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A

ACD—automatic call distributor: A specialized phone system developed for handling high-volumes of incoming voice traffic; now used for outgoing calls too.

ADSL—asymmetric digital subscriber line: A type of DSL service and an evolving high-speed transmission technology that uses the existing UTP copper wires from the telephone company's central office to the subscriber's premises. It requires ADSL modems at both locations. Asymmetric means the line has different speeds away from and toward the user (Voice and Data).

AMPS—advanced mobile phone service: An analog network protocol for air interface used by cellular operators in North America. Two cellular phone companies in each geographic region share the spectrum allocated to AMPS. (Other parts of the world embraced cellular service later than North America and are therefore digital.)

Analog: In telephone transmission, spoken words are transmitted as analog sound waves or frequencies (as opposed to digital signals). Until the late 1960s, all telephone calls were analog. Now, while most phone companies are digital, there are still many sections of telephone networks that use analog service, including the majority of home telephones that plug into jacks and the telephone lines from homes to the nearest phone company equipment. Modems broaden analog capabilities allowing these lines to carry data from digital computers.

ATM—asynchronous transfer mode: A high-speed switching technology that uses fixed-size data cells to transmit voice, data, and video.

B

Backbone: A network segment that connects other network segments and carries high concentrations of traffic.

Bandwidth: The measurement of the capacity of a transmission. The terms for measurement vary from analog (hertz—“S” cycles per second) and digital (bits per second). Common measurements include: Kbps (kilobits per second), Mbps (megabits per second), and Gbps (gigabits per second).

Bandwidth on demand: An option to use and pay for bandwidth only when you need it. This flexibility, offered by more and more ISPs, is usually related to a T-1 line and works well for growing companies that have high-volume connectivity needs requiring the use of a full T-1 only during certain busy times. High-demand needs might include Web and e-mail servers, active networks, large data and file transfers (including CAD/CAM files), and multimedia applications (including video or image file transfers and online videoconferencing).

Bit/byte: A *bit* is the smallest unit of data in a computer. However, computers usually store data and execute instructions in multiples of bits, called bytes. In most computer systems, there are eight bits in a byte (which generally represents a single letter or character, or four bytes to a word). A byte is abbreviated with a capital "B" and a bit is abbreviated with a lowercase "b." Bandwidth is typically measured in bits per second, whereas computer storage is measured in bytes.

Broadband: Data transmissions in which multiple transmissions share the same path or a circuit supporting bandwidth in excess of T-3 capacity (45 Mbps).

C

CAP—competitive access provider: Originally formed to bypass local telephone service dependency, these organizations sell local and long-distance telephone and Internet service.

Cellular: A wireless personal telecommunications system that utilizes base station controllers, each having multidirectional antennas that create spatial cells for the purpose of frequency reuse through space division multiplexing.

Centrex: Central exchanges, like PBXs, and route and switch calls. With Centrex, the services are managed by the local telephone, where the telecommunications equipment for the service physically lies.

CIC code—carrier identification code: A unique four-digit code given to telecommunications carriers for billing and call routing purposes.

CIR—committed information rate: The guaranteed rate of bandwidth available to a customer. Used in frame relay contracts to ensure a customer has necessary bandwidth available.

CLEC—competitive local exchange carrier: A telecommunications carrier given permission by local regulatory agencies to offer local telephone service.

CO—central office: Generally, a telephone company facility where subscribers' lines are aggregated and connected to switching equipment.

CPE—customer premise equipment: Telecommunications and data networking equipment that resides at the customer's facility.

CSU/DSU—channel service unit/data service unit: A device used for connecting CPE to digital circuits. It sits between a digital circuit from the CO and the subscriber's data communications equipment. The device terminates the digital channel at the customer's location and performs line conditioning functions, permitting high-speed bandwidth.

D

Dedicated service: Also known as private lines because the party leasing the line has exclusive use of the circuit. Service is billed at fixed monthly rates and is available 24-hours a day, seven days a week. Both analog and digital lines are offered as dedicated services. Examples include T-1 lines, fractional T-1s, and T-3 circuits.

Denial of service attack: A security attack on a network that floods it with so many requests that regular traffic is either slowed or completely interrupted. It is a deliberate attempt to disable a network. It starts with an innocent PING utility to determine whether a specific IP address is accessible. (See also PING and Smurf attack.)

Digital: The first digital telephone system switch for routing calls came in the late 1970s from Northern Telecom, but it did not become widely available until the 1980s. Compared to analog frequencies, digital signals travel longer distances, at faster speeds, and with clearer voice quality and less static. Digital signals also require less complex peripheral equipment. Instead of transmitting in sound waves, digital signals are transmitted in binary bits.

DSL—digital subscriber line: First introduced in 1989, the biggest obstacle to a digital subscriber line (DSL) is availability, which is still quite limited in many areas. There is a growing family of DSL services, an evolving high-speed transmission technology that uses the existing UTP copper wires from the telephone company's central office to the subscriber's premises. Its main applications are Internet and video file access. DSL technology increases the speed of the copper cabling in the local loop without

adding new copper cabling or fiber to the curb or customer's location. DSL services allow voice and data to share the same copper cable and usually require the use of a splitter at the customer's premises to separate voice and data traffic from the line. Forms of DSL include ADSL, RADSL, IDSL, SDSL, HDSL, and VDSL.

DSL Lite: Also known as G.Lite. Slower version of DSL service boasting easier installation, as no splitter is required. Maximum upstream data rate for the largely consumer offering is 384 Kbps, with a 1 Mbps downstream rate.

DS-0—digital signal level-0: Refers to the speed of each channel (64 Kbps) of a T-1 circuit (1.544 Mbps).

DS-1—digital signal level-1: Measurement of a digital circuit providing 1.544 Mbps bandwidth in the United States, Canada, and Japan. A DS-1 in Europe provides 2.048 Mbps bandwidth. It includes 24 circuits, or channels, in the United States, Canada, and Japan. In Europe, a DS-1 includes 30 channels.

DS-3—digital signal level-3: Measurement of a digital circuit providing 44.7 Mbps bandwidth in the United States and Canada and 32.06 Mbps in Japan. A DS-3 in Europe provides 34.368 Mbps bandwidth. It includes 672 channels in the United States and Canada and 480 circuits in Japan. In Europe, a DS-3 includes 480 channels.

E

E-1: The European equivalent of the North American T-1 circuit. The bandwidth is 2.048 Mbps.

E-3: The European equivalent of the North American T-3 circuit. The bandwidth is 34.368 Mbps.

F

FDDI—fiber distributed data interface: A protocol in which computers communicate 100 Mbps over fiber optic cabling.

Fractional T-1: Refers to an arrangement in which two to six channels of a T-1 are leased, with each channel providing 64 Kbps of bandwidth.

Fractional T-3: Refers to an arrangement in which a fraction of a T-3 circuit is leased in order to provide the service of a T-1 or similar circuit, but at a lesser price.

Frame relay: A protocol-independent telecommunications data networking service that uses switch technology to deliver various-sized packets across public networks.

FTP—file transfer protocol: A protocol used for transferring files from one computer to another over a TCP/IP network (including the Internet).

G

Gateway: Electronic repeater devices that intercept and steer electrical signals from one network to another. A gateway may be small or large, but it is an entrance into, and exit out of, a communications network.

Gigapops: Gigabit points of presence—regional aggregation points that will allow universities to coordinate their connectivity to the Internet2 network. (Internet2's architecture is one of rapid connectivity through high-speed switching points being developed across the U.S.) Gigapops offer sufficient routing and switching capacity for multimedia applications like streaming audio and video and for collaborative tools that top university labs need to conduct sophisticated research work. The hope is that the use of

gigapops for the next-generation Internet will isolate significant amounts of traffic to a local or dedicated infrastructure, offloading the commercial Internet networks, thus relieving some of the Internet's congestion.

H

HDSL—high-bit-rate digital subscriber line: DSL service requiring four wires limited to 12,000-foot distances and maximum bandwidth of 1.54 Mbps upstream and 1.54 Mbps downstream.

I

IDSL—ISDN digital subscriber line: DSL service with limited availability. It possesses 18,000-feet coverage and 128-144 Kbps bandwidth upstream and downstream.

ILEC—incumbent local exchange carrier: Local telephone service providers in existence prior to the Telecommunications Act of 1996.

ITU—International Telecommunications Union: A United Nations-sponsored group that sets frequency allocations for the world, coordinates telco practices, and promotes telecommunications growth in developing countries. It is based in Geneva, Switzerland. Its scope includes telegraphy, telephony, telematics, data, and other new services.

Internet2: Not a single separate network, Internet2 joins members' networks with advanced technologies. Its aim is to develop new points of presence (POPs) that will connect university campuses with a high-speed network operating at 2.4 gigabits per second by the year 2000. It is an effort to push the advancement of Internet technology and applications far beyond their current capabilities—including IPv6, multicasting, and quality of service (QoS)—to enable a new generation of Internet applications.

IP—internetworking protocol: A connectionless protocol that uses datagrams, or data packets, for sending data between networks.

ISDN—integrated services digital network: ISDN is a digital network standard that comes in two forms. The technology supports voice, data, and video over a single telephone line. Basic rate interface (BRI) constitutes two 64 Kbps B channels, while primary rate interface (PRI) uses 24 64-Kbps channels.

ISP—Internet service provider: Organizations that typically offer e-mail, Internet access, Web hosting services, and high-speed circuit sales.

IXC—inter exchange carrier: Facilities-based companies providing inter-LATA (or long-distance) voice, and data services.

J

JTAPI—Java telephony application programming interface: Extends computer-telephony support to Java applications.

L

Last mile: The link (usually composed of twisted-pair copper cabling) between an end-user and the telephone carrier’s central office. “Last mile” infrastructure generally runs up to 12,000 feet, a little more than two miles, so the term shouldn't be taken literally.

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LATA—local access and transport area: Consists of approximately 200 local service areas in the U.S. in which local telephone companies may provide telecommunications services. LATAs were created following the federal government's breakup of AT&T.

LDAP—lightweight directory access protocol: A standard for storing information in a common format enabling companies to use one central directory for updating multiple directories.

LEC—local exchange carrier: A local telephone company.

Local loop: The telecommunications infrastructure leg from the subscriber's premises to the telephone company's point of presence. Twisted-pair copper-cabling, fiber optics, or even microwave transmissions can link this circuit.

M

Mail bomb: To spam, or send massive amounts of e-mail to a single person with the intention of crashing his or her computer. A successful mail bomb may cause the victim's disk quota to be exhausted, the disk holding his/her mailbox to fill up, or his/her computer to spend a large portion of its time processing mail.

Multiplexing: A technology enabling multiple devices to share a telephone circuit.

O

OC-3: Optical carrier technology. An OC-3 line provides bandwidth of 155-Mbps and 2,016 64-Kbps channels.

OC-12: Optical carrier technology. An OC-12 line provides bandwidth of 622-Mbps and 8,064 64-Kbps channels.

P

Packet switching: A network technique in which data packets contain addressing and error-correcting information, in addition to informational data.

PBX—private branch exchange: Computerized telephone systems that route telephone calls within an organization, as well as from outside the organization.

PING: A PING request is generally used to troubleshoot Internet connections, but when a network is overwhelmed with replies to a PING, it becomes a security breach called a "Smurf." (See also: denial of service attack and Smurf attack.)

POP—point of presence: The long-distance company equipment that is connected to a local telephone carrier's central office. It's at the POP that telephone and data calls are handed off between local and long-distance telecommunications companies.

POTS—plain old telephone service: A basic, no-frills-added telephone line connected to a residential or small business location. POTS lines are analog from the end user's premises to the nearest local telephone company station or central office.

PPP—point-to-point protocol: A standard protocol used to establish communication over telephone lines using modems.

PPTP—point-to-point tunneling protocol: A protocol that enables "tunneling," or use of other protocols (IPX, NetBEUI, or TCP/IP) wrapped inside PPP data packets in a manner that provides a secure link between a client and server over the Internet.

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R

RADSL—Rate-adaptive digital subscriber line: A variation of DSL whose speed and effective distances vary depending on the condition of the customer's copper cabling.

RBOC—regional Bell operating company: Following the divestiture of AT&T in 1983, the 22 Bell telephone operating companies were divided into seven regional holding companies: Ameritech, Bell Atlantic, BellSouth, NYNEX, Pacific Telesis, Southwestern Bell, and U.S. West. Mergers and acquisitions have since muddied the RBOC landscape.

Router: A hardware device or software program that enables communication across networks.

S

SDSL—symmetric digital subscriber line: SDSL requires only one pair of wires. It operates at up to 24,000 feet and provides upstream bandwidth of 1.1 Mbps and downstream capacity at the same rate, hence its name.

Script kiddies: Aspiring hackers who use ready-made scripts, languages, and techniques that were written by more experienced hackers to break into online distant computer sites, usually via dial-up phone lines.

SHTTP—secure HTTP: A system proposed by a coalition of businesses interested in developing the Internet for commercial uses. As a higher-level protocol that works only with the HTTP protocol, SHTTP is potentially more extensible than SSL.

Set-top box: An Internet appliance for the home. It is a kind of thin client that contains a Web browser and the TCP/IP protocol, and it connects to the Internet through a phone line ("WebTV") or cable TV. Several kinds of new set-top boxes are being developed for Internet TV and other interactive services.

SIM—subscriber identity module: Also known as a "smart card," a SIM card is the physical item in a mobile telephone that contains all necessary information for uniquely identifying a subscriber.

SLA—service level agreement: Documentation or a contract that details service quality commitments between a carrier and the subscriber.

SMTP—simple mail transfer protocol: SMTP is a TCP/IP protocol used for sending mail between e-mail servers.

SONET—synchronous optical network: SONET converts electrical impulses to light impulses and back, using multiplexing to transfer high-speed digital bits onto fiber optic cabling and back at blazing speeds. SONET supports speed rates that currently exceed 13 Gbps.

Smurf attack: A maliciously sent PING request sent to an Internet broadcast address, where it can be replicated up to 255 times. Since the attacker's address appears to be the address of the victim, all PING request replies come to the victim's address instead of the real sender's address. A single attacker sending thousands of these PING messages per second can bring an entire ISP network down by filling its T-1 or T-3 with PING replies. The Computer Emergency Response Team at Carnegie Mellon University said Smurf attacks went up from 3 percent of reported incidents in January 1998 to 10 percent by December 1998.

Spam: Any unsolicited message sent via e-mail to numerous people.

SSL—secure socket layer: A low-level encryption standard (devised and used by Netscape) that encrypts transactions in protocols such as HTTP, NNTP, and FTP. The SSL protocol includes provisions

for server authentication (verifying the server's identity to the client), encryption of data in transit, and optional client authentication (verifying the client's identity to the server).

Switch: A device that opens and closes circuits or selects paths.

Switched 56: This switched data service permits subscribers to create dial-up connections that transmit data at 56 Kbps over a four-wire digital synchronous circuit.

T

T-1: A circuit providing 1.544-Mbps bandwidth in the United States, Canada, and Japan. A DS-1 line in Europe provides 2.048-Mbps bandwidth. Includes 24 circuits, or channels, in the United States, Canada, and Japan. In Europe, a DS-1 includes 30 channels. Uses time division multiplexing.

T-3: A circuit providing 44.7-Mbps bandwidth in the United States and Canada and 32.06 Mbps in Japan. A DS-3 line in Europe provides 34.368-Mbps bandwidth. Includes 672 channels in the United States and Canada and 480 circuits in Japan. In Europe, a DS-3 includes 480 channels. Uses time division multiplexing.

TAPI—telephony application programming interface: A programming interface that allows a PC running Windows to connect to telephone services through a server. TAPI was developed by Microsoft and Intel in 1993 and allows Windows client applications to access voice services on LAN or WAN connections. TAPI provides interoperability between PCs and telephone equipment such as PBXs.

TCP—transfer control protocol: TCP creates a connection-oriented session, or virtual circuit, between nodes on a network.

Telefelony/telefelon: Telco fraud, a huge issue facing the telco industry. Telefelons are hackers who break into company phone systems to make expensive phone calls worldwide.

Telematics: Also called mobile telematics, it involves integrating wireless communications and (usually) location tracking devices into automobiles to do remote engine diagnostics, track stolen vehicles, provide roadside assistance, and more.

Time division multiplexing: A technique in which time slots are allotted for transmitting a number of different data, voice, and video signals simultaneously over a single communications line. Not as efficient as ATM and IP, which do not assign specific time slots.

Trunk: A trunk is a general-use circuit, which spans from the CO to the PBX to establish a connection between the two switching devices.

TSAPI—telephony server application programming interface: Integrates voice and data traffic on one Novell NetWare network either over a LAN or WAN.

Twisted pair: Solid core copper wire, not a silver satin wire, twisted together in pairs.

U

UDP—user data protocol: UDP is considered a connectionless protocol because packets arrive at the destination independently and from various routes. As a result, UDP packets have smaller headers than TCP packets, due to the latter’s use of addressing and error correction data.

UTP—unshielded twisted-pair: A type of twisted-pair copper cabling in which the cabling is unshielded.

V

VoIP—voice-over Internet protocol: Also called IP telephony. VoIP is the two-way transmission of phone conversations over an IP network, allowing audio to travel over the Internet, intranets, or private LANs and WANs. Users at both locations must have identical or compatible software. Calls may be made from PC-to-PC, PC-to-phone, or phone-to-phone, using an Internet telephony service provider (ITSP). VoIP is popular for international calls, since the calls are essentially free over the Internet.

VDSL—very high-bit-rate digital subscriber line: VDSL supports upstream data speeds of up to 3 Mbps and downstream capacity of up to 52 Mbps. However, the technology's distance limitation is severe, requiring customer premises to be located within 1,000-feet for such network performance. Reaching to 4,500 feet drops upstream capacity to 640 Kbps and downstream speed to 13 Mbps.

VPN—virtual private networks: VPNs provide features of private networks without the need for dedicated circuits between sites. Instead, distributed sites wanting to connect via VPNs connect to telecommunications facilities in their local area.

X

XDSL: The "X" simply stands for a form of digital subscriber line service.