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NEWTON'S TELECOM DICTIONARY

**The Official Dictionary
of Telecommunications
Networking and
the Internet**

**16th
EXPANDED
& UPDATED
EDITION**

BY HARRY NEWTON

NEWTON'S TELECOM DICTIONARY

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Network) data communications developed through the IEEE's Project 802. The standards also include an overview of recommended networking architectures, approved in 1990. The 802 standards follow a unique numbering convention. A number followed by a capital letter denotes a standalone standard; a number followed by a lower case letter denotes either a supplement to a standard, or a part of a multiple-number standard (e.g., 802.1 & 802.3). The 802 standards segment the data link layer into two sublayers:

1. A Medium Access Control (MAC) layer that includes specific methods for gaining access to the LAN (Local Area Network). These methods — such as Ethernet's random access method and Token Ring's token procedure — are in the 802.3, 802.5 and 802.6 standards.

2. A Logical Link Control (LLC) Layer, described in the 802.2 standard, that provides for connection establishment, data transfer, and connection termination services. LLC specifies three types of communications links:

- An Unacknowledged connectionless Link, where the sending and receiving devices do not set up a connection before transmitting. Instead, messages are sent on a "best try" basis and there is no provision for error detection, error recovery, and message sequencing. This type of link is best suited for applications where the higher layer protocols can provide the error correction and functions, or where the loss of broadcast messages is not critical.

- A Connection-mode Link, where a connection between message source and destination is established prior to transmission. This type of link works best in applications, such as file transfer, where large amounts of data are being transmitted at one time.

- An Acknowledged connectionless Link that, as its name indicates, provides for acknowledgement of messages without burdening the receiving devices with maintaining a connection. For this reason, it is most often used for applications where a central processor communicates with a large number of devices with limited processing capabilities.

802.1 IEEE standard for overall architecture of LANs and internetworking.

802.11 IEEE standard for wireless LANs; intended to provide for interoperability of wireless LAN products from different manufacturers. It was ratified on June 26, 1997. The standard defines the over-the-air interface — the protocol that wireless stations will use to talk to each other or to access points. 802.11 does not define the protocol for backbone or wired networks. 802.11 defines both the Physical (PHY) and Medium Access Control (MAC) protocols for wireless LANs. Specifically, the PHY spec includes three transmission options — one infrared (IR), two radio frequency — RF — which include direct sequence spread spectrum and frequency hopping spread spectrum. Direct sequence data rates clock in at 2 Mbps and frequency hopping clocks in at 1 Mbps. The IR runs at 1Mbps with an optional implementation to 2 Mbps. The MAC protocol works well with standard Ethernet, making wired and wireless nodes on an enterprise LAN logically indistinguishable.

802.12 Standard for 100VG-AnyLAN. Addresses 100 Mbps demand-priority access method physical-layer and repeater specifications. Approved in 1995.

802.1B Standard for LAN/WAN management, approved in 1992; along with 802.1k, became the basis of ISO/IEC 15802-2.

802.1D IEEE standard for interconnecting LANs through MAC bridges (specifically between 802.3, 802.4, and 802.5 networks). The standard was approved in 1990, and was

incorporated into ISO/IEC 10038. Works at the MAC level.

802.1E IEEE standard for LAN and MAN load protocols.

Approved in 1990, formed the basis for ISO/IEC 15802-4.

802.1F Standard for defining network management information specified in 802 umbrella standards. Approved in 1993.

802.1G A developing standard for remote bridging at the MAC layer.

802.1H IEEE practices recommended for bridging Ethernet LANs at the MAC layer. Approved in 1995.

802.1I IEEE standard for using FDDI (Fiber Distributed Data Interface) as a MAC-layer bridge. Approved in 1992, the standard was incorporated into ISO/IEC 10038.

802.1J IEEE standard for LAN connectivity using MAC-layer bridges. A supplement to 802.1D, it was approved in 1996.

802.1K IEEE standard for the discovery and dynamic control of network management information. Approved in 1993. In conjunction with 802.1B, was the basis for ISO/IEC 15802-2.

802.1M A conformance statement for 802.1E, it addresses definitions and protocols for system load management. Approved in 1993, it was incorporated into ISO/IEC 15802-4.

802.1P IEEE extension of 802.1D. Specification for the use of MAC-layer bridges in filtering and expediting multicast traffic. Prioritization of traffic is accomplished through the addition of a 3-bit, priority value in the frame header. Eight topology-independent priority values (0-7) are specified, with all eight values mapping directly into 802.4 and 802.6. Switches that support 802.1P and 802.1Q provide a framework for bandwidth prioritization. Essentially what all these words mean is that you can assign a priority to the type of The QoS feature on the Catalyst 6000 Family of switches prioritizes network traffic with IEEE 802.1p class-of-service (CoS) values that allow network devices to recognize and deliver high-priority traffic in a predictable manner. When congestion occurs, QoS drops low-priority traffic to allow delivery of high-priority traffic. See also 802.1Q.

802.1Q IEEE specification for implementation of VLANs in Layer 2 LAN switches, with emphasis on Ethernet. Similar to 802.1P, prioritization of traffic is accomplished through an additional four bytes of data in the frame header. Most data fields in this addition to the header are specific to VLAN operation. Also included is a field which provides the same 3-bit priority flag specified in 802.1P's priority-mapping scheme. In addition to conventional data traffic, 802.1Q supports voice and video transmission through Ethernet switches. In short, the 802.1Q specification provides a 32-bit header for VLAN frame tagging. Each 802.1Q tag sits in an Ethernet frame between the source address field and the media access control (MAC) client type/length field.

802.2 The IEEE standard for Logical Link Control, primarily using MAC-layer bridges, in LAN and MAN domains. Originally approved in 1989, and updated in 1994. A format used for frames of data sent on Ethernet, token ring and several other types of local area networks. Now the format favored by Novell for NetWare 4.x LANs over the 802.3.

802.2 SNAP (Cub-Network Access Protocol). A variation on the 802.2/802.3 scheme which expands the 802.2 LLAMA header to provide sufficient space in the header to identify almost any network protocol.

802.3 IEEE standard for carrier sense multiple access with collision detection (CSMA/CD). A physical layer standard specifying a LAN with a CSMA/CD access method on a bus topology. Ethernet and Starlan both follow the 802.3 standard. Typically they transmit at 10 megabits per second (Mbps). The theoretical limit of Ethernet, measured in 64 byte packets,

DAVIC Digital Audio Video Council. A consortium (the Special Interest Group) organized to "foster the success of emerging digital audio-visual applications and services, by the timely availability of internationally agreed upon specifications of open interfaces and protocols that maximize interoperability across countries and applications/services." The current set of DAVIC 1.0 specifications are to further the deployment of broadcast and interactive systems that support initial applications such as TV distribution, near video on demand, video on demand, and basic forms of teleshopping. DAVIC is one of the organizations examining the developing specifications for VDSL (Very-high-bit-rate Digital Subscriber Line), which is intended for video applications. www.davic.org

Day-Of-Week Factors A call center term. A historical pattern consisting of seven factors, one for each day of the week, that defines the typical distribution of call arrival throughout the week. Each factor measures how far call volume on that day deviates from the average daily call volume.

dB 1. Decibel. A unit of measure of signal strength, usually the relationship between a transmitted signal and a standard signal source. dB stands for decibels, which is a way to represent logarithmic ratios. Since a dB number is a ratio, it must always be a ratio between two things. The dB number is equal to 20 times the log of the ratio between two numbers. A ratio of 10 is 20dB, a ratio of 100 is 40dB, a ratio of 1000 is 60 dB, etc. For example, if a filter has -40dB of noise reduction, that means that the ratio between the output noise and the input noise is 40dB or 100. The letters "dB" are always used in lower case. A 6 dB of loss would mean that there is 6 dB difference between what arrives down a communications circuit and what was transmitted by a standard signal generator. See Decibel.

2. Database

3. Short for Data Bus connector. Usually shown with a number that represents the number of wire conductors in the connector, e.g. DB-9 or DB-25, both of which are very common connectors to plug into serial ports on PCs. See DB-9, DB-15 and DB-25.

db Loss Budget Should be written as dB. dB Loss Budget is the amount of light available to overcome the attenuation in the optical link and still maintain specifications.

DB-9 This is the standard nine-pin RS-232 serial port on all laptop PC computers and most desktop computers today. The term DB-9 is used to describe both the male and female plug. So be careful when you order. See also the Appendix in this Dictionary for more information on the pinning of RS-232-C plugs. The above is contemporary usage, i.e. the way it's used today. In fact, it's wrong historically. The "D" originally described the shape of the housing. The second letter: A, B, C, D or E originally specified the size of the housing where the "E" is used somewhat like it's used as a drawing size (i.e., smaller than a "D"). There are connectors made with, e.g., size "B" housing with other than 9, 15 or 25 pins. Sometimes coax "pins" are included, which use up several little pin locations. See the Appendix in this dictionary for more information on the pinning of RS-232 plugs.

DB-15 A standardized connector with 15 pins. It can be used in Ethernet transceivers. It can also be used for connecting VGA monitors. DB-15 is used to describe both the male and female plug. So be careful when you order. See also DB-9 for a longer explanation.

DB-25 The standard 25-pin connector used for RS-232 ser-

ial interface. See also DB-9 and the Appendix in this Dictionary for more information on the pinning of RS-232 plugs.

DB-40 A connector with 40 pins in four rows (10 pins each row).

DB2 IBM's relational database system that runs on System 370-compatible mainframes under the MVS operating system.

DBA 1. Dynamic Bandwidth Allocation.

2. Database administrator. The individual in the organization with the responsibility for the design and control of database.

3. dbA. dbA is a measure of sound level. The ratio for determining db in this case is the ratio between the sound level measured with a microphone and an implicit reference sound level, namely 0db, which is defined to be approximately equal to the threshold of human hearing. 45dbA is a very faint whisper, 75 dbA is typical conversation, 100 dbA is about as loud a Walkman can get, and 120dbA is a jet plane taking off at 20 feet away from the engine. The "A" represents a special filter which is used to take into account the fact that people are less sensitive to very low and very high frequencies. The dbA system is used for measuring background sounds like computer fans or office noise. A system with a different filter called dbC is used when very loud sounds are being measured. This definition courtesy APC.

DBI Don't Believe It. This is used in telecontrol systems or electricity transmission/distribution systems to denote an unreliable state change at a substation RTU i.e. both inputs have either gone high or low. They should normally be different. An alarm legend is then generated and sent to the NMS with a status of DBI instead of the normal ON or OFF i.e.

BREAKER ON

BREAKER DBI 00

BREAKER OFF

DBIT Also called D-BIT. The delivery confirmation bit in an X.25 packet that is used to indicate whether or not the DTE wishes to receive an end-to-end acknowledgment of delivery. In short, a bit in the X.25 packet header that assures data integrity between the TPAD and the HPAD.

DBM Decibels below 1mW. This should be written as dBm. Output power of a signal referenced to an input signal of 1mW (Milliwatt). Similarly, dBm0 refers to output power, expressed in dBm, with no input signal. (0 dBm = 1 milliwatt and -30 dBm = 0.001 milliwatt). See Decibel.

DBMS Database management system. A computer program that manages data by providing the services of centralized control, data independence, and complex physical structures. Advantages include efficient access, integrity, recovery, concurrency control, privacy, and security. A DBMS enables users to perform a variety of operations on data, including retrieving, appending, editing, updating, and generating reports.

dBm Decibels above Reference Noise. A ratio of power level in dB relative to a noise reference. dBmC uses a noise reference of -90 dBm, as measured with a noise meter, weighted by a frequency function known as C-message weighting which expresses average subjective reaction to interference as a function of frequency.

DBS Direct Broadcast Satellite. A term for a satellite which sends relatively powerful signals to small (typically 18-inch diameter) dishes installed at homes. See C Band, 1994 and Direct Broadcast Satellite.

DBU 1. Dial Back-Up. In the event of the local leased line failing, users are automatically switched to high-speed ISDN

with Hewman@Comcast.net

Decibels below 1mW.

DC Direct Current. The flow

within an electrical conduct

in Delayed Call.

DC Signalling A collection

of signals using dir

produced by a dry cell hou

is only used on cable.

DCA 1. Defense Commu

agency responsible for ins

including the ARPANET a

writes contracts for oper

(network) and pays for net

2. Document Content Arch

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document is transformer

office system.

DCAS Direct Carrier Adr

DCC 1. Data Commun

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ions channels to comm

AT&T SONET term.

2. An ATM term. Data C

try in which an address

ISO 3166. The length o

the data country code

(BCD) syntax. The cod

the right with the hexa

3. Digital Compact Ca

analog audio cassette

both analog and digit

sound a lot better.

DCCH Digital Contr

newer digital cellular

purposes between th

base station. See also

DCD 1. Data Carrier

(printer) to the DTE

(modem) is receiving

at the other end of th

2. Dynamically Con

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DCE 1. Data Comm

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Data Terminal Equi

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DCE devices (typ

Equipment) devic

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When wiring one

tion. Because a diode is positive on one side and negative on the other, it normally conducts current only in one direction. Thus diodes play an indispensable role as rectifiers. That is, they can take alternating current (AC) from your wall and convert it into direct current (DC) to run your computer.

"In this role, diodes demonstrate a prime law of electrons. Negatively charged, electrons flow only toward a positive voltage. They cannot flow back against the grain. Like water pressure, which impels current only in the direction of the pressure, voltage impels electrical current only in the direction of the voltage. To attempt to run current against a voltage is a little like attaching a gushing hose to a running faucet."

"It had long been known, however, that if you apply a strong enough voltage against the grain of a diode, the p-n wall or junction will burst. Under this contrary pressure, or reverse bias, the diode will eventually suffer what is called avalanche breakdown. Negative electrons will overcome the p-n barrier by brute force of numbers and flood "uphill" from the positive side to the negative side. In erasable programmable read-only memories (EPROMs), this effect is used in programming computer chips used to store permanent software, such as the Microsoft operating system in your personal computer (MS-DOS). Avalanche breakdown is also used in Zener diodes to provide a stable source of voltage unaffected by changes in current."

Diode A semiconductor device which allows electricity to pass through it in only one direction, restricting flow the other way.

Diode Matrix Ringing A method of connecting a common audible line to a system so that all stations do not ring on all lines. See also Matrix Ringing.

DIP 1. The act of consulting a database for information. Much like dipping into a bucket of water to extract a drink, carrier switches must dip into centralized databases in order to access various types of information. The database is housed in one or more SCPs (Service Control Points), which are centralized in the networks in order that many switches can share access to them, generally via SS7 links. Dips are made into such databases in order to accomplish tasks like calling card verification. 800/800 number routing requires that a dip be made in order to determine the serving IXC or LEC. LNP (Local Number Portability), mandated by the Telecommunications Act of 1996, requires the deployment of SCPs in order that the call can be terminated by the serving LEC. See also LNP and Number Portability.

2. See DIP Switch.

3. Document Image Processing. A term for converting paperwork into electronic images manipulable by a computer. Components include input via scanner, storage on optical media and output via video display terminal, printer, fax, micrographics, etc.

4. See Dedicated Inside Plant.

DIP Switch Dual In-Line Package. A teeny tiny switch usually attached to a printed circuit board. It may peek through an opening in a piece of equipment. It may not. It usually requires a ball point pen or small screwdriver to change. There are only two settings — on or off. Or 1 or 0. But printed circuit boards often have many DIP switches. They're used to configure the board in a semipermanent way. The DIP switches are similar to integrated circuit chips which have two rows (dual) of pins in a row (in-line) that fit into holes on a printed circuit board. If something doesn't work when you first install it, check the DIP switches first. Then check the cable connecting it to something else.

DIP/DOP Dedicated Inside Plant/Dedicated Outside Plant.

Diphones Speech segment beginning in the middle of one phoneme and concluding in the middle of another. See Phoneme.

Diplexer A device that permits parallel feeding of one antenna from two transmitters at the same or different frequencies without the transmitters interfering with each other. Diplexers couple transmitter and receiver to the same antenna for use in mobile communications.

Dipole Antenna fed from the center. Name often applied to "rabbit ear" antenna.

DIR An ATM term. This is a field in an RM-cell which indicates the direction of the RM-cell with respect to the data flow with which it is associated. The source sets DIR=0 and the destination sets DIR=1.

Direct Access Test Unit DATU. Also called Mechanized Loop Test (MLT) added or built into a central office switch. With DATU a technician can execute tests for shorts, opens and grounds remotely. The technician gets a digital voice, enters a password and is given a series of options. The technician can get results as a digital recording or through an alpha-numeric pager. DATU units can send a locating tone as TIP, RING or a combination of both. The unit can short lines and remove battery voltage for testing.

Direct Bond An electrical connection using continuous metal-to-metal contact between the things being joined.

Direct Broadcast Satellite DBS. A digital satellite system transmitting TV programs which can be received by small and relatively inexpensive dish antennas typically mounted on either the roofs or sides of houses. The receiving dish is stationary, being locked in on the position of the DBS service provider with which you have a subscription agreement. As a result, it can receive only those channels broadcast by that specific provider. DBS satellites operate in the Ku-band spectrum, and at fairly high power levels; hence the small size of the receiving dish, which commonly is as small as 19.7 inches in diameter. DBS has virtually eliminated the old C-band satellite dishes — huge things about 3 meters (118.1 inches) across which you mounted in your back yard. The C-band systems were tunable, however; that is to say that they could be adjusted to pick up programming from just about any TV broadcast satellite which didn't encrypt its signals. Once DBS was introduced in the U.S. in 1994, it very quickly took significant market share away from the CATV providers.

Direct Connect A term describing a customer hooking directly into a long-distance telephone company's switching office, bypassing the local phone company. Such "direct connect" could be via a leased copper pair, a specially-run copper pair, a fiber optic or a private microwave system. See Direct Electrical Connection, which is different. See Direct Connect Modem.

Direct Connect Modem A modem connected to telephone lines using a modular plug or wired directly to the outside phone line. It thus transfers electrical signals directly to the phone network without any intermediary protective device. Direct connect modems must be certified by the FCC. Direct connect modems are much more reliable and more accurate than acoustically coupled modems. Virtually all modems these days are directly connected. One day pay phones will even come with RJ-11 jacks into which you can plug the modem of your portable laptop computer.

Direct Connection Connection of terminal equipment to the telephone network by means other than acoustic and/or inductive coupling.

Direct Control Switching The switching path is set up

directly through the ne central control. The Tel trol switching. A step control switching.

Direct Current DC direction. Contrast wit

Direct Current Si signaling circuit E & voice circuit and no l signals from the voic

Direct Departme that routes incoming trunks to specific phc

Direct Distance which lets a user di phones outside the u assistance.

Direct Electrical between two things.

two things. This durr because there was a when you couldn't (i connect your own ph network. Those were System) were trying necting anyone else never did prove this, necton of FCC-cert won't cause any har

Direct In Line S

Direct In Termi programmed to rou out the attendant int trunk circuits on a Termination is slig though how differe

Direct InterLAT trunk groups used Interexchange Carr Presence (POPs) (BOC) end office s

Direct Inward side a company to pass through an o the dialed digits ar office). The PBX th

is often proposed Inward System Ac

Direct Inward telephone system

the telephone sys and facilities. DIS calls from home distance lines, lik

ing dictation for tl vidual extensions tor. To use DISA

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thorized people) run up expensive

DISA to trusted p generated. Chan help prevent thi

NEWTON'S TELECOM DICTIONARY

phone line. DSVD allows the simultaneous transmission of data and digitally-encoded voice signals over a single analog phone line. DSVD modems use V.34 modulation (up to 33.6 kilobits per second), but may also use V.32 modulation (14,400 kilobits per second). DSVD modems use eight kilobits per second for voice transmissions. The remaining bandwidth is available for data transmission. The voice coder is a modified version of an existing specification and is defined as G.729 Annex

The DSVD voice/data multiplexing scheme is an extension of the V.42 error correction protocol widely used in modems. DSVD also specifies fallbacks that enable DSVD modems to communicate with standard data modems (i.e., V.32 bis, V.32 and V.22).

Can You Do With DSVD? (Below is good manufacturer information on DSVD. The words came from Rockwell.)
 Have you ever promised someone on the telephone that you'd send a document to them, then forgot to send it? Have you ever traveled cross-country or halfway around the world to make a presentation? Have you considered expensive video conferencing hardware and applications as a way to communicate? Have you been frustrated waiting online, hoping to get some technical support?

When you need to work on a project, spreadsheet or presentation with someone from another location, a DSVD modem lets you do it without leaving your office or requiring costly video conferencing equipment. Both parties can simultaneously collaborate on a shared document, each viewing and discussing the additions and modifications made. This can save time and money previously wasted exchanging faxes or relying on overnight express mail deliveries. Computer software demonstrations can be easily conducted through a DSVD modem. This is a great way to highlight or test market new features and get immediate customer feedback. For a computer company, DSVD means fewer support follow-up calls and lower telephone bills. With a DSVD modem, you will be able to dial your favorite online catalog showrooms, browse the aisles, ask a salesperson a question or two, then place an order. Unlike other online "malls", with DSVD the human interface is still intact. While you're interactively shopping you can talk with salespeople or even other shoppers, just like the real mall. See V.70.

DSX Digital System Cross-connect frame. It is a manual bay structure to which T-1 lines and DS1 circuit packs are wired. DSX permits cross-connections by patch cords and plugs, at any time. A DSX panel is used in small office applications where only a few digital trunks are installed. See also DACS.

DSX-1 Digital Signal Cross-connect Level 1. The set of parameters for cross connecting DS-1 lines.

DSX-3 The designation for the DS3 point of interface (cross-connect).

DT Direct termination. DT allows long distance carriers to bypass the LEC and terminate the switched traffic over dedicated (non-LEC) facilities to the customer premises. Direct termination calls are routed using six or ten-digit screening in terminating long distance switch.

DTMF Digital Trunk Controller.

DTMFC Digital Transmit Command.

DTC Digital Traffic Channel. A digital cellular term. Defined in IS-54, the DTC is the portion of the air interface which carries the actual data transmitted. The DTC operates over frequencies separate from the DCCH (Digital Control Channel), which is used for signaling and control purposes. See also IS-54 and IS-136.

DTD Document Type Definitions (DTDs), often used in relationship with the Extensible Markup Language (XML). See cXML.

DTE 1. Data Terminal Equipment. In the RS-232-C standard specification, the RS-232-C is connected between the DCE (Data Communications Equipment) and a DTE. The main difference between a DCE and a DTE is that pins two and three are reversed. See also DCE and the Appendix.

2. Defense Technology Enterprise.

DTE-DCE Rate Data terminal equipment/data communications equipment rate. A designation for the maximum rate at which a modem and a PC can exchange information, expressed in kilobits per second (kbps). For maximum performance, a modem must support a DTE-DCE rate in excess of its maximum theoretical throughput.

Dterm A line of proprietary electronic phones made by NEC for use with its PBXs. The Dterm terminal derives its intelligence from its own microprocessor, which detects events and accepts direction from the PBX.

DTH Direct To Home. Intended as a replacement for C-band satellite systems, DTH was proposed to operate on medium-powered FSS (Fixed Satellite Systems) in the Ku-band. DTH was superseded by DBS (Direct Broadcast Satellite), which allows the use of even smaller receive antennae than possible with DTH. See also Direct Broadcast Satellite and KU Band.

DTL An ATM term. Designated Transit List: A list of nodes and optional link IDs that completely specify a path across a single PNNI peer group.

DTL Originator An ATM term. The first switching system within the entire PNNI routing domain to build the initial DTL stack for a given connection.

DTL Terminator An ATM term. The last switching system within the entire PNNI routing domain to process the connection and thus the connection's DTL.

DTLU Digital Trunk and Line Unit. Provides system access for T1-carrier lines used for inter office trunks or remote switching module umbilicals.

DTM According to www.netinsight.se, DTM (Dynamic synchronous Transfer Mode) is a network protocol for high speed networking developed for dynamic transport of integrated traffic. It is a transport network architecture based on circuit-switching augmented with dynamic reallocation of bandwidth. The protocol is designed to be used in integrated services networks. It supports point-to-point, multicast and broadcast communication, i.e. a DTM network will be used for both distribution and unicast communication. DTM includes switching and a signaling protocol and can thus, in contrast to say SDH/SONET, set up multi-rate channels (circuits) on demand, and the capacity of a channel can be changed according to traffic characteristics during operation. Additionally, resources can be reallocated between nodes according to the current demands. In this way, free bandwidth is allocated to nodes with highest demands, providing an autonomous and efficient dynamic infrastructure.

DTMF Dual Tone Multi-Frequency. A fancy term describing push button or Touchtone dialing. (Touchtone is a not registered trademark of AT&T, though until 1984 it was.) In DTMF, when you touch a button on a push button pad, it makes a tone, actually a combination of two tones, one high frequency and one low frequency. Thus the name Dual Tone Multi-Frequency. In U.S. telephony, there are actually two types of "tone" signaling, one used on normal business or home pushbutton/touchtone phones, and one used for signaling within the telephone network itself. When you go into a central office, look for the test board. There you'll see what looks

ET Exchange Termination. Refers to the central office link with the ISDN user.

ETACS Extended TACS. The cellular technology used in the United Kingdom and other countries. It is developed from the U.S. AMPS technology. See also AMPS, TACS, NTACS and NAMPS.

Etailer A retailer who conducts his business by electronic commerce — i.e. over the Internet and the world wide web.

ETB Abbreviation for end-of-transmission block. The binary code is 0111001, the hex is 71.

ETC Enhanced Throughput Cellular is an error correction cellular communications protocol, which helps prevent disruptive signal fading and thus reduces the number of dropped calls.

Ethched Antiglare treatment that prevents glare but also reduces screen sharpness and clarity on monitors. Generally considered an obsolete technology.

Eternity Hold Our own creation for what happens when someone puts you on long-term hold. Governmental agencies, airlines and police departments (especially when you need them) tend to be firm believers in placing their callers on Eternity Hold. A new service adjunct to Eternity Hold is Conference Hold. Here everyone on Eternity Hold can speak to each other. We made this up. It doesn't exist, but we think it would be great if it did.

Ether The medium which, according to one theory, permeates all space and matter and which transmits all electromagnetic waves.

EtherRing ADC Telecommunications' name for a "revolutionary new idea allowing transport of native mode Ethernet and Fast Ethernet (100 million bits per second) data packets over a wide area network (WAN). Unlike typical Ethernet transport solutions," according to ADC Telecommunications (www.adc.com), "EtherRing has no distance limitations."

Ethernet A local area network used for connecting computers, printers, workstations, terminals, servers, etc., within the same building or campus. Ethernet operates over twisted wire and over coaxial cable at speeds up to 10 million bits per second (Mbps). For LAN interconnection, Ethernet is a physical link and data link protocol reflecting the two lowest layers of the DNA/OSI model. The theoretical limit of Ethernet, measured in 64 byte packets, is 14,800 packets per second (PPS). By comparison, Token Ring is 30,000 and FDDI is 170,000. Ethernet specifies a CSMA/CD (Carrier Sense Multiple Access with Collision Detection). CSMA/CD is a technique of sharing a common medium (wire, coaxial cable) among several devices. As Byte Magazine explained in its January, 1991 issue, Ethernet is based on the same etiquette that makes for a polite conversation: "Listen before talking." Of course, even when people are trying not to interrupt each other, there are those embarrassing moment when two people accidentally start talking at the same time. This is essentially what happens in Ethernet networks, where such a situation is called a collision. If a node on the network detects a collision, it alerts the other nodes by jamming the network. Then, after a random pause, the sending nodes try again. The messages are called frames (see the diagram).

AN ETHERNET FRAME					
Preamble	Destination address	Source address	Type	Data up to 1500	Frame check sequence
8 bytes	6 bytes	6 bytes	2 bytes	bytes	4 bytes (contains CRC check)

The first personal computer Ethernet LAN adapter was shipped by 3Com on September 29, 1982 using the first Ethernet silicon from SEEQ Technology. Bob Metcalfe created the original Ethernet specification at Xerox PARC and later went on to found 3Com. In the October 31, 1994 issue of the magazine InfoWorld, Bob Metcalfe explained that Ethernet got its name "when I was writing a memo at the Xerox Palo Alto Research Center on May 22, 1973. Until then I had been calling our proposed multimegabit LAN the Alto Aloha Network. The purpose of the Alto Aloha Network was to connect experimental personal computers called Altos. And it used randomized retransmission ideas from the University of Hawaii's Aloha System packet radio network, circa 1970. The word ether came from luminiferous ether — the omnipresent passive medium once theorized to carry electromagnetic waves through space, in particular light from the Sun to the Earth. Around the time of Einstein's Theory of Relativity, the light-bearing ether was proven not to exist. So, in naming our LAN's omnipresent passive medium, then a coaxial cable, which would propagate electromagnetic waves, namely data packets, I chose to recycle ether. Hence, Ethernet."

According to Metcalfe, "Ethernet has been renamed repeatedly since 1973. In 1976, when Xerox began turning Ethernet into a product at 20 million bits per second (Mbps), we called it The Xerox Wire. When Digital, Intel, and Xerox decided in 1979 to make it a LAN standard at 10 Mbps, they went back to Ethernet. IEEE tried calling its Ethernet standard 802.3 CSMA/CD — carrier sense multiple access with collision detection. And as the 802.3 standard evolved, it picked up such names as Thick Ethernet (IEEE 10Base-5), Thin Ethernet (10Base-2), Twisted Ethernet (10Base-T), and now Fast Ethernet (100Base-T)."

Ethernet PC cards now come in a couple of basic varieties — for connecting to an Ethernet LAN via coaxial cable or via two twisted pairs of phone wires, called 10Base-T. See also 10Base-T, Collision Domain, Ethernet Controller, Ethernet Identification Number, Ethernet Switch, Ethertalk, Frame, Thinnet and Token Ring.

Ethernet Controller The unit that connects a device to the Ethernet cable. An Ethernet controller typically consists of part of the physical layer and much or all of the data link layer and the appropriate electronics.

Ethernet Identification Number This is a unique, hexadecimal Ethernet number that identifies a device, such as a PC/AT with a SpeedLink/PC16 network interface card installed, on an Ethernet network.

Ethernet II (DIX) Defined by Digital, Intel and Xerox. The frame format for Ethernet II differs from that of IEEE 802.3 in that the header specifies a packet type instead of the packet length.

Ethernet Switch An Ethernet data switch. Ethernet is the most common local area network (LAN) standard in the world today. Ethernet is very cheap, but its approach to congestion management is a bit on the ugly side. Ethernet transmission is over a shared bus, which is much like a big multipoint circuit. When an Ethernet-attached device puts data frames (data

packets) onto the network, those frames move in both directions, and pass by all devices on the network. In other words, every attached workstation, printer and host sees the frames, until the intended device sees the data, recognizes its address in the data frame, and takes it off the network. As a result, Ethernet networks can become very heavily con-

gested. While the theoretical Ethernet data rate is 10Mbps (ten million bits per second), they often run at a fraction of that speed — 4Mbps or 2Mbps is not uncommon. One cheap way of reducing Ethernet congestion is through the use of hubs, like 10Base-T. 10Base-T hubs allow the Ethernet to be divided into physical segments at the workgroup level, with each workgroup representing a "community of interest." This segmentation process serves to reduce congestion by confining traffic to all those Ethernet stations on the shared hub, passing it on to other hubs only if necessary. In other words, the single logical LAN is subdivided into multiple physical and logical segments. However, the hub still presents the data to all connected devices over a common, shared bus; therefore, hubs really don't do anything internally to control congestion. Switches, which work at Layer 2 of the OSI Reference Model, are better than hubs at controlling congestion. Switches cost more than hubs. First, let's consider an Ethernet switch at the workgroup-level. Workgroup-level switches serve a community of interest, such as the marketing department or the accounting department. An Ethernet workgroup switch is used to interconnect Ethernet-attached devices (e.g., workstations, printers, and servers), each of which connects to a switch port via UTP (Unshielded Twisted Pair). When the transmitting workstation, for instance, sends an Ethernet frame of data to the switch, that frame is captured in a buffer and is fragmented into smaller data units. The switch then flows those fragments over a common, shared bus, from the input port of the originating device to the output port associated with the destination device. The common bus also can support other transmissions, as it is carved into time slots through a process akin to TDM (Time Division Multiplexing). More complex workgroup-level switches may involve a switching matrix comprising multiple, interconnected busses, and yielding multiple possible transmission paths between ports. In either case, the switch directs the data only to the target device, rather than to all attached devices. Therefore, and unlike hubs, switches do quite a lot internally to reduce Ethernet LAN congestion. What this means to you is that a 36-port Ethernet switch can allow your and all 35 of your co-workers to communicate simultaneously. You can all pass data between each other at the same time, or you can all access the same e-mail server at the same time. Depending on the nature, design and quality of the internal switching matrix, you each may get 10Mbps or you each may get a good deal less, but you'll each have access, and your traffic will be confined to your own workgroup unless it needs to go somewhere else. Workgroup switches can be interconnected directly. For example, the accounting department might have its own switch on the 10th floor, and the sales and marketing department might have its own switch on the first floor. Connecting from switch to switch, the top salesman can check his commission statement, assuming that the accounting department allows him access to that database (highly unlikely). Again, the data remain confined to your workgroup switch unless they need to go elsewhere. Workgroup switches also can be interconnected through either a backbone switch or a router, which is a highly intelligent (read much more capable, but much slower and much more expensive) switch. In either case, the data are forwarded from one workgroup switch to another only if the destination address requires. A backbone switch has a higher-speed internal switching matrix, and connects to workgroup-level hubs and switches through high-speed links, commonly in the form of fiber optics. Backbone switches also can be connected to

other backbone switches. Again, the data go only where they need to go, rather than being blasted all over the company, and slowing down the whole network in the process. See also Ethernet, Hub, Router and Switch.

Ethernet Transceiver A device used in an Ethernet local area network that couples data terminal equipment to other transmission media.

EtherTalk An Ethernet protocol used by Apple computers. AppleTalk protocol governing Ethernet local area network transmissions. Also the Apple Computer Ethernet adapter and drivers. Apple's implementation of Ethernet is compliant with IEEE specification 802.3.

Ethertype A two-byte code indicating protocol type in an Ethernet local area network packet.

ETI Electronic Telephone Interface.

ETISALAT Emirates Telecommunications Corporation is the sole provider of telecommunications services throughout the United Arab Emirates. The head office is in Abu Dhabi.

ETM Electronic Ticketing Machine. A machine that looks like a banking Automated Teller Machine (ATM), except that it will dispense airline tickets and possibly, hotel reservations, car rental agreements, etc.

ETN 1. Electronic Tandem Network. An ETN is a large private network which comprises dedicated leased lines interconnecting electronic tandem switches. ETNs were deployed in the 1970s and 1980s by very large user organizations such as state and federal governments.

2. Earning Telephone Number. A billing term which is synonymous with WTN (Working Telephone Number). Multiple ETNs can be associated with a single BTN (Billing Telephone Number).

ETNO The European Public Telecommunications Network Operations Association (ETNO).

ETS 1. European Telecommunications Standard. A standard defined by the European Telecommunications Standards Institute (ETSI). See ETSI.

2. Electronic Tandem Switching. See Electronic Tandem Switching.

3. Ethernet Terminal Server. A cost-effective and flexible way of connecting serial-based asynchronous terminals and peripherals to one or more host computers across an Ethernet LAN. See Terminal Server.

ETS 300 211 Metropolitan Area Network (MAN) Principles and Architecture.

ERS 300 212 Metropolitan Area Network (MAN) Media Access Control Layer and Physical Layer Specification.

ETS 300 217 Connectionless Broadband Data Service (CBDS).

ETS Set A Northern Telecom term for an electronic Telephone Set.

ETSI European Telecommunications Standards Institute, is the European counterpart to ANSI, the American National Standards Institute. ETSI is based in Sophia-Antipolis, near Nice, France. ETSI's task is to pave the way for telecommunications integration in the European community as part of the single European market program. ETSI was founded in 1988 as a result of an initiative of the European Commission. It was established to produce telecommunications standards by democratic means, for users, manufacturers, suppliers, administrations, and PTs. ETSI's main aim is the unrestricted communication between all the member states by the provision of essential European standards. It is now an independent, self-funding organization, which works closely with both CEPT (European Conference of Posts and

between its logic gates when it leaves the factory. But it has a huge number of potential connections, which can be firmed up in the field by a programmer with the right tools. FPGAs are a competitor to the cheaper ASICs — Application Specific Integrated Circuits. See Virtual Computing.

FPI Formal Public Identifier. A string expression that represents a public identifier for an object. FPI syntax is defined by ISO 9070.

FPLMTS Future Public Land Mobile Telecommunication System. A concept developed by the ITU for a family of technological solutions which would enable the development and implementation of a 3G (3rd Generation) wireless network in support of voice and high-speed data communications. FPLMTS was abandoned in favor of IMT-2000. See also IMT-2000.

FPM DRAM Fast Page Mode Dynamic Random Access Memory.

FPP Fiber Optic Patch Panel.

FPS 1. Fast Packet Switching.

2. Frames Per Second. A measure of the quality of a video signal. NTSC TV

— the standard in North America — uses 30 fps. Film is 24 FPS. PAL/SECAM (European) is 25 FPS.

FPT Forced Perfect Terminator. A high-quality type of single-ended SCSI terminator, developed by IBM, with special circuitry that compensates not only for variations in terminator power but also for variations in bus impedance. See also Active Terminator and Passive Terminator.

FPU Floating Point Unit. A formal term for the math coprocessors (also called numeric data processors, or NDPs) found in many PCs. The Intel 80387 is an example of an FPU. FPUs perform certain calculations faster than CPUs because they specialize in floating-point math, whereas CPUs are geared for integer math. Today, most FPUs are integrated with the CPU rather than sold separately. See also CPU and DSP.

FQDN Fully Qualified Domain Name. An Internet term. The FQDN is the full site name of an Internet computer system, rather than just its hostname. For example, the system lisa at Widener University has a FQDN of lisa.cs.widener.edu.

FR See Flat Rate Service.

FR-1 A flammability rating established by Underwriters Laboratories for wires and cables that pass a specially designed vertical flame test. This designation has been replaced by VW-1.

Fractal A word coined in 1975 by Benoit B. Mandelbrot from the Latin fractus ("to break"). One fractal creator called fractals a shape with the property of "self-similarity."

Fractal Compression An asymmetrical compression technique that shrinks an image into extremely small resolution-independent files by storing it as a mathematical equation as opposed to storing it as pixels. The process starts with the identification of patterns within an image and results in collection of shapes that resemble each other but that have different sizes and locations within an image. Each shape-pattern is summarized and reproduced by a formula that starts with the largest shape and repeatedly displaces and shrinks it. These patterns are stored as equations and the image is reconstructed by iterating the mathematical model. Fractal compression can store as many as 60,000 images on one CD-ROM. One disadvantage of fractal compression is that it is time consuming, taking as long as four minutes to convert a 1.3 MB TIFF file to a 228 KB file. See Fractals.

Fractal Geometry The underlying mathematics behind fractal image compression, discovered by two Georgia Tech mathematicians, Michael Barneley and Alan Sloan.

Fractal Image Format FIF A compression technique that uses on-board ASIC chips to look for patterns. Exact matches are rare and the process works on finding close matches using a function known as an affine map.

Fractals Along with raster and vector graphics, fractals are a way of defining graphics in a computer. Fractal graphics translate the natural curves of an object into mathematical formulas, from which the image can later be constructed. See Fractal Compression.

Fractional Services A British term. Bandwidth available from carriers in increments of 64Kbit/s such as Mercury's Switchband. See Fractional T-1 for the North American definition.

Fractional T-1 FT-1. Fractional T-1 refers to any data transmission rate between 56/64 Kbps (DSO rate) and 1.544 Mbps (T-1). Fractional T-1 is a four-wire (two copper pairs) digital circuit that's not as fast as a T-1. Fractional T-1 is popular because it's typically provided by a LEC (Local Exchange Carrier) or IXC (InterExchange Carrier) at less cost than a full T-1, and in support of applications that don't require the level of bandwidth provided by a full T-1. While FT-1 is less costly than a full T-1, it is more costly on a channel-by-channel basis, as you would expect. Users love FT-1, but carriers hate it. FT-1 costs the carriers just as much to provision as does as full T-1, they just turn down some of the channels. FT-1 is typically used for LAN interconnection, videoconferencing, high-speed mainframe connection and computer imaging.

Fractional T-3 A telephone company service in which portions of a T-3 (44.7364 Mbps) transmission service are leased to provide a service similar to a T-1 (1.544 Mbps) or T-2 (3.152 Mbps) channel, but normally at a lower cost.

FRAD Frame Relay Access Device, also sometimes referred to as a Frame Relay Assembler/Disassembler. Analogous to a PAD (Packet Assembler/Disassembler) in the X.25 world, a FRAD is responsible for framing data with header and trailer information prior to presentation of the frame to a Frame Relay switch. On the receiving end of the communication, the FRAD serves to strip away the Frame Relay control information in order that the target device is presented with the data packaged in its original form. On the receiving end, the FRAD also generally is responsible for detecting errors in the payload data created during the process of network switching and transmission; error correction generally is accomplished through a process of retransmission. A FRAD may be a standalone device, although the function generally is embedded in a router.

Fragment The pieces of a frame left on an FDDI ring, caused by a station stripping a frame from the ring.

Fragmentation 1. In messaging it is the process in which an IP (Internet Protocol) datagram is broken into smaller pieces to fit the requirements of a given physical network. The reverse process is termed "reassembly."

2. ATM and SMDS networks routinely perform a process of Segmentation and Reassembly (SAR), segmenting the native PDU into 48-octet payloads which are carried in 53-octet cells. The process is reversed on the receiving end.

3. A condition that affects data stored on a disk. Adding and deleting records in a file, creates what is sometimes called the Swiss cheese effect. The operating system stores the data for an individual file in many different physical locations on the disk, leaving large holes between records. Fragmented files slow system performance because it takes time to locate all parts of a file.

Frame 1. A frame is a packet. It's a generic term specific to a number of data communications protocols. A frame of data is a logical unit of data, which commonly is a fragment of a

much larger set of data, such as a file of text or image information. As the larger file is prepared for transmission, it is fragmented into smaller data units. Each fragment of data is packaged into a frame format, which comprises a header, payload, and trailer. The header prepends (prepend means added to the front of) the payload and includes a beginning flag, or set of framing bits, which are used for purposes of both frame delineation (beginning of the frame) and synchronization of the receiving device with the speed of transmission across the transmission link. Also included in the header are control information (frame number), and address information (e.g., originating and terminating addresses). Following the header is the payload, which is the data unit (fragment) being transmitted. Appending the payload is the trailer, which comprises data bits used for error detection and correction, and a final set of framing bits, or ending flag, for purposes of frame delineation (ending of the frame). This frame format, in the broader generic sense, also is known as a data packet. Frame, therefore, is a term specific to certain bit-oriented data transmission protocols such as SDLC (Synchronous Data Link Control) and HDLC (High-level Data Link Control), with the latter being a generic derivative of SDLC. In the case of SDLC, a frame is very similar to a block, which would be employed in a character-oriented protocol such as IBM's BSC (Binary Synchronous Communications), also known as Bisync. See also BSC, HDLC, Packet, and SDLC.

2. In TV video, a frame is a single, complete picture in video or film recording. A video frame consists of two interlaced fields of either 525 lines (NTSC) or 625 lines (PAL/SECAM), running at 30 frames per second (NTSC) or 25 frames per second (PAL/SECAM). 24 frames are sent in moving picture films and a variable number, typically between 8 and 30, sent in video-conferencing systems, depending on the transmission bandwidth available. Up to about 12 frames a second looks "jerky."

3. One complete cycle of events in time division multiplexing. The frame usually includes a sequence of time slots for the various sub channels as well as extra bits for control, calibration, etc. T-Carrier makes use of such a framing convention for packaging data. Channelized T-1, for instance, frames 24 time slots with a framing bit which precedes each set of sampled data.

4. A unit of data in a Frame Relay environment. The frame includes a payload of variable length, plus header and trailer information specific to the operation of a Frame Relay network service.

5. A metal framework, such as a relay rack, on which equipment is mounted. A distribution frame. A rectangular steel bar framework having "verticals and horizontals" which is used to place semipermanent wire cross connections to permanent equipment. Found in telephone rooms and central offices. See Distribution Frame.

Frame Alignment The extent to which the frame of the receiving equipment is correctly phased (synchronized) with respect to that of the received signal.

Frame Alignment Errors A frame alignment error occurs when a packet is received but not properly framed (that is, not a multiple of 8 bits).

Frame Alignment Sequence See Frame Alignment Signal.

Frame Alignment Signal FAS. Frame Alignment Signal or Frame Alignment Sequence.

The distinctive signal inserted in every frame or once in n frames that always occupies the same relative position within the frame and is used to establish and maintain frame alignment, i.e. synchronization. See Frame Alignment Errors.

Frame Buffer A section of memory used to store an image to be displayed on screen as well as parts of the image that lie outside the limits of the display. Some systems have frame buffers that will hold several frames, in which case they should be called "frames buffers." But they're not.

Frame Check Sequence Bits added to the end of a frame for error detection. Similar to a block check character (BCC). In bit-oriented protocols, a frame check sequence is a 16-bit field added to the end of a frame that contains transmission error-checking information. In a token ring LAN, the FCS is a 32-bit field which follows the data field in every token ring packet. This field contains a value which is calculated by the source computer. The receiving computer performs the same calculation. If the receiving computer's calculation does not match the result sent by the source computer, the packet is judged corrupt and discarded. An FCS calculation is made for each packet. This calculation is done by plugging the numbers (1's and 0's) from three fields in the packet (destination address, source address, and data) into a polynomial equation. The result is a 32-bit number (again 1's and 0's) that can be checked at the destination computer. This corruption detection method is accurate to one packet in 4 billion. See Frame Check Sequence Errors.

Frame Check Sequence Errors Errors that occur when a packet is involved in a collision or a corrupted by noise.

Frame Dropping The process of dropping video frames to accommodate the transmission speed available.

Frame Duration The sum of all the unit time intervals of a frame. The time from the start of one frame until the start of the next frame.

Frame DS1 The DS1 frame comprises 193 bit positions. The first bit is the frame overhead bit, while the remaining 192 bits are available for data (payload) and are divided into 24 blocks (channels) of 8 bits each.

Frame Error An invalid frame identified by the Frame Check Sum (FCS). See also Frame Errors.

Frame Error Rate FER. The ratio of errored data frames to the total number of frames transmitted. If the FER gets too high, it might be worth while stepping down to slower baud rate. Otherwise, you would spend more time retransmitting bad frames than getting good ones through. In other words, throughput would suffer. The theory is that the faster the speed of data transmission the more likelihood of error. This is not always so. But if you are getting lots of errors, the first — and easiest — step is to drop the transmission speed. Frame Error Rate is thus a measure of transmission quality. It is generally shown as a negative exponent, (e.g., 10 to the minus 2 power (10^{-2}) means one out of 100 frames are in error.) The FER is directly related to the Bit Error Rate (BER). See also Bit Error Rate.

Frame Errors In the 12-bit, D4 frame word, an error is counted when the 12-bit frame word received does not conform to the standard 12-bit frame word pattern.

Frame Flag Sequence The unique bit pattern "01111110" used as the opening and closing delimiter for the link layer frames.

Frame Frequency A video term. The number of times per second a frame is scanned.

Frame Grab To capture a video frame and temporarily store it for later manipulation by a graphics input device.

Frame Grabber A PC board used to capture and digitize a single frame of NTSC video and store it on a hard disk. Also known as Frame Storer. See Video Capture Board.

Frame Ground FGD. Frame Ground is connected to the

storing information for input into a computer. Remember the cards you got telling you "not to fold, bend, punch, spindle, etc.?" They were Hollerith Cards. They're now falling into disfavor as other, less tamper-proof methods appear.

Hollerith Code Twelve level punched card code.

Hollow Pipeline Jargon for a broad bandwidth circuit that has no framing. A private out-of-band signaled (CCC, Clear Coded Channel) DS1. There is no timing, framing or error connection. You input a bit stream into one end and it comes out the other end in the same order. The maximum speed for DS-1 is 1.536 Mbps. This is 1.544 Mbps less than the framing overhead of 8 Kbps.

Hologram A three-dimensional image produced by a system that uses lasers instead of lenses.

Holographic Data Storage A technology still in the labs. It uses lasers and crystals rather than magnetic medium to store bits and bytes in holograms. Holographic data storage portends major reduction in physical storage space and much shorter seek time.

Holy War Arguments that involve basic tenets of faith, about which one cannot disagree without setting one of these off. For example: PCs are superior to Macintoshes.

Home The beginning place of a cursor on a CRT screen. Usually it's the top left hand corner. The function key on an IBM PC or clone marked "Home" will take the cursor to the home position, namely the top left hand corner.

HomePNA Home Phoneline Networking Alliance. The HomePNA is a consortium of more than 90 companies from the PC, consumer electronics, and network equipment manufacturing industries that aim to deliver easy-to-use, affordable, high-speed networking solutions over existing telephone wires. The HomePNA expects its 10 Mbps home networking standard, called 2.0, to be finalized in the second half of 1999. Home networking allows multiple members of a household to simultaneously use PCs or consumer electronic devices to access files and the Internet, print documents, and play video games from external Internet connections including cable TV, Digital Subscriber Line (DSL), satellite or conventional analog modems. www.homepna.org.

HomeRF Home RF (Radio Frequency) Working Group. According to its Web site, the HRFWG "was formed to provide the foundation for a broad range of interoperable consumer devices by establishing an open industry specification for wireless digital communication between PCs and consumer electronic devices anywhere in and around the home." The Shared Wireless Access Protocol (SWAP) specification is intended to enable interoperability of electronic devices from a large number of manufacturers, while providing the flexibility and mobility of a wireless solution. SWAP is expected to yield a wireless home network to share voice and data between devices such as PCs, peripherals, PC-enhanced cordless phones, and devices yet to be developed. www.homerf.org.

Home Agent A Mobile IP term. Mobile nodes associated with nomadic users register their presence at a remote location through a foreign agent. The foreign agent communicates with the home agent in order that data packets can be forwarded to the remote subnet. See also Mobile Agent and Mobile IP.

Home Carrier The cellular operating company which a subscriber is registered with and pays the monthly service charge and usage charges to.

Home Location Register HLR. A wireless telecommunications term. A permanent SS7 database used in cellular

networks, including AMPS (Advanced Mobile Phone System), GSM (Global System for Mobile Communications), and PCS. The HLR is located on the SCP (Signal Control Point) of the cellular provider of record, and is used to identify/verify a subscriber; it also contains subscriber data related to features and services. The HLR is used not only when you are making a call within the area of coverage supported by your cellular provider of record. It also is used to verify your legitimacy and to support the features to which you subscribe when you are roaming outside that home area. In a roaming scenario, the local service provider queries the HLR via a SS7 link. Once verified, your data is transferred via SS7 to the VLR (Visitor Location Register), where it is maintained during your period of roaming activity within the coverage area of that provider. HLR is a key element of IS-41, the predominant wireless standard in North America. See also AMPS, GSM, IS-41, PCS, SCP, SS7 and VLR.

Home Page The classic definition: The front page of an "online brochure" about an individual or organization. The Internet definition: The first page browsers see of the information you have posted on your computer attached to the World Wide Web is your "home page." It's a "welcome" page. It says "Welcome to my site, my home." It typically contains some sort of table of contents to more information which a visitor (browser, surfer, etc.) will find at your site by clicking onto hypertext links you've created. In a Web site, a home page is usually called [index.htm](#), [index.html](#) or [index.asp](#). The biggest mistake made by people creating Web sites is that they fail to call their home page [index](#).* (that star depends on the operating system which the Web hoster is using). See HTML, Internet, Streaming and World Wide Web.

Home Run Phone system wiring where the individual cables run from each phone directly back to the central switching equipment. Home run cabling can be thought of as "star" cabling. Every cable radiates out from the central equipment. All PBXs and virtually all key systems work on home run cabling. Some local area networks work on home run wiring. See Loop Through.

HomePNA Home Phoneline Networking Alliance. An association of companies working toward the adoption of a single, unified phoneline networking standard and bringing to market a range of interoperable home networking solutions using in-place phone wiring. HomePNA solutions are intended to be plug-and-play for networking of multiple PCs, peripherals (e.g., printers, scanners and video cameras), multi-player network games, home automation devices (e.g., environmental control and security systems), digital televisions and digital telephones. An all-purpose Home Area Network (HAN) using existing telephone wiring, the HomePNA solution also is intended as a means of shared access to IP voice and video networks, the IP-based Internet, and the conventional circuit-switched Wide Area Network (WAN). Network access technologies are intended to include analog, ISDN and xDSL local loops. Initial efforts are directed at a technology that will support spatial separation of nodes by as much as 500 feet, which represents a home of up to 10,000 square feet (which is bigger than my home, and probably bigger than yours, unless you are Bill Gates and live in a monstrosity of a castle, in which case you probably already have an ATM-based LAN with SONET fiber optics pipes running at 10 Gbps, but I digress), and running at data rates of 1 Mbps. Frequency Division Multiplexing (FDM) is intended to support simultaneous voice and data traffic; frequency ranges are intended to avoid interference from devices (e.g., refrigerators and air conditioners)

found in the home. HomePNA solutions are based on an Ethernet derivative, running at 1 Mbps at frequencies above 2 MHz using a proprietary compression technique from Tut Systems, and using the CSMA/CD protocol native to Ethernet; speeds of 10 Mbps are planned into the future, with the theoretical potential being as much as 100 Mbps. Members include 2Com, AT&T, Compaq, Hewlett-Packard, IBM, Intel, Lucent and Tut Systems. www.homepna.org. See also Ethernet, FDM, ISDN, SNET and xDSL. www.homepna.org

Homeostasis The state of a system in which the input and output are exactly balanced, so there is no change.

Homes Passed An expression of the number of dwellings that a CATV provider's distribution facilities pass by in a given cable service area and an expression of the market potential of the area.

Homing 1. When you dial a long distance number, your central office will choose a special set of trunks to send your call onto the next switching center for movement through the nationwide toll system. Those trunks are said to be the homing trunks for your central office. In other words, your central office is said to home on these trunks. If you're consistently encountering lousy long distance lines (and so are others on your central office), then ask your telephone company to check these trunks out.

2. Returning to the starting position, as in a rotary stepping switch when its connection is released.

Homo 1. The Greek prefix meaning the same.

2. Home Office Mobile Office. See also SOHO, which stands for Small Office Home Office.

Homogeneous Networks Composed of similar hardware from the same manufacturer.

Homologation Conformity of a product or specification to international telephony connection standards. What this means in simple language is that you have submitted your product to a regulatory agency or a government testing agency in a foreign country and they have said that your product is OK for use and sale in that country and it is allowed to be connected to the local phone system. In short, your product has now been homologated in that country.

Honeycomb Coil A type of inductance in which the turns do not lie adjacent to each other.

Honeymoon It was the accepted practice in Babylon 4,000 years ago that for a month after the wedding, the bride's father would supply his son-in-law with all the mead he could drink. Mead is a honey beer, and because their calendar was lunar based, this period was called the "honey month" or what we know today as the honeymoon.

Hook-up Wire A wire used for low current, low voltage (under 1000 volts) applications within enclosed electronic equipment.

Hookemware Free software that contains a limited number of features designed to entice the user into purchasing the more comprehensive version. See also Hyperware, Meatware, Shovelware, Slideware and Vaporware.

Hookflash Momentarily depressing (up to eight tenths of a second) the hookswitch of a telephone instrument can initiate various services such as calling the attendant, conferencing calls, transferring calls or answering a call coming in on a line equipped with call waiting. In ISDN, a hookflash signals the System Adapter to perform an operation, such as placing a call on hold. To hookflash, simply depress and release the receiver button. By default, the Hayes ISDN System Adapter recognizes a hookflash when the receiver button is depressed less than 0.8 of a second. You can change the default. See Hookswitch.

Hooking Signal An on-hook signal of 0.1 to 0.2 second duration used to indicate that a subscriber intends to initiate a new process such as "add-on."

Hookswitch Also called switchhook or switch hook. The place on your telephone instrument where you lay your handset. A hookswitch was originally an electrical "switch" connected to the "hook" on which the handset (or receiver) was placed when the telephone was not in use. The hookswitch is now the little plunger at the top of most telephones which is pushed down when the handset is resting in its cradle (on-hook). When the handset is raised, the plunger pops up and the phone goes off-hook. Momentarily depressing the hookswitch (up to 0.8 of a second) can signal various services such as calling the attendant, conferencing or transferring calls. See Hookflash and Hooking Signal.

Hookswitch Dialing You can make phone calls by depressing the hookswitch carefully. If you push it five times, you dial five. Push it ten times you dial 0. Some coin phones discourage hookswitch dialing. Some don't.

Hoot'n'Holler Hoot'n'Holler are special 24-hour a day phone circuits which stay open 24-hours a day, seven days a week. Anyone picking up a phone on the circuit can listen and talk to whoever's on the line, or whoever might be within earshot. The idea is that to get someone to speak to you, you "hoot and holler," i.e. make a noise. A hoot'n'holler circuit is also called a Junkyard Circuit, Holler Down, Shout Down, Open Speech Circuit, Squawk Box System, FP or Full Period (as in FP 123456 circuit #). Hoot'n'Holler is a circuit consisting of 4 wires (2 pair — a transmit pair and a receive pair). Technically, this is how it works: Audio energy present on the transmit pair at any location will appear on the receive of all the other locations, usually a multipoint circuit. The transmitted audio will not return on the receive pair of the originating location. Hoot'n'Holler circuits are voice conferencing oriented party lines and are non private by nature. There is no signaling on a hoot and holler circuit except when one "shouts down" to open speakers and "listening" at the distant out points. A Hoot'n'Holler circuit is a dedicated full time voice network. Individual four wire "drops" are connected via various bridging mechanisms. These "bridges" can be analog or digital and act as mix minus devices (mixes everyone else minus yourself). They provide all drops with connectivity with each other.

Hop 1. Each short, individual trip that packets (or e-mail messages) make many times over, from router to router, on their way to their destinations.

2. A change of Radio Frequency (RF) channel used to carry the Cellular Digital Packet Data (CDPD) data for a channel stream.

Hop by Hop Route A route that is created by having each switch along the path use its own routing knowledge to determine the next hop of the route, with the expectation that all switches will choose consistent hops such that the call will reach the desired destination. PNNI (Private Network-Network Interface) does not use hop-by-hop routing.

Hop Channel A Radio Frequency (RF) channel that has been declared a candidate for carrying a Cellular Digital Packet Data (CDPD) channel stream after a channel hop.

Hop Count The number of hops it will take for a packet to make it from a source to a destination. In short, the number of nodes (routers or other devices) between a source and a destination. In TCP/IP networks, hop count is recorded in a special field in the IP packet header and packets are discarded when the hop count reaches a specified maximum value.

Hop Off When you make a phone call on the Internet you

is only one object instance. An object instance links a particular object to a specific node on the network. The numbering system is infinitely extendible to accommodate additions to this base identification scheme. This common naming structure permits equipment from a variety of vendors to be managed by a single management station that uses SNMP. The four main categories of the tree are Directory, Management, Experimental and Private/Enterprises.

Internet Number The dotted-quad address used to specify a certain system. The Internet number for cs.widener.edu is 147.31.130. A resolver is used to translate between hostnames and Internet addresses.

Internet Numbers Registry IR. The officially designated organization responsible for the assignment of IP addresses, the IR assigns unique URLs (Uniform Resource Locators), which are translated into IP addresses through a resolver. IR is a responsibility of the IANA (Internet Assigned Numbers Authority), a function assigned to the Information Sciences Institute (ISI) of the University of Southern California. In accordance with its discretionary authority, ISI initially delegated that responsibility to SRI International and, subsequently, to Network Solutions Inc. (NSI). Beginning March 1998, NSI shares that responsibility with CORE and Emergent Corporation, which administers the Shared Numbers Registry (SRS). See also CORE, IANA, SRS, and URL.

Internet Offloading To extract Internet data traffic from a carrier's telephone voice switch and process it on a separate data switch or other equipment, in order to get rid of the Internet-bound traffic and handle that data more cheaply. Here's the logic: A normal central office telephone switch is designed to handle voice phone calls, each averaging three minutes. Pricing is done to accommodate this pattern. After the Internet became very popular, the manager of my local phone company complained to me that his average phone call had now risen to one hour and this was "killing him." He had been forced to put in more capacity, even though he wasn't getting

Internet Open Trading Protocol IOTP. An interoperable framework for Internet commerce, IOTP was developed by the Open Trading Protocol Consortium, and has been accepted by the Internet Engineering Task Force (IETF) for standards development. IOTP is intended to be independent of any underlying electronic payment systems, such as SET (Secure Electronic Transaction), Mondex, CyberCash, and DigiCash. According to the IETF, a "fundamental ideal of the IOTP effort is to produce a definition of these trading events in such a way that no matter where produced, two unfamiliar parties using electronic commerce capabilities to buy and sell that conform to the IOTP specifications will be able to complete the business safely and successfully."

Internet Packet Exchange IPX. Novell NetWare's native LAN communications protocol, used to move data between server and/or workstation programs running on different network nodes.

Internet Plumbers Internet plumbers are the companies who make the equipment that makes up the Internet's infrastructure, such as the routers and the servers. They include Cisco, IBM, Lucent and Sun.

Internet Protocol IP. Part of the TCP/IP family of protocols describing software that tracks the Internet address of nodes, routes outgoing messages, and recognizes incoming messages. Used in gateways to connect networks at OSI network Level 3 and above. See Internet, Internet Protocol Address and TCP/IP.

Internet Protocol Address Also called IP Address. It's

a unique, 32-bit number for a specific TCP/IP host on the Internet. IP addresses are normally printed in dotted decimal form, such as 128.127.50.224. Once your domain is assigned a group of numbers by the Internet's central registry, it can house one or several domains and/or hosts, i.e. computertelephony.com and teleconnect.com. People looking for those domains will be pointed to that server where they will find all information in the domain — perhaps a home page, or a place to leave e-mail, etc. There are three classes of IP address A, B, and C — the most common of which is a class "C" address block. A class "C" address block can address about 256 hosts (e.g., 128.10.10.*), a class "B" address block can contain about 256*256 (e.g., 128.10.*.*) hosts. Some ip addresses are reserved for broadcasts in respective domains. See Domain and Internet.

Internet Protocol Datagram The fundamental unit of information passed across the Internet. Contains source and destination addresses along with data and a number of fields which define such things as the length of the datagram, the header checksum, and flags to say whether the datagram can be (or has been) fragmented. This is a self-contained packet, independent of other packets.

Internet Protocol Suite A suite of network protocols which have been adopted as the main de facto protocols for LANs.

Internet Registry Activities involved in the administration of generic Top Level Domains (gTLDs) in the CORE (Council or Registrars) Domain System. Such activities comprise all the services needed for assignment and maintenance of Internet domain names. As many as 90 registrars will be authorized by CORE as registrars to administer and maintain the new gTLDs: .arts, .firm, .info, .nom, .rec, .shop and .web. InterNIC historically has been primarily responsible for the assignment, administration and maintenance of a subset of the traditional gTLDs, specifically, .com, .edu and .org. Future responsibility for those traditional gTLDs is uncertain. See also CORE, DNS, gTLD and InterNIC.

Internet Relay Chat IRC. Sort of like CB radio, but run on the Internet, and far more confusing than CB radio.

Internet Router See Router.

Internet Security Information traveling on the Internet usually takes a circuitous route through several intermediary computers to reach any destination computer. The actual route your information takes to reach its destination is not under your control. As your information travels on Internet computers, any intermediary computer has the potential to eavesdrop and make copies. An intermediary computer could even deceive you and exchange information with you by misrepresenting itself as your intended destination. These possibilities make the transfer of confidential information such as passwords or credit card numbers susceptible to abuse. This is where Internet security comes in and why it has become a rapidly growing concern for all who use the Internet. See the Internet and Secure Channel.

Internet Server 1. An Internet server is a device which users on the Internet access to get services. Such services might be electronic mail, news, a Web page, etc. A company will have one or more Internet servers attached to the Internet when it wants to deliver services to people on the Internet. Such Internet servers could be called e-mail servers, FTP servers, News servers and World Wide Web servers. Internet servers most commonly run on Unix. But Microsoft Windows NT is increasingly gaining popularity.

2. A Sun Microsystems term, Part of Solaris' Server Suite.

Provides secure, scalable workgroup-based Internet computing.
Internet Server API See ISAPI.

Internet Service Provider ISP. A vendor who provides access for customers (companies and private individuals) to the Internet and the World Wide Web. The ISP also typically provides a core group of internet utilities and services like E-mail, News Group Readers and sometimes weather reports and local restaurant reviews. The user typically reaches his ISP by either dialing-up with their own computer, modem and phone line, or over a dedicated line installed by a telephone company. An ISP is also called a TSP, for Telecommunications Service Provider, and a ITSP, for Internet Telephony Service Provider.

Internet Society ISOC. A non-profit organization that fosters the voluntary interconnection of computer networks into a global communications and information infrastructure. According to Computerworld, the Internet Society is concerned with the evolution of the Internet and its social, political and technical issues. The ISOC is the umbrella organization for the IAB, IETF and IRTF. The ISOC has 5,000 members in 120 countries. Its Web site is www.isoc.org. See also IOPS and NANOG.

Internet Suite Of Protocols The combination of TCP (Transmission Control Protocol) and IP (Internet Protocol). See TCP/IP.

Internet Telephony In the very beginning, Internet telephony simply meant the technology and the techniques to let you make voice phone calls — local, long distance and international — over the Internet using your PC. To make these calls, both people on the phone need appropriate hardware and software. The hardware is typically a sound card or voice modem in a PC. There are almost as many ways of making phone calls on the Internet as there are software packages. The key is to figure a way that your PC can dial and reach someone else's distant PC — which must be turned on, plugged in and connected to some place that my PC can find you at. In short, making voice phone calls was the first definition of Internet telephony. But then people started thinking of other things Internet telephony could become. For example, Internet telephony could let you talk to someone while the two of you worked on making perfect a document that was on both your screens. If the Internet could send email, people started thinking of sending fax, voice, video and imaging mail/messages. And maybe, as you cruise the Internet and find a product you'd like to buy, you might see a button that says "I'd like to know more. Have an operator call me." So you click the button, and 15 seconds later your phone rings. The operator is calling, wanting to know how he can help? In short, the definition of Internet telephony is broadening day by day to include all forms of media (voice, video, image), all forms of messaging and all variations of speed from real-time to time-delayed. See Gold, Packet Switching, Tier 1 and, for the best explanation, TAPI 3.0.

Internet Terminal A sub-\$500 machine specially designed for Internet browsing and first proposed in the late Fall of 1995 by Larry Ellison, head of database software company Oracle. Part of its appeal to people outside Microsoft and Intel is that the Internet Appliance would not have to be based on standard PC technology. It need have an Intel chip and need not run Windows. This device is also called an Internet Terminal, a Network Computer or an IPC, an Interpersonal computer. The original description of the Internet Appliance was that it would come with 4mb of RAM, 4mb of flash memory, processor, monitor, keyboard and

mouse — all for under \$500. Also called a NC, or Network Computer.

Internet Worm This software program caused a major part of the Internet network to crash by replicating and generating spurious data.

Internet2 The next generation Internet, replacing the current Internet exclusively for the use of member universities. Internet2 is a project of the University Corporation for Advanced Internet Development (UCAID). As a result of the deteriorating performance of the Internet, 34 U.S. universities announced in October 1996 the formation of Internet2. Subsequently, the central goals of the project were adopted as part of the Clinton administration's Next Generation Initiative (NGI). This second version of the Internet is a collaboration of the National Science Foundation (NSF), the U.S. Department of Energy, over 110 research universities, and a small number of private businesses. Each participating university has committed at least \$500,000 to fund the project. Intended to serve as a private Internet for the exclusive use of its member organizations, it will be separate from the traditional Internet. The network eventually will operate over fiber optic transmission facilities at speeds of up to 2.4 Gbps (SONET OC-48), although current speeds of connection are at 155 Mbps (OC-3) and 622 Mbps (OC-12). Internet2 will connect through gigabit POPs, switches with throughput in the range of billions of packets per second, and will run the IPv6 protocol. www.internet2.edu. See also Internet.

Internetwork See Internetworking.

Internetwork Management A generic term used to describe the actions that help maintain, a complex network.

Internetwork Operating System IOS. Cisco's massive operating system that runs most routers on the Internet.

Internetwork Packet Exchange IPX. A network layer protocol developed by Novell and used in NetWare implementations. See IPX.

Internetwork Router In local area networking technology, an internetwork router is a device used for communications between networks. Messages for the connected network are addressed to the internetwork router, which chooses the best path to the selected destination via dynamic routing. Internetwork routers function at the network layer of the Open Systems Interconnection (OSI) model. Also known as a network router or simply as a router.

Internetworking 1. Communication between two networks or two types of networks or end equipment. This may or may not involve a difference in signaling or protocol elements supported. And, in the narrower sense — to join local area networks together. This way users can get access to other files, databases and applications. Bridges and routers are the devices which typically accomplish the task of joining LANs. Internetworking may be done with cables — joining LANs together in the same building, for example. Or it may be done with telecommunications circuits — joining LANs together across the globe.

InterNIC Internet Network Information Center. The InterNIC registry is where you always used to go to register your domain name. Registration was free until 1995; then it changed to \$50 a year; now it's \$35 a year for domain names with anniversary dates on or after April 1, 1998. The InterNIC Registration Services Host computer contains information on Internet Networks, ASNs, Domains, and POCs (Points of Contact, the person or persons identified in a record). The InterNIC was established in January 1993 as a collaborative project between AT&T, General Atomics (no longer involved)

oyee training, video conferencing, on demand. See the Internet, IP API, TAPI 3.0 and TCP/IP.

rrhythms The major IP Telephony today (fall of 1997), according to a "telephony powered by Fusion" from www.nmss.com), include:

thm, marketed by Microsoft, runs at ivative of the ITU (International ion) standard GSM work. GSM is and the world as the standard for dig- ations. Microsoft's implementation l in several ways including how the ted and what aspects of the encoder MicroSystems provides an MS-GSM ible with Microsoft's Win95/WinNT

hythm runs at 6.3 or 5.4 kbps and uses and dictionaries which help provide ig process is CPU-intensive, however rtium), so don't expect a PC-based ell for lots of real-time activity.

roprietary encoder that has been bun- heir Browser. It delivers 53:1 com- tter. VoxWare presents very low net- ments; however, it also has lower

gorithms have a set of rules concern- isposition management. This is often jement. "Jitter" in this case refers to nto frames. The decoding algorithm equence data and make "smoothing" rd packets versus waiting for an out- rive). Given the real-time nature of a fer management policies have a large ctual sound losses range from a syl- ng on how much data is in a given ize is often a quarter-second, large a word or a short word — similar to onnection in a poor coverage area.

Attorney.
Package.
ial Passenger Airline Reservation ed term.

IPs (Internet Service Providers) and viders) to provide roaming capabil- on proprietary standards, roamers eing afforded Internet access. Usage he I-PASS clearinghouse, with fees r use of its facilities by roamers. I- member ISPs in approximately 150 s over 1,000 POPs (Points of ptes with GRIC (Global Reach e IETF's Roamops working group is r roaming, as well. See also GRIC

ications. A system that lets threads data and messages among them- vices to and receive services from d IPC mechanisms under MS OS/2 pipes, queues, shared memory, and

nnel is the channel number used by "page" the phones on the system.

The term "paging" refers to notifying a particular phone that it has an incoming call. All idle, turned-on phones on a system monitor the data stream on the IPCM. Non-wireline cellular carriers use channel 0333 as the IPCH, while wireline providers (those operated by a telephone company use chan- nel 0334.

IPCI See Integrated Personal Computer Interface.

IPCP IP Control Protocol; protocol for transporting IP traffic over a PPP connection.

IPDC Internet Protocol Device Control. See MGCP and Simple Gateway Control Protocol.

IPDS Intelligent Printer Data Stream. It's IBM's host-to-print- er page description protocol for printing. You can now buy kits which let you use your present printer to emulate an IBM printer.

IPE Intelligent Peripheral Equipment. Northern Telecom's term for being able to extend all the features of its PBX over distances longer than a normal extension in a building. See Fiber Remote.

IPEI International Portable Equipment Identities. A wireless term.

IPEM If the Product Ever Materializes.

IPL Initial Program Load.

IPLC International Private Leased Circuit.

IPM Interruptions Per Minute or Impulses Per Minute.

IPNG IPng. IP Next Generation. Collective term used to describe the efforts of the Internet Engineering Task force to define the next generation of the Internet Protocol (IP) which includes security measures, as well as larger IP addresses to cope with the explosive growth of the Internet. The were three candidate protocols for IPng (CATNIP, TUBA and SIPP), were blended into IPv6, which is in trial stages at the time of this writing. See IPv6.

IPNS International Private Network Service. It actually inter- national private line service and it's typically a circuit from 9.6 Kbit/sec up to T-1 or E-1. Domestically you would simply call it "Private line data service."

IPP IPP is the Internet Print Protocol, a collection of IETF standards developed through the Printer Work Group, www.pwg.org, that will make it as easy to print over the Internet as it is to print from your PC. IPP uses the HTTP pro- tocols to "POST" a supported MIME Page Discription Language file to a printer. Printers are given Internet address- es such as, www.mydomain.com/ipp/my_printer, so they can be located on the Internet. IPP has the support of all the major printer companies including, Xerox, HP, Lexmark, IBM as well as Novell and Microsoft. Since fax, at a sufficient level of abstraction, is "remote printing," work is under way to create a Fax Profile for IPP as well, so that IPP can duplicate the legal as well as common practices of fax transmissions. Richard Shockey. Rshockey@ix.netcom.com contributed this definition. Thank you.

IPO Initial Public Offering. Start a company. Some years later, take it public. Come out at \$12. A week later, your stock is at \$24. You're a success, and rich. IPOs are critical in saying "Thank You" to all your hardworking employees.

iPOD IP (Internet Protocol) Phone over Data. There tend to be two variations — emulation and driving. The emulation iPOD connects directly to digital station ports on a PBX and emulates a digital PBX feature phone. The emulation iPOD also enables the new PC IP PBX vendors to interoperate with enterprise PBXs. The driving iPOD drives digital PBX phones in the same fashion as if the phone were connected directly to a PBX station circuit card. The driving iPOD can enable the

new PC PBX vendors to use existing desk sets in the enter- prise. Both versions of the iPOD provide a TCP/IP interface for the purpose of transporting the voice and call control sig- naling associated with a PBX digital station call over a pack- et network. Protocols, DSP algorithms, densities and different form factors all constitute possible platform variations.

IPR Intellectual Property Rights

IPRS Internet Protocol Routing Service. Defined by Bell Atlantic as "a low-cost access service for ISPs. This service supports basic dial, ISDN, and dedicated requirements for transparent connectivity from the end-user to the ISP."

IPS Internet Protocol Suite.

IPsec A collection of IP security measures that comprise an optional tunneling protocol for IPv6. IPsec supports authen- tication through an "authentication header" which is used to verify the validity of the originating address in the header of every packet of a packet stream. An "encapsulating security payload" header encrypts the entire datagram, based on the encryption algorithm chosen by the implementer. See also Authentication, Encryption, IPv6, and Tunneling.

IPT IP Telephony.

IPT Gateway IP Telephony Gateway. Imagine you and I work for a company which has a PBX — a telephone system. You dial 234 to reach Harry. You dial 9 and a long distance number to dial your biggest client in Los Angeles. Now imag- ine you want to call your the company's branch office in London. You dial 22. You hear a dial tone. You then punch in 689. You hear another dial tone. Then you punch 123. Bingo, the boss of the London office answers. Here's what all those numbers mean. Dialing 22 dials you into a PC called the IP Telephony Gateway, which, on the one side, is connected to your PBX and on the other side is connected to a data line your company has between your office and your London office. Dialing 689 is you telling the IPT Gateway that you want to speak to the PBX in your London office. Dialing 123 tells the London PBX to dial extension 123.

That connection between your PBX and your London office's PBX might be anything from a dedicated private data line (e.g. part of your company's Intranet), to a virtual circuit on a Virtual Private Network (VPN) or it might be the public Internet. The IPT Gateway's major function is to convert the analog voice coming out of your PBX into VoIP (voice over Internet Protocol) and then send it on a packet switched data circuit which conforms to the IP. In short, an IPT Gateway allows users to use the Internet (or most likely an Intranet or Virtual Private Network) to talk with remote sites using (Voice over Internet Protocol).

IPTC On April 30, 1998, Ericsson Inc. released a press release which contained, inter alia, "Ericsson Inc. has developed a new IP telephony platform called Internet Telephony Solution for Carriers (IPTC) that raises the standard for IP telephony sys- tems. IPTC offers phone-to-phone, fax-to-fax and PC-to- phone services over a TCP/IP network. It provides a superior operations and management (O&M) facility that moves IP tele- phony to a true carrier-class communications system. IPTC works by taking phone and fax calls that originate in the pub- lic switched telephony network (PSTN) and passing them to the IPTC platform, which carries them over the TCP/IP network to their destination where they are fed back to the PSTN net- work. PC-to-phone calls are taken directly from the TCP/IP network and carried to their destination in the same way...IPTC software runs on industry standard platforms that are based on Intel Pentium processors and Microsoft Windows NT...IPTC uses a Web-based management program to update and con-

P22 Format An enchanted version of the P2 format that appeared in the 1988 X.400 standard.

P2T Pulse to Tone & Rotary Dial Recognition products.

P35 Format The EDI (Electronic Data Interchange) message header enhancement to X.400 that enables EDI-specific addressing, routing and handling of EDI messaging. Defined in 1990 in the X.435 standard.

P802.11 P802.11 is a series of evolving standards in the wireless Local Area Network arena. The IEEE Program P802.11 Standards Working Group aims to define universal protocols for wireless LANs in the 900 MHz, 2.4 GHz and infrared frequency bands. Main components in the 802.11 standard are twofold: 1. The physical specifications for medium-dependent protocols. There are different physical specifications for each frequency band supported in 802.11. 2. The Medium Access Control (MAC) specifications for ad-hoc wireless networks and wireless network infrastructures. A single medium-independent MAC protocol provides a unified network interface between different wireless PHYs (Physical Specifications) and wired networks.

PA Public Address. Loud speaker system, sometimes used for paging.

PABX Private Automatic Branch eXchange. Originally, PBX was the word for a switch inside a private business (as against one serving the public). PBX means a Private Branch Exchange. Such a "PBX" was typically a manual device, requiring operator assistance to complete a call. Then the PBX went "modern" (i.e. automatic) and no operator was needed any longer to complete outgoing calls. You could dial "9." Thus it became a "PABX." Now all PABXs are modern. And a PABX is now commonly referred to as a "PBX."

PAC Personal Activity Center. A combination IBM PC clone, alarm clock, answering machine, speakerphone, fax machine, modem, compact-disk player and AM/FM radio all rolled into one unit sitting on your desk.

Pac Bell Pacific Bell, the California Bell Operating Company (BOC) which, along with Nevada Bell, formed Pacific Telesis (PacTel). PacTel was one of the seven original Regional Bell Operating Companies (RBOCs) formed in 1984 by the Modified Final Judgement (MFJ). As PacTel was acquired by SBC Corporation (Southwestern Bell) in 1996, Pac Bell is now a subsidiary of SBC.

Pacific Telesis One of the seven, now-independent Regional Holding Companies formed at the Divestiture of AT&T of 1983. It holds Pacific Bell, Nevada Bell and several non-regulated subsidiaries. In 1996, SBC Corporation bought Pacific Telesis.

Pacing Controlled rate of flow dictated by the receiving component, to prevent congestion. A method of flow control in IBM's SNA. See Pacing Group.

Pacing Algorithm The mathematical rules established to control the rate at which calls are placed by an automatic dialing machine, also called a predictive dialer. See Predictive Dialer.

Pacing Control SNA term for flow control. See Pacing Group.

Pacing Group In IBM's SNA, the number of data units (Path Information Units, or PIUs) that can be sent before a response is received. An IBM term for window.

Pack To compress data items so they take up less space. A process used by many database programs to remove records marked for deletion.

Packet 1. Generic term for a bundle of data, usually in binary form, organized in a specific way for transmission. The specific native protocol of the data network may term the packet as

Generic Format of a Data Packet STX=Start of Text EXT=End of Text

Header	STX	Text	EXT	Trailer
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a packet, block, frame or cell. A packet consists of the data to be transmitted and certain control information. The three principal elements of a packet include: 1. Header — control information such as synchronizing bits, address of the destination or target device, address of originating device, length of packet, etc. 2. Text or payload — the data to be transmitted. The payload may be fixed in length (e.g., X.25 packets and ATM cells), or variable in length (e.g., Ethernet and Frame Relay frames). 3. Trailer — end of packet, and error detection and correction bits. See also Block, Cell and Frame.

2. Specific packaging of data in a packet-switched network, such as X.25, Frame Relay or ATM. A true packet-switched network such as X.25 involves packets of a specific and fixed length. In a public packet switched network, such packet payloads originally were specified as being either 128B or 256B, where B=Byte. In later versions of the standards, that packet size was increased to a maximum of 4,096B, although the packet payload size generally does not exceed either 512B or 1024B. The larger packet size traditionally is used in airline reservation systems and other applications where relatively large sets of data routinely are transmitted. A X.25 packet prepends the payload with header information including a flag of eight bits; the flag denotes the beginning of the packet and also serves to assist the network nodes (packet switches) in synchronizing on the rate of transmission. An address field of eight bits also prepends the payload, with four bits identifying the target device and four bits identifying the transmitting device. Control data of eight-to-sixteen bits comprise the last element of the header; included in control data is the packet number in order that the network nodes might identify and correct for lost or errored packets. Appending the payload is a trailer consisting of a Cyclic Redundancy Check (CRC), which is used by all packet nodes for purposes of error detection and correction. See ATM, CRC, Frame Relay, Packet Assembler/Disassembler (PAD), X.25.

Packet Assembler/Disassembler PAD. A hardware/software combination that forms the interface between a X.25 network such as PDN and an asynchronous device such as a PC. The PAD generates call request, call clear, and other information packets in addition to the ones that contain user data. The PAD is responsible for packetizing the data from the transmitting device before it is forwarded through the packet network. On the receiving end of the transmission, the PAD strips away the control information contained in the header and trailer in order to get at the original text or payload, in effect disassembling the packets and reconstituting the original set of data in its native or original form. The PAD may be in the form of a standalone DCE device on the customer premise and supporting one or more terminals, or in the form of a printed circuit board which fits into an expansion slot of the terminal. Smaller users generally rely on the carrier to provide the PAD, which is embedded in the packet switch.

Packet Buffer Memory set aside for storing a packet awaiting transmission or for storing a received packet. The memory may be located in the network interface controller or in the

system. Busy Lamp Fields (BLFs) often come on key systems and sometimes on smaller PBXs. They're very handy.

Station Busy Override Pre selected phones have the privilege and ability to preempt busy circuits and override a private conversation.

Station Call Transfer A phone user can transfer incoming and outgoing calls to another phone without attendant assistance.

Station Camp-On Phones can camp-on to a busy extension. The camped-on phone will be notified of the camp-on by a special beep signal. The person at the other end may or may not hear the signal.

Station Clock The principal clock or alternative clock located at a particular station providing the timing reference for all major telecommunications functions at that station. A station clock may also be used to provide timing or frequency signals to other equipment.

Station Code The final four digits of a standard seven or 10 digit telephone number.

Station Conductor A wire that terminates at the equipment side of the lightning protector.

Station Direct Station Selection The phone user places a call to an extension within the PBX by pushing a single pushbutton on his phone.

Station Equipment Telephone instruments and associated equipment furnished to subscribers. We suspect that the word "station" came from early telephone industry which was regulated by the same government agency which regulated the railroad business.

Station Hunting This feature allows a calling phone which places a call to a busy phone to proceed to the next idle phone in the hunt group. This jump is done automatically. See also Rotary Hunt, which is the same thing for trunks.

Station Keeping The process on board a satellite for keeping it at its assigned longitude and inclination.

Station Line Cards Station line cards sit inside telephone systems and drive a bunch of connected phones. These cards translate the software inside the phone system into electrical impulses which tell the phones at the other what they're capable of and let them do things, like dial, transfer, conference, etc.

Station Line Protector Circuitry that protects the telephone system from high voltage hits and lightning strikes. Such circuitry is usually on every station line card.

Station Load The total power requirements of the integrated station facilities.

Station Message Detail Recording Now refers to the RS-232-C "port" or plug found on the back of most modern PBXs and some larger key systems. See Call Accounting System and Call Detail Recording.

Station Message Registers Message unit information centrally recorded on a per-station basis for each completed outgoing call.

Station Message Waiting Special light on a phone to alert hotel/motel guests of messages waiting at the front desk.

Station Monitoring Selected phones can monitor (i.e. listen in on) any other phones in the system.

Station Override Security Designated phones can be shielded against executive busy override (presumably other executives).

Station Protector A station protector protects phones and other phone-like devices ("stations") from lightning. A station protector is typically a gas discharge, carbon block or other device that short circuits harmful voltages to ground in the event of lightning strikes on the phone line. Sometimes it

works. Sometimes it doesn't. If a bad thunderstorm is about to erupt over your house or office, it's a good idea to unplug your phones from AC and from phone lines.

Station Rearrangement And Change Allows a user to move phones, change the features and/or restrictions assigned to phones and administer features associated with telephones.

Station Review A study of how people in an organization use the telephones and what communications needs are not being satisfied.

Station Ringer Cutoff Allows the ringer on the telephone to be turned off. Not always a good idea, since calls may still come in for that phone, but no one may pick them up because they don't hear it ring.

Station Set Another word for a common desk telephone. Station comes from earliest days when the phone industry in the U.S. was regulated by the same agency that regulated the railroads. It made phones stations, thus easier for the government bureaucrats.

Station To Station Call A directly dialed call. No operator is used. Most calls are now directly dialed. Some long distance companies don't even have operators to help complete calls. AT&T still does.

Station Tone Ringing Electronic tone ringer that replaces the bell.

Station Transfer Security If trunk call is transferred from one phone to another, and the second phone does not answer within a predetermined time, the trunk call will automatically go to the attendant.

Station Visual Signaling Lamp on a phone which indicates flashing incoming, steady busy, and "wink" hold visual conditions associated with that phone.

Stationary Orbit An orbit, any point on which has a period equal to the average rotational period of the Earth, is called a synchronous orbit. If the orbit is also circular and equatorial, it is called a stationary or geostationary orbit.

Statistical Equilibrium A telephone company definition. A state of traffic in which, over any considerable length of time, the call arrivals and departures are essentially equal. Traffic that is in statistical equilibrium has an average value of some measure of its level (such as the number of attempts arriving in a specified time interval) that does not change with time.

Statistical Multiplexing A multiplexing technique that differs from simple multiplexing in that the share of the available transmission bandwidth allocated to a given user varies dynamically. In other words, in statistical multiplexing, a channel is assigned only to devices (e.g., telephone, data terminal or fax machine) which are active and seeking to communicate. Static multiplexers, the original multiplexers, dedicated a channel to a device whether it was active or not. This was horribly wasteful, as devices commonly are inactive. As a result, statistical multiplexing is much more powerful than normal static FDM (Frequency Division Multiplexing) or static TDM (Time Division Multiplexing). In other words, Statistical Multiplexers act as contention devices, as well as multiplexers, making intelligent decisions about providing access to expensive bandwidth based on programmable parameters such as first-come-first-served, application priority (e.g., data vs. voice), and bandwidth reservations. See also Fast Packet Multiplexing, FDM and TDM.

Statistics Numbers looking for an argument. The best statistics are those for which you are the sole source or those which are repeated sufficiently often for them to become an integral part of society's conventional wisdom.

Statistics Port In network management systems, interface for reporting events and status.

STATMUX Multiplexing.

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NEWTON'S TELECOM DICTIONARY

STATMUX A statistical multiplexer. See Statistical Multiplexing.

Status Information Information about the logical state of a piece of equipment.

Status Signal Unit Signal unit of CCS used to initiate transmission on a link or to recover from loss of transmission.

Statute Mile A unit of distance equal to 1.609 km, 0.869 nmi, or 5,280 ft.

Stay or Bail Moment The precious few seconds that elapse after loading the front page of a Web site, during which one decides to either stay or leave. Defined by David Siegel in his book "Creating Killer Web Sites."

STC 1. Society of Telecommunications Consultants. A professional society for telecommunications consultants. They endeavor to set standards of behavior for the consulting community, chiefly to avoid having telecom consultants recommend to their clients equipment they receive a secret commission on from the manufacturer.

2. System Time Clock: The master clock in an MPEG-2 encoder or decoder system.

STD Subscriber Trunk Dialing. An non-North American term for direct distance dialing, i.e. dialing long distance calls directly without an operator's assistance. Pricing for long distance calls is typically done by billing a standard amount of money, e.g. a German Mark, for a length of speaking time, which shortens the further you call. For example, you might get one minute for a Mark if you're calling 50 miles. If you call 200 miles you might only get 20 seconds.

SDM Statistical Time Division Multiplexer. SDMs are TDMs (Time Division Multiplexers) with an added microprocessor that provides more intelligent data flow control and enhanced functionality, such as error control and more sophisticated user diagnostics. The major difference between TDMs and SDMs is that stat muxes dynamically allocate time slots on the link to inputting devices on an as-needed basis (rather than in round-robin fashion where all devices are polled in preordained order). Therefore, there is no idle time on the link because a device does not have information to send. Unlike TDMs, SDMs have buffers for holding data from attached devices. They can handle a combined input speed (aggregate speed) that exceeds the speed of the communications link.

STE 1. Station Terminal Equipment.

2. Section Terminating Equipment. SONET equipment that terminates a section of a link between a transmitter and repeater, repeater and repeater, or repeater and receiver. This is usually implemented in wide area facilities and not implemented by SONET Lite. STE Network elements perform section functions such as facility performance monitoring. The section is the portion of a transmission facility between a lightwave terminal and a line repeater or between two line repeaters.

3. Spanning Tree Explorer: A Source Route Bridging frame which uses the Spanning Tree algorithm in determining a route through a network. Often used in ATM networks.

Steady-state Condition 1. In a communication circuit, a condition in which some specified characteristic of a condition, such as value, rate, periodicity, or amplitude, exhibits only negligible change over an arbitrarily long period of time.

2. In an electrical circuit, a condition, occurring after all initial transients or fluctuating conditions have damped out, in which currents, voltages, or fields remain essentially constant or oscillate uniformly without changes in characteristics such as amplitude, frequency, or wave shape. 3. In fiber optics, synonym for equilibrium mode power distribution.

Steerable Beam Antenna An antenna whose main

beam can be directed in various directions either by an electrical or mechanical drive system.

Stentor A new name for the long distance network of nine regional Canadian phone companies. Inspiration for the name came from the Greek poet Homer. He had immortalized Stentor, a warrior in the Trojan war, "whose voice was as powerful as the voices of 50 other men." And so the adjective "stentorian" survived to be applied to someone with a powerful voice, often a politician. The nine members of Stentor are Bell Canada, British Columbia Telephone (BC Tel), AGT Limited, Manitoba Telephone Systems, SaskTel, Maritime Telephone, New Brunswick Telephone, Island Telephone and Newfoundland Telephone.

Step 1. One movement of an electromechanical switch which typically corresponds to one impulse from a rotary dial or one impulse from a touch tone phone which has been converted to a rotary dial.

2. Wang's name for its telephony link is STEP, which stands for Speech and Telephony Environment for Programmers.

Step By Step SXS. An automatic dial-telephone system in which calls go through the switching equipment by a succession of switches that move a step at a time, from stage to stage, each step being made in response to the dialing of a number. SXS is electromechanical switching. It was invented in the 1920s.

Step Call The phone user can, upon finding that the called phone is busy, call an idle nearby phone by merely dialing an additional digit.

Step Down 1. To reduce the voltage. Such reduction in voltage will increase the current.

2. A feature of fax machines that makes them drop their transmission speed when the quality of the phone lines they are transmitting over begins to deteriorate. Dropping the transmission speed is the major way of getting the faxes through on "dirty" lines. All Group III fax machines have "step-down" as a built in feature, or should have.

Step Down Transformer A transformer wound to give a lower voltage on the secondary side than that impressed on (i.e. put into) the primary. The current, however, will be stepped up. A step down (often spelled step-down or step-down) transformer has more primary than secondary turns. See also Stepdown Transformer and Joint Pole.

Step Index Fiber An optical fiber with a core having a uniform refractive index. See also Step Index Optical Fiber.

Step Index Optical Fiber A fiber that has a constant refractive index at its core but a different refractive index as the outer cladding is approached. This design minimizes losses at the core-cladding interface and is preferred for single-mode, long-distance transmission.

Step Index Profile For an optical fiber, a refractive index profile characterized by a uniform refractive index within the core and a sharp decrease in refractive index at the core-cladding interface.

Step Up Transformer A transformer wound to give a higher voltage on the secondary side than that impressed on the primary. The current, however, will be stepped down. It has fewer primary than secondary turns.

Stepdown transformer An oil-cooled transformer often mounted a telephone pole. Such transformer converts the primary voltage to the secondary voltage. Most stepdown transformers are designed for single-phase operation; if a three-phase secondary circuit is required, three physical transformers are sometimes mounted on the same pole. See Joint Pole.