function, and *gateway* refers to a special-purpose device that performs a Layer 7 conversion of information from one protocol stack to another, such as that performed by Cisco's CPT product.

gateway host In SNA, a host node that contains a gateway SSCP.

gateway NCP An NCP that connects two or more SNA networks and performs address translation to allow cross-network session traffic.

geosynchronous orbit Term referring to an orbit taken by satellites where the satellite's orbit velocity matches the rotation of the earth, causing the satellite to remain stationary relative to a position on the earth's surface. Geosynchronous orbit demands a position about 23,000 miles above the earth's surface over the equator.

GGP Gateway-to-Gateway Protocol. A MILNET protocol specifying how core gateways (routers) should exchange reachability and routing information. GGP uses a distributed shortest-path algorithm.

GOSIP Government OSI Profile. A government procurement specification for OSI protocols. Through GOSIP, the government has mandated that all federal agencies standardize on OSI and implement OSI-based systems as they become commercially available.

grade of service Measure of telephone service quality based on the probability that a call will encounter a busy signal during the busiest hour of the day.

ground station Collection of communications equipment designed to receive (and usually transmit) signals from/to satellites. Also called a *downlink station*.

group address A single address that refers to multiple network devices. Synonymous with *multicast address*.

group delay See *distortion delay*.

guard band Unused frequency band between two communications channels that provides separation of the channels to prevent mutual interference.

H

half duplex The capability for data transmission in only one direction at a time.

half gateway Literally, a device that performs the functions of half of a gateway. Gateways are often divided into two functional halves to simplify design and maintenance.

handset Part of a telephone containing the transmitter and receiver that is handled during use.

handshake Sequence of messages exchanged between two or more network devices to ensure transmission synchronization.

hardware address Also called *physical address* or *MAC-layer address*, a data-link layer address associated with a particular network device. Contrasts with network or protocol address, which is a network layer address.

H channel Full-duplex ISDN primary rate channel operating at 384 Kbps.

HDH HDLC Distant Host. A means of running the 1822 protocol over synchronous serial links instead of over special-purpose 1822 hardware. HDH is essentially 1822 headers and data encapsulated in LAPB (X.25 Level 2) packets.

HDLC High-level Data Link Control. Popular ISO standard bit-oriented, link-layer protocol derived from SDLC. HDLC specifies an encapsulation method of data on synchronous serial data links.

headend The end point of a broadband network. All stations transmit toward the headend; the headend then transmits toward the destination stations.

header Control information added before data when encapsulating the data for network transmission.

heartbeat See *SQE*.

HELLO A routing protocol used principally by NSFnet nodes. HELLO allows trusting packet switches to discover minimal delay routes. Also, the Hello protocol (different than the NSFnet HELLO protocol) is used by OSPF systems for establishing and maintaining neighbor relationships.

helper addresses The address configured on an interface to which broadcasts received in that interface will be sent.

HEMS High-level Entity Management System. A technically intriguing network management protocol that was a candidate for Internet standardization until it was withdrawn by its designer during the evaluation process in deference to SGMP (which evolved into SNMP) and CMOT.

HEPnet High-Energy Physics network. Research network that originated in the U.S., but has spread to most places where high-energy physics is done. Well-known sites include Argonne National Laboratory, Brookhaven National Laboratory, Lawrence Berkeley Laboratory, and the Stanford Linear Accelerator Center (SLAC).

Hertz Abbreviated "Hz," a measure of frequency or bandwidth. Synonymous with cycles/second.

heterogeneous network A network consisting of dissimilar devices that run dissimilar protocols and in many cases support dissimilar functions or applications.

hierarchical routing Routing based on a hierarchical addressing system. For example, IP routing algorithms use IP addresses, which contain network numbers, host numbers, and (possibly) subnet numbers.

HIPPI High-Performance Parallel Interface. High-performance interface standard defined in ANSI standard X3T9.3/88-023.

holddown A state into which a route can be placed whereby routers will neither advertise the route nor believe advertisements about the route for a specific length of time (the holddown period) in order to flush bad information about that route from all routers in the network. A route can be placed holddown when a link in that route fails.

homologation Conformity of a product or specification to international standards, such as CCITT, VCCI, UL, CS, and TUV. Enables portability across company and international boundaries.

hop The passage of a packet through one router.

hop count A routing metric used to measure the distance between a source and a destination. RIP uses *hop count* as a routing metric. The maximum allowable hop count for RIP is 16. See also *RIP.*

host Computer system on a network. Similar to the terms *device* or *node* except that *host* usually implies a computer system, whereas device and node generally apply to any networked system, including communication servers and routers.

host node An SNA subarea node that contains an SSCP.

HP Probe See *Probe.*

HSCI High-Speed Communications Interface. A controller developed and marketed by Cisco Systems. The HSCI is a single-ported interface providing full-duplex synchronous serial communications capability at up to 52 Mbps. It installs in some Cisco routers.

HSSI High-Speed Serial Interface. Network standard for high-speed (up to 52 Mbps) serial communications over WAN links.

hub Generally, a term used to describe a device that serves as the center of a star-topology network. In Ethernet/IEEE 802.3 terminology, a hub is an Ethernet multiport repeater, which is sometimes referred to as a *concentrator*. The term is also used to refer to a hardware/software device that contains multiple independent but connected modules of network and internetwork equipment. Hubs can be active (where they repeat signals sent through them) or passive (where they do not repeat, but merely split, signals sent through them).

hybrid network Term used to describe an internetwork made up of more than one type of network technology, including LANs and WANs.

I

IAB Internet Activities Board. A group of internetwork researchers who meet regularly to discuss issues pertinent to the Internet. This board sets much of the policy for the Internet through decisions and assignment of task forces to various issues.

ICMP Internet Control Message Protocol. A network-layer Internet protocol that provides message packets to report errors and other information relevant to IP packet processing. Documented in RFC 792.

IDI Initial Domain Identifier. Specifies the authority responsible for Domain Specific Part (DSP) values in OSI network addresses (NSAPs).

IDP Initial Domain Part. The part of a CLNS address that contains an authority and format identifier and a domain identifier.

IDPR Interdomain Policy Routing. An experimental interdomain routing protocol that dynamically exchanges policies between autonomous systems. IDPR encapsulates interautonomous system traffic and routes it according to the policies of each autonomous system along the path. IDPR is currently an IETF proposal.

IDRP IS-IS Interdomain Routing Protocol. OSI protocol that specifies how routers communicate with routers in different domains.

IEEE Institute of Electrical and Electronic Engineers. Professional organization that defines network standards. IEEE LAN standards are the predominant LAN standards today, including protocols similar or virtually equivalent to Ethernet and Token Ring.

IEEE 802.2 IEEE LAN protocol that specifies an implementation of the logical link control sublayer of the link layer. IEEE 802.2 handles errors, framing, flow control, and the Layer 3 service interface and is used in LANs such as IEEE 802.3 and IEEE 802.5.

IEEE 802.3 IEEE LAN protocol that specifies an implementation of the physical layer and MAC sublayer of the link layer. IEEE 802.3 uses CSMA/CD access at a variety of speeds over a variety of physical media. One physical variation of IEEE 802.3 (10Base5) is very similar to Ethernet.

IEEE 802.4 IEEE LAN protocol that specifies an implementation of the physical layer and MAC sublayer of the link layer. IEEE 802.4 uses token-passing access over a bus topology.

IEEE 802.5 IEEE LAN protocol that specifies an implementation of the physical layer and MAC sublayer of the link layer. IEEE 802.5 uses token passing access at 4 or 16 Mbps over shielded twisted pair wiring and is very similar to IBM Token Ring.

IEEE 802.6 IEEE metropolitan area network (MAN) specification based on DQDB technology. IEEE 802.6 supports data rates of 1.5 Mbps to 155 Mbps and supports data packets and circuits.

IETF Internet Engineering Task Force. An IAB task force consisting of over 40 groups responsible for addressing short-term Internet engineering issues.

IFIP International Federation for Information Processing. Research organization that performs OSI prestandardization work. Among other accomplishments, IFIP formalized the original MHS model.

IGP Interior Gateway Protocol. An Internet protocol used to exchange routing information within an autonomous system. Examples of common Internet IGPs include IGRP, RIP, and OSPF.

IGRP Interior Gateway Routing Protocol. An IGP developed by Cisco Systems to address the problems associated with routing in large, heterogeneous networks.

IGS Integrated Gateway Server. Cisco integrated (fixed-configuration) bridge/router.

IIH IS-IS Hello. Message sent by all IS-IS systems to maintain adjacencies.

ILMI Interim Local Management Interface. The ATM Forum's specification for incorporating network-management capabilities into the ATM UNI.

IMP Interface Message Processor. Old name for Internet packet switches. IMPs are now called packet-switched nodes, packet switches, or switches.

in-band signaling Transmission within a frequency range normally used for information transmission. Contrasted with out-of-band signaling, which uses frequencies outside the normal range of information-transfer frequencies.

infrared Electromagnetic waves whose frequency range is above that of microwave but below the visible spectrum. LAN systems based on this technology represent an emerging technology.

INOC Internet Network Operations Center. A BBN group that in the early days of the Internet monitored and controlled the Internet core gateways (routers).

INTAP Interoperability Technology Association for Information Processing. Technical organization formed to develop Japanese OSI profiles and conformance tests.

Integrated IS-IS Routing protocol based on the OSI routing protocol IS-IS, but with support for IP or other networks. Integrated IS-IS implementations send only one set of routing updates, making it more efficient than two separate implementations. Formerly referred to as *Dual IS-IS*.

interface A connection between two systems or devices. In routing terminology, a network connection. Also, the boundary between adjacent layers of the OSI model. In telephony, a shared boundary defined by common physical interconnection characteristics, signal characteristics, and meanings of interchanged signals.

interference Unwanted communication channel noise.

intermediate system See *IS*.

International Standards Organization Erroneous expansion of the acronym *ISO*.

Internet Term used to refer to the world's largest internetwork, connecting thousands of networks worldwide and having a "culture" based on simplicity, research, and standardization based on real-life use. Much of today's leading-edge network technology came from the Internet community. The Internet evolved from ARPANET.

Internet address Also called an "IP address," a 32-bit address assigned to hosts using TCP/IP. The address is written as four octets separated with periods (dotted decimal format) that are made up of a network section, an optional subnet section, and a host section.

internetwork A collection of networks interconnected by routers that functions (generally) as a single network. Sometimes called an *internet*, which is not to be confused with the *Internet*.

internetworking General term used to refer to the industry that has arisen around the problem of connecting networks together. The term can refer to products, procedures, and technologies.

interoperability The ability of computing equipment manufactured by different vendors to communicate successfully over a network.

intra-area routing In DECnet routing, term used to describe routing within an area.

IP Internet Protocol. A Layer 3 (network layer) protocol that contains addressing information and some control information that allows packets to be routed. Documented in RFC 791.

IP address See *Internet address.*

IPSO IP Security Option. The part of the Internet Protocol (IP) that defines security levels on a per interface basis.

IPX Internetwork Packet Exchange. Novell Layer 3 protocol similar to XNS and IP that is used in NetWare networks.

IRDP ICMP Router Discovery Protocol. Enables a host to determine the address of a router that it can use as a default gateway. Similar to ES-IS, but used with IP.

IRN Intermediate Routing Node. In SNA, a subarea node with intermediate routing capability.

IRTF Internet Research Task Force. A community of network researchers with an internetwork focus. The IRTF is governed by the Internet Research Steering Group (IRSG).

IS Intermediate System. A routing node in an OSI network.

isarithmic flow control Flow control technique wherein a permit travels through the network. Possession of these permits grants the right to transmit.

ISDN Integrated Services Digital Network. Communication protocols proposed by telephone companies to permit telephone networks to carry data, voice, and other source material. See also *BRI*, *BISDN*, and *PRI*.

IS-IS Intermediate System to Intermediate System. OSI link-state hierarchical routing protocol based on DECnet Phase V routing whereby intermediate systems (routers) exchange routing information based on a single metric to determine network topology.

ISO International Organization for Standardization. Often incorrectly referred to as the International Standards Organization. An international organization that is responsible for a wide range of standards, including those relevant to networking. ISO is responsible for the most popular networking reference model: the *OSI reference model.*

isochronous transmission Asynchronous (start-stop) transmission over a synchronous data link. In telephony, isochronous implies constant bit-rate sampling and is referred to as the inverse of asynchronous transmission.

ISODE ISO Development Environment. A popular implementation of OSI's upper layers on a TCP/IP protocol stack.

ISSI Inter-Switching System Interface. The standard interface between SMDS switches.

J

jabber An error condition in which a network device continually transmits garbage onto the network. In IEEE 802.3, a data packet whose length exceeds that prescribed in the standard.

JANET Joint Academic Network. A university network in the U.K.

jitter Analog communication line distortion caused by a variation of a signal from its reference timing positions. Jitter can cause data loss, particularly at high speeds.

JUNET Japan UNIX Network. The largest nationwide, noncommercial network in Japan, designed to promote communication between Japanese and outside researchers.

JVNCnet John Von Neumann Center Network. A regional network composed of T1 and slower serial links providing midlevel networking services to sites in the Northeast.

K

Karn's algorithm An algorithm that improves round-trip time estimations by helping transport layer protocols distinguish between good and bad round-trip time samples.

keepalive interval Period of time between each keepalive message sent by a network device.

keepalive message Message sent by one network device to inform another network device that the virtual circuit between the two is still active.

KERMIT A popular file-transfer and terminal-emulation program.

L

LAN Local Area Network. A network covering a relatively small geographic area (usually not larger than a floor or small building). Compared to WANs, LANs are usually characterized by relatively high data rates and relatively low error rates. See also *WAN* and *MAN*.

LAN Manager Distributed file system developed and supported by Microsoft.

LAN Network Manager Source-bridge and Token Ring management package provided by IBM. Typically running on a PC, it monitors source-route bridges and Token Ring devices, and can pass alerts up to NetView.

LAN Server Distributed file system derived from LAN Manager, which is developed and supported by IBM.

LAPB Link Access Procedure, Balanced. Derived from HDLC, a CCITT X.25 version of a bit-oriented data link protocol.

LAPD Link Access Protocol D. ISDN's link-layer protocol for the D channel. LAPD was derived from the CCITT X.25 LAPB protocol and is designed primarily to satisfy the signaling requirements of ISDN Basic Access. Defined by CCITT Recommendations Q.920 and Q.921.

LASER Light Amplification by Stimulated Emission of Radiation. Analog transmission device in which a suitable active material is excited by an external stimulus to produce a narrow beam of coherent light that can be modulated into pulses to carry data. Networks based on LASER technology are still in their infancy, but show promise due to potentially high bandwidths and relative resistance to interference.

LAT Local Area Transport. A network virtual terminal protocol developed by Digital Equipment Corporation.

LATA Local Access and Transport Area. A telephone dialing area serviced by a single local telephone company. Calls within LATAs are called local calls. There are well over 100 LATAs in the U.S.

latency The amount of time between when a device requests access to a network and when it is granted permission to transmit.

leased line A transmission line reserved by a communications carrier for the private use of a customer.

LEN node Low-Entry Networking node. End systems similar to end nodes but which cannot rely on network nodes (NN) for APPN services and therefore must have a statically defined image of the APPN network. A PU 2.1 that supports LU protocols but does not support CP-CP sessions.

level 1 router A device that routes within a DECnet or OSI area.

level 2 router A device that routes between DECnet or OSI areas. All Level 2 routers must form a contiguous network.

limited resource link Resource defined by device operator to remain active only when being used.

line Generally, another word for *link*. In SNA, a connection to the network.

line conditioning The use of equipment on leased voice-grade channels to improve analog characteristics, thereby allowing higher transmission rates.

line driver Inexpensive amplifier/signal converter that conditions digital signals to ensure reliable transmissions over extended distances.

line of sight Characteristic of certain transmission systems such as LASER, microwave, and infrared systems in which no obstructions on a direct path between transmitter and receiver may exist.

line turnaround The time required to change data transmission direction on a phone line.

link Network communications channel consisting of a circuit or transmission path, including all equipment, between a sender and a receiver. Most often used to refer to a WAN connection. Sometimes referred to as a *line*.

link layer See *data link layer*.

link-state routing algorithm A routing algorithm in which each router broadcasts or multicasts information on the cost of reaching each of its neighbors to all nodes in the internetwork. Link-state algorithms create a consistent view of the network and are therefore not very prone to routing loops, but they achieve this at the cost of relatively greater computational difficulty and somewhat more widespread traffic (compared with distance vector routing algorithms). See also *distance vector routing algorithm*.

little-endian A method of storing or transmitting data in which the least significant bit or byte is presented first. See also *big-endian*.

LLC Logical Link Control. IEEE-defined sublayer of the OSI link layer. LLC handles error control, flow control, and framing. The most prevalent LLC protocol is IEEE 802.2, which includes both connectionless and connection-oriented variants.

LLC2 Logical Link Control, type 2. A connection-oriented OSI logical link control sublayer protocol.

LMI Local Management Interface for Frame Relay. Packet containing sequence-number exchange between a DTI (router) and a switch. It is used by the switch to learn which DLCIs are defined and the current status of the DLCIs.

LMT ANSI LMI.

LM/X LAN Manager for UNIX environments.

LNM LAN Network Manager. An IBM product for managing a collection of source-route bridges and their Token Ring environments.

load balancing In routing, the ability of a router to distribute traffic over all its network ports that are the same distance from the destination address. Good load-balancing algorithms use both line speed and reliability information. Load balancing increases the utilization of network segments, thus increasing effective network bandwidth.

local acknowledgment A method whereby an intermediate network node, such as a Cisco router, terminates a data link layer session for an end host. Use of local acknowledgments reduces network overhead and, therefore, the risk of time-outs.

local bridge A bridge that directly interconnects networks in the same geographic area.

local loop The line from a telephone subscriber's premises to the telephone company CO.

LocalTalk Apple's proprietary 230-Kbps baseband CSMA/CA network protocol.

logical channel A nondedicated, packet-switched communications path between two or more network nodes. Through packet switching, many logical channels can exist simultaneously on a single physical channel.

loop Route where packets never reach the destination, but simply cycle repeatedly through a constant series of network nodes.

loopback test A test in which signals are sent and then directed back toward the source at some point along the communications path. Loopback tests are often used to test network interface usability.

lossy Characteristic of a network that is prone to lose packets when it becomes highly loaded.

LU Logical Unit. A primary component of SNA, an LU is a type of NAU that enables end users to communicate with each other and gain access to SNA network resources.

LU 6.2 Logical Unit 6.2. An LU governing peer-to-peer SNA communications. LU 6.2 supports general communication between programs in a distributed processing environment.

M

MAC-layer address See *hardware address* and *physical address*.

MAC sublayer Media Access Control sublayer. As defined by the IEEE, the lower portion of the OSI reference model data link layer. The MAC sublayer is concerned with media access issues, such as whether token passing or contention will be used.

MAN Metropolitan Area Network. A network that spans a metropolitan area. Generally, a network that spans a larger geographic area than a *LAN*, but a smaller geographic area than a *WAN*. See also *DQDB*.

managed object In network management, a network device that can be managed by a network management protocol.

management services SNA functions distributed among network components to manage and control an SNA network.

Manchester Encoding Digital coding scheme in which a mid-bit-time transition is used for clocking and a "1" is denoted by a high level during the first half of the bit time. The coding scheme used by IEEE 802.3/Ethernet.

MAP Manufacturing Automation Protocol. A network architecture created by General Motors to satisfy the specific needs of the factory floor. MAP specifies a token-passing LAN similar to IEEE 802.4.

MAU Medium Attachment Unit (IEEE 802.3) or Multistation Access Unit (IEEE 802.5). In IEEE 802.3, a device that performs IEEE 802.3 Layer 1 functions, including collision detection and injection of bits onto the network. A MAU is referred to as a *transceiver* in the Ethernet specification. IEEE 802.5 MAUs (sometimes called MSAUs so as not to confuse them with IEEE 802.3 MAUs) are wiring concentrators to which Token Ring lobes attach.

maxdata Maximum data size for frame on a link.

MCI A telecommunications company that competes with AT&T and U.S. Sprint for long distance telephone subscribers. For information about Cisco's MCI interface card, see *CSC-MCI*.

media Plural of *medium*. The physical environment through which transmission signals pass. Common network media include twisted pair, coaxial and fiber optic cable, and the atmosphere (through which microwave, LASER, and infrared transmission occurs).

message An application-layer logical grouping of information. See also *packet*, *frame*, *segment*, and *datagram*.

message switching Switching technique involving transmission of messages from node to node through a network. The message is stored at each node until such time as a forwarding path is available. See also *packet switching* and *circuit switching*.

message unit Unit of data processed by any layer.

MGS Midsize Gateway Server. Cisco 4-slot bridge/router.

MHS Message Handling System. CCITT X.400 recommendations that provide message handling services for communications between distributed applications. NetWare MHS is a different (though similar) entity that also provides message-handling services and is marketed by Novell.

MIB variables Management Information Base variables. A database of information on managed objects that can be accessed via network management protocols such as SNMP and CMIP.

MIC Media Interface Connector. FDDI de facto standard connector.

microwave Electromagnetic waves in the range 1 to 30 gigahertz. Microwave-based networks are a nascent technology gaining favor due to high bandwidth and relatively low cost.

MIDAS An Australian PSN.

midsplit Broadband cable system in which the available frequencies are split into two groups: one for transmission and one for reception.

MILNET Military Network. See *DDN*.

MODEM Modulator-Demodulator. A device that converts digital signals into a form suitable for transmission over analog communication facilities and vice versa.

modem eliminator Device allowing connection of two DTE devices without MODEMs.

modulation Process by which signal characteristics are transformed to represent information. Types of modulation include frequency modulation (FM), in which signals of different frequencies represent different data values, and amplitude modulation (AM), in which signal amplitude is varied to represent different data values.

MOP Maintenance Operation Protocol. Digital Equipment Corporation protocol, a subset of which is supported by Cisco Systems, that provides a way to perform primitive maintenance operations on DECnet systems. For example, MOP can be used to download a system image to a diskless station.

MSAU Multistation Access Unit. See *MAU*.

MSM Cisco's M chassis-based communication server.

MTU Maximum Transmission Unit. The maximum packet size, in bytes, that a particular interface will handle.

mu-law North American *companding* standard used in conversion between analog and digital signals in PCM systems. Similar to the European *a-law*.

multicast Single packets copied to a specific subset of network addresses. These addresses are specified in the destination-address field. In contrast, in a broadcast, packets are sent to all devices in a network.

multicast address An address that refers to multiple network devices. Synonymous with *group address*.

multidrop line See *multipoint line*.

multihomed host Host attached to multiple physical network segments in an OSI CLNS network.

multihoming Addressing scheme in IS-IS routing that supports assignment of multiple area addresses.

multimode fiber Optical fiber supporting propagation of multiple frequencies of light.

multiple domain network An SNA network with multiple SSCPs.

multiplexing Putting multiple signals on a single channel.

multipoint line A communications line having multiple cable access points. Also called a *multidrop line*.

multivendor network Network using equipment from more than one vendor. Multivendor networks pose many more compatibility problems than single-vendor networks.

N

N-1 An intra-university network in Japan, connecting mainframes via X.25.

NACSIS National Center for Science Information Systems. Japanese network that is considered the successor to N-1.

Nagle's algorithm Actually two separate congestion control algorithms that can be used in TCP-based networks. One algorithm reduces the sending window; the other limits small datagrams.

name caching Method by which remotely discovered host names are stored by a router for use in future packet-forwarding decisions for quick access.

name resolution Generally, the process of associating a name with a network location.

name server A server provided on the network that resolves network names into network locations (addresses).

narrowband See *baseband*.

NAU Network Addressable Unit. SNA term for an addressable entity. Examples include PUs, LUs, and SSCPs.

NAUN Nearest Active Upstream Neighbor. In Token Ring or IEEE 802.5 networks, the closest upstream network device from the device acting as reference point that is still active.

NBS National Bureau of Standards. See *NIST*.

NCC See *NOC*.

NCP Network Control Program. In SNA, a program that routes and controls the flow of data between a communications controller (in which it resides) and other network resources.

NDIS Network Driver Interface Specification. Produced by Microsoft, a specification for a generic, hardware-independent and protocol-independent device driver for NICs.

neighboring routers In OSPF, two routers that have interfaces to a common network. On multiaccess networks, neighbors are dynamically discovered by OSPF's Hello Protocol.

NET Network Entity Title. Network addresses, as defined by the ISO network architecture and as used in CLNS-based networks.

NetBIOS Network Basic Input/Output System. A session-layer interface for PC networks from IBM and Microsoft.

NetView IBM network management architecture and related applications.

NetWare Developed and marketed by Novell, Inc., the world's most popular distributed file system. NetWare provides transparent remote file access and numerous other distributed network services.

network A collection of computers and other devices that are able to communicate with each other over some network medium.

network address Also called a *protocol address*, a network layer address referring to a logical, rather than a physical, network device.

network administrator Person who helps maintain a network.

network analyzer A hardware/software device offering various network troubleshooting features, including protocol-specific packet decodes, specific preprogrammed troubleshooting tests, packet filtering, and packet transmission.

Network Information Center A location that provides access to RFCs and other information about the Internet. Usually referred to as a *NIC*.

network interface The boundary between a carrier's network and a local installation.

network layer Layer 3 of the OSI reference model. Layer 3 is the layer at which routing occurs.

network management Generic term used to describe systems or actions that help maintain, characterize, or troubleshoot a network. Network management is an increasingly important topic in the more general field of networking.

NFS Network File System. As commonly used, a distributed file system protocol suite developed by Sun Microsystems that allows remote file access across a network. In actuality, NFS is simply one protocol in the suite. "NFS" protocols include NFS, XDR (External Data Representation), RPC (Remote Procedure Call), and others. These protocols are part of a larger architecture that Sun refers to as *ONC* (Open Network Computing).

NIC Network Interface Controller, or Network Interface Card. See *adapter*. Also, the acronym NIC can expand to "Network Information Center." Today, many network information centers exist to serve the Internet community by supplying user assistance, documentation, training, and other services.

N-ISDN Narrowband ISDN. Contrast with *BISDN*.

NIST National Institute of Standards and Technology. Formerly the National Bureau of Standards (*NBS*), this U.S. government organization supports and catalogs a variety of standards.

NMS Network Management System. A system responsible for managing at least part of a network. An NMS is generally a reasonably powerful and well-equipped computer such as an engineering workstation, with a megapixel color display, large memory and disk space, and a fast processor. NMSs communicate with agents to help keep track of network statistics and resources.

NMVT Network Management Vector Transport. SNA message consisting of a series of vectors conveying network management specific information.

NN Network Node. Intermediate node in an SNA network that performs route selection and provides directory services to other APPN nodes.

NNI ATM Network Node Interface. The standard interface between ATM switches. Also Network-to-Network Interface in Frame Relay. In an SMDS network, an NNI is referred to as Inter-Switching System Interface (*ISSI*).

NOC Network Operations Center. Organization or site responsible for maintaining a network.

node Generic term used to refer to an entity that can access a network. Used interchangeably with *device*.

noise Undesirable communications channel signals.

Northwest Net NSF-funded regional network serving the Northwest, Alaska, Montana, and North Dakota. Northwest Net connects all major universities in the region as well as many leading industrial concerns such as Boeing and Sequent Computer.

NOS Network Operating System. Generic term used to refer to what are really distributed file systems. Examples of NOSs include NetWare, Banyan VINES, NFS, and LAN Manager.

NPDN Low-speed circuit-switched public network in the Nordic countries.

NREN National Research and Education Network. A new U.S. network being developed as a state-of-the-art network for research and educational institutions.

NRM Normal Response Mode. HDLC mode for use on links with one primary station and one or more secondary stations. In this mode, secondary stations can only transmit if they first receive a poll from the primary station.

NRZ Nonreturn to Zero. See *unipolar.*

NSAP Network Service Access Point. ISO network addresses, as specified by ISO 8348/Ad2. The point at which OSI Network Service is made available to a Layer 4 entity.

NSF National Science Foundation. A body that funds scientific research in the U.S.

NSFnet National Science Foundation Network. A large network controlled by the NSF that provides networking services in support of education and research in the U.S.

null modem Small box or cable used to join computing devices directly, rather than over a network.

Numeris Public ISDN network in France.

NVRAM Nonvolatile RAM. Random access memory that retains its contents when a unit is powered off. In Cisco products, NVRAM is used to store configuration information.

Nyquist Sampling Theorem Theorem proved by H. Nyquist showing that it is possible to reconstruct analog signals from samples if enough samples are taken.

NYSERNet New York state network with a T1 backbone connecting NSF, many universities, and several commercial concerns.

O

OARnet Ohio Academic Resources Network. Connects sites, including the Ohio supercomputer center in Columbus.

object instance Network management term referring to an instance of an object type that has been bound to a value.

ODA Office Document Architecture. OSI standard that specifies how documents are transmitted electronically.

ODI Open Data-link Interface. Novell specification providing a standardized way to access networks.

OIM OSI Internet Management. A group tasked with specifying ways in which OSI network management protocols can be used to manage TCP/IP networks.

ONC Open Network Computing. Distributed applications architecture founded by Sun Microsystems, currently controlled by a consortium led by Sun. The NFS protocols are part of ONC.

ones density See *pulse density.*

ONN APPI's Open Network Node that provides routing and directory services for APPN End Nodes (EN) and Low Entry Nodes (LEN). Counterpart to APPN's network node (NN). On the network side, an ONN uses TCP/IP transport and routing capabilities.

open architecture An architecture according to which third-party developers can legally develop products and for which public domain specifications exist.

open circuit A broken path along a transmission medium. Open circuits will usually prevent network communication.

optical fiber See *fiber-optic cable.*

OSI Open System Interconnection. An international standardization program created by ISO and CCITT to develop standards for data networking, that facilitates multivendor equipment interoperability.

OSINET International association designed to promote OSI in vendor architectures.

OSI reference model A network architectural model developed by ISO and CCITT. 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. The highest layer (the application layer) is closest to the user; the lowest layer (the physical layer) is closest to the media technology. The OSI reference model is used universally as a method for teaching and understanding network functionality.

OSPF Open Shortest Path First. Link state, hierarchical IGP routing algorithm proposed as a successor to RIP in the Internet community. OSPF's features include least-cost routing, multipath routing, and load balancing. OSPF was derived from an early version of OSI's IS-IS protocol.

outframe Maximum number of outstanding frames allowed in an SNA PU2 server at any time.

out-of-band signaling Transmission using frequencies or channels outside the normal frequencies or channels used for information transfer. Out-of-band signaling is often used for error reporting in situations in which in-band signaling can be affected by whatever problems the network might be experiencing.

P

pacing IBM term for flow control. See *flow control*.

packet A logical grouping of information that includes a header and (usually) user data. See also *frame*, *datagram*, *segment*, and *message*.

packet buffer Storage area to hold incoming data until the receiving device can process the data. See also *buffer*.

packet switching Network on which nodes share bandwidth with each other by intermittently sending logical information units (packets). In contrast, a circuit-switching network dedicates one circuit at a time to data transmission. See also *circuit switching* and *message switching*.

PACNET A New-Zealand-based packet network.

PAD Packet Assembler/Disassembler. Device used to connect simple devices (like character-mode terminals) that are by themselves not capable of assembling and disassembling packets to X.25 networks. PADs buffer data sent between hosts and terminals across an X.25 network, as defined by CCITT Recommendations X.3, X.28, and X.29.

PAM Pulse Amplitude Modulation. Modulation scheme where the modulating wave is caused to modulate the amplitude of a pulse stream.

parallel channel A channel having a system/370 channel-to-control-unit I/O interface that uses bus-and-tag cables as a transmission medium. See also *bus and tag channel*.

parallel transmission The simultaneous transmission of all bits making up a character or byte. See also *serial transmission*.

parity check A process for checking the integrity of a character. A parity check involves appending a bit that makes the total number of binary "1" digits in a character or word (excluding the parity bit) either odd (for "odd parity") or even (for "even parity").

path control layer Layer 3 in the SNA architectural model. This is the SNA layer that routes packets through an internetwork.

path control network SNA concept that consists of lower-level components that control the routing and data flow through an SNA network and handle physical data transmission between SNA nodes. Contrasts with NAUs, which provide upper-level services.

path cost Arbitrary value used as a routing metric to determine the best path to a destination. See also *routing metric.*

payload The 192 bits of information in a DS01 frame.

PBX Private Branch Exchange. A telephone switchboard on the user premises.

PCI Protocol Control Information. The OSI equivalent of the term *header.* Control information added to user data to comprise an OSI packet.

PCM Pulse Code Modulation. Transmission of analog information in digital form through sampling and encoding the samples with a fixed number of bits.

PDN Public Data Network. A network operated either by a government (as in Europe) or by a private concern to provide computer communications to the public, usually for a fee. PDNs enable small organizations to create a WAN without all the equipment costs of long-distance circuits.

PDS Premises Distribution System. Wiring system developed and marketed by AT&T.

PDU Protocol Data Unit. Another word for *packet* as defined by the OSI. A PDU is exchanged between devices within a specific level of the OSI reference model.

peer-to-peer computing As contrasted with client-server computing, peer-to-peer computing calls for each network device to run both client and server portions of an application. See also *client-server computing*. The phrase can also be used to describe communication between implementations of the same OSI reference model layer in two different network devices.

performance management One of five categories of network management defined by ISO for management of OSI networks. Performance management subsystems are responsible for analyzing and controlling network performance including network throughput and error rates. See also *accounting management*, *configuration management*, *fault management*, and *security management*.

peripheral node In SNA, a node that uses local addresses and is therefore not affected by changes to network addresses. Peripheral nodes require boundary function assistance from an adjacent subarea node.

P/F Poll/Final bit. A bit in bit-synchronous link-layer protocols that indicates the function of a frame. If the frame is a command, a "1" in this bit indicates a poll. If the frame is a response, a "1" in this bit indicates that the current frame is the last frame in the response.

phase The location of a position on an alternating wave form.

PHY FDDI physical sublayer; designation for FDDI fiber-optic cables.

physical address Term sometimes used to refer to the link-layer address of a network device. Contrasts with a *network* or *protocol* address, which is a network-layer address. See also *hardware address*.

physical control layer Layer 1 in the SNA architectural model. See *physical layer.*

physical layer Layer 1 of the OSI reference model. The physical layer defines the electrical, mechanical, and physical interfaces to the network and aspects of the network medium.

physical medium See *media.*

PHYSNET Physics Network. A group of many DECnet-based physics research networks, including HEPnet.

piggybacking The process of carrying acknowledgments within a data packet to save network bandwidth.

ping Packet Internet Groper. Refers to the ICMP echo message and its reply. Often used to test the reachability of a network device.

ping-ponging Phrase used to describe the actions of a packet in a two-node routing loop.

PLCP Physical Layer Convergence Procedure. Mapping of cells to a specific physical transmission medium (such as DS-3).

Plesiochronous A condition in a synchronized digital network where communicating devices each are synchronized to a different timing source of comparable accuracy and stability.

poison reverse updates Routing updates that specifically indicate that a network or subnet is unreachable, rather than implying that a network is unreachable by not including it in updates. Poison reverse updates are sent to defeat large routing loops. Working on the premise that increased route metrics generally indicate routing loops, Cisco's IGRP implementation sends poison reverse updates if a route metric has increased by a factor of 1.1 or greater.

polling An access method in which a primary network device inquires, in an orderly fashion, whether secondaries have data to transmit. The inquiry occurs in the form of messages to each secondary that give the secondary the right to transmit.

port An interface on an internetworking device (such as a router). In IP terminology, port is also used to specify the receiving upper-layer process.

POTS Plain Old Telephone Service. Standard analog telephone service used by many telephone companies throughout the United States.

PPP Point-to-Point Protocol. A successor to SLIP, this protocol provides router-to-router and host-to-network connections over synchronous and asynchronous circuits. See also *SLIP*.

presentation layer Layer 6 of the OSI reference model. This layer is concerned with the syntax of the data exchanged between two application-layer entities.

presentation services layer Layer 6 of the SNA architectural model. See *presentation layer*.

PRI Primary Rate Interface. ISDN interface to primary rate access. Primary rate access consists of a single 64-Kbps D channel plus 23 (in the case of 1.544 Mbps) or 30 (in the case of 2.048 Mbps) B channels for voice and/or data. See also *basic rate interface*, *BISDN*, and *ISDN*.

primary station In bit-synchronous link-layer protocols such as HDLC and SDLC, a station that controls the transmission activity of secondary stations and performs other management functions such as error control through polling or other means. Primary stations send commands to secondary stations and receive responses. Also called primaries. See also *secondary station*.

print server A networked computer system that fields, manages, and executes (or sends for execution) print requests from other network devices.

priority queueing Routing feature in which frames in an interface output queue are prioritized based on various features such as packet size and interface type.

Probe An address resolution protocol developed by Hewlett-Packard.

propagation delay The time required for data to travel over a network from source to ultimate destination.

protocol A formal description of a set of rules and conventions that govern how devices on a network exchange information.

protocol address See *network address*.

protocol converter Enables equipment with different data formats to communicate by translating the data transmission code of one device to the data transmission code of another device.

protocol stack Related layers of protocol software that function together to implement a particular communications architecture. Examples include AppleTalk and DECnet.

protocol translator A network device or software that converts one protocol into another, similar, protocol. For example, the Cisco CPT performs conversion between X.25 PAD and Telnet.

proxy An entity that, in the interest of efficiency, essentially stands in for another entity.

Proxy ARP Variation of the ARP protocol in which a third-party device (for example, a router) masquerades as an end node by sending an ARP response on behalf of that end node to the requesting host (which may not know how to use a router). Proxy ARP can save money by lessening bandwidth use on precious resources such as slow-speed WAN links.

PSN Packet Switch Node. An Internet packet switch. Also, a switching node in the X.25 architecture. Usually, the PSN is data communication equipment (DCE) and allows for connection to data terminal equipment (DTE). See also *X.25*. This acronym is also commonly used as an expansion for "packet-switched network."

PSNP Partial Sequence Number PDUs. Used to request LSPs from one IS-IS to another.

PSTN Public Switched Telephone Network. Refers to the telephone network.

PTT Postal Telephone and Telegraph. A government agency that provides telephone services. PTTs exist in most areas outside North America and provide both local and long-distance telephone services.

PU Physical Unit. SNA component that manages the physical resources of a node, as requested by a SSCP. There is one PU per node.

PU 2.1 Physical Unit 2.1. A type of network node used for connecting SNA nodes in a peer-oriented network. APPN is based upon Node Type 2.1. Type 2.1 nodes can also be connected into a traditional hierarchical SNA network.

pulse density Also called *ones density*. A measure of ones compared with the total number of digit time slots transmitted. Some specifications require no more than 15 consecutive zeros, with an average of 12.5% pulse density on T1 facilities.

PUP PARC Universal Protocol. A protocol similar to IP developed at Xerox Palo Alto Research Center.

PVC Permanent Virtual Circuit. Generally, a virtual circuit that is permanently established. PVCs save bandwidth associated with circuit establishment and tear down in those situations where certain virtual circuits must exist all the time.

Q

Q.920/Q.921 ISDN specifications for the user-network interface (UNI) data-link layer. See also *UNI*.

Q.931 CCITT recommendation. The standard for signaling to set up ISDN connections.

Q.93B CCITT recommendation that is a standard for signaling to set up ATM virtual connections. An evolution of CCITT Recommendation Q.931.

QOS Quality of Service. A measure of performance for a transmission system that reflects its transmission quality and availability of service.

query Message used (usually in a request-response protocol) to inquire about the value of some variable or set of variables.

queue Generally, an ordered list of elements waiting to be processed. In routing, a backlog of packets waiting to be forwarded over a router interface.

queueing delay The amount of time that data must wait before it can be transmitted onto a statistically multiplexed physical circuit.

queueing theory Scientific principles governing the formation or lack of formation of congestion on a network or at an interface.

R

RACE Research and Development Program in Advanced Communications in Europe. Project sponsored by the European Community for the development of broadband networking capabilities.

RADIO AUSTRIA A PSN based in Austria.

RARE Reseaux Associes pour la Recherche Europeénne. An association of European universities and research centers designed to promote an advanced telecommunications infrastructure in the European scientific community.

RARP Reverse Address Resolution Protocol. The logical reverse of ARP that provides a method for finding IP addresses based on media addresses.

RBHC Regional Bell Holding Company. One of seven telephone companies created after the AT&T divestiture in 1984. The RHBC crosses state lines.

RBOC Regional Bell Operating Company. One of seven telephone companies created after the AT&T divestiture in 1984. The RBOC exists entirely in one state. See also *BOCs*.

reassembly The putting back together of an IP datagram at the destination after it has been fragmented either at the source or at an intermediate node.

redirect A part of the ICMP and ES-IS protocols that allows a router to tell a host that use of another router would be more effective.

redirector Software that intercepts requests for resources within a computer and analyzes them for remote access requirements. If a remote access is required to satisfy the request, the redirector forms a RPC and sends the RPC to lower-layer protocol software for transmission through the network to the node that can satisfy the request.

redistribution Allowing routing information discovered through one routing protocol to be distributed in another routing protocol's update messages.

redundancy In telephony, the portion of the total information contained in a message that can be eliminated without loss of essential information or meaning. In computing, multiple (redundant) system elements that perform the same function.

relay OSI terminology for a device that connects two or more networks or network systems. A Layer 2 relay is a bridge; a Layer 3 relay is a router.

reliability Ratio of expected to received keepalives from a link. If the ratio is high, the line is reliable. Used as a routing metric.

remote bridge A bridge that connects physically disparate network segments via WAN links.

repeater A device that regenerates and propagates electrical signals between two network segments.

request/response unit See *RU*.

reverse channel See *back channel*.

RF Radio Frequency. Generic term referring to frequencies that correspond to radio transmissions. Cable TV and broadband networks use RF technology.

RFC Request For Comments. Documents used as the primary means for communicating information about the Internet. Some RFCs are designated by the IAB as "Internet standards." Most RFCs document protocol specifications such as Telnet and FTP, but some are humorous and/or historical. RFCs are available from Internet Network Information Centers.

RG-58 Coaxial cable with 50-ohm impedance. Used by IEEE 802.3 10Base2.

RG-62 Coaxial cable with 93-ohm impedance. Used by ARCnet.

RIF Routing Information Field. A field in the IEEE 802.5 header that is used by a source-route bridge to determine through which Token Ring network segments a packet must transit. A RIF is made up of ring and bridge numbers as well as other information.

ring group A collection of Token Ring interfaces on one or more Cisco routers that is part of one bridged Token Ring network.

ring latency The time required for a signal to propagate once around a ring in a Token Ring or IEEE 802.5 network.

ring monitor Centralized management tool for Token Ring networks based on IEEE 802.5 specification. See also *active monitor* and *standby monitor.*

ring topology Topology in which the network consists of a series of repeaters connected to one another by unidirectional transmission links to form a single closed loop. Each station on the network connects to the network at a repeater.

RIP Routing Information Protocol. An IGP supplied with Berkeley UNIX systems. The most common IGP in the Internet. RIP uses *hop count* as a routing metric. The largest allowable hop count for RIP is 16.

RJ-11 Standard 4-wire connectors for phone lines.

RJ-45 Standard 8-wire connectors for IEEE 802.3 1Base5 (StarLAN) networks. Also used as phone lines in some cases.

RJE Remote Job Entry. IBM-originated acronym referring to an application that is batch-oriented, as opposed to interactive. In RJE environments, "jobs" are submitted to a computing facility and output received later.

rlogin Terminal emulation program, similar to Telnet, offered in most UNIX implementations.

ROSE Remote Operations Service Element. The OSI RPC mechanism used by various OSI network application protocols.

route A path through an internetwork.

routed protocol A protocol that can be routed by a router. To route a routed protocol, a router must understand the logical internetwork as perceived by that routed protocol. Examples of routed protocols include DECnet, AppleTalk, and IP.

route extension In SNA, a path from the destination subarea node through peripheral equipment to a NAU.

route processor In Cisco's hardware architecture, a processor board that determines routes and runs configuration, security, accounting, debugging, and network management processes. Also sometimes called a supervisory processor. The CSC/3 and the CSC/4 are route processors.

router An OSI Layer 3 device that can decide which of several paths network traffic will follow based on some optimality metric. Also called a *gateway* (although this definition of gateway is becoming increasingly outdated), routers forward packets from one network to another, based on network-layer information.

routing The process of finding a path to the destination host. Routing is very complex in large networks because of the many potential intermediate destinations a packet might traverse before reaching its destination host.

routing metric The method by which a routing algorithm determines that one route is better than another. This information is stored in routing tables. Metrics include reliability, delay, bandwidth, load, MTUs, communication costs, and hop count. See also *path cost*.

routing protocol A protocol that accomplishes routing through the implementation of a specific routing algorithm. Examples of routing protocols include IGRP, RIP, and OSPF.

routing table A table stored in a router or some other internetworking device that keeps track of routes (and, in some cases, metrics associated with those routes) to particular network destinations.

routing update A message sent from a router to indicate network reachability and associated cost information. Routing updates are typically sent at regular intervals and after a change in network topology.

RPC Remote Procedure Call. The technological foundation of distributed (client-server) computing. Remote procedure calls are procedure calls that are built or specified by clients and executed on servers, with the results returned over the network to the clients.

RS-232-C Popular physical layer interface. Virtually identical to the V.24 specification.

RS-422 A balanced electrical implementation of RS-449 for high-speed data transmission.

RS-423 An unbalanced electrical implementation of RS-449 for RS-232-C compatibility.

RS-449 Popular physical layer interface. Essentially a faster (up to 2 Mbps) version of RS-232-C capable of longer cable runs.

RSRB Remote Source-Route Bridging. Source-route bridging over WAN links. RSRB is supported by Cisco routers in its 9.0 software release.

RTMP Routing Table Maintenance Protocol. Apple Computer's proprietary routing protocol. RTMP was derived from RIP.

RTP Routing table protocol. Used in Banyan VINES routing with delay as a routing metric.

RTS Request To Send. An RS-232 control signal that requests a data transmission on a communications line.

RTT Round-Trip Time. The time required for a network communication to travel from the source to the destination and back. RTT therefore includes time required for the destination to process the message from the source and generate a reply. RTT is used by some routing algorithms to aid in calculating optimal routes.

RU Request/response Unit. SNA request and response messages exchanged between NAUs in an SNA network.

RUB Router Hub. Product jointly developed by Cisco and SynOptics Communications that combines the capabilities of a router and a hub.

sampling rate The rate at which samples of a particular waveform's amplitude are taken.

SAP Service Access Point. An interface between adjacent OSI layers. Also *Service Advertisement Protocol*, a Novell protocol through which network resources such as servers become known to clients.

SAPONET-P South African public packet-switching data network.

SAR Segmentation and Reassembly. The process by which data frames are segmented into ATM cells at the transmitter and reassembled into their original format at the receiver.

SAS Single-Attached Station. Also known as a Class B station, an SAS is a device attached to FDDI media through a single PMD connection. Typically, the PMD connects to a Class A concentrator.

satellite communications Use of geostationary orbiting satellites to relay data between multiple earth-based stations. Satellite communications offer high bandwidth, cost which is not related to distance between earth stations, relatively long propagation delays, and broadcast capability.

SDLC Synchronous Data Link Control. IBM bit-synchronous link-layer protocol that has spawned numerous similar protocols, including HDLC and LAPB.

SDLC Transport Cisco router feature where disparate environments may be integrated into a single, high-speed, enterprise-wide network. Cisco routers can pass native SDLC traffic through point-to-point serial links and multiplex other protocol traffic over the same links. cisco routers can also encapsulate SDLC frames inside IP datagrams for transport over arbitrary (non-SDLC) networks.

SDLLC A feature where translation between SDLC and IEEE 802.2 type 2 is performed.

SDSU SMDS Data Service Unit (DSU). A DSU for access to SMDS via high-speed serial interfaces (HSSI) and other serial interfaces.

secondary station In bit-synchronous link-layer protocols such as HDLC, a station that responds to commands from a primary station. See also *primary station*.

security management One of five categories of network management defined by ISO for management of OSI networks. Security management subsystems are responsible for controlling access to network resources. See also *accounting management*, *configuration management*, *fault management*, and *performance management*.

segment Term used in the TCP specification to describe a single transport-layer unit of information.

serial transmission A method of data transmission in which the bits of a data character are transmitted sequentially over a single channel. See also *parallel transmission*.

server A node or software program that provides services to a *client*. See also *back end* and *client*.

service point An interface between non-SNA devices and NetView that sends alerts from equipment unknown to the SNA environment.

session A related set of communications transactions between two or more network devices. In SNA, a logical connection enabling two NAUs to communicate.

session layer Layer 5 of the OSI reference model. Coordinates session activity between applications, including application-level error control, dialog control, and remote procedure calls.

SGMP Simple Gateway Monitoring Protocol. A network management protocol that was considered for Internet standardization and later evolved into SNMP; documented in RFC 1028.

shielded cable Cable that has a layer of shielded insulation to reduce EMI.

shortest-path routing Routing that minimizes distance or path cost through application of some algorithm.

signaling The process of sending a transmission signal over a physical medium for purposes of communication.

simplex transmission Data transmission in only one direction.

single-mode fiber Fiber with a relatively narrow diameter through which only one mode will propagate. Such fiber is higher bandwidth than multimode fiber, but requires a light source with a narrow spectral width (for example, a LASER).

sliding window flow control Method of flow control in which a receiver gives transmitter permission to transmit data until a window is full. When the window is full, the transmitter must stop transmitting until the receiver advertises a larger window. TCP, other transport protocols, and several link-layer protocols use this method of flow control.

SLIP Serial Line Internet Protocol. Used to run IP over serial lines such as telephone circuits.

slotted ring LAN architecture based on a ring topology in which the ring is divided into slots that circulate continuously. Slots can be either empty or full, and transmissions must start at the beginning of a slot.

slow switching Packet processing performed by a CSC processor while operating at process level.

SMB Server Message Block. A file-system protocol used in LAN Manager and similar NOSs to package data and exchange information with other systems.

SMDS Switched Multimegabit Data Service. High-speed, packet-switched, datagram-based WAN networking technology offered by the telephone companies.

SMI Structure of Management Information. A document (RFC 1155) specifying rules used to define managed objects in the MIB.

SMT Station Management. FDDI X3T9.5 specification that defines how ring stations are managed.

SMTP Simple Mail Transfer Protocol. An Internet protocol providing electronic mail services.

SNA Systems Network Architecture. A large, complex, feature-rich network architecture developed in the 1970s by IBM.

SNADS SNA Distribution Services. Along with Document Interchange Architecture (DIA) and Distributed Data Management (DDM), one of three SNA transaction services architectures. SNADS provides asynchronous distribution of information between end users.

SNAP SubNetwork Access Protocol. Internet protocol that operates between a network entity in the subnetwork and a network entity in the end system and specifies a standard method of encapsulating IP datagrams and ARP messages on IEEE networks. The SNAP entity in the end system makes use of the services of the subnetwork and performs three key functions: data transfer, connection management, and quality of service selection.

SNI SNA Network Interconnection. IBM gateway connecting multiple SNA networks. SNI also stands for Subscriber Network Interface for SMDS-based networks. It is the interface between customer premises equipment (CPE) and an SMDS switch.

SNMP Simple Network Management Protocol. The Internet network management protocol. SNMP provides a means to monitor and set network configuration and runtime parameters.

SNPA SubNetwork Point of Attachment. This is a data link address (such as an Ethernet address, X.25 address, or Frame Relay DLCI address). SNPA addresses are used to configure a CLNS route for an interface.

socket Software structure operating as a communications end point within a network device.

SONET Synchronous Optical Network. High-speed (up to 2.5 Gbps) synchronous network approved as an international standard in 1988. The RBOCs are likely to make SONET popular as a transmission system underlying SMDS.

source address Address of a sending network device.

source-route bridging Method of bridging originated by IBM where the entire route to a destination is predetermined, in real time, prior to the sending of data to the destination. Contrast this with *transparent bridging*, wherein bridging occurs on a hop-by-hop basis. Source-route bridging (sometimes abbreviated to SRB) is most popular in Token Ring networks.

source-route translational bridging Sometimes referred to as SR/TLB, a method of bridging where source-route stations can communicate with transparent bridge stations with the help of an intermediate bridge that translates between the two bridge protocols.

source-route transparent bridging Bridging scheme proposed by IBM that attempts to merge the two most prevalent bridging strategies (transparent and source-route bridging). SRT, as it is sometimes referred to, employs both technologies in one device to satisfy the needs of all end nodes. No translation between the bridging protocols is done, as compared to *source-route translational bridging* (SR/TLB).

SPAN Space Physics Analysis Network. A data comparison network serving NASA projects and facilities, with extensions to Japan, Canada, and many European countries.

span Full duplex digital transmission line between two digital facilities.

spanning tree A loop-free subset of a network's topology.

spanning-tree algorithm An algorithm, the original version of which was invented by Digital Equipment Corporation, used to prevent bridging loops by creating a *spanning tree.* The algorithm is now documented in the IEEE 802.1d specification, although the Digital algorithm and the IEEE 802.1d algorithm are not the same, nor are they compatible.

speed matching A feature that provides sufficient buffering capability in a destination device to allow a high-speed source to transmit data at its maximum rate, even if the destination device is a lower-speed device.

split horizon updates A routing technique in which information about routes is prevented from exiting router interfaces through which that information was received. Split horizon updates are useful in preventing routing loops.

spooler An application that manages requests or jobs submitted to it for execution. Spoolers process the submitted requests in an orderly fashion from a queue. A print spooler is perhaps the most common example of a spooler.

SQE Signal Quality Error. A transmission sent by a transceiver back to the controller to let the controller know whether the collision circuitry is functional. Also called *heartbeat.*

SRB See *source-route bridging.*

SRT See *source-route transparent bridging.*

SR/TLB See *source-route translational bridging.*

SSCP System Services Control Point. Focal point within an SNA network for managing network configuration, coordinating network operator and problem determination requests, and providing directory services and other session services for network end users.

SSCP-PU session Session used by SNA to allow an SSCP to manage a node's resources through the PU. SSCPs can send requests to, and receive replies from, individual nodes in order to control the network configuration.

standard A commonly used or officially specified set of rules or procedures. See also *de facto standard* and *de jure standard.*

standby monitor Device in standby mode on a Token Ring network in case an active monitor becomes inactive. See also *active monitor* and *ring monitor.*

StarLAN Another name for IEEE 802.3 1Base5. A 1-Mbps CSMA/CD LAN promulgated by AT&T.

star topology LAN topology in which end points on a network are connected to a common central switch by point-to-point links.

start-stop transmission See *asynchronous transmission.*

static route A route that is manually entered into the routing table. Static routes take precedence over routes chosen by all dynamic routing protocols.

statistical multiplexer Multiplexing equipment that dynamically allocates trunk capacity only to active input channels, allowing more devices to be connected than with a traditional multiplexer. Also referred to as a *statistical time division multiplexer* or a *stat mux*.

store and forward Message-switching technique where messages are temporarily stored at intermediate points between the source and destination until such time as network resources (such as an unused link) are available for message forwarding.

STUN Serial Tunneling. Cisco acronym for a router feature allowing two SDLC- or HDLC-compliant devices to connect to one another through an arbitrary multiprotocol topology (using Cisco routers) rather than through a direct serial link. STUN provides configuration flexibility for the network administrator.

subarea Portion of a SNA network that consists of a subarea node and any attached links and peripheral nodes.

subarea node An SNA communication controller or host that handles complete network addresses.

subchannel In broadband terminology, a frequency-based subdivision creating a separate communications channel.

subnet mask A 32-bit address mask used in IP to specify a particular subnet. See also *address mask*.

subnetwork Term sometimes used to refer to a network segment. In IP networks, a network sharing a particular subnet address. In OSI networks, a collection of ESs and ISs under the control of a single administrative domain and using a single network access protocol.

subvector A data segment of a vector in an SNA message. A subvector consists of a length field, a key that describes the subvector type, and subvector specific data.

SURAnet Southeastern Universities Research Association Network. Network connecting hosts in 12 southeastern states.

SVC Switched Virtual Circuit. A virtual circuit that can be dynamically established on demand. Contrasted with *PVC*.

switch processor In Cisco's hardware architecture, a bit-slice processor board that acts as the administrator for all ciscoBus activities. Also called the *ciscoBus controller*.

synchronization Establishing common timing between sender and receiver.

synchronous transmission Operation of a network system wherein events occur with precise clocking.

T

T1 Bell system terminology referring to a digital carrier facility used for transmission of data through the telephone hierarchy. The rate of transmission is 1.544 Mbps.

T3 A digital WAN service that operates at 45 Mbps.

TAC Terminal Access Controller. An Internet host that accepts terminal connections from dial-up lines.

TACACS Terminal Access Controller Access System. A system developed by the Defense Data Network community to control access to its TACs. TACACS is supported by Cisco products.

T-carrier Time division multiplexed transmission method usually referring to a line or cable carrying a DS-1 signal.

T-connector T-shaped device with two female and one male BNC connectors.

TCP/IP Transmission Control Protocol/Internet Protocol. The two best-known Internet protocols, often erroneously thought of as one protocol. TCP corresponds to Layer 4 (the transport layer) of the OSI reference model. It provides reliable transmission of data. IP corresponds to Layer 3 (the network layer) of the OSI reference model and provides connectionless datagram service. TCP/IP was developed by the U.S. Department of Defense in the 1970s to support the construction of worldwide internetworks.

TCU Trunk Coupling Unit. In Token Ring networks, a physical device that enables a station to connect to the trunk cable.

TDM Time Division Multiplexing. A technique where information from multiple channels can be allocated bandwidth on a single wire based on time slot assignment.

TDR Time Domain Reflectometer. Device capable of sending signals through a network medium to check cable continuity and other attributes. TDRs are used to find physical layer network problems.

telecommunications Term referring to communications (usually involving computer systems) over the telephone network.

TELENET Major public PSN in the United States.

telex Teletypewriter service allowing subscribers to send messages over the PSTN.

Telnet Standard Internet terminal emulation protocol.

termid Also called *Xid*, an SNA cluster controller identification. Termid is only meaningful for switched lines.

terminal adaptor An ISDN modem.

terminal emulation A very popular network application in which a computer runs software that makes it appear to a host across the network as a directly attached dumb terminal.

terminator Electrical resistance at the end of a transmission line that absorbs signals on the line, thereby keeping them from bouncing back and being heard again by network stations.

TFTP Trivial File Transfer Protocol. A simplified version of FTP allowing the transfer of files from one computer to another over a network.

THC over X.25 Feature providing TCP/IP header compression over X.25 links, for purposes of link efficiency.

THEnet Texas Higher Education Network. Regional network comprising over 60 academic and research institutions in the Texas area.

Thinnet A term used to define a thinner, less expensive version of the cable specified in the IEEE 802.3 10Base2 standard when compared with *Cheapernet*.

throughput Rate of information arriving at, and possibly passing through, a particular point in a network system.

time-out An event that occurs when one network device expects to hear from, but does not hear from, another network device within a specified period of time. The resulting time-out usually results in a retransmission of information or the outright dissolving of the virtual circuit between the two devices.

TN3270 Terminal emulation software that allows a terminal to appear to an IBM host as a 3278 Model 2 terminal. Cisco's TN3270 implementation allows user to access an IBM host without using a special IBM server or a UNIX host acting as a server.

token A control information frame, possession of which grants a network device the right to transmit.

token bus LAN architecture using token passing access over a bus topology. This LAN architecture is the basis for the IEEE 802.4 LAN specification.

token passing Access method by which network devices access the physical medium in an orderly fashion based on possession of a small frame called a *token*. See also *contention* and *circuit switching*.

Token Ring A token-passing LAN developed and supported by IBM. Very similar to an IEEE 802.5 LAN.

TOP Technical Office Protocol. An OSI-based architecture developed for office communications by Boeing.

topology The physical arrangement of network nodes and media within an enterprise networking structure.

TOS Type of Service. See *COS*.

TP0 Transport Protocol Class 0. An OSI connectionless transport protocol for use over reliable subnetworks defined by ISO 8073.

TP4 Transport Protocol Class 4. An OSI connection-based transport protocol defined by ISO 8073.

trailer Control information appended to the data in a packet.

transaction A result-oriented unit of communication processing.

transaction services layer Layer 7 in the SNA architectural model. See *application layer*.

transceiver See *MAU*.

transceiver cable See *AUI*.

transit bridging Bridging that uses encapsulation to send a frame between two similar networks over a dissimilar network.

translational bridging Bridging between networks with dissimilar MAC sublayer protocols.

transmission control layer Layer 4 in the SNA architectural model. Responsible for establishing, maintaining, and terminating SNA sessions, sequencing data messages, and session level flow control.

transmission group In SNA routing, one or more parallel communications links treated as one communications facility.

transmission link See *link*.

TRANSPAC Major packet data network run by France Telecom.

transparent bridging Bridging scheme preferred by Ethernet and IEEE 802.3 networks in which bridges pass frames along one hop at a time based on tables associating end nodes with bridge ports. Transparent bridging is so named because the presence of bridges is transparent to network end nodes.

transport layer Layer 4 of the OSI reference model. The transport layer is responsible for reliable network communication between end nodes. It implements flow and error control and often uses virtual circuits to ensure reliable data delivery.

traps Unsolicited messages sent by an SNMP agent to a network management system (NMS) that indicate the occurrence of a significant event.

tree topology LAN topology similar to a bus topology, except that tree networks can contain branches. Like the bus topology, transmissions from a station propagate the length of the medium and are received by all other stations.

TRouter Cisco product capable of both routing and communication service.

trunk Transmission channel connecting two switching devices.

TUV Test agency within Germany that certifies products to European EMC and safety standards.

twisted pair Relatively low-speed transmission medium consisting of two insulated wires arranged in a regular spiral pattern. The wires may be shielded or unshielded. Twisted pair is very common in telephony applications and is increasingly common in data networks.

TYMNET Major public PSN in the United States.

Type 1 operation IEEE 802.2 (LLC) connectionless operation.

Type 2 operation IEEE 802.2 (LLC) connection-oriented operation.

type of service routing Routing scheme where the choice of a path through the internetwork depends on the characteristics of the subnetworks involved and of the packet, as well as the shortest path to the destination.

U

UDP User Datagram Protocol. A connectionless transport-layer protocol belonging to the Internet protocol family.

UL Underwriters Laboratories, Inc. Independent agency within the United States that tests product safety.

ULP Upper-Layer Protocol. A protocol higher in the OSI reference model than the current reference point. ULP is often used to refer to the next-highest protocol in a particular protocol stack.

UltraNet Very high-speed (125 Mbps) network developed and marketed by Ultra Network Technologies.

unbalanced configuration HDLC configuration with one primary station and multiple secondary stations.

UNI The user–network interface defined by the ATM Forum for public and private ATM network access. The interface between an ATM end system (such as a router) and an ATM switch. Also used in Frame Relay. Called SNI (subscriber network interface) for SMDS.

unicast address An address specifying a single network device.

unipolar Literally meaning one polarity, unipolar is the fundamental electrical characteristic of internal signals in digital communications equipment. Contrasted with *bipolar.*

unity gain In broadband networks, the balance between signal loss and signal gain through amplifiers.

UNMA Unified Network Management Architecture. AT&T's network management architecture.

unnumbered frames HDLC frames used for various housekeeping purposes, including link startup and shutdown and mode specification.

USENET Initiated in 1979, one of the oldest and largest cooperative networks, with over 10,000 hosts and a quarter of a million users. Its primary service is *news*, a distributed conferencing service.

UUCP UNIX-to-UNIX Copy Program. Protocol used for communication between consenting UNIX systems. Also, a UNIX-based network closely associated with USENET.

V

V.24 A common physical-layer interface in many countries. Very similar to EIA-232D and RS-232-C.

V.25bis dialing A CCITT standard for in-band dialing on bit-synchronous (HDLC) serial lines. Used in DDR. Supports addressed call mode.

VCCI Voluntary Control Council for Interference. Agency within Japan that deals with interference generated by data-processing equipment.

VPI/VCI Virtual Path Identifier/Virtual Channel Identifier. Combined, these fields identify a connection in the ATM network. VCI uses 16 bits and VPI uses 8 bits.

vector A data segment of an SNA message. A vector consists of a length field, a key that describes the vector type, and vector specific data.

VINES Virtual Network System. A NOS developed and marketed by Banyan Systems.

virtual circuit A logical circuit set up to ensure reliable communication between two network devices.

virtual route SNA terminology for virtual circuit. A logical connection between subarea nodes that is physically realized as a particular explicit route.

VLSM Variable Length Subnet Mask. The ability to specify a different subnet mask for the same network number on different subnets. VLSM can help optimize available address space. It is currently supported by the *OSPF* routing protocol and by static routing.

VTAM Virtual Telecommunications Access Method. A set of programs that control communication between nodes and application programs running on a host system.

VTP Virtual Terminal Protocol. An ISO application for establishing a virtual terminal connection across a network.

W

WAN Wide Area Network. A network spanning a wide geographic area. See also *LAN* and *MAN*.

waveform coding Electrical techniques used to convey binary signals.

wideband See *broadband*.

wiring closet Specially designed room used for wiring data and voice networks. Wiring closets serve as a central junction point for wiring and wiring equipment that is used for interconnecting devices.

WISCNET TCP/IP network in Wisconsin, U.S.A. connecting 27 campuses of the University of Wisconsin plus a number of private colleges. Links are 56 Kbps and T1.

X

X.21 A CCITT recommendation that defines a protocol for communication between a circuit-switched network and user devices.

X.25 A CCITT standard that defines the packet format for data transfers in a public data network. Many establishments have X.25 networks in place that provide remote terminal access. These networks can be used for other types of data, including IP, DECnet, and XNS.

X.28 A CCITT recommendation that defines the terminal-PAD interface.

X.29 A CCITT recommendation that defines the PAD-computer interface.

X.3 A CCITT recommendation that defines various PAD parameters.

X3T9.5 The number assigned to the Task Group of Accredited Standards Committee for their internal, working document describing the Fiber Distributed Data Interface. See *FDDI*.

X.400 A CCITT recommendation specifying a standard for electronic mail transfer.

X.500 A CCITT recommendation specifying a standard for distributed maintenance of files and directories.

XID Exchange identification.

Xid See *termid*.

XDMCP X Display Manager Control Protocol. Protocol used to communicate between X terminals and workstations running UNIX.

XNS Xerox Network Systems. A protocol suite originally designed by Xerox PARC. Many PC networking companies, such as Ungermann-Bass, Novell, Banyan, and 3Com, used or currently use a variation of XNS as their primary transport protocol stack.

XRemote Protocol developed specifically to optimize support for X Windows over a serial communications link.

X Windows Distributed, network-transparent, device-independent, multitasking windowing and graphics system originally developed by MIT for communication between X terminals and UNIX workstations.

Z

zero code suppression Coding scheme to substitute a one in the seventh bit of a string of eight consecutive zeros. See also *pulse density.*

zone In AppleTalk, a logical group of network devices.

Selected Network References

Bellamy, J. *Digital Telephony.* Wiley, 1982.

Black, Uyless *Data Networks: Concepts, Theory, and Practice.* Prentice Hall, 1989.

Comer, Douglas *Internetworking with TCP/IP: Principles, Protocols, and Architecture.* Prentice Hall, 1988.

Digital Equipment Corporation *DECnet Digital Network Architecture (Phase IV) General Description.* Order No. AA-149A-TC, 1982.

Duc, N.Q. "ISDN Protocol Architecture," *IEEE Communications Magazine 23*, No. 3, March, 1985.

Feinler, J., O.J. Jacobsen, and M. Stahl *DDN Protocol Handbook*, Volumes 1-4, DDN Network Information Center, 1985.

IBM Corporation *Systems Network Architecture Concepts and Product.* Order No. GC30-3072-3, IBM, 1986.

IBM Corporation *Systems Network Architecture Technical Overview.* Order No. GC30-3073-2, IBM, 1986.

Jacobsen, Ole, (ed.) *ConneXions: The Interoperability Report.* Interop, Inc., 1987 - present.

Kuo, F. F., (ed.) *Protocols and Techniques for Data Communication Networks.* Prentice Hall, 1981.

Lam, S. S., (ed.) *Tutorial: Principles of Communication and Networking Protocols.* IEEE Computer Society Press, 1984.

Lippis, Nick "The Internetwork Decade." *Data Communications*, October, 1991.

Martin, James *SNA: IBM's Networking Solution.* Prentice Hall, 1987.

Metcalf, R. M. and Boggs, D. R. "Ethernet: Distributed Packet Switching for Local Computer Networks." *Communications of the ACM* 19, No. 7, July, 1976.

Quarterman, John S. *The Matrix: Computer Networks and Conferencing Systems Worldwide.* Digital Press, 1990.

Rose, Marshall T. *The Open Book: A Practical Perspective on OSI.* Prentice Hall, 1990.

Rose, Marshall T. *The Simple Book: An Introduction to Management of TCP/IP-based Internets.* Prentice Hall, 1991.

Ross, F. E. "FDDI - A Tutorial." *IEEE Communications Magazine 24*, No. 5, May, 1986.

Schwartz, M. *Telecommunications Networks: Protocols, Modeling and Analysis.* Addison-Wesley, 1987.

Sherman, Ken *Data Communications: A User's Guide.* Prentice Hall, 1990.

Spragins, et. al. *Telecommunications Protocols and Design.* Addison-Wesley, 1991.

Stallings, William *Handbook of Computer-Communications Standards*, Vol. 2. Macmillan, 1990.

Stallings, William *Local Networks*, 3rd edition. Macmillan, 1990.

Strole, N. C. "The IBM Token Ring Network—A Functional Overview." *IEEE Network 1*, No. 1, January, 1987.

Sunshine, Carl A. (ed.) *Computer Network Architectures and Protocols*, 2nd edition. Plenum Press, 1989.

Tanenbaum, Andrew S. *Computer Networks*, 2nd edition. Prentice Hall, 1988.

Zimmerman, H. "OSI Reference Model—The ISO Model of Architecture for Open Systems Interconnection." *IEEE Transactions on Communications* COM-28, No. 4, April, 1980.

Corporate Headquarters
Cisco Systems, Inc.
P.O. Box 3075
1525 O'Brien Drive
Menlo Park, CA 94026
USA
Tel: 415 326-1941
800 553-NETS (6387)
Fax: 415 326-1989

European Headquarters
Cisco Systems Europe, s.a.r.l.
BP 706 Evolic
16 avenue du Quebec
91961 Les Ulis Cedex
France
Tel: 33 1 6092 2000
Fax: 33 1 6928 8326
European Offices
Belgium
Tel: 32 2 643 2626
Fax: 32 2 643 2627
Germany
Tel: 49 89 3215 070
Fax: 49 89 3215 0710
Italy
Tel: 39 2 62 726 43
Fax: 39 2 62 729 13
Spain
Tel: 34 1 57 203 60
Fax: 34 1 57 071 99
Sweden
Tel: 46 8 19 62 05
Fax: 46 8 19 04 24
Switzerland
Tel: 41 55 95 60 44
Fax: 41 55 95 64 14
United Kingdom
Tel: 44 494 464944
Fax: 44 494 465300

Intercontinental Headquarters
(Latin America and Asia-Pacific)
Cisco Systems, Inc.
1525 O'Brien Drive
P.O. Box 3075
Menlo Park, CA 94026
USA
Tel: 415 326-1941
Fax: 415 688-4646
Regional Offices
Cisco Systems Australia Pty., Ltd.
Tel: 61 2 957 4944
Fax: 61 2 957 4077
Cisco Systems Canada Limited
Tel: 416 506-1500
Fax: 416 506 1506
Cisco Systems Hong Kong, Ltd.
Tel: 852 529 3534
Fax: 852 520 2676
Cisco Systems de Mexico, S.A. de C.V.
Tel: 525 254 0880
Fax: 525 531 9659
Cisco Systems New Zealand
Tel: 9 649 358 3776
Fax: 9 649 358 4442

Japanese Headquarters
Nihon Cisco Systems K.K.
Shiba Excellent Building, 5F
2-1-13 Hamamatsucho,
MinatoKuTokyo 105 Japan
Tel: 81 3 5472 3571
Fax: 81 3 5472 3577

Cisco Systems has over 50 sales offices worldwide. Call 415 326-1941 to contact your local account representative or, in North America, call 800 553-NETS (6387).

CISCO SYSTEMS

Text printed on recycled paper containing 10% post-consumer waste.

78-1086-01