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total. In most fields, it's known as the LonWorks Platform. It's designed to connect all manner of devices to the Internet — from electricity meters to subway doors. See also [www.Echelon](#).

711 The Services Code now available for Telecommunications Relay Access (TRS) to aid those with speech and/or hearing disabilities to access police, fire and other governmental departments for both emergency and non-emergency purposes. See also 911 and 311.

8.3 Under the MS-DOS naming structure, a file's name can be eight letters in front of the period and three after it, e.g. LAZARUS.TXT.

8.3 minutes. The time it takes for light to travel from the Sun to the Earth.

8-bit Computer A computer that uses a central processing unit (CPU) with an 8-bit data bus and that processes one byte (8 bits) of information at a time. The first microprocessors used in personal computers, such as the MOS Technology 6502, Intel 8080, and Zilog Z-80, were installed in 8-bit computers such as the Apple II, the MSAI 8080, and the Commodore 64.

800 The first "area code" for what AT&T originally called In-WATS service. See 800 Service and 8NN.

800 Portability 800 Portability refers to the fact that you can take your 800 number to any long distance carrier. A case example, once I had 1-800-LIBRARY. For many years, that number was provided by AT&T. When portability came along, we were able to change it from AT&T to MCI and still keep 1-800-LIBRARY, which is 800-542-7279. 800 Portability is provided by a series of complex databases the local phone companies, under FCC mandate, have built. 800 Portability started on May 1, 1993. See 800 Service.

800 Service A toll free call paid for by the called party, rather than the calling party. A generic and common term for In-WATS (Wide Area Telecommunications Service) service provided by a phone company, whether a LEC (Local Exchange Carrier) or an IXC (InterExchange Carrier). In North America and in order of their introduction, all these In-WATS services have 800 (1967), 888 (1996), 877 (1998), 866 (2000), or 855 (2001) as their "area code." (Note: Future 800 numbers will follow the convention 8NN, where NN are specific numbers which are identical. Such 800 service is typically used by merchants offering to sell something such as hotel reservations, clothes, or rental cars. The idea of the free service is to entice customers to call the number, with the theory being that if the call was a toll call and therefore cost the customer something, he or she might be less inclined to call. Suppliers of 800 services use various ways to configure and bill their 800 services.

800 Service works like this: You're somewhere in North America. You dial 1-800, 1-888, 1-877, 1-866 or 1-855 and seven digits. The LEC (Local Exchange Carrier, i.e., the local phone company) central office sees the "1" and recognizes the call as long distance. It also recognizes the 8NN area code and queries a centralized database before processing the call further, with the query generally taking place over a SS7 (Signaling System 7) link. The centralized database resides on a Service Management System (SMS), which is a centralized computing platform. The database identifies the LEC or IXC (InterExchange Carrier) providing the 8NN number. Based on that information, and assuming that the toll-free number is associated with an IXC, the LEC switch routes the call to the proper IXC. Once the IXC has been handed the call, it processes the 800 number, perhaps translating it into a "real" telephone number in order to route it correctly. Alternatively, the IXC translates the 800 number into an internal, nonstandard 10-digit number for further routing to the terminating Central Office (CO) and trunk or trunk group.

As a real-life example, the publisher of this book has an 800 number, 800-LIBRARY (or 800-542-7279). When you call that number, MCI routes that number to the first available channel on the dedicated T-1 circuit which leased from MCI's, and connecting the MCI New York City POP (Point Of Presence) to the CMP New York City office.

Because 800 long distance service is essentially a database lookup and translation service for incoming phone calls, there are endless "800 services" you can create. You can put permanent instructions into the company to change the routing patterns based on time of day, day of week, number called, number calling. Some long distance companies allow you to change your routing instructions from one minute to another. For example, you might have two call centers into which 800 phone calls are pouring. When one gets busy, you may tell your long distance company to route all the 800 inbound phone calls to the call center, which isn't busy. See Eight Hundred Service and One Number Calling for more, especially all the features you can now get on 800 service.

In May of 1993 the FCC mandated that all 800 (and by extension all 8NN) numbers become "portable." That means that customers can take their 800 telephone number from one long distance company to another, and still keep the same 800. See also 800 Portability.

800 Services are known internationally as "Freefone Services." In other countries the dialing scheme may vary, with examples being 0-800 and 0-500. Such services also go under the name "Greenfone." In June 1996, the ITU-T approved the E.169 standard Universal International Freefone Number (UIFN) numbers, also known as "Global 800." UIFN will work across national boundaries, based on a standard numbering scheme of 800, 888 or 877 plus an 8-digit telephone number. See also UIFN and Vanity Numbers.

802 See 802 Standards.

802 Standards The 802 Standards are a set of standards for LAN (Local Area Network) and MAN (Metropolitan Area Network) data communications developed through the IEEE's Project 802. The two most important standards are 802.11b and 802.11a. 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:

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

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 on a "best effort" basis, with no provision for error detection, error recovery, or 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-Made 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. See all the following definitions.

802.11a 802.11a is an updated, bigger, better, faster version of 802.11b (also called WiFi), which is now commonly installed in offices, airports, coffee shops, etc. Many laptops now come with 802.11b built-in. The newer 802.11a, also an IEEE standard for wireless LANs, supports speeds up to 54 Mbps. 802.11a runs in a 300-MHz allocation in the 5 GHz range, which was allocated by the FCC in support of UNII (the Unlicensed National Information Infrastructure). Specifically, 200 MHz is allocated at 5.15-5.35 MHz for in-building applications, and 100 MHz at 5.725-5.825 MHz for outdoor use. This allocated spectrum is divided into three working domains. At 5.15-5.25 MHz, maximum power output is restricted to 50mW (milliWatts), 5.25-5.35 to 250mW, and 5.725-5.825 to 1 Watt. 802.11a has been dubbed Wi-Fi5 (Wireless Fidelity 5 MHz) by the Wireless Ethernet Compatibility Alliance (WECA).

802.11a uses Coded Orthogonal Frequency Division Multiplexing (COFDM) as the signal modulation technique. COFDM sends a stream of data symbols in a massively parallel fashion, with multiple subcarriers (i.e., small slices of RF, or Radio Spectrum, within the designated carrier frequency band. Each carrier channel is 20 MHz wide, and is subdivided into 52 subcarrier channels, each of which is approximately 300 KHz wide; 48 of the subcarrier channels are used for data transmission, and the remaining four for error control. Through the application of a coding technique, each symbol comprises multiple data bits. The specified coding techniques and data rates specified, all of which must be supported by 802.11-compliant products, include BPSK (Binary Phase Shift Keying) at 125 Kbps per channel for a total of 6 Mbps across all 48 data channels, QPSK (Quadrature Phase Shift Keying) at 250 Kbps per channel for a total of 12 Mbps, and 16QAM (16-level Quadrature Amplitude Modulation) at 500 Kbps per channel for a total of 24 Mbps. The standard also allows more complex modulation schemes, that offer increased data rates. Currently, the

most complex and fastest is 64QAM (64-level QAM), at 1.125 Mbps per channel for a total of 54 Mbps.

The symbol rate is slowed down enough that each symbol transmission is longer than the delay spread. The delay spread is the variation in timing between receipt of the signals associated with a given symbol, with the delay spread caused by multipath fading. Multipath fading is the phenomenon whereby the RF signals carrying a given data symbol arrive at the receiver at slightly different times. This is because the signal spreads out from the transmitter, with certain portions of the signal reaching the receiver more or less directly, while other portions of the signal bounce around off of walls, furniture, your co-worker's pointy head, and such. Now, each of the symbols contains multiple bits, which are imposed on it through the coding processes identified above. As the multiple symbols reach the receiver, they are sorted out and decoded, with the decoding process providing some additional time for the receiver to adjust for the delay spread and to get ready to receive the next symbol. Both 802.11a and 802.11b are designed to be compatible with Ethernet LANs, using the MAC (Media Access Control) technique of CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance).

If this sounds great, that's because it is great. If this sounds too good to be true, that's because it gets a little more complicated. While the 5 GHz spectrum is pretty clear in the US, it's not so readily available elsewhere. Military and government installations use portions of this band overseas. In Japan, only the 5.15-5.25 MHz spectrum is available. In Europe, the 5.725-5.825 MHz spectrum is already allocated for other uses. In Europe, ETSI (European Telecommunications Standards Institute) requires that two additional protocols be used in conjunction with 802.11a in order to protect incumbent applications and systems running over previously allocated shared spectrum. DFS (Dynamic Frequency Selection) allows the 802.11a system to dynamically shift frequency channels and TPC (Transmission Power Control) reduces the power level. In combination, these protocols serve to eliminate interference issues with incumbent signals. See also 802.11b, 802.11g, BPSK, CSMA/CA, MAC, OFDM, QAM, QPSK, WECA and Wi-Fi.

802.11b 802.11b is now the most common wireless local area network. 802.11b is now installed in offices, airports, coffee shops, hotels, boardrooms and homes. Many laptops now come with 802.11b wireless transmit and receive electronics built-in. 802.11b is also called Wi-Fi or WiFi (Wireless Fidelity). 802.11b is a low power wireless system so the closer you are to a transmitter, the faster it will be. This is roughly what you'll get: Wireless operating range (indoors): 100 feet at 11 Mbps, 165 feet at 5.5 Mbps, 230 feet at 2 Mbps, 300 feet at 1 Mbps. Wireless operating range (outdoors): 500 feet at 11 Mbps, 885 feet at 5.5 Mbps, 1,300 feet at 2 Mbps, 1,500 feet at 1 Mbps. 802.11b operates at the same frequency as some cordless phones, garage door openers, walkie-talkies, etc. So there's a real chance for interference in big cities, like New York. An 802.11b base station is often attached to a local area network, which is then attached to the Internet and/or the corporate network. This means that you use 802.11b to surf the Internet or get to corporate databases, etc.

802.11b defines both the Physical (PHY) and Medium Access Control (MAC) protocols. Specifically, the PHY spec includes three transmission options — one Ir (Infrared), and two RF (Radio Frequency). 802.11b uses DSSS (Direct Sequence Spread Spectrum) modulation for digital communication. DSSS involves the transmission of a stream of one's and zero's, which is modulated with the Barker code chipping sequence. Barker code is an 11-bit sequence (e.g., 10110111000) that has advantages in wireless transmission. Each bit is encoded into an 11-bit Barker code, with each resulting data object forming a "chip." The chip is put on a carrier frequency in the 2.4 GHz range (2.4-2.483 GHz), and the waveform is modulated using one of several techniques. 802.11 systems running at 1 Mbps make use of BPSK (Binary Phase Shift Keying). Systems running at 2 Mbps make use of QPSK (Quaternary Phase Shift Keying). Systems running at 11 Mbps make use of CCK (Complementary Code Keying), which involves 64 unique code sequences, which technique supports six bits per code word. The CCK code word is then modulated onto the RF carrier using QPSK, which allows another two bits to be encoded for each 6-bit symbol. Therefore, each 6-bit symbol contains eight bits. Power output is limited by the FCC to 1 watt EIRP (Equivalent Isotropically Radiated Power). At this low power level, the physical distance between the transmitting devices becomes an issue, with error performance suffering as the distance increases. Therefore, the devices adapt to longer distances by using a less complex encoding technique, and a resulting lower signaling speed, which translates into a lower data rate. For example, a system running at 11 Mbps using CCK and QPSK, might throttle back to 5.5 Mbps by halving the signaling rate as the distances increase and error performance drops. As the situation gets worse, it might throttle back to 2 Mbps using

only QPSK, and 1 Mbps using BPSK. Also to be considered in this equation is the fact that the 2.4 GHz range is in the unlicensed ISM (Industrial, Scientific and Medical) band, which is shared by garage door openers, microwave ovens, bar code scanners, cordless phones, Bluetooth LANs, and a wide variety of other devices. As a result, this slice of spectrum can be heavily congested at times, and performance can drop considerably. 802.11 divides the available spectrum into 14 channels. In the US, the FCC allows the use of 11 channels. Four channels are available in France, 13 in the rest of Europe, and only one in Japan. There also is overlap between adjacent channels (e.g., channels one and two), which fact further affects performance; therefore, any given system must maintain maximum channel separation from other systems in proximity.

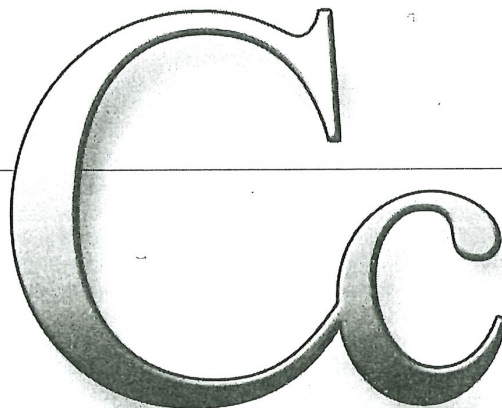
Both 802.11a and 802.11b are designed to be compatible with Ethernet LANs. 802.11b uses a variation of the MAC (Media Access Control) technique of CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance), which is used in some wired Ethernet, as well. A device seeking to transmit over the shared medium (in this case, a shared RF channel) listens to the network. If it senses no activity over the carrier frequency for a minimum period of time known as the DIFS (DCF (Distributed Coordinated Function) InterFrame Spacing), it requests access by first transmitting a RTS (Request To Send) packet. The RTS packet includes both the source (i.e., transmitter) and destination (i.e., intended receiver) addresses, the duration of the intended session (i.e., transmission), and the ACK (ACKnowledgement) associated with it. If the network is available, the destination device responds with CTS (Clear To Send), repeating both the duration and the ACK. All other devices back off the network until the session is concluded. If the network, on the other hand, is busy, the device waits a period of time equal to the DIFS, plus a random number of slot times, as calculated with several back-off timers. The "listening" process takes several forms. CAM (Constant Access Method), the default method, involves constant monitoring of the network. Since CAM creates a power consumption issue for battery-powered devices, PAM (Polled Access Mode) can be substituted. PAM calls for all client devices to go into sleep mode, all awaking at regular intervals, at the exact same time, to listen for network activity. On January 3, 2000 the 802.11 technology got another boost when Microsoft and Starbucks announced that they were to join forces to offer wireless access, using 802.11b among other standards, in most of Starbucks' coffee outlets over the next two years. The deal, some analysts say, is a further sign that 802.11b could become a serious competitor to better known wireless technologies such as Bluetooth, HomeRF, or even next-generation cellular networks. Apple was the first to launch an 802.11b product line (called AirPort). All Apple computers now include a built-in antenna which, in conjunction with a networking card, can exchange data with a small base station plugged into a broadband Internet connection up to 45 metros (150 feet) away. Although some PC laptops now come pre-equipped with wireless hardware, most users buy a PCMCIA card, or PC card, that serves as a wireless modem and antenna. See also 802.11a, 802.11g, Bluetooth, BPSK, Chip, CSMA/CA, DSSS, EIRP, Ethernet, HomeRF, MAC, QPSK, Spread Spectrum, WECA and Wi-Fi.

802.11g In November, 2001, Task Group G of the IEEE's 802.11 Committee voted to finish the specs on a new wireless networking standard (802.11g) that would allow wireless data rates up to 54 megabits per second in the 2.4 GHz spectrum. Current 802.11b Wi-Fi systems have a maximum data rate of 11 megabits per second. The proposed will be compatible with 802.11b. Mandatory modulation schemes of the proposed standard are Complementary Code Keying (CCK), used in 802.11b, and Orthogonal Frequency Division Multiplexing (OFDM), used in 802.11a. Two optional modulations are allowed if systems manufacturers chose to add them: CCK-OFDM and CCK-PBCC. The new standard 802.11g is important because 802.11a and 802.11b are incompatible, but 802.11g devices will work with both 802.11a and 802.11b devices. On May 15, 2003, the Institute of Electrical and Electronics Engineers Inc. (IEEE), the group responsible for setting standards in the networking industry, approved a new and final draft standard for 802.11g wireless LANs.

802.11i The IEEE's 802.11i working group is developing (or was when I wrote this) a far-reaching standards-based solution for both encryption and authentication on wireless 802 LANs.

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

802.15.1 The 802.15.1 is an IEEE standard for wireless personal area networks. Basically it is an enhanced Bluetooth v1.1 specification and it is fully compatible with the Bluetooth v1.1 specification. Bluetooth technology defines specifications for small-form-factor, low-cost wireless radio communications among notebook computers, personal digital



C 1. A powerful programming language developed at Bell Labs by Brian Kernighan and Dennis Ritchie in the early 1970s. C has wide application, including central office switches and voice processing systems. C operates under Unix, MS-DOS, Windows (all flavors) and other operating systems.

2. Symbol for capacitance. See also Capacitance.

3. Symbol for Celsius.

C Band A portion of the electromagnetic spectrum used heavily for both terrestrial microwave and non-terrestrial (i.e., satellite) microwave radio transmission. In terrestrial microwave applications, the C Band is in the range of 4-6 GHz. Satellites split the C Band into an uplink channel at approximately 6 GHz and a downlink channel at 4 GHz. Traditionally, C-Band satellites ranged in power from five to 11 watts per transponder, requiring receive antennas of five to 12 feet in diameter. The fleet of C-Band satellites is being gradually replaced by higher-powered (10-17 watt) satellites, which allow the size of the dish to be reduced to 90 inches in diameter. Traditional applications include voice communications, videoconferencing, and broadcast TV and radio. The large dish size and associated high cost of such dishes have contributed to their lack of popularity for TV reception by individuals; Ku band dishes largely have replaced them in support of DBS (Direct Broadcast Satellite) TV reception. Contrast with KU Band and KA Band. See also C-Band.

C Band Dish Large (6- to 10-foot) satellite dish antenna, usually motorized, used to intercept signals from C band satellites. Many big dish antennas today receive both C band and Ku band signals.

C Battery A source of low potential used in the grid circuit of a vacuum tube to cause operation to take place at the desired point on the characteristic curve.

C Bit Signaling and control bits used in certain T-carrier systems. Classic M13 multiplexers serve to multiplex 28 T-1s into a T-3 signal. M13 multiplexers accomplish this process by first combining four T-1s, at a signaling speed of 1.544 Mbps, into a T-2, at a signaling speed of 6.312 Mbps. At this stage, 136 Kbps of overhead is added, including justification, or bit stuffing. (Note that $1.544 \text{ Mbps} \times 4 = 6.176 + .136 = 6.312$). At the next stage, seven T-2s, are combined into a T-3, at a total signaling speed of 44.736 Mbps, with 552 Kbps of bit stuffing. (Note: $6.312 \times 7 = 44.184 + .552 = 44.736$) The stuff bits added during this last stage are known as C Bits, as A & B Bits are used in older channel banks for signaling and control purposes at the T-1 level. C Bits are used for a variety of signaling and control purposes, including synchronization, and parity checking for error control. See also A & B Bits.

C BIT Parity Framing T-3 framing structure that uses the traditional management overhead bits (X,P,M,F), but differs in that the control bits (C bits) are used for additional functions, e.g. FID, FEAC, FEBE,TDL and CP. See C Bit for a longer explanation.

C Conditioning A type of line conditioning which controls attenuation, distortion and delay so that they lie within specified limits. See Conditioning.

C Connector Also called a female amp connector or 25-pair female connector. The male version is called a P connector.

C Drop Clamp Clamp used to fasten aerial wire to buildings.

C Lead The third of three wires which make up trunk lines between central office switches. There are three wires — positive, negative, and the “c lead.” The purpose of the “c lead” is to control the grounding, holding and releasing of trunks.

C Links An SS7 term. Cross links used between mated pairs of Signal Transfer Points (STPs). They are primarily used for STP to STP communications or for network management messages. If there is congestion or a failure in the network, this is the link that the STPs use to communicate with each other. See A, B and D Links.

C Message Weighting This definition from James Harry Green, author of the excellent Dow Jones Handbook of Telecommunications. C Message Weighting is a factor in noise measurements to approximate the lesser annoying effect on the human ear of high and low-frequency noise compared to mid-range noise.

C Plane The control plane within the ISDN protocol architecture; these protocols provide the transfer of information for the control of user connections and the allocation/deallocation of network resources; C Plane functions include call establishment, call termination, modifying service characteristics during the call (e.g. alternate speech/unrestricted 64 kbps data), and requesting supplementary services.

C Wire C Wire is what the phone company calls the last piece of its wire that comes into your house or office. It is typically the piece of underground cable that comes in from its pedestal on the street to your network interface box on the side of your house or building.

C&C Computers and Communications. An NEC slogan which focused on the deployment of computer and telephony elements to create an integrated environment. Later on, NEC changed it to “Computing and Communicating” and expanded it into a “Fusion” strategy. See Fusion.

C++ A high-level programming language developed by Bjarne Stroustrup at AT&T’s Bell laboratories. Combining all the advantages of the C language with those of object-oriented programming, C++ has been adopted as the standard house programming language by several major software vendors.

C-Band Conventional Wavelength Band. The optical wavelength band from 1490 to 1570nm (nanometers). The C-Band has been used by conventional WDM (Wavelength Division Multiplexing) optical fiber systems since about 1993. Most WDM and DWDM (Dense WDM) systems, therefore, currently make use of this band. According to ITU-T standards, the C-Band will support 8 optical channels at a frequency spacing of 400 GHz, or wavelength spacing of 3.2nm; 16 channels at 200 GHz, or 1.6nm; 40 channels at 100 GHz, or 0.8nm; 80 channels at 50 GHz, or 0.4nm; and 160 at 25 GHz, or 0.25nm. See also C Band, L-Band and S-Band.

he supposedly said that the death penalty was appropriate for even so slight a crime as stealing a cabbage. Excessively severe rules or laws have come to be known as draconian in nature. See also Trivia.

Draft Proposal An ISO standards document that has been registered and numbered but not yet approved.

Drag Dragging is a way of moving an item on the screen using your mouse. To drag a window in Windows, for example, move the mouse pointer onto a window's title bar, then hold down the mouse button while moving the mouse across your desktop. When you release the mouse button, the window will remain in its new location. Apply this technique to drag any data object, such as icons or list box items.

Drag And Drop The "drag and drop" definition defines how objects from one desktop application can be "dragged" out of that application, through clicking on the object with a mouse, across the desktop and "dropped" on another application. Most of the graphics operating systems, like Windows, Apple's Macintosh and Sun Sparc use Drag and Drop.

Drag Line A length of rope or string used to pull wire and cable through conduit or inaccessible spaces. Drag lines are often inserted in wall and ceilings during construction to ease future wire installation.

Drag Queen A drag queen is a man who likes to dress as a woman. In the 1940s, California law made it illegal to dress as a member of the opposite sex. Drag queens avoided this restriction by pinning pieces of paper to their dresses which read "I'm a boy!" The courts accepted the argument that anyone wearing such a notice was technically dressed as a man, not a woman. Some people claim that DSL lines are really T-1 lines in drag, but at a much lower price.

Drain Wire In a cable, an uninsulated wire laid over the component or components and used as a ground connection.

DRAM 1. Dynamic Random Access Memory. Pronounced "dee-ram." The readable/writable memory used to store data in older PCs. DRAM stores each bit of information in a "cell" composed of a capacitor and a transistor. Because the capacitor in a DRAM cell can hold a charge for only a few milliseconds, DRAM must be continually refreshed to retain its data. In contrast, Static RAM, or SRAM, requires no refresh and delivers better performance, but it is more expensive to manufacture. See also DDR-SDRAM, EDO RAM, Flash RAM, FRAM, Microprocessor, RAM, RDRAM, SDRAM, SRAM, and VRAM.

2. Digital Recorder Announcer Module.

Drawing In the manufacture of wire, pulling the metal through a die or series of dies in order to reduce the diameter to a specified size.

Drawing Tools A computer imaging term. The means of creating freehand lines or basic geometric shapes. Paint packages often provide an ellipse-drawing function as a variation of the circle (or vice versa) and a square drawing function as a variation of the rectangle. Virtually all packages offer filled geometric figures, the fill item being either a solid color or a pattern.

DRB Digital Radio Broadcasting.

DRCS Digital Radio Concentrator System.

Dress down day A workday when employees are allowed to dress casually. When things were better economically, there were more dress down days.

Dressing Cable You "dress" cable by taking multiple cables and joining them together neatly with cable ties. A nicely-dressed, clean installation is a sign of telephony professionalism. It still exists.

Drift 1. When a carrier frequency changes due to a transmitter problem. It can be caused by bad connections or defective components, temperature changes or diffraction. Crystal oscillators are the most drift-reliable circuits.

2. When customers leave and go to another carrier. See also Churn.

3. A long-term and usually steadily increasing change in a parameter, such as frequency, from its nominal value.

4. The tendency of a geosynchronous satellite in orbit to move towards one of the two satellite stable points, at 75 °E and 105 °W.

Drill Down Microsoft jargon which means to learn more about a subject.

Drip Irrigation One thing not to do is mess your company's entire relationship with a customer in the beginning of that relationship by unveiling a massive, complicated profile or questionnaire. Instead, gather the information that is useful for the current transaction, remember it, and build your relationship's context over time, little by little. Think of the task as a kind of "drip irrigation" for the relationship. This definition from Garage.com.

Drip Loop Several inches of slack in a cable that prevents water from collecting on the cable or running along the surface of the cable. A drip loop between the LNB of a satel-

lite dish and the entry point into the building also allows some free movement of the dish while adjusting it.

Drive Shortened word for hard drive.

Drive By Spamming You have an "office" in your truck. You find a local WiFi hotspot — an area you can receive and transmit 802.11(b) or (a) wireless transmissions. You park your truck in the area. You send out three million spam emails. Then you disappear. No one can trace who sent them (and thus stop future transmissions) because you're long gone. Next time, one hopes, the owner of the WiFi hotspot you used will improve his security and you won't be able to get on. Many WiFi hotspots don't have security and can easily be found with a sniffer. See Sniffer.

Drive Icon A Windows NT term. An icon in a directory window in File Manager that represents a disk drive on your system. Different icons depict floppy disk drives, CD-ROM drives, network drives, etc.

Drive Mappings A Novell NetWare term. Drive mappings provide direct access to particular locations in the directory structure. They are a "shorthand" method for accessing directories on a disk. Instead of typing in the complete path name of a directory that you want to access, you can simply enter a drive letter that has been assigned to that directory. NetWare recognizes two types of drives (physical drives and logical drives) and three types of drive mappings (local, network, and search drive mappings).

Drive Test Hang a cell phone antenna from a crane in its proposed spot before construction of the permanent tower. Then technicians drive around with phones to see the range of the proposed spot. This way they see if it is worth having a tower in that proposed location.

Drive Type A number representing a standard configuration of physical parameters (cylinders, heads and sectors) of a particular type of hard disk drive. You need to know your drive's drive type; otherwise the BIOS of your machine will not recognize your drive on boot up and your PC will not work. Normally this information of your drive's type resides in memory kept alive by a small lithium battery. However, should the lithium battery die, your PC will "forget" which drive it has and it will ask you. If you don't know, you're in big trouble. Your PC simply won't work. My recommendation: write the drive type on two labels — one to stick on the drive and the other to stick on the bottom of your machine. This way you'll be able to find it easily. You will usually find the drive type's number on paperwork sent originally with your machine.

Drivebar A Windows NT term. Allows you to change drives by selecting one of the drive icons.

Driver A driver (which is always software) provides instructions for reformatting or interpreting software commands for transfer to and from peripheral devices and the central processor unit (CPU). Many printed circuit boards which you drop into a PC require a software driver in order for the other parts of the computer and the software you're running to work correctly. In other words, the driver is a software module that "drives" the data out of a specific hardware port. The port in question will usually have another device connected, such as a printer or modem, and the driver will be organized in software (i.e. configured) to communicate with the device.

Drivethrough The McDonald's in Ft. Huachuca was the first restaurant to have a drive through window. The drive through allowed soldiers from Ft. Huachuca to get food since uniforms were not permitted in business establishments.

Driveway effect A special quality exhibited by a radio program that causes listeners to stay in their cars after they have arrived home so they can hear the end of the program.

Drop 1. A wire or cable from a pole or cable terminal to a building.

2. That portion of a device that looks toward the internal station facilities, e.g., toward an AUTOVON 4-wire switch, toward a switchboard, or toward a switching center.

3. Single channel attachment to the horizontal wiring grid (wall plate, coupling, MOD-MOD adapter).

4. The central office side of test jacks.

5. To delete, intentionally or unintentionally, part of a signal for some reason, e.g., dropping bits.

Drop And Insert That process wherein a part of the information carried in a transmission system is demodulated (dropped) at an intermediate point and different information is entered (inserted) for subsequent transmission.

Drop Cable 1. The outside wire pair which connects your house or office to the transmission line coming from the phone company's central office. See also DROP WIRE, which is different.

D

Emulation / Encryption

SONET/SDH fiber optic transmission system. LANE (LAN Emulation) allows an ATM network to emulate a LAN, offering LAN functionality over an ATM network. See LANE for more detail.

Emulation What happens one gadget emulates another. See Emulate.

Emulation Mode Function of a network control point (NCP) that enables it to perform activities equivalent to those performed by a transmission control unit. See NCP.

Emulator A device or computer program which can act as if it is a different device or program, that is emulate (i.e. pretend to be) another device. Certain computer terminals are necessary in specific systems and a terminal that is not that type may be able to act as if it was. If it can, it is an Emulator. This is not a common term. See also the verb Emulate.

En bloc See En-bloc.

En-bloc Enbloc is considered a buffer that holds on to all dialed digits and sends all digits to the central office at the same time. This must be enabled for PRI. It is an ISDN term for a process of call establishment. En-bloc (from French, meaning "in a group") places all of the necessary information in a block of data which is part of the call setup message sent to the network in order to request the establishment of a connection. Such information includes originating number, dialed number, and type of call (e.g., voice, data, or video). En-bloc is used in ISDN PRI (Primary Rate Interface) implementations, as the device (e.g., PBX or router) is sophisticated enough to implement this approach. It also is used in BRI (Basic Rate Interface) implementations, assuming that an intelligent TA (Terminal Adapter) or ISDN router is involved. En-bloc signaling is highly efficient in comparison to "overlap sending," where each dialed digit is sent individually, as it is dialed. The most common example of en-bloc dialing is what we do when we dial on a cell phone. We punch out our digits. They stay in the phone until we hit "Send." The phone then sends our complete dial stream into the network. En-bloc dialing at its best. See also En-bloc signaling.

En-bloc Signaling Signaling in which address digits are transmitted in one or more blocks, each block containing sufficient address information to enable switching centers to carry out progressive onward routing. See en-bloc.

EN50-091 A European test standard for UPS system safety. Supersedes and is a superset of the IEC950 standard formerly used for UPS testing. In addition to the typical safety tests found in the IEC950 standard, this standard includes special sections on batteries and other safety concerns specific to UPS systems. UPS products are normally certified to this standard by VDE, TÜV, SEMKO or other authorized certification body.

ENA Enterprise Network Accounting. "Enterprise Network Accounting is software that allows end users to collect call data from routers and generate communications management reports. ENA software tracks and allocates the costs of using a corporate network or the Internet, which allows network administrators to bill users for time spent on the network. ENA software also generates traffic statistics reports that show traffic patterns, potential misuse/abuse, and network inefficiencies. As voice traffic moves to the net, communications managers need tools to track and account for network usage. ENA represents the next phase in call accounting products. "Network World" coined the term concerning an announcement by Cisco Systems regarding a partnership with Telco Research, which is developing ENA products for Cisco Systems.

Enable To make something happen. Or, in more complex language, to set various hardware and software parameters so that the central computer will recognize those parameters and start doing what you want.

Enabler An "enabler" is a strange name for a piece of software.

Enabling Signal A signal that permits the occurrence of an event.

Enbloc See En-bloc.

Encapsulated Postscript File EPS. A file that prints at the highest possible resolution for your printer. An EPS file may print faster than other graphical representations. Some Windows NT and non-Windows NT graphical applications can import EPS files.

Encapsulating Bridge A LAN/WAN term. A special bridge type usually associated with backbone/subnetwork architectures. Encapsulating bridges place forwarded packets in a backbone-specific envelope — FDDI, for example — and send them out onto the backbone LAN as broadcast packets. The receiving bridges remove the envelope, check the destination address and, if it is local, send the packet to the destination device. For a much longer explanation, see Bridge.

Encapsulating Security Payload ESP The portion of the IPsec virtual private networking protocol which is used predominantly to provide data privacy.

Encapsulation 1. Encasing a splice or closure in a protective material to make it watertight.

2. In object-oriented programming, the grouping of data and the code that manipulates it into a single entity or object. Encapsulation refers to the hiding of most of the details of the object. Both the attributes (data structure) and the methods (procedures) are hidden. Associated with the object is a set of operations that it can perform. These are not hidden. They constitute a well-defined interface — that aspect of the object that is externally visible. The point of encapsulation is to isolate the internal workings of the object so that, if they must be modified, those changes will also be isolated and not affect any part of the program. See Object-Oriented Programming.

3. Component lingo. Encapsulation is the isolation of a component's attributes and behaviors from surrounding structures. The technique protects components from outside interference and protects other components from relying on information that may change over time. Components are often encapsulated.

4. An electronic messaging term. The technique used by layered protocols in which a layer adds header information to the PDU (Protocol Data Unit) form the layer above. As an example, in Internet terminology, a packet would contain a header from the physical layer, followed by a header from the network layer (IP), followed by a header from the transport layer (TCP), followed by the application protocol data.

5. A networking term. It means carrying frames of one protocol as the data in another. Often the encapsulating protocol will be TCP/IP.

6. See also Encapsulation Bridging.

Encapsulation Bridging Method of bringing dissimilar networks where the entire frame from one network is simply enclosed in the header used by the link-layer protocol of the other network.

Encipher Use of a cipher process to conceal some form of communicated intelligence.

Enclosure Usually refers to a "headend enclosure," relay equipment enclosure hut, or a small weather proof equipment box. In short, a place to put your precious equipment and protect it from the weather and from vandals.

Enclosure Reverberation A phenomenon of acoustics in which sound is reflected, or echoed, within an enclosure. This effect is particularly troublesome in automobile hands-free cell phone applications, as the coupling of the speakerphone, cell phone microphone, and the enclosed automobile chamber can degrade the quality of the transmitted signal.

Encoding The process of converting data into code or analog voice into a digital signal. See also PCM and ADPCM.

Encircling Encircling is the name of a technology which Hyperlock Technologies (www.hyperlock.com) has created which allows CD owners to unlock premium content stored on music compact discs. According to Hyperlock, instead of typical encryption approaches that wrap the equivalent of a digital security envelope around a complete piece of content, Hyperlock's system removes key pieces of data from content stored on the compact disc. The content can only be played then, by retrieving the missing data from a pre-selected Web site, e.g. the publisher of the compact disc.

Encryption A fancy term for scrambling a message so that no one can read it except for the person for whom it's intended. In more formal terms, encryption is the transformation of data into a form unreadable by anyone without a secret decryption key. Its purpose is to ensure privacy by keeping the information hidden from anyone for whom it is not intended. In security, encryption is the ciphering of data by applying an algorithm to plain text to convert it to ciphertext. Symmetric encryption uses the same key to both encrypt and decrypt the message. Asymmetric encryption, also known as Public Key Encryption, equips each user with two keys — a private key and a public key, both of which are provided by a trusted third party known as a Certificate Authority (CA). The public key, which is known by everyone, is used to encrypt the message. The private key, which is known only to the intended recipient, is used to decrypt the message. Each public key and private key are linked in a manner such that only the public key can be used to encrypt messages and only the private key held by each individual recipient can be used to decrypt them. See also Public Key Encryption for a longer explanation.

Here is a definition courtesy, Alcatel: Encryption is the use of an algorithm to hide the meaning of a piece of information so that it cannot be read and understood. Encryption techniques have been around since the Roman Empire in the form of simple replacement techniques. One such technique is shown in the table below where the top row represents a character from the original message and the bottom row will be the replacement for the original character.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D

Link Protocol / Lit Fiber

ing the communications link and allows only user data to open the line. Link optimization ensures that remote connections are not kept open unnecessarily, which saves usage costs.

Link Protocol The set of rules by which a logical data link is set up and by which data transfers across the link. It includes formatting of the data.

Link Pulse A communication mechanism used in 10Base-T networks to indicate link status and, in auto-negotiation equipped devices, to communicate information about abilities and negotiate communication methods. 10Base-T uses Normal Link Pulses (NLPs) which indicate link status only. These are transmitted periodically while not transmitting packets. 10Base-T and 100Base-T nodes equipped with auto-negotiation exchange information using a Fast Link Pulse (FLP) mechanism which is compatible with NLP.

Link Rot The process by which links on a Web page become obsolete because of changes in location or expiration of the sites to which they are connected. Link rot happens quickly.

Link Set A group of signaling links directly connecting two signaling points.

Link State Protocol A type of routing algorithm in which updates to routing tables are exchanged between neighboring routers only when modifications need be made. Such modifications would be required, for example, if a new link or router were added to the network, or if a link between two routers suffered a catastrophic failure. Some link state protocols provide means to assess the performance characteristics of the various available links, thereby supporting a bias toward the link performing best. Distance Vector Protocols, on the other hand, exchange routing data on a highly regular and predetermined basis, regardless of whether updates are required. Therefore, link state protocols consume less networking resources and reduce network congestion by providing updates only when needed, and sending only the changes. Periodically, the entire route table will be sent as a precautionary procedure. Examples of link state protocols include OSPF (Open Shortest Path First, ISO's IS-IS (Intermediate System-to-Intermediate System), and Novell's NLSF (NetWare Link Services Protocol). See also Distance Vector Protocol, Path Vector Routing Protocol, Policy Routing Protocol, Router, and Static Routing.

Link State Parameter Information that captures an aspect or property of a link.

Link Status Signal Unit LSSU. A packet sent between MTPs (Message Transfer Part of the SS7 Protocol) to provide SS7 information about the sending node and its links. This information is sent during the initial alignment of the links, when there is an associated processor outage, or when link congestion is detected.

Link Test A test that is performed by the hardware to ensure the integrity of the cable in a local area network. The link test can be disabled to allow old style NICs incapable of performing a link test to connect to the repeater.

Link Time This is a specific time delay that allows access to PBX or Centrex features through a telephone system. Link Time is also referred to as a Hookswitch Flash or Recall.

Linked Object A representation or place holder for an object that is inserted into a destination document. The object still exists in the source file and, when it is changed, the linked object is updated to reflect these changes.

Links 1. The transmission portion of the local loop.

2. An affectionate name for Apple's electronic mail system, called AppleLink.

LINX London Internet Exchange. See IX.

Linux Linux (officially pronounced LINN-uks) is the creation of Linus Torvalds, who started the Linux kernel as a research project at the University of Helsinki, Finland. Since then, Linux has evolved into a full-featured, powerful and robust open source, operating system based on Unix. While it is true that Linux is very closely modeled after Unix, and in most cases programs that run on Unix will run on Linux, Linux is not really Unix. Linux is among the most powerful and feature-packed operating systems available for the PC, offering a large base of hardware peripheral compatibility. Linux hosts an impressive array of compilers and development environments, including C/C++, Perl, Pascal, SmallTalk, and complete X-windows system that rivals many commercial offerings. For all its life, Linux has been free. But it is not shareware. Major parts of it are copyrighted. Linux has many script languages and parsers such as Awk, Sed, Yacc as well as all popular shells (Borne, Korn, C, BASH, etc.). The Linux kernel was originally written only for the Intel 80x86 microprocessor, i.e. the 386/486/Pentium family of chips. But it has been ported to Alphas, sparc, 68k, and PowerPC. There are several companies selling pre-configured Alpha based systems as well as the standard 80x86 based systems. In many ways, Linux is a better performing UNIX than many of the commercial versions of UNIX. Here is the definition of Linux taken from the August, 1999 Linux Journal, the major Linux magazine. "Linux is a multi-user, multi-tasking operating system that runs on many platforms, including Intel, Motorola, MC68K, and DEC Alphas. It implements a superset of the POSIX

standard. Linux works well with other operating systems, including Apple, Microsoft and Novell. It supports a wide range of software, including X Windows, Emacs, TCP/IP networking (including SLIP/PPP/ISDN), the works. A PC running Linux often makes an excellent and fast substitute for a conventional UNIX workstation. Linux (often pronounced with a short 'i' and with the first syllable stressed - LIN-uks) is freely available — it can be copied and redistributed without fees or royalties. The source code for Linux is available on the Internet to anyone who wants it." See www.linuxresources.com/what.html, www.redhat.com and www.rtems.com.

Lilon Lithium Ion. The Lithium Ion battery is lightweight and does not suffer from memory effect. It also delivers a higher run time average and about 80% more power per ounce. Similar to NiMH technology, Lilon batteries have a life expectancy of 500 charge and discharge cycles. Lilon batteries are typically used in mid- to high-priced portables.

LIP Loop Initialization Protocol. Part of the FC-AL (Fibre Channel Arbitrated Loop) standard for reconfiguring the system when nodes are added or removed from the loop.

Lipstick Over her lifetime, the average American woman will swallow four pounds of lipstick. The good news is that that's a lot less than the Coca Cola I drink.

Lipstick Indicator The tendency for lipstick sales to increase prior to and during a recession.

Liquid Crystal Display LCD. A low power display that aligns material suspended in a liquid under the influence of a low voltage so it reflects ambient light and displays alphanumeric characters. LCD displays are finding great use as methods of displaying information on new electronic telephones, especially those positioned behind PBXs. The advantage of putting such displays on telephones is that the power to drive the display is very small. The display can be line powered — i.e. powered by the one or two pairs coming from the PBX. This avoids the necessity and cost of a transformer/rectifier — the little black box you plug into the wall to run your answering machine or to power up your rechargeable calculator/laptop computer. Such LCD displays on electronic phones can perform many functions. The most useful is that of "walking" the user through the phone call — showing him/her how to transfer a call, to make a conference call, to split a conference, etc. An LCD can also alert you as to who's calling you.

LIRC Long Run Incremental Cost.

LIS 1. Link Interface Shelf.

2. Local Interconnection Service. A local interconnection service arrangement with an ILEC (Incumbent Local Exchange Carrier) to provide trunking, E911, SS7 requirements for LNP (Local Number Portability).

LISP An interpretive language developed for manipulation of symbolic strings and recursive data; while the language has been developed to aid in the handling of symbolic lists, it can be and has been used successfully in the manipulation of mathematical and arithmetic logic.

List Box A Windows term. In a dialog box, a box that lists available choices, for example, a list of all files in a directory. If all the choices do not fit in the list box, there is a scroll bar.

List Host A host computer, in the form of a server, that is used to support e-mail list services, usually on an outsourced basis. The service provider will place your e-mail list on its host computer, and associate it with an e-mail that you want to send to many e-mail addresses. You just send the e-mail to a special target mailbox, and the list host server forwards it to everyone on your list. If people want to be removed from the list, they so indicate with a return e-mail, and the list host server takes care of it. At least that's the theory.

List Server An automated mailing list distribution system.

Listed Directory Number LDN. Incoming exchange network calls to the PBX via assigned listed local telephone directory number are directed to the attendant.

Listen Before Talk LBT. Same as carrier sense multiple access (CSMA). Compare with Listen While Talk.

Listen While Talk LWT. Same as carrier sense multiple access with collision detection (CSMA/CD). Compare with Listen Before Talk.

LIT See Line Insulation Test.

Lit Fiber Let's start with optical fiber. When a carrier initially installs an optical fiber in the ground (sub-terrestrial), under the ocean (submarine), or through the air (hung on poles), it's called "dark" fiber. That means he hasn't put any electronics on it, so he's not sending any light down the fiber and thus he's not transmitting any information. Usually a dark fiber is one of many dark fibers in a cable containing a great many fibers, commonly 432 in sub-terrestrial cabling systems. The carrier deploys such a large cabling system

2. Network Object.
3. Number.

No Answer Transfer A service provided by a cellular carrier that automatically transfers an incoming cellular call to another phone number if the cellular subscriber is unable to answer. Most no-answer transfer systems will automatically transfer an incoming cellular call to another phone number if the cellular subscriber is unable to answer (it's not turned on) or if it's not answered after the third or fourth ring if the phone is turned on.

No Attendant Option CBX systems with Direct Inward Dialing may be designed (configured) without an attendant console.

No Bill Phone A name for a cellular phone from which you can make free phone calls — local or long distance. The name "no bill" was given by crooks, largely in Southern California in the Spring of 1992, to phones they had modified to emulate other legitimate cellular phones. Thus all calls made by "no bill" phones are billed to legitimate users, who happen to have other cellular phones with identical codes and now have huge cellular bills. Sorry about that.

No Busy Test A circuit used to connect to a busy subscriber's line number.

No Hold Conference/transfer In the event that a call to 911 is being transferred to a secondary or what they call a downstream PSAP (Public Service Answering Position), it is important that the caller never be left in disconcerting silence. After all it is an emergency call. "No hold" features allow the conference or transfer to be done while the PSAP 911 agent is in full uninterrupted communication with the caller.

No Incoming Calls A cell phone carrier restriction that prevents incoming calls to the assigned cellular number. Only outgoing calls are permitted. This is an optional feature that some cellular phone users subscribe to because it saves them money. In North America, calls coming into a cell phone typically cost the user a per minute charge that is equal to the cost of an outgoing call. This not the case in most GSM cell phone systems in Europe, Japan and Australia, etc.

No Line Preference Requires the user to manually select (i.e. punch down) a line for each call.

No Op Instruction that does nothing. It is used to hold the place for future insertion of a machine instruction.

NOAA National Oceanic and Atmospheric Administration. A US government agency which runs satellites used, inter alia, to track wildlife movements. Two satellites, called NOAA-11 and NOAA-12, orbit the earth via the poles every 100 minutes. As the Earth revolves beneath them, they are able to scan every point on its surface. The satellites work by listening for the "Doppler Shift" in the signal being transmitted by a collar round an animal's neck. The shift is a change in the perceived frequency of the radio signal — similar to what a pedestrian hears happen to the pitch of a police siren as the police car speeds by. Using this technique, you can track animals to with an accuracy of a little more than half a mile, or one kilometer.

NOBIS Network Operations Business Information System.

NOC Network Operations Center, a group which is responsible for the day-to-day care and feeding of a network. Each service provider usually has a separate NOC, so you need to know which one to call when you have problems. Also called NCC for Network Control Center. See also NOCC.

NOCC Network Operations Control Center. See also NOC.

NOD Network Outward Dialing. A service feature of an automatically switched telephone network that allows a calling user to dial directly all user numbers on the network without operator intervention. See also Direct Outward Dialing.

Nodal Architectures Also called Hub architectures. Nodal network architectures means that network traffic from many locations are connected into a single network site for consolidation and aggregation to higher speed circuits. The traffic is then transmitted from this hub site to a central network site, or to other hub sites. Nodal architectures save money, but also increase the risk of a single network failure affecting multiple network locations.

Nodal Attribute A nodal state parameter that is considered individually to determine whether a given node is acceptable and/or desirable for carrying a given connection.

Nodal Clock The principal clock or alternate clock located at a particular node that provides the timing reference for all major functions at that node.

Nodal Constraint A restriction on the use of nodes for path selection for a specific connection.

Nodal ID Another name for a MAC address. Every Network Interface Card (NIC) has a MAC address hardcoded into it. That address is unique in all the world to that NIC card. The

MAC address effectively identifies the LAN-attached device with which it is associated. A NIC works with the network software and computer operating system to transmit and receive messages on the network. I first saw the use of the term Nodal ID in instructions to install a PCMCIA network card into a laptop running Windows NT. Those instructions asked you for the card's nodal ID, which happened (though I didn't know it) to be printed on the card itself. I had never run into this problem because Windows for Workgroups, Windows 95 and Windows 98 automatically recognize the MAC address. See Network Interface Card.

Nodal Metric A nodal parameter that requires the values of the parameter for all nodes along a given path to be combined to determine whether the path is acceptable and/or desirable for carrying a given connection.

Nodal State Parameter Information that captures an aspect or property of a node.

Node 1. A point of connection into a network. In multipoint networks, it means it's a unit that's polled. In LANs, it's a device on the ring. In packet switched networks, it's one of the many packet switches which form the network's backbone.

2. An SCSSA term. An independent SCSSA unit in a distributed processing SCSSA network, consisting of one or more resource and/or network boards, and one or more SCbus adapter boards. Communication between nodes take place via the SCbus. From a device programming point of view, a node is simply an addressable system unit which contains boards connected by an SCbus. See S.100.

Node Address The unique identifier used to describe a specific node. See Node Number.

Node Number A node number identifies a network board on a local area network. Every station on a network must contain at least one network board. Each network board must have a unique node number to distinguish it from all the other network boards in that network. In a file server with more than one network board, the node number in LAN A is designated for all traffic addressed to that server. Node numbers can be set in a variety of ways, depending on which network board you use: (1) with jumpers or switches on boards such as Arcnet, (2) at the factory for Token-Ring and Ethernet boards, or (3) with software.

Node Type In IBM's SNA, the classification of a network device based on the protocols it supports and the network addressable units (NAUs) it can contain. Type 1 and Type 2 nodes are peripheral nodes. Type 4 and 5 nodes are subarea nodes.

NoFA NoFA (pronounced as one word, /NO-fuh/). Notice of Field Activity. A notification created by engineers to notify others (users, other engineers, etc...) of scheduled service outages. Used at Broadwing and other fine companies. Contributed by Harvey Madison in customer care planning (whatever that is). This mention, Harvey claims, will get him free beer from his co-workers. He claims it's a legitimate word.

NOI Notice Of Inquiry. The first public notification that the FCC is about to hold a public inquiry into a particular subject.

NOIS Microsoft has coined the term, NOIS, for the group of four Net-centric companies that tend to believe that what happens on the Internet might be so strong as to alleviate Microsoft's hegemony over the PC industry. The four members are Netscape, Oracle, IBM and Sun.

Noise 1. Unwanted electrical signals introduced into telephone lines by circuit components or natural disturbances which tend to degrade the performance of the line. Also known as Line Noise.

2. Noise in stock market parlance is market rumors, guesses, and faulty analysis. It contrasts with information, which consists of solid verifiable information. The concept of noise was first introduced by Fischer Black in his 1986 presidential address to the American Finance Association. His speech, called "Noise", contains this wonderful paragraph, "Noise makes financial markets possible, but it also makes them imperfect. If there is no noise trading, there will be very little trading in individual assets. People will hold individual assets, directly or indirectly, but they will rarely trade them.... The whole structure of financial markets depends on relatively liquid markets in the shares of individual firms. Noise trading provides the missing ingredient."

Noise Cancelling Headset manufacturers have long sought to reduce the background noise transmitted via headsets. One approach is the use of noise cancelling microphones. These microphones consist of two separate microphones, one directed at the headset user's mouth, the other in the opposite direction. The room side element will pick up ambient room noise along with some ambient user sound. The microphone directed at the user will receive the same amount of ambient room noise as the other microphone, but a much greater amplitude of the user's voice. Both signals are then transmitted to the amplifier. At this point, signals common to both microphones are cancelled out. What remains is



work in a variety of operating systems — including MS-DOS, UNIX, OS/2, Windows, etc.

Open Wire A transmission facility typically consisting of pairs of bare (uninsulated) conductors supported on insulators which are mounted on poles to form an aerial (above ground) pole line. Most basic of all practical types of transmission media. Open wire may be used in both communication and power.

OpenAir A wireless LAN specification promoted by the Wireless LAN Interoperability Forum (WLI Forum). Open Air is recognized by many as an ad hoc standard. Actually an interface specification, OpenAir describes the physical and MAC layer (Layers 1 and 2 of the OSI Reference Model) interface used by WLI Forum products. Based on the RangeLAN2 protocol developed by Proxim, the specification employs Frequency Hopping Spread Spectrum (FHSS) technology in the 2.4 GHz portion of the unlicensed Industrial, Scientific and Medical (ISM) radio band. The specification includes Access Points (APs) in the form of protocol-independent wireless bridges which connect to a standard wired backbone, such as IEEE 802.3 Ethernet. Client workstations are equipped with compatible client adapters, completing the wireless circuit. Security is provided at several levels. First, the FHSS implementation includes 79 frequencies, each of which can be used in a pseudo-random fashion in any of 15 hopping sequences. Second, every station is programmed with a 20-bit security code number which must be validated by the network during the process of circuit initiation and network synchronization. Third, the security code is encrypted. See also FHSS, ISM and WLI Forum.

OpenCable OpenCable is a trademarked term for a project established by CableLabs and aimed at defining a next-generation digital device for interactive services over CATV networks. The project addresses both hardware and software specifications. See also CableLabs.

OpenView Hewlett-Packard's suite of a network-management application, a server platform, and support services. OpenView is based on HP-UX, which complies with AT&T's Unix system.

Operand That which is being operated on. An operand is usually identified by the address part of an instruction.

Operating Agency See OA.

Operating Environment Referring to the combination of (usually IBM) host software that includes operating system, telecommunications access method, database software and user applications. Some common operating environments include MVS/CICS and MVS/TSO.

Operating Company Number OCN. A code used in the telephone industry to identify a telephone company. Company codes assigned by NECA (National Exchange Carriers Association) may be used as OCNs. See also AOCN and NECA.

Operating Income There are two ways American telecom companies traditionally report their earnings — operating income and net income. Operating income purports to show how much money the company earned from running its basic business — that of making and selling its primary products and services. Operating income starts with total revenues (i.e. sales from products and services) and then deducts the cost of delivering those sales, i.e. raw materials, components, supplies, packagings, etc. In short, all direct costs. Next deduction is sales and marketing expenses. The final result gives you "operating income." If you then deduct interest expense (or add in interest income), goodwill amortization, "other (unusual) income or losses" (e.g. profit or loss on the sale of a building) and state and federal income taxes, you end up with a number that is referred to as Net Income. See GAAP.

Operating System An operating system is a software program which manages the basic operations of a computer system. It figures how the computer's main memory will be apportioned, how and in what order it will handle tasks assigned to it, how it will manage the flow of information into and out of the main processor, where in memory it will place material, how it will get material to the printer for printing, to the screen for viewing, how it will receive information from the keyboard, etc. In short, the operating system handles the computer's basic housekeeping. These days operating system also handle the computer's access to various flavors of networks — from local area networks (LANs) to corporate networks that span the world and, of course, to the Internet. MS-DOS, Linux, UNIX, PICK, Windows, Solaris, Symbian, etc. are operating systems. Historically, an operating system was the minimal set of software needed to manage a device's hardware capability and share it between application programs. Practically, "OS" is now used to mean all software including kernel, device drivers, communications, graphics, data management, GUI framework, system shell application, and utility applications. See also NOS (Network Operating System).

Operating Time The time required for seizing the line, dialing the call and waiting for the connection to be established.

Operation Code The command part of a machine instruction.

Operational Data Integrator ODI. An MCI term: Combines data from the Customer Information Manager, the MCI Information Manager, and the Management Information Systems to build databases containing network information.

Operational Fixed Station A service established by the FCC operating between 2.65 GHz and 2.68 GHz.

Operational Grammar A voice recognition term. A vocabulary structure where certain word sets activate other word sets.

Operational Load The total power requirements for communication facilities.

Operational Security OPSEC. A thorough on-site examination of an operation or activity to determine if there are vulnerabilities that would permit adversaries and exploitation of critical information during the planning, preparation, execution, and post-execution phases of any operation or activity. A Federal Government definition.

Operational Service Period A performance measurement period, or succession of performance measurement periods, during which a telecommunication service remains in an operational service state. An operational service period begins at the beginning of the performance measurement period in which the telecommunications service enters the operational service state, and ends at the beginning of the performance measurement period in which the telecommunications service leaves the operational service state.

Operations Applications OAs. A telephone company AIN term. A class of functions to provide provisioning, administration, maintenance, and management capabilities for network elements, network systems, software, and services (e.g., assessment of service quality over the group of systems and software that support the service). These functions usually reside in Operations Systems but may be assigned to network elements or network systems.

Operations Domains A telephone company AIN term. The set of operations functions residing in network elements, network systems, Operations Applications, and associated interfaces necessary to accomplish memory administration, network surveillance, network testing, network traffic management, and network data collection.

Operations Evaluation System OES. An MCI internal system, which generates daily, weekly, and monthly switch data reports; used to scan high-level switch degradation problems and to analyze specific switch problems.

Operations Support System See OSS.

Operator 1. Employee of telephone company, or an individual business or institution, who aids in the completion of phone calls. Traditionally a woman's occupation, now increasingly the role of men and machines. In some countries, like Germany, the phone company doesn't have operators.

2. In PCs, an operator is a symbol that represents a mathematical action, such as a + and * (plus, minus, divide and multiply). Operators can also be words like AND, OR and NOT.

Operator Assisted A phone call placed with the assistance of the carrier's operator. You pay more when you use an operator.

Operator Console Same as attendant console. See Attendant Console.

Operator Service System Equipment capable of processing certain kinds of traffic originating or terminating to an end office; this processing may take place either with or without an operator's assistance. Use of such equipment includes call rating and charge recording functions, operator assistance functions, coin control and collection functions, automatic or manual identification of calling line number, and verification of the busy/idle condition of subscriber lines.

Operator Services OS. Any of a variety of telephone services which need the assistance of an operator or an automated "operator" (i.e. using interactive voice response technology and speech recognition). Such services include collect calls, third party billed calls and person-to-person calls. The responsibility for operator services used to be very straightforward. The LECs had their own operators and so did the IXC's. That's no longer necessarily true. Many IXC's use an Alternative Operator Services (AOS) service bureau, which essentially is a huge incoming call center. The AOSs typically provide operator services for a large number of small long distance companies, many of which are resellers and aggregators who don't own their own facilities. That is to say that they own no switches or transmission facilities — they simply resell long distance services which they buy at bulk wholesale rates from the larger carriers. Since the MFJ (Modified Final Judgment) broke



— i.e. dial the phone, listen for a carrier tone from a remote modem and connect to that modem. The modem at the receiving end must be set to "Answer" mode. In any asynchronous data conversation, one side must be set to "Originate" and the other to "Answer." Such settings are usually made in software.

Originate/Answer The two modes of operation for a modem. Originate and answer states define the frequencies used to transmit and receive. In a two-way communication system, one modem must be set to originate and the other to answer.

Originating Direction The use of Access Service for the origination of calls from an End User premise to a customer premise.

Originating Office The central office that serves the calling party.

Originating Restriction A phone line with this restriction cannot place calls at any time. Calls directed to the phone, however, will be completed normally.

Origination A call that is placed by the mobile subscriber, calling either a land-line circuit or another mobile subscriber.

Origination Cablecasting Programming over which a cable television system operator exercises editorial control. This term includes programming produced by the operator; Non-broadcast local programming produced by other entities and carried voluntarily by the system. Example: PRISM; regional news channels; Satellite-delivered non-broadcast programming carried voluntarily by the system, such as HBO, ESPN, CNN, C-SPAN, QVC, etc.

This term does not include programming over which the operator does not exercise editorial control, including any broadcast signal, including satellite-delivered broadcast "superstations" (WGN-TV, WWOR, etc.); Any access channel designated by franchise for public, educational, or governmental use; Leased-access channels.

The cable system operator is required by Section 76.225c of the FCC Rules to maintain records, in the PIF, to verify compliance with rules governing commercial matter in children's programming carried on origination-cablecasting channels. See PIF.

Originator The user that is the ultimate source of a message or probe.

ORM Optically Remote Module. A type of switching module made by AT&T which connects directly to the SESS switch communications module via optical fibers.

Orphan A Windows NT term. A member of a mirror set or a stripe set with parity that has failed in a severe manner, such as a loss of power or a complete head crash. When this happens, the fault-tolerance driver determines that it can no longer use the orphaned member and directs all new reads and writes to the remaining members of the fault-tolerant volume.

Orthogonal Having, meeting or determined at right angles.

Orthogonal Frequency Division Multiplexing See OFDM.

OS 1. Outage Seconds.

2. Operating System, as in MS-DOS (Microsoft Disk Operating System), Windows NT, Windows 2000, Windows XP, Solaris, Unix, Linux, Symbian or OS/2. See Operating System.

3. Operator Services. See Operator Services.

4. Operations System. Includes SCOTS, FMAS, etc.

OS/2 Operating System/2. An operating system originally developed by IBM and Microsoft for use with Intel's microprocessors and for use with IBM personal system/2 personal computers. OS/2 has pretty well died. Microsoft's various flavors of Windows survive it.

Osborne Effect Once there was a personal computer company called Osborne Computer Company. One day, the president announced a revolutionary new computer. It was so good not one of his dealers wanted to (or could) sell the existing product and they sent all their inventory back. Meantime, it was six months before the company could deliver the new product. But without any sales in the meantime, it had no money and Osborne went broke. There is a lesson here for companies who are attempting to manage transition between old and new product lines. Be careful, or suffer the horrible consequences of The Osborne Effect.

Oscar Hollywood gives our Oscars for great movies, performances, etc. Apparently when the first statue was cast, someone quipped, "My God. It looks like my uncle Oscar." Apparently it stuck.

Oscillator 1. A device for generating an analog test signal.

2. Electronic circuit that creates a single frequency signal.

Oscilloscope Electronic testing device that can display wave forms and other information on a TV-screen-like cathode ray tube. A basic fixture in sci-fi movies.

OSDM Optical Spatial Division Multiplexing is a technology developed to improve the

efficiency with which SONET (Synchronous Optical Network) supports bursty packet data traffic such as LAN traffic. OSDM accomplishes this by dynamically allocating arbitrary levels of bandwidth to such traffic, guaranteeing minimum levels that are supplemented by higher levels of bandwidth as it becomes available. OSDM is a protocol-independent, self-contained technology that adapts to various current and developing physical layer technologies such as digital wrappers and DWDM (Dense Wavelength Division Multiplexing).

OSF Open Software Foundation. An industry organization founded in 1988 to deliver technology innovations in all areas of open computer systems, including interoperability, scalability, portability and usability. The OSF was an international coalition of vendors and users in industry, government and academia that worked to provide technology solutions for a distributed computing environment. In February 1996, the OSF consolidated with X/Open Company Ltd. to form The Open Group. See The Open Group. www.open-group.org.

OSF/1 Version 1 of the Open Software Foundation's Unix-based operating system

OSI Open Systems Interconnection. A Reference Model developed by the ISO (International Organization for Standardization, as translated into English). The OSI Reference Model is the only internationally accepted framework of standards for communication between different systems made by different vendors. ISO's goal is to create an open systems networking environment where any vendor's computer system, connected to any network, can freely share data with any other computer system on that network or a linked network. Most of the dominant communications protocols used today have a structure based on the OSI model. Although OSI is a model and not an actively used protocol, and there are still very few pure OSI-based products on the market today, it is still important to understand its structure. The OSI model organizes the communications process into seven different categories and places these categories in a layered sequence based on their relation to the user. Layers 7 through 4 deal with end to end communications between the message source and the message destination, while layers 3 through 1 deal with network access.

OSI Reference Model

Layer 7	Application	Semantics
Layer 6	Presentation	Syntax
Layer 5	Session	Dialog Coordination
Layer 4	Transport	Reliable Data Transfer
Layer 3	Network	Routing & Relaying
Layer 2	Data Link	Technology-Specific Transfer
Layer 1	Physical	Physical Connections

Layer 1 — The Physical Layer deals with the physical means of sending data over lines (i.e., the electrical, mechanical and functional control of data circuits). Examples include EIA-232 (RS-232), T-carrier and SONET.

Layer 2 — The Data Link Layer is concerned with procedures and protocols for operating the communications lines. It also has a way of detecting and correcting message errors. Examples include Frame Relay, PPP (Point-to-Point Protocol), and SLIP (Serial Line Internet Protocol). ATM runs at Layers 1 & 2, as do LANs.

Layer 3 — The Network Layer determines how data is transferred between computers. It also addresses routing within and between individual networks. The most visible example is IP (Internet Protocol).

Layer 4 — The Transport Layer defines the rules for information exchange and manages end-to-end delivery of information within and between networks, including error recovery and flow control. TCP (Transmission Control Protocol) is an example, as is the OSI Transport Protocol (TP), which comprises five layers of its own. Layer 4 protocols ensure end-to-end integrity of the data in a session. The X.25 packet-switching protocol operates at Layers One, Two, Three, and Four.

Layer 5 — The Session Layer is concerned with dialog management. It controls the use of the basic communications facility provided by the Transport layer. If you've ever lost

OSI Model / OSS

your connection while Web surfing, you've likely experienced a session time-out, so you have some sense of the Session Layer.

Layer 6 — The Presentation Layer provides transparent communications services by masking the differences of varying data formats (character codes, for example) between dissimilar systems. Conversion of coding schemes (e.g., ASCII to EBCDIC to Unicode), and text compression and decompression exemplify Presentation Layer functions.

Layer 7 — The Applications layer contains functions for particular applications services, such as file transfer, remote file access and virtual terminals. TCP/IP application protocols such as FTP (File Transfer Protocol), Simple Mail Transfer Protocol (SMTP), SNMP (Simple Network Management Protocol) and TELNET (TELEcommunications Network) take place at Layer 7.

See also OSI Standards, which compares Layers 1 through 2 on OSI to making a phone call on the public switched telephone network.

OSI Model Open Systems Interconnection Model. See OSI.

OSI Network Address The address, consisting of up to 20 octets, used to locate an OSI Transport entity. The address is formatted into an Initial Domain Part which is the responsibility of the addressing authority for that domain and a domain-specific part which is the responsibility of the addressing authority for that domain.

OSI Presentation Address The address used to locate an OSI Application entity. It consists of an OSI Network Address and up to three selectors, one each for use by the Transport, Session, and Presentation entities.

OSI Standards The International Standards Organization (ISO) has established the Open Systems Interconnection (OSI) Reference Model is to provide a standard network design framework to allow equipment from different vendors to be able to communicate. Standards allow us to buy items such as batteries and light bulbs. Many of us have learned "the hard way" that the lack of computer standards can make it impossible for computers from different vendors to talk to each other. Because a major goal of a LAN (Local Area Network) is to connect varied systems, standards have been developed to specify the set of rules networks will follow. The OSI Model is a design in which groups of protocols, or rules for communicating, are arranged in layers. Each layer performs a specific data communications function. The concept of layered protocols is analogous (but not identical) to the steps we follow in making a phone call:

- Step 1 — Listen for dial tone.
- Step 2 — Dial a phone number.
- Step 3 — Wait for a ring.
- Step 4 — Exchange greetings to check that the connection is made and we're speaking the same language.
- Step 5 — Talk, i.e. communicate messages back and forth.
- Step 6 — Prepare to end conversation. For example, say Goodbye.
- Step 7 — Take physical action. Hang up.

Each of these steps, or OSI "layers," builds upon the one below it. Although each step must be performed in preset order, within each layer there are several options. Within the OSI model, there are seven layers. The first three are the Physical (PHY), Data Link (DLL), and Network layers, all of which are concerned with data transmission and routing. The last three — Session, Presentation and Application — focus on user applications. The fourth layer, Transport, provides an interface between the first and last three layers. The X.25 Protocol which created a standard for data transmission and routing is equivalent to the first three layers of the OSI Reference Model." See also OSI and X.25.

OSINet A test network sponsored by the National Bureau of Standards (NBS) designed to provide vendors of products based on the OSI model a forum for doing interoperability testing.

Osmics The science of smells. See Snortal.

OSMINE Operations System Modifications for the Integration of Network Elements. OSMINE enables equipment used by Regional Bell Operating Companies (RBOCs) and other service providers to be managed effectively from the same software program, helping to ensure multi-vendor interoperability.

OSN Operations System Network.

OSP 1. Operator Service Provider. A new breed of long distance phone company. It handles operator-assisted calls, in particular Credit Card, Collect, Third Party Billed and Person-to-Person. Phone calls provided by OSP companies are often more expensive than phone calls provided by "normal" long distance companies, i.e. those which have their own long distance networks and which you see advertised on TV. You normally encounter an OSP only when you're making a phone call from a hotel or hospital phone, or privately-owned

payphone. It's a good idea to ask the operator what the cost of your call will be before you make it.

2. Online Service Provider. A company that provides content only to subscribers of their service. This content is not available to regular Web surfers. The idea was to build subscription and other revenues from a closed knit group of people. The problem with this idea was the Internet came along and no one any longer could afford a team to compete with the Web's exploding and varied content. So, some online service providers dropped their attempt at content altogether. Others severely limited it. But all were forced to offer (and do offer) access to the Internet. As a result the term "online service provider" has virtually become obsolete, to be replaced by the term, Internet Service Provider.

OSPF Open Shortest Path First. My definition is that OSPF is a link-state routing algorithm that is used to calculate routes based on the number of routers, transmission speed, delays and route cost. Here's a longer explanation from Alcatel:

Open Shortest Path First (OSPF) as described in RFC 1245 and RFC 1583 is a routing protocol designed for larger or more complex networks than those typically supported by the Routing Information Protocol (RIP). OSPF uses link state and interior gateway protocols to create a network map on each router and then uses the Dijkstra shortest path algorithm to find the optimum path between network devices. RIP has visibility only to the next hop and uses the distance vector algorithm.

Link state protocol algorithms determine the state of, or status of, each link connected to the router. In a network each router constructs a link state advertisement (LSA) with the status of its links and transmits this to its neighbors. Each router builds a list of all routes to all destinations, based on the compilation of LSAs from each router. Each router identifies which routers and subnets are directly connected to it. Then, it distributes this information to all other routers. OSPF routers take the information and build a table of what the network looks like. Using this table, each router can identify where the sub-networks are located, what routers are in direct connection, and how to get to any specific router.

As an interior gateway protocol, OSPF distributes routing information between routers in a single autonomous system. Once all routers have constructed their databases based on the LSA information, they run the Shortest Path First Algorithm. This results in a tree structure with each router at the "root" of its own tree, and the shortest path to all other destinations mapped out. The selection of the path to these destinations is based on metrics. These metrics may be based on hop count, bandwidth, load, cost, reliability, delay, or controlled statically by the user. This provides the network manager greater control over how routing occurs in the network. Dijkstra's Shortest Path Algorithm is a mathematical process by which it is possible to find the shortest path between points. Essentially, the Dijkstra Shortest Path Algorithm calculates the cost of a path between points beginning with the closest points to the starting point and works its way outward until it reaches the desired end point. A high bandwidth link costs less because more information can be sent across it at one time. Conversely, a lower speed/smaller bandwidth connection costs more because it is not able to send information as quickly. For instance, when sending packets across a 56k point-to-point serial connection there is more delay and overhead than if the same packet was sent over a 100Mbps Ethernet connection. Therefore, it would cost more time to send a transmission over the 56k connection compared to the 100Mbps connection.

OSPF is an excellent protocol in a larger network because it can build a map of large complex networks and then navigate a path between two of the network devices with visibility of the entire network providing the most efficient routing paths possible. Because of its ability to handle large complex networks, OSPF can be complex for the network manager to configure and set up and requires greater computing power within the router. However, OSPF is often the routing protocol of choice when configuring larger networks due to its ability to quickly adapt to network changes (faster route convergence), larger network metrics, area-based topology, low traffic overhead and the ability to support complex address structures and route summarization. Such speed and efficiency means minimized bandwidth usage, faster routing compared to other comparable protocols (RIP, RIPv2), lower network latency and better overall network performance, which is especially useful in networks where bandwidth is at a premium such as in a WAN.

OSPFIGP Open Shortest-Path First Internet Gateway Protocol. An experimental replacement for RIP. It addresses some problems of RIP and is based upon principles that have been well-tested in non-internet protocols. Often referred to simply as OSPF. See OSPF.

OSPR Optical Shared Protection Ring.

OSPS An AT&T word for Operator Services Position System.

OSS Operations Support System. Methods and procedures (mechanized or not) which directly support the daily operation of the telecommunications infrastructure. The average

tions for the FCC identifying services that will be supported by a federal universal service funding mechanism. Relying heavily on the Joint Board's November 8, 1996, Recommended Decision, the FCC released a Report and Order that undertakes to modernize universal service policy in an increasingly competitive marketplace and to fundamentally expand its applicability. See also FCC, High Cost, NECA, Separations and Settlements and Universal Service Fund. See also www.fcc.gov/ccb/universal_service/welcome.html and www.ntia.doc.gov/opadhome/uniserve/univweb.htm

Universal Service Administrative Company USAC. The not-for-profit corporation set up and operated by NECA (National Exchange Carriers Association) to administer the Universal Service Fund (USF). USAC accepts the Universal Service funds collected by the LECs (Local Exchange Carriers) and IXCs (InterExchange Carriers), and disburses them in support of Universal Service (US). Universal Service first was stated as a national United States objective in the Communications Act of 1934, with the idea being that all U.S. citizens should have access to basic telephone service of good quality and at reasonable cost, regardless of where they live, and regardless of the underlying cost to the LEC of providing such service. That translated into a complex set of cross-subsidies administered by the FCC (Federal Communications Commission), which was formed by that very same act. Universal Service finally was codified (made into law) with the Telecommunications Act of 1996 (The Act), and the fund was formalized to support universal service in high-cost areas. The Act also led to the formation of USAC and its three divisions, The High Cost and Low Income Division, The Schools and Libraries Division (SLD) and the Rural Health Care Division (RHCD). The first division is responsible for disbursement of funds in connection with the original stated purposes of the USF. The last two divisions are responsible for the disbursement of funds to ensure that funds are made available to their respective constituencies to subsidize the cost of inside wiring, telecommunications services, and Internet access, with the ultimate objective being that of ensuring that all US citizens can participate in the Information Age. See also FCC, Telecommunications Act of 1996, Universal Service, and Universal Service Fund.

Universal Service Charge A federal subsidy program that is apparently apparently being widely abused. The idea is that phone companies would add a figure to their bill, of apparently 6.9 percent. But some of the long distance companies are charging up to 12 percent. And the FCC seems to have little clue, according to testimony, where the extra money is going — though it's obviously adding to the carriers' income. See Universal Service Fund.

Universal Service Fund USF. Under the direction of the FCC, the National Exchange Carriers Association (NECA) administers the USF, which is a cost allocation mechanism designed to keep local exchange rates at reasonable levels, especially in "high cost" (i.e., rural) areas. The primary support mechanism that applies to telecom carriers is the high cost Support mechanism, of which there are five main components:

- 1) High-Cost Loop Support. Compensates rural operators for the cost to build local loops in areas where the cost exceeds 115% of the national average.
- 2) Local Switching Support. Interstate support to cover switching costs for companies that serve fewer than 50,000 customers.
- 3) Long-Term Support. Distribution of interstate access charges for rate-of-return-regulated operators. A new universal support mechanism, Interstate Common Line Support, was created under the MAG plan (discussed below) to convert implicit subsidies to explicit subsidies.
- 4) High Cost Support for Non-Rural Carriers. Compensates rural operators for the cost to build the local loop in areas where the cost exceeds 135% of the national average.
- 5) Interstate Access Support. Distribution of interstate access charges for price cap regulated operators. The CALLS plan, which was passed in 2001, established an explicit support mechanism capped at \$650 million for such charges.

NECA administers the program by collecting USF data, determining LEC eligibility, billing the IXCs (long distance phone companies), and distributing the payments. The original goal of the Universal Service Fund was to provide at least one access line for basic telephone service to every household in the U.S., and at a reasonable, subsidized cost. The fund gets money from a surcharge on phone lines, and uses those funds to offset operating costs of telcos in high-cost areas. While the concept of Universal Service was first stated in the Telecommunications Act of 1934, and while the USF has been in place for a great many years, it wasn't codified (enacted into law) until the Telecommunications Act of 1996 (The Act). The Act changed the underlying subsidy mechanism, authorizing the carriers to add a surcharge of up to five percent onto every telephone bill. The Act also established two new not-for-profit corporations, which now operate as divisions of the Universal Service

Administrative Company (USAC), a not-for-profit corporation operated by NECA. The Schools and Libraries Corporation (SLC), which operates as the Schools and Libraries Division (SLD), is funded to the tune of up to \$2.25 billion per year. The Rural Health Care Company (RHCC), which operates as the Rural Health Care Division (RHCD), is funded to the tune of \$400 million per year. The funds are parceled out by these divisions to help fund necessary inside wiring, telecommunications services, and Internet access. See also FCC, NECA and Universal Service.

Universal Service Obligation See USO.

Universal Service Order Code USOC. The information in coded form for billing purposes use by the local telephone company pertaining to information on service and equipment (S&E) records. USOCs are not truly "universal," as operating companies can have wide differences in terminology. For example, a flat-rate single-party residence line is known variously in USOC terminology as 1FR and FR1.

Universal Service Plan See USP.

Universal Trunk Cards Most PBXs have different circuit boards (or circuit cards - same thing) for combination trunks and for DID (direct inward dial) trunks. A Universal Circuit Board enables you to use the ports on the board for either combination trunks OR DID trunks. This capability makes the PBX more flexible. If you have spare ports on a trunk circuit board you may use them for either a combination or a DID type of trunk.

Universal Turret A very large key system for financial traders, emergency teams at nuclear power stations and others who need single phone button access to hundreds of people. By simply pushing one of the button in front of them, the user can dial one of hundreds of people. These buttons may be connected to tie lines, foreign exchange lines. They may even be DDD lines with autodial capability. Like all good key systems, the buttons have a lamping display which shows if the particular line is idle, busy, ringing, on hold, etc.

Universal Wall Jack There's really no such animal. Every manufacturer of installation gadgetry is trying to propagate the idea that their jack is universal, when it really isn't. The "universal" wall jack we installed in our new offices is actually four jacks — 1. Four pairs for two PBX voice lines (one electronic two-pair phone and one tip and ring phone) and one spare. 2. One RS-232-C 12-conductor shielded cable for connecting to centralized printers, for connecting to a dataPBX and for permanent null-modem connection of computers. 3. One for connecting to our high-speed, one megabit per second LAN, and 4. One spare twisted, shielded, stranded pair for a second LAN, or whatever comes along.

Universal Wireless Communications Consortium UWCC. A consortium of over 100 wireless telecommunications carriers and vendors dedicated to promoting and supporting TDMA (Time Division Multiple Access) cellular phone service. TDMA competes with FDMA (Frequency Division Multiple Access), the analog cellular approach, and CDMA (Code Division Multiple Access), another digital approach. Specifically, the UWCC promotes TDMA as a platform for developing and delivering enhanced personal communications features through the TIA's (Telecommunications Industry Association's) IS-136 (Interim Standard-136) for the TDMA digital air interface, and the IS-41 Wireless Intelligent Network (WIN) internetwork standard. The attempt is to bring together the three primary versions of TDMA RF (Radio Frequency) technology. GSM (Global System for Mobile Communications), is the European version. PHS (Personal Handyphone Service), also known as PDC (Personal Digital Cellular), is the Japanese version. IS-136 is the North American version, which allows AMPS (Advanced Mobile Phone System) to coexist with TDMA on the same network, sharing frequency bands and channels. GSM, PHS, and IS-136 are incompatible, meaning your phone which works on one of these networks won't work on the other networks. The UWCC also is involved heavily in the promotion of 3G (3rd Generation) TDMA-based wireless standards, including EDGE (Enhanced Data Service for GSM Evolution), GPRS (General Packet Radio Service), and UMTS (Universal Mobile Telecommunications System). See also CDMA, Cellular, EDGE, FDMA, GPRS, GSM, IS-41, IS-136, PHS, TDMA, UMTS, and WIN. www.uwcc.org.

Universe A call center term. The total number of names to be attempted on an outbound call program.

UNIX An immensely powerful and complex operating system for computers for running data processing and for running telephone systems. UNIX was developed in 1969 by Ken Thompson, Dennis Ritchie and a few other programmers at Bell Telephone Laboratories. They had been working on the MULTICS (MULTiplexed Information and Computing System) project, a multiuser time-share system development project sponsored by MIT, Bell Labs and General Electric. Thompson then began to develop UNICS (a single-user variant on MULTICS) on an old DEC PDP-7 minicomputer he scrounged. According to legend, Thompson wanted to play Space War, an early computer game. In 1973, Thompson and

U

UNIX-To-UNIX Copy Program / Unpublished Phone Number

Dennis Ritchie rewrote UNICS in the high-level C programming language, which is extremely portable, offering the incredible advantage of allowing programs to transition smoothly to newer computing platforms over time. At that point, UNICS became known as UNIX. The "X" in "UNIX" signifies that it can run on just about any computing platform. (Note: "X" is the generic "whatever.")

UNIX provides multi-tasking, multi-user capabilities that allow both multiple programs to be run simultaneously and multiple users to use a single computer. On a single-user system, such as MS-DOS, only one person at a time, on an individual task basis, can use a computer's files, programs, and other resources. Later Windows versions of MS-DOS added multi-tasking capabilities, of course. Today, the UNIX operating system is available on a wide range of hardware, from small personal computers to the most powerful mainframes, from a multitude of hardware and software vendors. UNIX is also a trademark of UNIX Systems Laboratories, Inc. which used to be owned by Novell Inc. but then was sold to SCO, Santa Cruz Operations. UNIX has given rise to a number of variants, including AIX from IBM, HP-UX from Hewlett-Packard, LINUX, POSIX from the US government, Solaris from Sun, and ULTRIX from DEC. See also LINUX and MULTICS.

UNIX-To-UNIX Copy Program UUCP. A standard UNIX utility for exchanging information between two UNIX-based machines in a network. UUCP may also be referred to as the UNIX-TO-UNIX Communications Protocol and is widely used for electronic mail transfer.

unknown device A Bluetooth term. A device that is currently not connected with the (LocDev and the LocDev has not paired with it in the past. Also called a new device. No information about the device is stored (e.g., BD_ADDR, link key, or other information).

Unlicensed bands There are two types of wireless communications devices. Those that require a license from the Federal Communications Commission. And those that don't. Those that require a license run in a licensed communications band, a specific frequency. Those that don't require run in unlicensed communications bands can be plugged in and run — so long as they meet FCC rules for that communications band, i.e. that frequency. The FCC's rules loosely prohibit "harmful interference" of unlicensed devices, but devices that run in an unlicensed band are not guaranteed protection from interference.

Unlicensed PCS Unlicensed PCS is the name for wireless frequency in the PCS band, which in the United States is 1.920 GHz - 1.930 GHz. The advantage of unlicensed PCS is that you can install a wireless telephone system in your company in this band without having to secure licenses from the Federal Communications Commission. Such systems are often called "business wireless." Such systems are typically all digital and often hang off a PBX. And the wireless phones often will have most of the features that an electronic phone wired to the PBX would have.

Unlisted Number There are various interpretations of what constitutes an "unlisted," an "unpublished" or a "non-published" phone number in North America. Some phone companies use these words interchangeably. Some don't. In California, Pacific Bell offers unpublished phone service. Your phone number is not listed in the paper phone directories, but is listed with dial up "Directory Assistance." Pacific Bell also has a more expensive service called "Unlisted Service." Here, your phone number is not included in the paper phone directories or given out to callers to Directory Assistance. Telephone companies have a service whereby you can leave a message for the owner of an unlisted number. "Please call me. You've won the lottery." The owner of the unlisted number then has the choice to return the call or not. He doesn't pay to receive this message. Some telephone companies confuse the definitions and some invent new ones. For example, some phone companies use the term "non-published" number. You won't find the number in a phone book or by calling Directory Assistance. Over 25% of many private phone numbers in major metropolitan areas are unlisted, unpublished or non-published — a "service" their subscribers pay extra for. To my simple brain, it's a lot easier to simply publish your name as "Apple Plumpudding." See Unpublished.

Unloaded Line A telephone line with its loading coils removed to increase the distance and speed with which data may be transmitted over the line. A fee is usually charged for removing the coils.

Unlock Code This is a three-digit number required to unlock a cellular phone when you have electronically locked it to prevent unauthorized use. You might lock it when you park your car in a hotel. The factory default is 123.

UNMA Unified Network Management Architecture. AT&T's proprietary architecture for network management.

UNMR Universal Network Management Record.

Unnumbered Command In a data transmission, a command that does not contain sequence numbers in the control field.

Unnumbered Information Frame U1 frame. A transmission frame generated by the High-Level Data Link Control (HDLC) data link protocol, where no flow control and no error control are implemented.

UnPBX An UnPBX is a server on a LAN, dedicated to communications. The UnPBX is comprised of four elements. First, it is one or several joined PCs; Second, it has boards inside the PC and software to run them; Third, it's joined to the same phone lines a PBX is joined to — analog POTS lines to digital T-1 lines; And fourth, it's joined to a local area network. Some of the cards that drop into an UnPBX are proprietary. Most are not. Most UnPBXs run on familiar operating systems — NT and Unix, etc. Most UnPBXs are open. They offer far more programming "hooks" than any other telephony device, including the "open" PBX. Most UnPBXs drop a phone on your desk via a tip and ring line. You speak on the phone. You can dial on the phone, or dial via the screen on your PC. Some UnPBXs zing your voice over ATM, Ethernet or the Internet. Some use the multimedia-equipped PC to do the dialing, speaking and phoning. You typically do everything else — from checking your messages to setting up conference calls — via software on your LAN-attached PC. Some UnPBXs have their own desktop software. Some use a browser — Netscape or Internet Explorer. Some people call the UnPBX a "total communications server." Here's what the UnPBX does:

1. Typically, the UnPBX is an office's phone system. It is a PBX in a PC. You dial your mother from your desk through it. It will switch incoming calls to your desktop. You can call the guy in the next office on it. In short, an UnPBX has all the basic PBX functions. The UnPBX is your office's auto attendant / voice mail system. It answers incoming calls, gives out a message, listens for tones and transfers the call to you. It will alert you to the incoming call, prompt you for what it should do with the call — hold it, transfer it, conference it, dump it in voice mail, etc. If not answered, it will probably put the call in voice mail. It could also dial half a dozen outside numbers and chase you down. It can usually do solid IVR. Punch 1 to find out when we sent your order. Punch 2 to find out how much it cost. Give out and collect information from your customers at 3:00 AM. It is your office's fax and email server. It handles incoming faxes and emails. It tells you that you have mail. It lets you view your fax or email mail or listen to your voice mail. It is your one place for all your mail — fax, email, voice mail, video mail, etc. One screen showing all your mail. We call it unified messaging. The UnPBX makes you super organized. It is an ACD (automatic call distributor). It's not as sophisticated as what BIG airlines have. But it can come very close. An UnPBX's ACD can make your customers very, very happy. The UnPBX can be a predictive dialer. It can pump out telemarketing and dunning calls with the best of them.

Being open, being standards-based and being programmable, an UnPBX may be more or less than the list above. For example, it may also page you when you have a message. Or it may only page you when you have one from your largest customer.

We haven't scratched what's possible with an UnPBX. Today's UnPBX delivers many benefits. Among them:

1. It's cheaper. Don't be fooled by the sticker prices you see in Ed's Roundup. One communications system is a lot cheaper than today's multiple, cobbled-together systems.

2. It's easier to manage. It has one database. One place you assign phone extensions, email addresses, fax locations, email boxes, etc. One place to do billing for all these services. You'll pay the UnPBX off manyfold with just the administration savings.

3. It's much easier to use. You see the words, the icons, the images. Click. Drag and Drop. You now can use telephony features today's horrid telephones deny you.

4. You feel in control. You see your messages. They're all in one place. You can join voice mail messages to Excel spreadsheets and forward the multimedia message to your client. It sells.

5. You can have it your way. Write some software for your UnPBX. Get your reseller or system integrator to do it. Customize your phone system, your IVR system, your fax system, your ACD... all in one box. Gain a major competitive advantage.

Unpublished Phone Number There are various interpretations of what constitutes an "unpublished" phone number in North America. Some phone companies use these words interchangeably. Some don't. In California, Pacific Bell offers unpublished phone service. Your phone number is not listed in the paper phone directories, but is listed with dial up "Directory Assistance." Pacific Bell also has a more expensive service called "Unlisted Service." Here, your phone number is not included in the paper phone directories or given out to callers to Directory Assistance. Some phone companies have a service whereby you can leave a message for the owner of an unlisted number. "Please call me. You've won the lottery." The owner of the unlisted number then has the choice to return the call or not. He doesn't pay to receive this message. Some telephone companies con-

includes supplementary call-handling things such as hold, transfer, conference and call park that are often found in PBXs, Centrex, ISDN and other phone systems. In general, TAPI services arbitrate requests from apps to share comm ports and devices. Win32-based apps can use TAPI to make outgoing calls while others are waiting for incoming calls. Of course, only one call can be performed at a time, but users no longer have to close apps that are using the comm port.

TAPI does not need local hardware. It can also use drivers that work on a LAN, which support multiple systems today (e.g. Genesys, Dialogic's CT Connect, Nortel Networks' Tmap, etc.) Microsoft is making the client side ubiquitous and is planning on dropping the server side in (i.e. Windows 2000 Server) shortly.

MODEMING: Windows lets you install and configure a modem once to work for all communications apps, just as you do for a printer. Benefits: Centralized modem and COMM port configuration through the "modems" option in the control panel for all comm apps created for Windows 95; Support for hundreds of modems, including automating the detection of them (again, just like Windows did with printers); Modem connections and configuration using point-and-click options rather than annoying AT commands.

The Windows OS includes three tools here: 1. HyperTerminal. This lets you connect two computers through a modem and TAPI for transferring files. It also automatically detects data bits, stop bits and parity. 2. Phone Dialer. This lets you use your computer to dial numbers for voice calls. It includes a phone dialpad, user-programmable speed dials and a call log. 3. Microsoft File Transfer. This lets you send and receive files while talking on the phone. This works with VoiceView-enabled modems.

E-MAILING: Also in Windows is its included Microsoft Exchange client capability. Exchange is a messaging app that retrieves messages into one inbox from many kinds of messaging service providers, including, Microsoft Mail, The Microsoft Network and Microsoft Fax. With Microsoft Exchange client, you can: send or receive e-mail in a Win95 workgroup; include files and objects created in other apps as part of messages; use multiple fonts, font sizes, colors and text alignments in messages (via an included OLE-compatible text editor); create a personal address book or use books from multiple service providers; and create folders for storing related messages, files and other items.

According to Microsoft, Exchange client will work with any electronic mail system or unified messaging app that has a MAPI service provider, which architects very similar to the TAPI schematic. The MAPI service provider specifies all the connections and addressing settings needed to talk with a mail server on one end and with the Exchange client on the other.

MAPI is a set of API functions and OLE interface that lets messaging clients, such as Microsoft Exchange, interact with various message service providers, such as Microsoft Mail, Microsoft Exchange Server, Microsoft Fax and various computer telephony servers running under Windows NT server. Overall, MAPI helps Exchange manage stored messages and defines the purpose and content of messages — with the objective that most end users will never know or care about it.

FAXING: As part of Windows 95, Microsoft included a new technology called Microsoft Fax. With this embedded Group 3-compatible software, users with modems and running Microsoft Fax can exchange faxes and editable files (pictures, binary files, *.EXE software, etc.) as easily as printing a document or sending an electronic mail message. To use it, you must install Microsoft Exchange. Microsoft integrated the two as a messaging application programming interface (MAPI) service provider. All faxes sent to Microsoft Fax are received in the Exchange universal inbox. You can send a fax by composing a Microsoft Exchange message or by using the Send option on the File menu of a MAPI-compatible application (such as Microsoft Excel or Microsoft Word). In addition, Microsoft Fax includes a fax printer driver so that users can "print to fax" from within any Windows-based application.

Key features: 1. Delivery By Address Type. The MAPI service provider architecture lets you mix different types of recipients in the same message. For example, it's possible to send a message simultaneously to destination addresses in Microsoft Mail, CompuServe, Internet, normal fax and Microsoft Fax as long as profiles for these destinations have been defined within Microsoft Exchange. A recipient's fax address can be selected from the Microsoft Exchange Personal Address Book or the fax can be addressed by using an address that you use just once, such as [fax:555-1212].

1. Binary File Transfer (BFT). Microsoft Fax supports Microsoft At Work BFT, which makes it possible to attach an editable document to a Microsoft Exchange mail message. These editable documents can be sent to users of Windows 95, Windows for Workgroups 3.11, and other Microsoft FAX BFT enabled platforms.

2. Security. Microsoft Fax lets you securely exchange confidential documents by using public key encryption or digital signatures. Any security specified by user is applied before

the message is passed to the modem or connected fax device.

3. Network Fax Service. You can install a fax device in one computer and share it with other users within a workgroup. Individual computers can have their own fax devices installed and still use the shared fax device.

4. Microsoft Fax Viewer. The Microsoft Fax Viewer displays outgoing fax messages that have been queued to a local fax modem or to a Microsoft Fax network fax that are queued for transmission. You can also browse multipage faxes in thumbnail or full-page views.

5. Connecting to Fax Information Services. Microsoft Fax can connect to fax-on-demand systems by using a built-in, poll-retrieve feature that allows you to retrieve rendered faxes or editable documents from a fax information service.

6. "Best Available" Fax Format. When you make a fax connection in Windows 95, Microsoft Fax queries and exchanges its fax capabilities with the recipient. This exchange of capabilities determines whether the recipient is a traditional Group 3 fax machine, which can only receive rendered faxes, or if the recipient has Microsoft Fax capabilities, and can receive editable files. Windows 95, Windows for Workgroups 3.11 and Microsoft At Work fax platforms are all capable of receiving binary files and traditional faxes. Perks:

If the receiving fax device supports Microsoft Fax capabilities and an editable document is attached to a Microsoft Exchange message, then the file is transferred in its native format. If the receiving fax device is a traditional Group 3 fax machine, then Microsoft fax converts the document to the most compressed type of fax supported by the machine (MH, MR or MMR compression type) and transmits the image by using the best available communications protocol supported by the mutual connection (that is, V.17, V.29 or V.27). If Microsoft Fax sends a noneditable fax to another Microsoft Fax user, then the fax is transmitted by using the Microsoft At Work rendered fax format. This special format is much more compressed, on average, than Group 3 MMR. Therefore, the exchange of noneditable faxes between Microsoft Fax users is always faster than between Group 3 fax machines.

Overall, you can send faxes either by using the mail client or the Microsoft Fax printer driver. In each case, the message is sent to the Microsoft Fax service provider by using MAPI. If you sent the message from a mail client, it might contain text, embedded OLE formats and attachment to the mail message. MAPI allows messages to be preprocessed based on the transport protocol used to send them. The transport protocol chooses the correct modem connection, uses TAPI to create a dial string and sends the message into a fax form to be printed by a fax machine. The rendered format is attached to the original message as a message property and is deleted either when the message is sent or when the transport protocol tries to send the message but determines it cannot.

If the message does not have to be rendered, the message is converted from its original binary format to a line image (also called a linearized form), and then it is compressed. After the message is submitted, the transport protocol determines what type of recipient the message is intended for through TAPI subkey values.

Windows 98 Windows 98 is the successor to Windows 95. See Windows 95.

Windows Application A term used in this document as a shorthand term to refer to an application that is designed to run with Windows and does not run without Windows. All Windows applications follow similar conventions for arrangement of menus, style of dialog boxes, and keyboard and mouse use.

Windows CE A smaller version of Microsoft's Windows operating system to be used for a range of mobile handheld communications, computing or entertainment devices. See also Microsoft At Work, an earlier attempt by Microsoft at making an operating system for devices other than PCs.

Windows Character Set The character set used in Windows and Windows applications. Most TrueType fonts have a set of about 220 characters.

Windows For Workgroups Windows for Workgroup is an obsolete local area networked version of Microsoft Windows operating system version 3.1 that offered integrated file sharing, electronic mail (Microsoft Mail) and workgroup scheduling (Schedule+), thus bringing the graphical user interface to the workgroup. Windows For Workgroups also has Network DDE, which allows users to create compound documents that share data across network. Most importantly, Windows for Workgroups 3.11 lets you do 32-bit disk access and 32-bit file access. Windows 95 superseded Windows for Workgroups.

Windows MetaFile WMF. A method of encoding files. Other methods include EPS, PCX and TIFF.

Windows NT Windows New Technology, now called Windows 2000, is a 32-bit operating system from Microsoft, designed to replace Windows95 and MS-DOS. As an operating system, Windows NT is targeted at the top 10% "power" users who need the



Windows NT File System / Windows XP Real Time Communications

power of a big, powerful operating system. Here are the main advantages of Windows NT, as explained by Microsoft:

- **Interoperability.** Windows NT delivers support for open computing benefits through its protected subsystem architecture. Windows NT was also designed to be protocol independent. As such it will interoperate with all leading network systems, regardless of the native protocol of the system.
- **Portability.** Windows NT was designed to be portable across a variety of hardware systems. The Hardware Abstraction Layer (HAL) limits and isolates the amount of code necessary to port Windows NT to a new platform. Windows NT will run on processors other than those made by Intel. MS-DOS, for example, doesn't.
- **Scalability.** Windows NT scales to work on both single and multi processor computer systems. This scalability gives users the flexibility to implement their own solutions, today or over time, on machines that meet the performance needs of sophisticated client server solutions.
- **System Management.** Windows NT supports SubNetwork Access Protocol (SNMP) and NetView network management standards.
- **Published Interfaces.** The interfaces to the Windows NT operating system are fully documented and published. Software developers are free to add functionality to the system based on their interface definitions.
- **Support of Industry Standards.** These include POSIX.1, OSF DCE, TCP/IP and WOSA, which is Microsoft's Windows Open Services Architecture. WOSA is a standard set of interfaces to connect a variety of applications with a range of back-end devices and services, such as messaging, telephony, databases, etc. Windows Telephony is part of WOSA.

Windows NT File System NTFS. An advanced file system designed for use specifically with the Windows NT operating system. NTFS supports file system recovery and extremely large storage media. It also supports object-oriented applications by treating all files as object with user-defined and system-defined attributes.

Windows Open Services Architecture See WOSA.

Windows Telephony Introduced in the spring of 1993 jointly by Microsoft and Intel, Windows Telephony is a piece of software called a Windows Telephony DLL and two standards. The first standard is the Service Provider Interface (SPI). If a hardware manufacturer's product honors that SPI, that product can happily talk to the Windows Telephony DLL. The second standard is called the Application Programming Interface and it is directed at software developers who write applications programs. If those developers' programs adhere to the API, they can take advantage of the Windows Telephony DLL to drive whatever telephony devices or services adhere to the SPI. The Windows Telephony API is called TAPI. DLL stands for Dynamic Link Library. It is a Windows feature that allows executable code modules to be loaded on demand and linked at run time. At one stage, it was thought at Windows Telephony would bring about an explosion of shrink-wrapped Windows based telephone software applications — from simple personal rolodexes to power dialers, to customized phone systems for banks and for bakers. It was going to bring about an explosion of new telephony hardware devices — from telephones that look more like PCs than phones, to PCs that are phones, to blackbox telephony devices that hook to laptops and transform hotel phones.

Windows Telephony removed earlier overwhelming barriers to creating PC-driven telephony applications, namely the wide enormity of telephony "network" services — from the many telephone company interfaces (POTS to T-1), to the many more proprietary interfaces behind dozens of proprietary PBXs, key systems and hybrid phone systems. Unfortunately Windows Telephony never took off, largely because the telephone industry just "didn't get it." The industry also resented that an outsider — someone from the computer industry would attempt to layer standards on the phone business. As a result, Windows Telephony has never taken off. See At Work, Fax at Work, Telephony Services, Windows Telephony Services, Windows Toolkits and WOSA.

Windows Telephony Services Here is Microsoft's original definition: Windows Telephony services are provided as a WOSA (Windows Open Services Architecture) component. It consists of both an application programming interface (API) used by applications and a service provider interface (SPI) implemented by service providers. The focus of the API is to provide "personal telephony" to the Windows platform. Telephony services break down into Simple Telephony services and Full Telephony services. Simple Telephony allows telephony-enabled applications to be easily created from within these applications without these apps needing to become aware of the details of the Full Telephony services. Word processors, spreadsheets, databases, personal information man-

agers can easily be extended to take advantage of this. Complete call control is only possible through the use of the Full Telephony services. Applications access the Full Telephony API services using a first-party call control model. This means that the application controls telephone calls as if it is an endpoint of the call. The application can make calls, be notified about inbound calls, answer inbound calls, invoke switch features such as hold, transfer, conference, pickup, park, etc., detect and generate DTMF for signaling with remote equipment. An app can also use the API to monitor call-related activities occurring in the system.

The fact the API presents a first-party call control model does not restrict its use to only first-party telephony environments. The Windows Telephony API can be meaningfully used for third-party call control. The API provides an abstraction of telephony services that is independent of the underlying telephone network and the configuration used to connect the PC to the switch and phone set. The API provides independent abstractions of the PC connections to the switch or network and the phone set. The connection may be realized in a variety of arrangements including pure client based wired or wireless connections, or client/server configurations using some sort of local area network.

The Telephony API by itself is not concerned with providing access to the information exchanged over a call. Rather, the call control provided by the API is orthogonal to the information stream management. The Telephony API can work in conjunction with other Windows services such as the Windows multimedia wave audio, MCI, or fax APIs to provide access to the information on a call. This guarantees maximum interoperability with existing audio or fax applications.

The Telephony API defines three levels of service. The lowest level of service is called Basic Telephony and provides a guaranteed set of functions that corresponds to "Plain Old Telephone Service" (POTS - only make calls and receive calls). The next service level is Supplementary Telephone Service providing advanced switch features such as hold, transfer, etc. All supplementary services are optional. Finally, there is the Extended Telephony level. This API level provides numerous and well-defined API extension mechanisms that enable application developers to access service provider-specific functions not directly defined by the Telephony API. See Windows Telephony.

Windows Toolkits Windows toolkits are libraries of code that implement the graphical user interface objects that every software application uses. The toolkits save time by eliminating the need for software developers to re-implement the same code repeatedly for each application. Toolkits also have the benefit of consistent user interface implementation across all applications that use the toolkit. See also Windows.

Windows XP An updated version of Windows 2000 that has Win2000's stability and some nice new features, including the ability to dial into the machine remotely and to make phone calls. See the next definition.

Windows XP Real Time Communications When it introduced Windows XP towards the end of 2001, Microsoft announced an update of the Windows Messenger Real-Time Communications client, that will enable consumers to use their personal computers to make voice calls from their PCs to telephones anywhere in the world via a choice of participating service providers. These new PC-to-phone calling options, along with other enhancements, are included in a downloadable update to the Windows Messenger feature within Windows XP. In addition, an update to the MSN messenger client will enable this new PC-to-phone support for users of previous versions of Windows. The Microsoft Voice Services program enables carriers to participate in and benefit from this Windows Messenger Real-Time Communications update, which includes embedded Voice Over IP (VoIP) and PC-to-phone calling capability. Microsoft will host a referral service of qualified carriers who will be our partners in terminating PC to phone calls via the Messenger client. The Voice Services program will allow Microsoft, via Messenger, to refer new customers to the participating carriers in order to subscribe, and also will integrate the user online communications services with voice services from an Internet Telephony Service Provider (ITSP).

If you are an ITSP, the Voice Services program provides you with a way to build differentiating services, reduce customer churn by adding new applications and capabilities for your existing customers, find new customers (every copy of Windows XP that ships is essentially a telephone handset that needs a backbone carrier for VoIP traffic), and most importantly, increase the average revenue per customer you currently enjoy if you are not already offering VoIP services. ITSPs will be able to manage their own customers to include provisioning, call processing and termination, billing, and customer care.

Voice Services is one of the first ways an ITSP can adopt and leverage the Microsoft .NET platform. Microsoft Voice Services incorporates the Passport web service to authenti-