

Data Communications Glossary

A ready reference for finding what you need to know. Compiled by the staff of Data Communications

A

A and B signaling Procedure used in most T1 transmission facilities operated by telephone companies, where bits, "robbed" from each of the subchannels, are used for carrying dial and control information; a type of in-band signaling used in T1 transmission

Abbreviated dialing A feature of some telephone switches that permits users to establish calls by entering fewer digits than would otherwise be required; speed-dialing directories are predefined, though usually changeable by the user; also, speed dialing

ABM Asynchronous Balanced Mode (ADCCP)

Access charges FCC-specified tariffs levied for access to a local exchange carrier (LEC), either for private-line access by users or for access to the LEC by interexchange carriers (IECs)

Access line That portion of a leased telephone line that permanently connects the user with the serving central office or wire center

Accunet Data-oriented digital services from AT&T Communications, including: Accunet T1.5, terrestrial wideband at 1.544 Mbit/s; Accunet Reserved T1.5, satellite-based channels at 1.544 Mbit/s primarily for video teleconferencing applications; Accunet Packet Services, packet-switching services; Accunet Dataphone digital service (DDS), private-line digital circuits at 2.4, 4.8, 9.6, and 56 kbit/s; Accunet Switched 56

ACF Advanced Communications Function; family of IBM communications software products that add to other systems (nonapplications) software the functions of SNA network operation, control, and management; with IBM's Network Control Program (NCP), the software load for front-end and remote communications processors (370X/3725), generated in the host and downloaded; performs critical control functions for IBM SNA networks; ACF/NCP/VS (ACF/Network Control Program/Virtual Storage); also, ACF/TCAM, ACF/VTAM, ACF/VTAME

ACK Control code or designation for a positive acknowledgment; sent from a receiver to a transmitter to indicate that a transmission, or sequence of transmissions, has been received correctly

ACM Association for Computing Machinery

Acoustic coupler A device that allows a telephone handset to be used for access to the switched telephone network for data transmission; digital signals are modulated as sound waves; data rates are typically limited to about 300 bit/s, some up to 1.2 kbit/s

A/D Analog-to-digital (conversion)

ADCCP Advanced Data Communications Control Procedure

ADCU Association of Data Communications Users

Address A sequence of bits, a character, or a group of characters that identifies a network station, user, or application; used mainly for routing purposes; in telephony, the number entered by the caller that identifies the party called

ADPCM Adaptive differential pulse code modulation; encoding technique, standardized by the CCITT, that allows an analog voice conversation to be carried within a 32-kbit/s digital channel; 3 or 4 bits are used to describe each sample, which represents the difference between two adjacent samples; sampling is done 8,000 times a second

AFIPS American Federation of Information Processing Societies

Alternate routing A feature of network switches, especially PBXs, where a call is completed over other circuit routes when first-choice routes are unavailable (not in service or occupied)

AM See Amplitude modulation

Ameritech One of seven regional Bell operating companies (RBOCs) resulting from divestiture, covering the Midwestern United States, based in Chicago, Ill.

Amplifier Any electronic component that boosts the strength or amplitude of a transmitted—usually analog—signal; functionally equivalent to a repeater in digital transmissions

Amplitude modulation (AM) Transmission method in which variations in the voltage or current waveform of a carrier signal determine encoded information

Analog In communications, transmission employing variable and continuous waveforms to represent information values, where interpretation by the receiver is an approximation (quantization) of the encoded value; compare with digital

Analog loopback Technique for testing transmission equipment and devices that isolates faults to the analog signal receiving or transmitting circuitry; where a device, such as a modem, echoes back a received (test) signal that is then compared with the

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original signal; see Loopback; compare with digital loopback

ANSI American National Standards Institute

Answerback The response of a terminal or other communications device to remotely transmitted control signals; typically part of handshaking between devices

APD Avalanche photodiode; a diode that, when light strikes it, increases its electrical conductivity by a multiplication effect; popular technology employed in receivers for lightwave transmission due to its sensitivity to weakened light signals

APPC Advanced Program-to-Program Communications; also called Logical Unit 6.2, an IBM-specified network node definition featuring high-level program interaction capabilities on a peer-to-peer basis

Application layer A logical entity of the OSI model; the top of the seven-layer structure, generally regarded as offering an interface to, and largely defined by, the network user; in IBM's SNA, the end-user layer

Application Program Interface (API) A set of formalized software calls and routines that can be referenced by an application program to access underlying network services

ARPA Advanced Research Projects Agency; operates within the U. S. Department of Defense

ARQ Automatic request for repeat or retransmission; communications feature whereby the receiver asks the transmitter to resend a block or frame, generally because of errors detected by the receiver

ASCII American National Standard Code for Information Interchange; the standard, and predominant, seven-bit (eight bits, with parity) character code used for data communications and data processing

ASR Automatic send/receive; describes a type of operation, typically of a teleprinter terminal, and especially of older ones equipped with paper tape punches and readers

Asymmetrical A term applied to certain modems that use the majority of the bandwidth on a dial-up link for data transmission in one direction, and a small portion of the bandwidth for control information traveling in the opposite direction

Asynchronous Transmission that is not related to a specific frequency, or to the timing, of the transmission facility; describing transmission characterized by individual characters, or bytes, encapsulated with start and stop bits, from which a receiver derives the necessary timing for sampling bits; also, start/stop transmission

Asynchronous balanced mode (ABM) Used in the IBM Token Ring's logical link control (LLC), ABM operates at the SNA data link control level and allows devices on a Token Ring to send data link commands at any time and to initiate responses independently of each other

AT Command set The de facto autodialing command-set standard for most Bell 212A full-duplex dial-up modems. The

command set refers to a specific set of ASCII characters that may be sent to the modem for control purposes. The command set, developed by Hayes Microcomputer Products Inc., can be used by any computer or intelligent terminal to tell the modem to perform such functions as "go off-hook," "hang up," "enable carrier," "disable carrier," "use dial tone," "use pulse dialing," "echo characters," "nonecho characters." An ASCII "A" and "T" must precede each command

ATM Automated teller machine

Attenuation Reduction or loss of signal strength, measured in decibels; opposite of gain

Audiotex A service that allows a database host to pass data to a voice-mail computer, where it is interpreted and delivered over the telephone as a natural, spoken-voice message

Authentication In security, ensuring that the message is genuine, that it has arrived exactly as it was sent, and that it comes from the stated source

Auto-answer Automatic answering; capability of a terminal, modem, computer, or similar device to respond to an incoming call on a dial-up telephone line and to establish a data connection with a remote device without operator intervention; unattended operation for incoming dial-up calls

Autodial Automatic dialing; capability of a terminal, modem, computer, or similar device to place a call over the switched telephone network and establish a connection without operator intervention; also, autocal

Automatic fallback A modem's ability to negotiate an appropriate data rate with the modem on the other end of the link, depending on line quality. For example, if two 1.2-kbit/s modems could not pass data at 1.2 kbit/s, each might "fall back" to 300 bit/s automatically in order to transmit data without excessive errors

Automatic Route Selection (ARS) The capability of a switch, typically a private branch exchange (PBX), to automatically determine an optimal route establishing a circuit; also called least-cost routing (LCR)

Auxiliary network address In ACF/VTAM, any network address, except the main network address, assigned to a logical unit capable of having parallel sessions (IBM)

AVD Alternate voice/data

B

Backbone network A transmission facility designed to interconnect lower-speed distribution channels or clusters of dispersed user devices

Balanced-to-ground With a two-wire circuit, where the impedance-to-ground on one wire equals the impedance-to-ground on the other wire; compare with unbalanced-to-ground, which in most cases is a preferable condition for data transmission

Balun Balanced/unbalanced, in the IBM cabling system, refers to an impedance-matching device used to connect balanced twisted-pair cabling with unbalanced coaxial cable

Bandwidth The difference, expressed in Hertz (Hz), between the highest and lowest frequencies of a transmission channel

Baseband Describing a signal frequency that is below the point that the signal is modulated as an analog carrier frequency; in modulation, the frequency band occupied by the aggregate of the transmitted signals when first used to modulate the carrier (IBM)

Basic Beginners All-purpose Symbolic Instruction Code; the most common end-user programming language used with personal computers

Basic rate In ISDN, two 64-kbit/s information-carrying B channels and one 16-kbit/s signaling D channel (2B + D)

Basic (vs. enhanced) services As defined by the FCC, basic service refers to transport-level services provided by the BOCs and AT&T. However, the lines drawn are unclear

Batch processing A type of data processing operation and data communications transmission where related transactions are grouped together and transmitted for processing, usually by the same computer and under the same application; generally regarded as nonreal-time data traffic consisting of large files; type of data traffic where network response time is not critical; compare with interactive (processing)

Baud A measurement of the signaling speed of a data transmission device; equivalent to the maximum number of signaling elements, or symbols, per second that are generated; may be different from bit/s rate, however, especially at higher speeds, as several bits may be encoded per symbol, or baud, with advanced encoding techniques such as phase shift keying

Baudot code An aging data transmission code using five bits for character representation, usually with one start and one or two stop bits added

BCC Block check character; control character appended to blocks in character-oriented protocols used for determining if the block was received in error; used in longitudinal and cyclic redundancy checking

BCD Binary-coded decimal; aging, numeric-based character code set, where numbers zero through nine have a unique 4-bit binary representation

B channel In Integrated Services Digital Network, a 64-kbit/s information-carrying channel

Beam splitter A device for dividing an optical beam into two or more separate beams; often a partially reflecting mirror

B8ZS Binary 8 zero substitution; a technique used to accommodate the ones density requirements of digital T-carrier facilities in the public network, while allowing 64 kbit/s clear data per channel. Rather than inserting a one for every seven consecutive zeroes (see Ones density), B8ZS inserts two violations of the bipolar line encoding technique used for digital transmission links.

Bell Atlantic One of seven regional Bell operating companies (BOCs) resulting from divestiture, encompassing the Midatlantic region of the United States

Bellcore Bell Communications Research; organization established by the AT&T divestiture, representing and funded by the BOCs and RBOCs, for the purposes of establishing telephone-network standards and interfaces; includes much of what had been Bell Laboratories

BER See Bit error rate

BERT Bit error rate test, or tester

Beta test, site Testing of product prototypes and early releases at client locations prior to general public marketing. Contrast with alpha tests, which are performed in-house by a vendor

Bipolar The predominant signaling method used for digital transmission services, such as DDS and T1, in which the signal carrying the binary value successively alternates between positive and negative polarities; zero and one values are represented by the signal amplitude at either polarity, while no-value "spaces" are at zero amplitude; also, polar transmission; also, a type of integrated circuit (IC, or semiconductor) that uses both positively and negatively charged currents, characterized by high operational speed and cost

Bisync Binary synchronous communications (BSC); character-oriented data communications protocol developed by IBM; oriented toward half-duplex link operation; still widely employed, though replaced in current IBM data communications products by the bit-oriented synchronous data link control (SDLC)

Bit A binary digit; the representation of a signal, wave, or state as either a binary zero or a one

Bit duration The time it takes one encoded bit to pass a point on the transmission medium; in serial communications, a relative unit of time measurement, used for comparison of delay times (e.g., propagation delay, access latency) where the data rate of a (typically high-speed) transmission channel can vary

Bit error The case where the value of an encoded bit is changed in transmission and interpreted incorrectly by the receiver

Bit error rate (BER) The ratio of received bits that are in error (relative to a specific amount of bits received); usually expressed as a number referenced to a power of 10; e.g., 1 error in 10^5 bits—also referred to as a BER of 10^{-5}

Bit-oriented Describing a communications protocol or transmission procedure where control information is encoded in fields of one or more bits; oriented toward full-duplex link operation; uses less overhead—and is therefore more efficient—than character- or byte-oriented protocols

Bit/s Bits per second; basic unit of measure for serial data transmission capacity; kbit/s, or kilobit/s, for thousands of bits per second; Mbit/s, or megabit/s, for millions of bits per second; Gbit/s, or gigabit/s for billions of bits per second; Tbit/s, or terabit/s, for trillions of bits per second

Bit stuffing Process, in bit-oriented data communications proto-

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cols, where, for example, a string of "one" bits is broken by an inserted zero, added by the sender and removed by the receiver; adding of zero bits is done to prevent user data containing a series of one bits from being interpreted as a flag control character

BLAST Blocked asynchronous transmission

BLERT Block error rate test

Block A quantity of transmitted information regarded as a discrete entity by size; more commonly, a discrete entity by its own starting- and ending-control delimiters, usually with its own self-contained control, routing, and error-checking information; in (primarily) Bisync, that portion of a message terminated by an EOB or ETB line-control character or, if the last block in a message, by an EOT or ETX line-control character; a block may contain one or more records, or a record one or more blocks

Blocking The inability of a network, switch, or access node to grant service to a requesting user due to the unavailability of a transmission channel; said mainly of PBX and central-office switches that lack the ability to provide circuits for all potential users all of the time

Block multiplexer channel An IBM mainframe input/output (I/O) channel that allows interleaving of data blocks

BOC Bell operating company; one of 22 local telephone companies spun off from AT&T as a result of divestiture, reorganized into seven regional Bell holding companies; among the largest of the 1,600 independent local U. S. telephone companies

Boundary node In IBM's SNA, a subarea node that can provide certain protocol support for adjacent subarea nodes, including transforming network addresses to local addresses, and vice versa, and performing session-level sequencing and flow control for less intelligent peripheral nodes

BPSK Binary phase-shift keying

Bridge A device that connects local area networks at the data link layer

Bridge tap An undetermined length of wire attached between the normal endpoints of a circuit that introduces unwanted impedance imbalances for data transmission; compare with terminated line; also, bridging tap, bridged tap

Broadband Describing transmission equipment and media that can support a wide range of electromagnetic frequencies; typically, the technology of CATV transmission, as applied to data communications, that employs coaxial cable as the transmission medium and radio-frequency carrier signals in the 50-to-500-MHz range; any communications channel having a bandwidth greater than a voice-grade telecommunications channel, sometimes used synonymously with wideband

Broadcast Delivery of a transmission to two or more stations at the same time, such as over a bus-type local area network or by satellite; protocol mechanism whereby group and universal addressing is supported

BSC See Bisync

BTAM Basic Telecommunications Access Method; one of IBM's early host-based control programs for managing the remote data communications interface to host applications; supportive of pre-SNA protocols

Buffering Process of temporarily storing data in a register or in RAM, which allows transmission devices to accommodate differences in data rates and to perform error checking and retransmission of data received in error

Buffer storage Electronic circuitry where data is kept during buffering

Bus A transmission path or channel; typically, an electrical connection, with one or more conductors, wherein all attached devices receive all transmissions at the same time; a local area network topology, such as used in Ethernet and the token bus, where all network nodes "listen" to all transmissions, selecting certain ones based on address identification; involves some sort of contention-control mechanism for accessing the bus transmission medium

Bypass Generally refers to any private networking scheme used to access long-distance transmission facilities without going through the local exchange carrier (LEC) to do so

Byte Generally, an 8-bit quantity of information, used mainly in referring to parallel data transfer, semiconductor capacity, and data storage; also generally referred to in data communications as an octet or character

Byte multiplexer channel An IBM mainframe input/output channel that allows for the interleaving, or multiplexing, of data in bytes; compare with block multiplexer channel

C

CAD Computer-aided design

CAE Computer-aided engineering

CAI Computer-aided instruction

Callback modem A modem that must be password-activated by the caller. It will then typically hang up and call back the caller's predefined telephone number to establish a communications session

Call-detail recording (CDR) A feature of private branch exchanges where each telephone call is logged, typically by time and charges, and retrievable by the network operator for cost charging by department; also called station message detail recording (SMDR)

Call forwarding A PBX feature that lets a user direct calls to another extension

Call pickup A PBX feature that lets a user answer an incoming call from any station other than the called destination

Call waiting A PBX feature that informs a station user of an

incoming call when another call is already in progress

CAM Computer-aided manufacturing

Carrier A continuous frequency capable of being modulated or impressed with a second data-carrying signal

Carrier band A band of continuous frequencies that can be modulated with a signal

CATV Community Antenna Television (formal) or Cable Television (colloquial); data communications based on radio frequency (RF) transmission, generally using 75-ohm coaxial cable as the transmission medium; communications via coaxial cable where multiple frequency-divided channels allow mixed transmissions to be carried simultaneously; broadband

C band Portion of the electromagnetic spectrum heavily used for satellite and microwave transmission; frequencies of approximately 4 to 6 GHz

CBEMA Computer Business Equipment Manufacturers Association

CCIA Computer and Communications Industry Association

CCIS Common channel interoffice signaling; AT&T method of separate-channel signaling by which control and signaling for a group of (typically digital) trunks between telephone central offices is carried in a separate dedicated channel; being upgraded in the United States to Signaling System No. 7

CCITT International Telegraph and Telephone Consultative Committee (from the French, *Comité Consultatif International Télégraphique et Téléphonique*); see CCITT V.XX and X.XX specifications under appropriate alphabetical listings

ccs Hundred call seconds; unit of traffic measurement in telephony; a circuit, connection, or port where usage of 36 ccs, or one Erlang, is continuous; typical usage for most voice communications ranges from about 3 to 10 ccs per user station, while data circuits generally involve longer holding times ranging from 12 to 20 ccs per station when busy; also used to compare relative nonblocking throughput capacity of a switch, PBX, or network

CDMA Call-division multiple access

CDR Call data recording (port)

Cell The geographic area served by a single transmitter in a cellular radio network

Cellular radio Technology employing low-power radio transmission as an alternative to local loops for accessing the switched telephone network; users may be stationary or mobile—in the latter case, they are passed, under control of a central site, from one cell's transmitter to an adjoining one's with minimal switchover delay

Central office (CO) In telephony, the telephone-company switching facility or center, usually a Class 5 end office, at which subscribers' local loops terminate; handles a specific geographic area, identified by the first three digits of the local telephone number; since divestiture, these are invariably the facilities of the

local Bell operating company (see Class X office)

Centrex A widespread telephone-company switching service that uses (typically digital) central-office switching equipment and to which customers connect via individual-extension access lines; telephone features typically supplied include direct inward dialing (DID), direct distance dialing (DDD), and attendant switchboards

CEPT Conference of European Postal and Telecommunications administrations

Channel In communications, a physical or logical path allowing the transmission of information; the path connecting a data source and a data "sink" (receiver)

Channel-attached Describing the attachment of devices directly to the input/output channels of a (mainframe) computer; devices attached to a controlling unit by cables, rather than by telecommunications circuits; same as locally attached (IBM)

Channel bank Equipment, typically in a telephone central office, that performs multiplexing of lower-speed, generally digital, channels into a higher-speed composite channel; the channel bank also detects and transmits signaling information for each channel and transmits framing information so that time slots allocated to each channel can be identified by the receiver

Character Standard bit representation of a symbol, letter, number, or punctuation mark; generally means the same as byte

Character code One of several standard sets of binary representations for the alphabet, numerals, and common symbols, such as ASCII, EBCDIC, BCD

Characteristic impedance The impedance termination of an electrically uniform (approximately) transmission line that minimizes reflections from the end of the line

Character-oriented Describing a communications protocol or transmission procedure that carries control information encoded in fields of one or more bytes; compare with bit-oriented; also, byte-oriented

Checksum The sum of a group of data items, associated with the group, for checking purposes

CICS Customer Information Control System; an IBM program product and mainframe operating environment, designed to enable transactions entered at remote terminals to be processed concurrently by user-written application programs; includes facilities for building and maintaining databases

CIM Computer-integrated manufacturing

Circuit Generally, a transmission medium interconnecting two or more electronic devices

Circuit switching The process of establishing and maintaining a circuit between two or more users on demand and giving them exclusive use of the circuit until the connection is released

Class Custom local area signaling services; based on the availability of common channel interoffice signaling, Class consists of number-translation services, such as call-forwarding and

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caller identification, available within a local exchange or Local Access and Transport Area (LATA)

Class of Service (COS) Designation for one of several variable network-connection services available to the user of a network, usually distinguished by security offered (such as encryption), transmission priority, and bandwidth; the network user designates class of service at connection establishment, typically using a symbolic name mapped into a list of potential routes, any of which may provide the requested service

Class X office Designation of a telephone-company switching facility in the telephone hierarchy, where Class 5 is an end office, Class 4 is a toll center, Class 3 is a primary center, Class 2 a sectional center, and Class 1 a regional center

Clear channel Characteristic of a transmission path wherein the full bandwidth is available to the user; said primarily of telephone-company digital circuits that do not require that some portion of the channel be reserved for carrier framing or control bits

Clock An oscillator-generated signal that provides a timing reference for a transmission link; used to control the timing of functions such as sampling interval, signaling rate, and duration of signal elements; an "enclosed" digital network typically has only one "master" clock

Closed user group In communications, a subgroup of users assigned to a network facility that restricts communications from any member of that subgroup to members of other subgroups; typically, however, a data terminal equipment (DTE) device may be accessed by more than one closed user group

Cluster controller A device that handles the remote communications processing for multiple (usually dumb) terminals or workstations; generally considered to be an IBM 3270-family controller, such as the IBM 3274 or a compatible device

CMA Communications Managers Association

CMOS Complementary metal oxide semiconductor

Coaxial cable A popular transmission medium consisting of, usually, one central wire conductor (two in the case of twinaxial cable) surrounded by a dielectric insulator and encased in either a wire mesh or an extruded metal sheathing; coaxial cable exists in many varieties, depending on the degree of EMI shielding afforded and voltages and frequencies accommodated; common Community Antenna Television (CATV) transmission cable, typically supporting RF frequencies from 50 to about 500 MHz; also called coax

Codec Coder/decoder; an integrated circuit (IC), or series of ICs, that performs a specific analog-to-digital conversion (e.g., conversion of an analog voice signal to a 64-kbit/s digital bit stream, or an analog television signal to a digital format)

Code conversion The process of changing the bit grouping for a character in one code into the corresponding bit grouping for the character in another

CO-LAN Central office local area network; a Centrex-like service offered by several Bell operating companies (BOCs), in which LAN capabilities are provided to customers within a common

local telephone serving area using the capabilities of the BOC's central-office switch

Colocation With regard to the public network, the practice of installing another organization's (either customer's, service provider's, or interexchange carrier's) equipment on the central-office premises of a BOC or an interexchange carrier (IEC). Equipment is usually colocated so the BOC or IEC can provide maintenance service or enhanced network service for the organization that is colocating

Combined station In the high-level data link control (HDLC) protocol, a data station capable of assuming either the role of a primary or a secondary station; also, a balanced station

Common carrier In the United States, any supplier of transmission facilities or services to the general public that is authorized to provide such facilities or services by the appropriate regulatory authority and bound to adhere to the applicable operating rules, such as making services available at a common price (tariff) and on a nondiscriminatory basis

Communications server An intelligent device providing communications functions; usually, an intelligent, specially configured node on a local network designed to enable remote communications access to, and egress from, LAN users

Companding Compressing/expanding; the process of reducing the bandwidth required for representation of an analog waveform for transmission and then reconstructing (most of) the original waveform at the receiving end; performed by electronic circuitry that applies a compression algorithm; generally, the compression/expansion of analog voice or video signals

Compression Any of several techniques that reduce the number of bits required to represent information in data transmission or storage, therefore conserving bandwidth and/or memory, wherein the original form of the information can be reconstructed; also called compaction

Computer Inquiry II (CI II) Formally known as the Second Computer Inquiry, FCC Docket No. 20828. The final decision, in 1980, articulated a policy toward competition and deregulation for all participants in the telecommunications industry, including major long-distance carriers

Computer Inquiry III (CI III) Adopted by the Federal Communications Commission in May 1986, Computer Inquiry III removed the structural separation requirement between basic and enhanced services, for the Bell operating companies (BOCs) and for AT&T; CI III replaced that requirement with "nonstructural safeguards;" this action resulted in the imposition of such concepts as "comparably efficient interconnection (CEI)" and Open Network Architecture (ONA)

COMSAT Communications Satellite Corp.; private U. S. satellite carrier, established by Congress in 1962 for the coordination and construction of satellite communications and facilities for international voice and data communications

Concatenation The linking of transmission channels (telephone lines, coaxial cable, and optical fiber) end to end

Concentrator Any communications device that allows a shared

transmission medium to accommodate more data sources than there are channels currently available within the transmission medium

Conditioning Extra-cost options that users may apply to leased, or dedicated, voice-grade telephone-company data circuits, wherein line impedances are carefully balanced; will generally allow for higher-quality and/or higher-speed data transmission; in increasing order of resultant line quality and cost, conditioning may be C1, C2, C4, or D1; allows improved line performance with regard to frequency response and delay distortion

Connector A physical interface, such as RJ-11C or EIA RS-232-C, typically with male and female components

Connect time The time that a circuit, typically in a circuit-switched telephone-like environment, is in use; also, holding time

Contention In communications, the situation when multiple users vie for access to a transmission channel, whether a PBX circuit, a computer port, or a time slot, within a multiplexed digital facility

Control characters In communications, any extra transmitted characters used to control or facilitate data transmission between data terminal equipment (DTE) devices; characters transmitted over a circuit that are not message or user data but cause certain control functions to be performed when encountered; also, extra characters associated with addressing, polling, message delimiting and blocking, framing, synchronization, error checking, and other control functions

Conversational Time-dependent data transmissions, during which an operator, upon initiating a transmission, waits for a response from a destination before continuing; also, interactive

Core The central region of an optical waveguide through which light is transmitted; typically 8 to 12 microns in diameter for single-mode fiber, and 50 to 100 microns for multimode fiber

Corporation for Open Systems (COS) A nonprofit organization of networking vendors and users designed to promote OSI and ISDN standards in the United States and to advance interoperability certification

COS Corporation for Open Systems

CPE Customer premises equipment; in telephony, equipment that interfaces to the telephone network and physically resides at the user's location; includes most, but not all, gear referred to as network channel terminating equipment (NCTE)

CPI Computer-to-PBX Interface (Digital Equipment Corp. and Northern Telecom Co.)

CR Carriage return; teletypewriter, or TTY, code for start of new line of message

CRC Cyclic redundancy check; a basic error-checking mechanism for link-level data transmissions; a characteristic link-level feature of (typically) bit-oriented data communications protocols, wherein the data integrity of a received frame, or a packet, is checked by the use of a polynomial algorithm based on the content of the frame and then matched with the result that is performed by the sender and included in a (most often 16-bit) field appended to the frame

Crossbar switch An early form of the matrix switch; an electromechanical switch that uses moving electronic relays to connect multiple circuits to other multiple circuits via vertical and horizontal leads and mechanisms; an aging switching machine still employed in many telephone central offices

Crosstalk Unwanted transference of electrical energy from one transmission medium to another, usually adjacent, medium; generally in—but not restricted to—the voice-grade frequency range and typical of unshielded twisted-pair wires in telephony and, more recently, data applications

CRT Cathode-ray tube

CSDC Circuit-Switched Digital Capability; AT&T-designed service, implemented within the BOCs, that offers users a 56-kbit/s digital channel on a user-switchable basis; uses same local loop as for analog voice but without loading coils; user first sets up analog circuit, then switches to digital mode; employs time-compression multiplexing over local loop; see PSDS

CSMA/CD Carrier-sense multiple access with collision detection; a leading local area network access-control technique, by which devices attached to the network "listen" for transmissions in progress before attempting to transmit and, if two or more begin transmitting at the same time, each backs off (defers) for a variable period of time (determined by a preset algorithm) before again attempting to transmit

CSU Channel service unit; a component of customer premises equipment (CPE) used to terminate a digital circuit, such as DDS or T1, at the customer site; performs certain line-conditioning functions, ensures network compliance per FCC rules, and responds to loopback commands from the central office; also, ensures proper ones density in transmitted bit stream and performs bipolar-violation correction (also see DSU)

CTS Clear to send; modem control code

Current The amount of electrical charge flowing past a specified circuit point per unit of time, measured in amperes

Customer-controlled reconfigurability (CCR) An AT&T service that lets users make changes in their digital-access and cross-connect network configurations either in real time or according to a preplanned schedule

CVSD Continuous variable-slope delta modulation; speech encoding and digitizing technique that uses a one-bit sample to encode the difference between two successive signal levels; sampling usually done at 32,000 times a second, though some implementations employ lower sampling rates

Cyclic redundancy check See CRC

D

DACS Digital Access and Cross-connect System; this is a new generation of central-office switching equipment manufactured by AT&T and other switch vendors; DACS allows T1 carrier facilities, or any of the subchannels (nominally at 64 kbit/s), to be switched

or cross-connected to another T1 carrier

DASD Direct-access storage device (often pronounced "dazzdee")

Data Digitally represented information, which includes voice, text, facsimile, and video

Data access arrangement (DAA) Device or circuitry that is required to allow attachment of privately owned data terminal equipment (DTE) and communications equipment to the telephone network; now generally integrated into such directly attached devices

Data communications The transmission, reception, and validation of data (IBM); data transfer between data source (originating node) and data sink (destination node) via one or more data links according to appropriate protocols (ISO)

Data Encryption Standard (DES) Cryptographic algorithm designed by the National Bureau of Standards to encipher and decipher data using a 64-bit key; specified in Federal Information Processing Standard Publication 46, dated January 15, 1977

Datagram A finite-length packet with sufficient information to be independently routed from source to destination without reliance on previous transmissions; datagram transmission typically does not involve end-to-end session establishment and may or may not entail delivery-confirmation acknowledgment

Data link Any serial data communications transmission path, generally between two adjacent nodes or devices and without any intermediate switching nodes

Data link layer Layer 2 in the OSI model; the network processing entity that establishes, maintains, and releases data link connections between (adjacent) elements in a network

Data Network Identification Code (DNIC) A four-digit number assigned to public data networks and to specific services within those networks

Data PBX A switch that allows a user on an attached circuit to select from among other circuits, usually one at a time and on a contention basis, for the purpose of establishing a through connection; distinguished from a PBX in that only digital transmission, and not analog voice, is supported

Dataphone A service and trademark of AT&T; refers to the transmission of data over the telephone network (Dataphone digital service, or DDS) or to equipment furnished by the telephone company for data transmission

Data set A software term for a certain type of data file; infrequently used today for a modem, except among telephone carriers

Data transfer rate The average number of bits, characters, or blocks per unit of time transferred from a data source to a data sink

dB Decibel; a unit of measurement used to express the ratio of two values, usually the power of electrical or electromagnetic

signals; equal to 10 times the logarithm of the ratio of the two power levels, which are expressed in watts; the relative gain or loss of a signal when the measured signal value is compared in a logarithmic ratio to another—usually its input—value

D-bit The delivery confirmation bit in an X.25 packet that is used to indicate whether or not the DTE wishes to receive an end-to-end acknowledgment of delivery

dBm Decibel referenced to one milliwatt; relative strength of a signal, calculated in decibels, when the signal is compared in a ratio to a value of one milliwatt; used mainly in telephony to refer to relative strength of a signal (e.g., at 0 dBm, a signal delivers 1 milliwatt to a line load, while at -30 dBm a signal delivers .001 milliwatt to a load)

DBMS Database management system

DCE Data circuit-terminating equipment (also, incorrectly, data communications equipment); in a communications link, equipment that is either part of the network, an access point to the network, a network node, or equipment at which a network circuit terminates; in the case of an RS-232-C connection, the modem is usually regarded as DCE, while the user device is DTE, or data terminal equipment; in a CCITT X.25 connection, the network access and packet-switching node is viewed as the DCE

D channel In Integrated Services Digital Network, a 16-kbit/s signaling channel for basic-rate access, or a 64-kbit/s signaling channel within primary-rate access

DCM Digital circuit multiplication; a means of increasing the effective capacity of primary-rate, and higher-level PCM hierarchies, based upon speech coding at 64 kbit/s

DDCMP Digital Data Communications Message Protocol (Digital Equipment Corp.)

DDD Direct distance dialing; referring to the conventional long-distance-switched telephone network, dial-up calls placed over the network, or dial-up long-distance circuits; see MTS

DDN Defense Data Network (DOD)

DDP See Distributed data processing

DDS Dataphone digital service (AT&T); private-line digital service offered intraLATA by BOCs and interLATA by AT&T Communications, with data rates typically at 2.4, 4.8, 9.6, and 56 kbit/s; now a part of the services listed by AT&T under the Accunet family of offerings

DDS-SC Dataphone digital service with secondary channel (also often referred to as DDS II); a tariffed private-line service offered by AT&T and certain BOCs that allows 64-kbit/s clear-channel data with a secondary channel that provides end-to-end supervisory, diagnostic, and control functions

Decnet Digital Equipment Corp.'s proprietary network architecture that works across all of the company's machines; endowed with a peer-to-peer methodology

Dedicated line A dedicated circuit, a nonswitched channel; also

called a private line; see Leased line

Delay In communications, the wait time between two events, such as from when a signal is sent until it is received; see Propagation delay, Response time

Demarcation point The point defined under the terms of AT&T divestiture that marks the end of a customer's premises and the beginning of the public network

Demodulation The extraction of transmitted information from a modulated carrier signal

DES See Data Encryption Standard

Destination field A field in a message header that contains the address of the station to which a message is being directed

D4 framing T1 12-frame format in which the 193rd bit is used for framing and signaling information; ESF is an equivalent but newer 24-frame technology

DIA/DCA Document Interchange Architecture/Document Content Architecture; IBM-promulgated architectures, part of SNA, for transmission and storage of documents over networks, whether text, data, voice, or video; becoming industry standards by default

Dial backup A network scheme using two dial-up lines to effect data transmission as a temporary replacement for a failed dedicated line; in this configuration, one dial-up link is used to transmit data and the other to receive data

Dial-up Describing the process of, or the equipment or facilities involved in, establishing a temporary connection via the switched telephone network

Digital Referring to communications procedures, techniques, and equipment by which information is encoded as either a binary "1" or "0"; the representation of information in discrete binary form, discontinuous in time, as opposed to the analog representation of information in variable, but continuous, waveforms

Digital Access and Cross-connect System See DACS

Digital circuit multiplexing (DCM) A proprietary speech-compression technique, developed by ECI Telecom Inc., to boost voice capacity over the TAT-8 transatlantic cable from 10,000 to 50,000 voice channels

Digital loopback Technique for testing the digital processing circuitry of a communications device; may be initiated locally or remotely via a telecommunications circuit; device being tested will echo back a received test message after first decoding and then re-encoding it, the results of which are compared with the original message (compare with analog loopback)

Digital speech interpolation (DSI) A voice-compression technique that takes advantage of the pauses inherent in human speech to multiplex other voice conversations onto the same transmission link

Digital switching The process of establishing and maintaining a connection, under stored program control, by which binary-

encoded information is routed between an input and an output port; generally, a "virtual" through circuit is derived from a series of time slots (time-division multiplexing), which is more efficient than requiring dedicated circuits for the period of time that connections are set up

Direct inward dialing (DID) Feature of some telephone switches and PBXs that allows an external caller to call an extension without going through an operator

Direct outward dialing Feature of some telephone switches and PBXs allowing an internal caller at an extension to dial an external number without requiring an operator to intercede in the function

Disk/file server A mass storage device that can be accessed by several computers

Disoss Distributed Office Support System (IBM)

Distortion The corruption of a signal; quantitatively, the difference between values of two measured parameters of a signal or between the transmitted and received characteristics of the same signal; the measured variation, for example, of frequency (frequency response), of time (delay distortion), or of harmonics

Distributed data processing (DDP) Describing a network of geographically dispersed, though logically interconnected, data processing nodes; generally configured so that nodes can share common resources, such as a file server, a print server, host applications, or a database; communications between DDP nodes may be sporadic or intensive, interactive or batch; also, distributed processing

Distribution frame A typically wall-mounted structure for terminating telephone wiring, usually the permanent wires from, or at, the telephone central office, where cross-connections are readily made to extensions; also, distribution block

Divestiture The breakup of AT&T mandated by the federal courts, based on an antitrust accord reached between AT&T and the U. S. Department of Justice, effective January 1, 1984; most notable effects include the separation of 22 AT&T-owned local Bell operating companies (BOCs) into seven independent regional Bell holding companies, the requirement that AT&T manufacture and market customer premises equipment through a separate subsidiary, and use of the Bell name and logo only by the divested BOCs (RBOCs)

DLC Data link control; data line card

DMA Direct memory access

DMI Digital Multiplexed Interface (AT&T)

DNA Digital Network Architecture (Digital Equipment Corp.)

DOD Department of Defense (United States)

Domain In IBM's Systems Network Architecture, a host-based Systems Services Control Point (SSCP) and the physical units (PUs), logical units (LUs), links, link stations, and all the associated resources that the host (SSCP) has the ability to control

DOS Disk operating system

DOV Data over voice; technology used primarily with local Centrex services or special customer premises PBXs for transmitting data and voice simultaneously over twisted-pair copper wiring; typical data rates for DOV applications with Centrex are 19.2 kbit/s, although speeds of up to 1 Mbit/s have been achieved with certain PBX-based networks

Down-link Complement of up-link

Downtime The period during which computer or network resources are unavailable to users due to a failure

Draft proposal An ISO standards document that has been registered and numbered but not yet given final approval

Driver Usually a software module that, under control of the processor, manages an I/O port to an external device, such as a serial RS-232-C port to a modem

Drop-and-insert A term applied to a multiplexer that can add data (insert) to a T1 data stream, or act as a terminating node (drop) to other multiplexers connected to it

Drop cable In local area networks, a cable that connects perpendicularly to the main network cable, or bus, and attaches to data terminal equipment (DTE)

Dropouts Cause of errors and loss of synchronization with telephone-line data transmission; defined as incidents when signal level unexpectedly drops at least 12 dB for more than 4 milliseconds; Bell standard allows no more than two dropouts per 15-minute period

Dry T1 T1 with an unpowered interface

DS-0 Digital signal Level 0; telephony term for a 64-kbit/s standard digital telecommunications signal or channel

DS-1 Digital signal Level 1; telephony term describing the 1.544-Mbit/s digital signal carried on a T1 facility

DS-1C Digital signal Level 1C; telephony term describing a 3.152-Mbit/s digital signal

DS-3 Equivalent of 28 T1 channels, communications access operating at 44.736 Mbit/s; effectively synonymous with T3

DSU Data service unit; component of customer premises equipment (CPE) used to interface to a digital circuit (say, DDS or T1), combined with a channel service unit (CSU); performs conversion of customer's data stream to bipolar format for transmission

DSX-1 Digital signal cross-connect Level 1; telephony term for the set of parameters used where DS-1 digital signal paths are cross-connected

DTE Data terminal equipment; generally, user devices, such as terminals and computers, that connect to data circuit-terminating equipment (DCE); they either generate or receive the data carried by the network; in RS-232-C connections, designation as either DTE or DCE determines the signaling role in handshaking; in a CCITT X.25 interface, the device or equipment that manages the

interface at the user premises; see DCE

DTMF Dual tone multifrequency; in telephony, the push-button, or Touch-Tone, signaling method by which each depressed key generates two audio output tones, the combination of which is unique for each of the 12 keys, in contrast to the older pulse dialing of rotary telephones

DTS Digital Termination Systems; microwave-based transmission technology designed for bypass functions for short-hop, line-of-sight applications; never converts to analog; useful in high-volume, pure-data applications in urban settings where line costs are high; requires FCC license; referred to formally by FCC as Digital Electronic Message Service, or DEMS

Dynamic bandwidth allocation A feature available on certain high-end T1 multiplexers that allows the total bit rate of the multiplexer's tail circuits to exceed the bandwidth of the network trunk; this is allowable since the multiplexer only assigns channels on the network trunk to tail circuits that are transmitting

E

Earth station In satellite communications, a terrestrial communications center that maintains direct links with a satellite. See Ground station

EBCDIC Extended Binary Coded Decimal Interchange Code; 8-bit character code set developed and promulgated by IBM

Echo In communications, the reflection back to the sender of transmitted signal energy; length of delay in an echo depends on the distance from the transmitter to the point of reflection

Echo cancellation Technique used in higher-speed modems that allows for the isolation and filtering out of unwanted signal energy caused by echoes from the main transmitted signal

ECMA European Computer Manufacturers Association

ECSA Exchange Carriers Standards Association; an accredited standards group under ANSI that was in existence before the AT&T divestiture; consists of RBOCs and independent telephone companies

EFT Electronic funds transfer

EHF Extremely high frequency; portion of the electromagnetic spectrum; frequencies in the microwave range of approximately 30 to 300 GHz

EIA Electronic Industries Association; see EIA RS-XX specifications under appropriate alphabetical listings

EMI Electromagnetic interference; a device's radiation leakage that is coupled onto a transmission medium, resulting (mainly) from the use of high-frequency wave energy and signal modulation; reduced by shielding; minimum acceptable levels are detailed by the FCC, based on type of device and operating frequency

Emulation The imitation of all or part of one device, terminal, or computer by another, so that the imitating device accepts the same data, performs the same functions, and appears to other network devices as the imitated device

Encoding/decoding The process of reforming information into a format suitable for transmission, and then reconverting it after transmission; for pulse-code-modulated voice transmission, the generation of digital signals to represent quantized samples and the subsequent reverse process

Encryption In security, the ciphering of data by applying an algorithm to plaintext in order to convert it to ciphertext

End office A Class 5 telephone central office, at which subscribers' local loops terminate

EOA End of address; header code

EOB End of block; a control character or code that marks the end of a block of data

EOM End of message; for single-message transmission, equivalent to EOT

EOT End of transmission; a control code in character-oriented protocols, or a bit field set to "one" in bit-oriented protocols, that tells the receiver that all user data (text) has been sent

EPROM Erasable programmable read-only memory

Equal access Mandated by divestiture of AT&T, equal access requires that the Bell operating companies (BOCs) provide inter-exchange carriers (IECs), other than AT&T, the same convenient access to the BOCs' central-office switches as that provided for AT&T. Hence, under equal access, customers could dial long distance over their preferred IEC without having to dial extra digits

Equalization In the telephone network, the spacing and operation of amplifiers so that the gain provided by the amplifier, per transmission frequency, coincides with the signal loss at the same frequency; within communications devices, equalization is achieved by circuitry that compensates for the differences in attenuation at different frequencies, usually a combination of adjustable coils, capacitors, and resistors

Erasable storage A storage device whose contents can be modified (e.g., random access memory, or RAM), as contrasted with read-only storage (e.g., read-only memory, or ROM)

EREP Environmental Recording, Editing, and Printing (IBM)

Erlang Standard unit of measurement of telecommunications traffic capacity and usage demand; for throughput and capacity planning, an Erlang equals 36 ccs, which represents full-time use of a conventional telecommunications traffic path

Error burst A sequence of transmitted signals containing one or more errors but regarded as a unit in error in accordance with a predefined measure; enough consecutive transmitted bits that are in error to cause a loss of synchronization between sending and receiving stations, and to necessitate resynchronization

Error-correction code In computers, rules of code construction

that facilitate reconstruction of part or all of a message received with errors

ESF Extended superframe format; an AT&T-proposed T1-framing standard that provides frame synchronization, cyclic redundancy checking, and data link bits; frames consist of 24 bits instead of the previous standard 12 bits; the standard allows error information to be stored and retrieved easily, facilitating network performance monitoring and maintenance

Esprit European strategic program for research and development in information technology; a \$1.7 billion research and development program funded by the European Community

ESS Electronic Switching System; one of a family of AT&T-manufactured, stored-program-control, central-office switches; most prevalent are the Nos. 1, 1A, 4, and 5 switches

ETB End of transmitted block; see EOB

Ethernet A popular local area network design and the trademarked product of Xerox Corp., characterized by 10-Mbit/s baseband transmission over a shielded coaxial cable and employing CSMA/CD as the access-control mechanism; standardized by the IEEE as specification IEEE 802.3; referring to the Ethernet design or compatible with Ethernet

ETS Electronic tandem switch

ETX End of text; control code that notifies the receiver that the end of the message text has been reached

Exchange Referring to the local telephone central office, or to the local area in which a caller may place a call without incurring an extra charge (toll)

Extended addressing In many bit-oriented protocols, a facility allowing larger addresses than normal to be used; may be required in extensive networks; in IBM's SNA, the addition of two high-order bits to the basic addressing scheme

External modem A standalone modem, as opposed to a plug-in "board" modem integrated within a computer or terminal

F

Facsimile The communications process in which graphics and text documents are scanned, transmitted via a (typically dial-up) telephone line, and reconstructed by a receiver; facsimile-device operation typically follows one of the CCITT standards for information representation and transmission (Group 1 analog, with page transmission in four or six minutes; Group 2 analog, with page transmission in two or three minutes; Group 3 digital, with page transmission in less than one minute; and Group 4 digital, with page transmission in less than 10 seconds); also, often called fax

Fading A phenomenon, generally of microwave or radio transmission, whereby atmospheric, electromagnetic, or gravitational influences cause a signal to be attenuated, deflected, or diverted away from the target receiver

Glossary

Far-end crosstalk Crosstalk that travels along a circuit in the same direction as the signals in that circuit; compare with near-end crosstalk

Fast packet switching (also called wideband packet switching); packet switching that supports both voice and data

Fax See Facsimile

FCC Federal Communications Commission; board of commissioners appointed by the President under the Communications Act of 1934, with the authority to regulate all interstate telecommunications originating in the United States

FDM See Frequency-division multiplexing

FDX See Full duplex; sometimes called duplex or "dix"

FEC See Forward error correction

FED-STD-1001 Synchronous high-speed data signaling rate between data terminal equipment and data circuit-terminating equipment

FED-STD-1002 Time and frequency reference information in telecommunications "systems"

FED-STD-1003-A Synchronous bit-oriented data link control procedures (Advanced Data Communications Control Procedures)

FED-STD-1005 Coding and modulation requirements for nondiversity 2.4-kbit/s modems

FED-STD-1006 Coding and modulation requirements for 4.8-kbit/s modems

FED-STD-1007 Coding and modulation requirements for duplex 9.6-kbit/s modems

FED-STD-1008 Coding and modulation requirements for duplex 600-bit/s and 1.2-kbit/s modems

FEP Front-end processor; a dedicated computer linked to one or more host computers or multiuser minicomputers that performs data communications functions and serves to offload the attached computers of network processing; in IBM SNA networks, an IBM 3704, 3705, 3725, or 3745 communications controller

Fiber Distributed Data Interface (FDDI) An American National Standards Institute (ANSI)-specified standard for fiber optic links with data rates up to 100 Mbit/s. The standard specifies: multi-mode fiber; 50/125, 62.5/125, or 85/125 core-cladding specification; an LED or laser light source; and 2 kilometers for unrepeated data transmission at 40 Mbit/s

Fiber loss Attenuation of the light signal in optical-fiber transmission

Fiber optics Transmission technology by which modulated lightwave signals, generated by a laser or LED, are propagated along a (typically) glass or plastic medium, and then typically demodulated back into electrical signals by a light-sensitive receiver

File server In local area networks, a station dedicated to providing file and mass data storage services to the other stations on the network

File Transfer, Access, and Management (FTAM) An ISO application-layer standard for network file transfer and remote file access

Filter Electronic circuitry that removes energy in unwanted frequencies, such as noise, from a transmission channel; may be analog or digital in operation

Final-form document An electronic document that is only suitable for printing or displaying but not for modifying

FIPS Federal Information Processing Standard

FIPS PUB 1-1 Code for information interchange

FIPS PUB 7 Implementation of the code for information interchange and related standards

FIPS PUB 15 Subsets of the standard code for information interchange

FIPS PUB 16-1 Bit sequencing of the code for information interchange in serial-by-bit data transmission

FIPS PUB 17-1 Character structure and character parity sense for serial-by-bit data communications in the code for information interchange

FIPS PUB 22-1 Specifies synchronous signaling rates between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)

FIPS PUB 37 Synchronous high-speed data signaling rates between data terminal equipment and data circuit-terminating equipment

FIPS PUB 46 See Data Encryption Standard

FIPS PUB 71 Advanced Data Communications Control Procedures (ADCCP)

FIPS PUB 78 Guideline for implementing Advanced Data Communication Control Procedures (ADCCP)

Flag In communications, a bit pattern of six consecutive "1" bits (character representation is 01111110) used in many bit-oriented protocols to mark the beginning (and often also the end) of a frame

Flow control Capability of network nodes to manage buffering schemes while handling devices operating at different data rates, enabling them to talk with each other

FM See Frequency modulation

FM subcarrier One-way data transmission using signals modulated in unused portions of the FM radio-broadcast frequency band

Fortran Formula translator (computer programming language)

Glossary

H

Half duplex (HDX) Operational mode of a communications line whereby transmission occurs in both directions but only in one direction at a time; transmission directions may be alternately switched to accommodate two-way data flow

Handshake protocol A predefined exchange of signals or control characters between two devices or nodes that sets up the conditions for data transfer; also, handshaking

Hard-wired A link (remote telephone line or local cable) that permanently connects two nodes, stations, or devices; describes electronic circuitry that performs fixed logical operations by virtue of fixed circuit layout, not under computer or stored-program control

Harmonic distortion Communications interference resulting from generated harmonic signals; measured in decibels as compared with the power of the input signal at the base (fundamental) frequency

HASP Houston Automatic Spooling Program; a control protocol adopted by IBM for transmitting data processing files and jobs to IBM 360 and 370 computers; an early job-control language

HDLC See High-level data link control

HDX See Half duplex

Head end A passive component in a broadband transmission network that translates one range of frequencies (transmit) to a different frequency band (receive); allows devices on a single-cable network to send and receive without the signals interfering with each other

Header Control information and codes that are appended to the front of a block of user data for control, synchronization, routing, and sequencing of a transmitted data frame or packet

Hertz (Hz) Measurement that distinguishes electromagnetic waveform energy; number of cycles, or complete waves, that pass a reference point per second; measurement of frequency, by which one Hertz equals one cycle per second

High-capacity service Generally refers to tariffed, digital-data transmission service equal to, or in excess of, T1 data rates (1.544 Mbit/s)

High frequency (HF) Portion of the electromagnetic spectrum, typically used in short-wave radio applications; frequencies approximately in the 3-to-30-MHz range

High-level data link control (HDLC) CCITT-specified, bit-oriented, data link control protocol; any related control of data links by a specified series of bits, rather than by control characters; the model on which most other bit-oriented protocols are based

High pass A specific frequency level above which a filter will

allow all frequencies to be passed; opposite of low pass

Hz See Hertz

I

IATA International Air Transport Association

ICA International Communication Association (academic); International Communications Association (users)

IDCMA Independent Data Communications Manufacturers Association

IEC Interexchange carrier; since divestiture, any carrier registered with the FCC that is authorized to carry customer transmissions between LATAs interstate or, if approved by a state public utility commission, intrastate; includes carriers such as AT&T Communications (formerly AT&T Long Lines), Satellite Business Systems, Telenet, U S Sprint, and MCI

IEEE Institute of Electrical and Electronics Engineers

IFIPS International Federation of Information Processing Societies

Impedance The effect on a transmitted signal, which varies at different frequencies, of resistance, inductance, and capacitance

Impulse hits Cause of errors in telephone-line data transmission; voltage surges lasting from 1/3 to 4 milliseconds that come to within 6 dB of the normal signal level; Bell standard allows no more than 15 impulse hits per 15-minute period; also, spikes

IMS/VS Information Management System/Virtual Storage; a common IBM host operating environment, usually under the MVS operating system, oriented toward batch processing and telecommunications-based transaction processing

Infrared Portion of the electromagnetic spectrum used for optical-fiber transmission and also for short-haul, open-air data transmission; transmission wavelengths longer than about 0.7 microns

Inside wiring In telephone deregulation, the customer premises wiring

Intelligent terminal A programmable terminal

Interactive Describing time-dependent (real-time) data communications, typically one in which a user enters data and then awaits a response message from the destination before continuing; also, conversational; contrast with batch (processing)

Interface A shared boundary; a physical point of demarcation between two devices, where the electrical signals, connectors, timing, and handshaking are defined; the procedures, codes, and protocols that enable two entities to interact for a meaningful exchange of information

International standard An ISO standards document that has been approved in final balloting

Forward channel The communications path carrying data or voice from the call initiator to the called party; opposite of reverse channel; the main communications channel

Forward error correction (FEC) Technique used by a receiver for correcting errors incurred in transmission over a communications channel without requiring the retransmission of any information by the transmitter; typically involves a convolution of the transmitted bits and the appending of extra bits by both receiver and transmitter using a common algorithm

Four-wire Refers to a transmission path that allows for physically separate transmit and receive channels; at one time, four-wire was the only method for implementing full-duplex transmission

Frame A group of bits sent serially over a communications channel; generally, a logical transmission unit sent between data link layer entities that contains its own control information for addressing and error checking; the basic data transmission unit employed with bit-oriented protocols, similar to blocks; also, in video transmission, a set of electron scan lines (usually 525 in the United States) that comprise a television picture

Frame-check sequence (FCS) In bit-oriented protocols, a 16-bit field that contains transmission error-checking information, usually appended at the end of a frame

Framing A control procedure used with multiplexed digital channels, such as T1 carriers, whereby bits are inserted so that the receiver can identify the time slots that are allocated to each subchannel; framing bits may also carry alarm signals indicating specific alarm conditions

Freeze frame Type of digital television transmission whereby screen images are replenished, or "painted," every few seconds at the receiver set; images are sent in real time, and motion is not continuous; in video teleconferencing applications, allows a smaller-bandwidth transmission facility to be used than with full motion

Frequency The number of repetitions per time unit of a complete waveform; typically, the number of complete cycles per second, usually expressed in Hertz (Hz)

Frequency band Portion of the electromagnetic spectrum within a specified upper- and lower-frequency limit; also, frequency range

Frequency-division multiplexing (FDM) Technique for sharing a transmission channel wherein carrier signals of different frequencies are transmitted simultaneously

Frequency hopping A spread-spectrum technique by which the information is hopped between several communications channels. See Spread spectrum

Frequency modulation (FM) Method of encoding a carrier wave by varying the frequency of the transmitted signal

Frequency response The variation in relative strength (measured in decibels) between frequencies in a given frequency band, usually of the voice-frequency range of an analog telephone line

FSK Frequency-shift keying; modulation technique whereby two

different tones represent either the "0" or the "1" state of binary information

Full duplex (FDX) Operation of a data communications link where transmissions are possible in both directions at the same time between devices at both ends

Full-motion video Television transmission by which images are sent and displayed in real time and motion is continuous; compare with freeze frame

Fully connected network A network topology in which each node is directly connected by branches to all other nodes; impractical as the number of nodes in the network increases

FX Foreign exchange; special telephone-company line arrangement whereby calls placed into the switched telephone network from a customer location enter the network through a central office other than the one normally serving the customer location

G

G Giga; prefix meaning one billion (e.g., Gbit/s)

Gain Increased signal power, usually the result of amplification; measured in decibels for the ratio of an output signal level to an input signal level; opposite of loss, or attenuation (negative gain)

Gain hits Cause of errors with telephone-line data transmission, usually where the signal surges more than 3 dB and lasts for more than 4 milliseconds; Bell standard calls for eight or fewer gain hits in a 15-minute period

Gateway A conceptual or logical network station that serves to interconnect two otherwise incompatible networks, network nodes, subnetworks, or devices; performs a protocol-conversion operation across numerous communications layers

Gaussian noise Undesirable, random electrical energy that is introduced into a transmission channel from the environment; generally of low amplitude, but it may still occasionally interfere with a carrier signal; background electrical noise

Geosynchronous orbit The orbit where communications satellites will remain stationary over the same earth location, about 23,300 miles above the earth's equator

Ground An electrical connection or common conductor that, at some point, connects to the earth

Ground station An assemblage of communications equipment, including signal generator, transmitter, receiver, and antenna, that receives (and usually also transmits) signals to/from a communications satellite; also, earth station

Group addressing In transmission, the use of an address that is common to two or more stations; on a multipoint line, where all stations recognize addressing characters, but only one station responds

Internet protocol Used in gateways to connect networks at OSI network Level 3 and above

Interoffice trunk A direct circuit between telephone central offices

Intug International Telecommunications Users' Group

I/O Input/output

IP Internet protocol

IPARS International Passenger Airline Reservation System (IBM)

IPL Initial program load

IRC International record carrier; one of a group of common carriers that until a few years ago exclusively carried data and text (record) traffic from gateway cities in the United States to locations abroad and overseas; with recent FCC rulings, there no longer is a rigid IRC monopoly, and several new carriers have entered the international arena, just as the IRCs have been allowed to service points domestically

ISDN Integrated Services Digital Network; project under way within the CCITT for the standardization of operating parameters and interfaces for a network that will allow a variety of mixed digital transmission services to be accommodated; access channels under definition include basic rate (144 kbit/s) and primary rate (nominally, 1.544 and 2.048 Mbit/s)

I-series recommendations A group of CCITT recommendations concerning digital networks in general and ISDN in particular

ISO International Organization for Standardization

ISO 646 7-bit character set for information processing interchange

ISO 2022 Code-extension techniques for use with ISO 7-bit coded-character set

ISO 2110 25-pin DTE/DCE interface connector and pin assignments

ISO 2593 Connector pin allocations for use with high-speed data terminal equipment

ISO 3309 High-level data link procedures; frame structure

ISO 4902 HDLC unbalanced classes of procedures

ISO 4903 15-pin DTE/DCE interface connector and pin assignments

ITU International Telecommunications Union

IVDT Integrated voice/data terminal; one of a family of devices that features a terminal keyboard/display and telephone instrument; many contain varying degrees of local processing power, ranging from directory storage for automatic dialing to full microcomputer capacity; may be designed to work with a specific customer premises PBX or may be PBX independent

J

Jamming The intentional interference of (typically) open-air radio-frequency transmission to prevent communications between a transmitter and a receiver

JCL Job Control Language

JES Job Entry Subsystem; control protocol and procedure for directing host processing of a task in an IBM host environment; the specific IBM software release, host-based, that performs job-control functions

Jitter The slight movement of a transmission signal in time or phase that can introduce errors and loss of synchronization in high-speed synchronous communications; see Phase jitter

Job A large file, typically transmitted in batch mode; specifically, a set of data, including programs, files, and instructions to a computer, that collectively constitutes a unit of work to be done by a computer

Jumper A patch cable or wire used to establish a circuit, often temporarily, for testing or diagnostics

K

k Kilo; notation for one thousand (e.g., kbit/s)

K Expression for 1,024, or 2^{10} ; standard quantity measurement for disk and diskette storage and semiconductor circuit capacity; e.g., one K of memory equals 1,024 bytes, or 8-bit characters, of computer memory; slightly more than a thousand

Ka band Portion of the electromagnetic spectrum; frequencies approximately in the 18-to-30-GHz range

kbit/s Kilobits per second; standard measure of data rate and transmission capacity

Kermit Asynchronous file transfer protocol designed for academic computing at Columbia University

Keying Modulation of a carrier signal, usually by frequency or phase, to encode binary information; also, interruption of a DC circuit for the purpose of signaling information

Key management The management of the cryptographic keys or algorithms used to cipher data

Key telephone system (KTS) Key station, key equipment; describing multiline telephone CPE that offers limited PBX-type features; generally with line capacities ranging from 2 to 12 trunk lines, and from 4 to 40 extensions (e.g., 1A KTS)

KSR Keyboard send/receive; operational characteristic describ-

Glossary

ing some terminals, typically teleprinters

Ku band Portion of the electromagnetic spectrum, being used increasingly for satellite communications; frequencies approximately in the 10-to-12-GHz range

L

LAN See Local area network

LAP Link access procedure; the data link-level protocol specified in the CCITT X.25 interface standard; original LAP has been supplemented with LAPB (LAP-Balanced) and LAPD

LAPD Link Access Procedure-D; link-level protocol devised for ISDN connections, differing from LAPB (LAP-Balanced) in its framing sequence. Likely to be used as basis for LAPM, the proposed CCITT modem error-control standard

Laser Light amplification through the stimulated emission of radiation; a major light-signal source for optical-fiber transmission; produces a generally more coherent single-wavelength light signal than an LED and is also, typically, more expensive and shorter-lived; used mainly with single-mode optical fiber

LATA Local Access and Transport Area; one of 161 local telephone serving areas in the United States, generally encompassing the largest standard statistical metropolitan areas; subdivisions established as a result of the Bell divestiture that now distinguish local from long-distance service; circuits with both endpoints within the LATA (intraLATA) are generally the sole responsibility of the local telephone company, while circuits that cross outside the LATA (interLATA) are passed on to an interexchange carrier

Latency The time interval between when a network station seeks access to a transmission channel and when access is granted or received; equivalent to waiting time

Layer In the OSI reference model (seven basic layers), referring to a collection of related network-processing functions that comprises one level of a hierarchy of functions

L band Portion of the electromagnetic spectrum commonly used in satellite and microwave applications, with frequencies approximately in the 1 GHz region

LDM See Limited-distance modem

Leased line A dedicated circuit, typically supplied by the telephone company, that permanently interconnects two or more user locations; generally voice-grade in capacity and in range of frequencies supported; typically analog, though sometimes it refers to DDS substrate digital channels (2.4 to 9.6 kbit/s); used for voice (2000 Series leased line) or data (3002-type); could be point-to-point or multipoint; may be enhanced with line conditioning; also, private line

Least-cost routing see Automatic Route Selection

LEC Local exchange carrier

LED Light-emitting diode; device that accepts electrical signals and converts the energy to a light signal; with lasers, the main light source for optical-fiber transmission; used mainly with multimode fiber

Lightwave Referring to electromagnetic wavelengths in the region of visible light; wavelengths of approximately 0.8 to 1.6 microns; referring to the technology of fiber optic transmission

Limited-distance modem (LDM) A comparatively low-cost modem used on customer premises for transmitting data within or between buildings to a maximum distance of a few miles

Line hit An incident of electrical interference causing unwanted signals to be introduced onto a transmission circuit

Line of sight Characteristic of some open-air transmission technologies where the area between a transmitter and a receiver must be clear and unobstructed; said of microwave, infrared, and open-air, laser-type transmissions; a clear, open-air, direct transmission path free of obstructions such as buildings but in some cases impeded by adverse weather or environmental conditions

Line turnaround The action in a (typically half-duplex) communications link that, for example, a device takes after receiving a block of data to prepare sending its own block; in RS-232-C connections, the delay after request to send has been signaled and a clear to send indication is received; see Turnaround time

Link-attached Describing devices that are connected to a network, a communications data link, or telecommunications circuit; compare with channel-attached

Loading Adding inductance to a transmission line to minimize amplitude distortion; generally accomplished with loading coils; also, adding a program to a computer

Loading coil An induction device employed in telephone-company local loops, generally those exceeding 18,000 feet in length, that compensates for the wire capacitance and serves to boost voice-grade frequencies; removed for LDM circuits; often removed in the new generation of high-speed, local-loop data services, such as CSDC, because they may distort data signals at higher frequencies than those used for voice

Local area network (LAN) A type of high-speed (typically in the Mbit/s range) data communications arrangement wherein all segments of the transmission medium (typically coaxial cable, twisted-pair wire, or optical fiber) are in an office or campus environment under the control of the network operator

Local loop In telephony, the wire pair that connects a subscriber to a telephone-company end office; typically containing two wires, though four-wire local loops are common, especially with leased voice-grade circuits

Logical Link Control (LLC) A protocol developed by the IEEE 802 committee, common to all of its LAN standards, for data link-level transmission control; the upper sublayer of the IEEE Layer 2 (OSI) protocol that complements the MAC protocol; IEEE standard 802.2; includes end-system addressing and error checking

Logical unit (LU) In IBM's SNA, a port through which a user gains access to the services of a network; an LU can support two

types of sessions: with the host-based System Services Control Point (SSCP) and with other LUs

Long-haul Long-distance, describing (primarily) telephone circuits that cross out of the local exchange, or serving, area; now generally applied to any interLATA circuits, whether intrastate or interstate; said of a modem to distinguish it from an LDM

Loopback Diagnostic procedure used for transmission devices; a test message is sent to a device being tested, which is then sent back to the originator and compared with the original transmission; loopback testing may be within a locally attached device or conducted remotely over a communications circuit

Loop start Most commonly used method of signaling an off-hook condition between an analog telephone set and a switch, where picking up the receiver closes a wire loop, allowing direct current to flow, which is detected by a PBX or central-office switch and interpreted as a request for service

Loosely coupled Describing processors connected by means of channel-to-channel adapters that are used to pass control information between each other (IBM); compare with tightly coupled

Loss Reduction in signal strength, expressed in decibels; also, attenuation; opposite of gain

Low Entry Networking (LEN) A peer-oriented extension to SNA, first implemented on the System/36, that allows networks to be more easily built and managed by means of such techniques as topology database exchange and dynamic route selection

Low frequency (LF) A portion of the electromagnetic spectrum; frequencies approximately in the 30-to-300-kHz range

Low pass A specific frequency level, below which a filter will allow all frequencies to pass; opposite of high pass

LRC Longitudinal redundancy check

LSI Large-scale integration, as in LSI circuit

LU See Logical unit

LU 6.2 In Systems Network Architecture, a set of protocols that provides peer-to-peer communications between applications

M

m Milli; designation for one-thousandth

M Mega; designation for one million (e.g., Mbit/s)

MAC Media Access Control; media-specific access control protocol within IEEE 802 specifications; currently includes variations for the token ring, token bus, and CSMA/CD; the lower sublayer of the IEEE's link layer (OSI), which complements the Logical Link Control (LLC)

Macintosh A family of Apple microcomputers that represents

the first wide-scale PC deployment of icons, windows, "mice," and a consistent user interface

Magnetic medium Any data-storage medium, and related technology, including disks, diskettes, and tapes, in which different patterns of magnetization are used to represent bit values

Magnetic stripe A strip of magnetic material, similar to a piece of magnetic tape, affixed to a credit card, ID badge, or other portable item, on which data is recorded and from which data can be read

Main PBX or Centrex switch into which other PBXs or remote concentration of switching modules are homed; a PBX or Centrex connected directly to an electronic tandem switch (ETS); also, a power source

Main distribution frame In telephony, a structure where telephone-subscriber lines are terminated; in conjunction with a PBX, the place where central-office telephone lines are connected to on-premises extensions; at a telephone central office, a site where subscriber lines terminate

Main network address In IBM's SNA, the logical unit (LU) network address, within ACF/VTAM, that is used for SSCP-to-LU sessions and for certain LU-to-LU sessions; compare with auxiliary network address

Maintenance services In IBM's SNA, network services performed between a host SSCP and remote physical units (PUs) that test links and collect and record error information; related facilities include configuration services, management services, and session services

MAN Metropolitan area network; network that extends to 50-kilometer range, operates at speeds from 1 Mbit/s to 200 Mbit/s, and provides an integrated set of services for real-time data, voice, and image transmission; two standards bodies are involved with work on MANs: IEEE 802.3 and ANSI X3T9.5

Management services In IBM's SNA, network services performed between a host SSCP and remote physical units (PUs) that include the request and retrieval of network statistics

Manchester encoding Digital encoding technique (specified for the IEEE 802.3 Ethernet baseband network standard) in which each bit period is divided into two complementary halves: a negative-to-positive (voltage) transition in the middle of the bit period designates a binary "1," while a positive-to-negative transition represents a "0"; the encoding technique also allows the receiving device to recover the transmitted clock from the incoming data stream (self-clocking)

Manufacturing Automation Protocol (MAP) A General Motors-originated suite of networking protocols, the implementation of which tracks the seven layers of the OSI model

MAP Manufacturing Automation Protocol (General Motors)

Mapping In network operations, the logical association of one set of values, such as addresses on one network, with quantities or values of another set, such as devices on another network (e.g., name-address mapping, internetwork-route mapping, protocol-to-protocol mapping)

Maser Microwave amplification by stimulated emission of radiation; a device that generates electromagnetic signals in the microwave range, known for relatively low-noise characteristics

Master clock The source of timing signals—or the signals themselves—that all network stations use for synchronization

Master station A station that controls slave stations; see Primary station

Matrix In switch technology, that portion of the switch architecture where input leads and output leads meet, any pair of which may be connected to establish a through circuit

Matrix switch Device that allows a number of channels, connected via serial interfaces (typically RS-232-C), to connect, under operator control, to designated remote or local analog circuits, as well as to other serial interfaces

MAU Multistation access unit; wiring concentrator used in local area networks

M bit The More Data mark in an X.25 packet that allows the DTE or DCE to indicate a sequence of more than one packet

Mean time between failures (MTBF) A stated, or published, period of time for which a user may reasonably expect a device to operate before an incapacitating failure occurs

Mean time to repair (MTTR) The average time required to perform corrective maintenance on a failed device

Medium Any material substance that can be, or is, used for the propagation of signals, usually in the form of electrons or modulated radio, light, or acoustic waves, from one point to another, such as optical fiber, cable, wire, dielectric slab, water, air, or free space (ISO)

Megabyte (Mbyte or M) 1,048,576 bytes, equal to 1,024 Kbytes; basic unit of measurement of mass storage; also used in describing (primarily parallel) data transfer rates as a function of time (e.g., Mbyte/s)

Message Any information-containing data unit, in an ordered format, sent by means of a communications process to a named network entity or interface; in Bisync, the data between two ETX control characters

Message-Handling System (MHS) The standard defined by CCITT as X.400 and by ISO as Message-Oriented Text Interchange Standard (MOTIS)

Message switching Transmission method by which messages are transmitted to an intermediate point, where they are temporarily stored, and then transmitted later to a final destination in their original form (see Store-and-forward); the destination of the message is typically indicated in an internal address field of the message itself

Message-switching network A public data communications network over which subscribers send primarily textual messages to one another (e.g., TWX, Telex)

Message Telephone Service (MTS) Official designation for

tariffed long-distance, or toll, telephone service

Message unit In IBM's SNA, that portion of data within a message that is passed on to, and processed by, a particular network layer (e.g., path information unit, or PIU; request/response unit, or RU)

MICR Magnetic ink character recognition; a process of character recognition in which printed characters, containing particles of magnetic material, are read by a scanner and converted into a computer-readable digital format

Microcode Programmed instructions that typically are unalterable; usually synonymous with firmware and programmable read-only memory (PROM)

Microprocessor An electronic integrated circuit, typically a single-chip package, capable of receiving and executing coded instructions (e.g., Zilog Z80, Intel 8088, Motorola 68000 are popular microprocessors)

Microsecond One-millionth of a second

Microwave Portion of the electromagnetic spectrum above about 890 megahertz; describing high-frequency transmission signals and equipment that employ microwave frequencies, including line-of-sight, open-air microwave transmission and, increasingly, satellite communications

Millisecond One-thousandth of a second

Mini-MAP (Mini-Manufacturing Automation Protocol) A version of MAP consisting of only physical, link, and application layers intended for lower-cost process-control networks. With Mini-MAP, a device with a token can request a response from an addressed device; but, unlike a standard MAP protocol, the addressed mini-MAP device need not wait for the token to respond

Minimum Internetworking Functionality (MIF) A general principle within the ISO that calls for minimum local area network station complexity when interconnecting with resources outside the local area network

MIPS Million instructions per second; a general comparison gauge of a computer's raw processing power

MNP Microcom Networking Protocol; proprietary error-correcting protocol for modems operating at speeds from 2.4 kbit/s to 9.6 kbit/s; commercially licensed to more than 50 vendors, the protocol has been proposed as an adjunct to the CCITT LAP (link access procedure) family; operates only point-to-point and does not have easy connections to X.25 and ISDN technology

Modem Modulator/demodulator; electronic device that enables digital data to be sent over analog transmission facilities; the most prevalent modem types include the following Bell models:

- 103/113 Series: 300 bit/s, full-duplex, dial-up, asynchronous; originate-only (113C), answer-only (113D), or originate-and-answer (103J)
- 201 Series: 2.4 kbit/s, synchronous; dial-up (201C-L1C) or via 3002-type, unconditioned, two- or four-wire circuits (201C-L1D)
- 208 Series: 4.8 kbit/s, synchronous; full-duplex over 3002-type leased line (208A) or dial-up (208B)
- 212A: 0-300 bit/s or 1.2 kbit/s, dial-up, full-duplex

■ 209A: 9.6 kbit/s, synchronous, via four-wire, 3002-type leased line with D1 conditioning

Modem eliminator (also known as a null modem) Device that reverses certain serial interface leads so that two DTEs can talk to each other over RS-232 cabling lengths without the need for a modem; for example, a null modem will hard-wire the request to send/clear to send pins and transmit/receive data pins so that data can be transmitted between two devices

Modem-7 Microcomputer communications software program supporting the public-domain, X-modem, error-correcting file transfer protocol

Modulation Systematic changing of properties (e.g., amplitude, frequency, phase) of an analog signal to encode and convey (typically digital) information

Modulo N In communications, refers to a quantity, such as of messages or frames, that can be counted before the counter resets to zero, or (typically) the number of messages (N-1) that can be outstanding from a transmitter before an acknowledgment is required from the receiver (e.g., Modulo 8, Modulo 128)

MOS Metal-oxide semiconductor

MOSFET MOS field-effect transistor

MPG Microwave pulse generator; a device that generates electrical pulses at microwave frequencies

MS-DOS (Microsoft Disk Operating System) Microcomputer operating system developed for the IBM PC and, hence, a de facto industry standard; also referred to as PC-DOS, primarily by IBM

MTA Message transfer agent

MTBF See Mean time between failures

MTS Message transfer system; also, Message telephone service

MTTR See Mean time to repair

Multidomain network In IBM's SNA, a network consisting of two or more host-based System Services Control Points; typically, a network with more than one host mainframe

Multidrop A communications arrangement in which multiple devices share a common transmission channel, though only one may transmit at a time; see Multipoint line

Multileaving In communications, the transmission (usually via Bisync facilities and protocols) of a variable number of data streams between user devices and a computer

Multimode In fiber optics, describing an optical-fiber light guide, the core of which is capable of propagating light signals of two or more wavelengths or phases; essentially, an optical fiber designed to carry multiple signals, distinguished by frequency or phase, at the same time; compare with single-mode

Multiple routing The process of sending a message to more than one recipient, usually when all destinations are specified in the header of the message

Multiplexed channel A communications channel capable of servicing a number of devices, or users, at a time

Multiplexer (mux) A device that does multiplexing

Multiplexing The combining of multiple data channels onto a single transmission medium; any process through which a circuit normally dedicated to a single user can be shared by multiple users; typically, user data streams are interleaved on a bit or byte basis (time division) or separated by different carrier frequencies (frequency division)

Multipoint line A single communications channel (typically, a leased telephone circuit) to which more than one station or other device is attached, though only one may transmit at a time upon being polled (see Polling); upon selection, one or more devices on such a line may receive transmissions from the master station; also, a multidrop line

Multisystem Networking Facility (MSNF) An optional feature with certain of IBM's telecommunications access methods that permits more than one host entity (running ACF/TCAM or ACF/VTAM) to jointly control an ACF/NCP network

Multitasking Generically refers to the concurrent execution of two or more tasks, typically applications, by a computer; may also be the concurrent execution of a single program that is used by many tasks

Mux Multiplexer

MVS Multiple Virtual Storage; refers to a common IBM host operating environment; also, OS/VS2, Release 2

N

NAK Negative acknowledgment; in synchronous protocols, a supervisory control-code message sent by the receiver to indicate that the previous data block was received in error and that the receiver is again ready to accept a transmission

Nanosecond One-billionth of a second

NAPLPS North American Presentation-Level Protocol Syntax; a protocol for videotex graphics and screen formats; developed by AT&T and standardized within ANSI; based on Canada's Telidon videotex-graphics protocol

Narrowband Describing sub-voice-grade channels characterized by data speeds typically of from 100 to 200 bit/s

NARUC National Association of Regulatory Utility Commissioners

NBS/ICST National Bureau of Standards/Institute for Computer Sciences and Technology; the NBS directorate, based in Gaithersburg, Md., concerned with developing computer and data communications Federal Information Processing Standards that are used in (non-Department of Defense) government procurements

NCC Network control center; any centralized network diagnostic

Glossary

and management station or site, such as that of a packet-switching network

NCP See Network Control Program

NCTA National Cable Television Association; a leading trade organization representing U. S. cable-television carriers

NCTE Network channel-terminating equipment; equipment considered necessary for terminating a telephone circuit or facility at the customer premises; recent FCC decisions have established that most NCTE is customer premises equipment (CPE) and may therefore be supplied by third-party vendors

Near-end crosstalk (NEXT) Unwanted energy transferred from one circuit usually to an adjoining circuit; occurs at the end of the transmission link where the signal source is located; the absorbed energy is usually propagated in the direction opposite to the absorbing channel's normal current flow; caused by high-frequency or unbalanced signals and insufficient shielding

NECA National Exchange Carrier Association; an association of local exchange carriers, mandated by the FCC upon the divestiture of AT&T

Netview An IBM mainframe network management product that integrated the functions of several earlier IBM network management products

Network An interconnected group of nodes (ISO TC97); a series of points, nodes, or stations connected by communications channels; the assembly of equipment through which connections are made between data stations (IBM)

Network addressable unit (NAU) In IBM's SNA, a host-based logical unit (LU), physical unit (PU), or System Services Control Point (SSCP) that is the origin or destination of information transmitted by the path-control portion of an SNA network

Network architecture A set of design principles, including the organization of functions and the description of data formats and procedures, used as the basis for the design and implementation of a network (ISO)

Network Communications Control Facility (NCCF) A host-based IBM program product through which users and other programs can monitor and control network operation

Network Control Program (NCP) In IBM SNA networks, a host-generated program that controls the operation of a communications controller (such as an IBM 3705 or 3725)

Network layer Layer 3 in the OSI model; the logical network entity that services the transport layer; responsible for ensuring that data passed to it from the transport layer is routed and delivered through the network

Network Problem Determination Application (NPDA) A host-resident IBM program product that aids a network operator in interactively identifying network problems from a central point

Network services In IBM's SNA, the services within network addressable units (NAUs) that control network operations via sessions to and from the host SSCP

Network Terminal Option (NTO) An IBM program product that enables an SNA network to accommodate a select group of non-SNA asynchronous and bisynchronous devices via the NCP-driven communications controller

Network topology The physical and logical relationship of nodes in a network; the schematic arrangement of the links and nodes of a network (IBM); networks are typically of either a star, ring, tree, or bus topology, or some hybrid combination thereof

Network virtual terminal A communications concept wherein a variety of DTEs, with different data rates, protocols, codes, and formats, are accommodated in the same network; this is done as a result of network processing, whereby each device's data is converted into a network standard format and then converted into the format of the receiving device at the destination end

NIC Near instantaneous companding; the essentially real-time process of quantizing an analog signal into digital symbols

Node A point where one or more functional units interconnect transmission lines (ISO); a physical device that allows for the transmission of data within a network; an endpoint of a link or a junction common to two or more links in a network (IBM SNA); typically includes host processors, communications controllers, cluster controllers, and terminals

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 Type 5 nodes are subarea nodes

Noise Any extraneous and unwanted signal disturbances in a link (electromagnetic interference, or EMI); usually, random variations in signal voltage or current, or interfering signals

Noise suppressor Filtering or digital signal-processing circuitry in a receiver or transmitter that automatically reduces or eliminates noise

Nonblocking Describing a switch where a through traffic path always exists for each attached station; generically, a switch or switching environment designed never to experience a busy condition due to call volume

Nonerasable Describing integrated circuitry or any type of data storage that is unalterable; same as read-only

Nonimpact printer A printing device that does not use mechanical strikes to create characters (e.g., thermal, laser, and electrostatic printers)

Nontransparent mode A transmission environment, mainly Bisync, in which control characters and control-character sequences are recognized through the examination of all transmitted data; compare with transparent mode; also, normal mode

Nonvolatile storage Any storage medium or circuitry, the contents of which are not lost when power is turned off or lost

NPDA See Network Problem Determination Application

NRZ Nonreturn to zero; a binary encoding and transmission scheme in which "ones" and "zeros" are represented by

opposite, and alternating, high and low voltages; wherein there is no return to a reference (zero) voltage between encoded bits

NRZI Nonreturn to zero inverted; a binary encoding scheme that inverts the signal on a "one" and leaves the signal unchanged for a "zero"; wherein a change in the voltage state signals a "one" bit, and the absence of a change denotes a "zero" bit value; also, transition coding

NTIA National Telecommunications and Information Administration; agency of the U. S. Department of Commerce concerned with the development of communications standards

NTSC signal National Television System Committee-specified signal; de facto standard governing the format of television transmission signals

NUA Network Users Association

Null characters Control characters that can be inserted into, or removed from, a data stream without affecting the meaning of a sequence; typically added to fill in time slots or unused fields

Nyquist theorem In communications theory, a formula stating that two samples per cycle is sufficient to characterize a bandlimited analog signal; in other words, the sampling rate must be twice the highest frequency component of the signal (e.g., sampling at 8 kHz for a 4-kHz analog signal)



Object code Executable machine code; programs that have been compiled or assembled; compare with source code

OCR Optical character recognition (reader); the process of reading text characters by light-sensitive devices, which converts them into machine-readable digital codes; a popular method of inputting text or graphics data into a computer, storage device, or transmission device

OEM Original equipment manufacturer; the maker of equipment that is marketed by another vendor, usually under the name of the reseller; the OEM may manufacture certain components, or complete devices, which are then often configured with software and/or other hardware by the reseller

Off-hook In telephony, condition indicating the active state of a subscriber's telephone circuit; a line state that signals a central office that a user requires service; opposite of on-hook

Office class Functional ranking of a telephone-network switching center depending on transmission requirements and hierarchical relationship to other switching centers; see Class X office

Off-line Condition in which a user, terminal, or other device is not connected to a computer or is not actively transmitting via a network; operation of a functional unit without the continual control of a computer; compare with on-line

Ones density The requirement for digital transmission lines in the public switched telephone network that eight consecutive

zeros cannot be in a digital data stream; exists because repeaters and clocking devices within the network will lose timing after receiving eight zeros in a row; any number of techniques or algorithms used to insert a one after every seventh-consecutive zero; see Bit stuffing

One-way trunk A trunk between a switch (PBX) and a central office, or between central offices, where traffic originates from only one end

On-hook Deactivated condition of a subscriber's telephone circuit, in which the telephone or circuit is not in use; opposite of off-hook

On-line Condition in which a user, terminal, or other device is actively connected with the facilities of a communications network or computer; pertains to the operation of a functional unit under the continual control of a computer; opposite of off-line

Open-air transmission A transmission type, or associated equipment, that uses no physical communications medium other than (usually line-of-sight) air; used for most radio-frequency communications techniques, including microwave, shortwave and FM radio, and infrared; also, free-space transmission

Operating environment 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 system (OS) The software of a computer that controls the execution of programs, typically handling the functions of input/output control, resource scheduling, and data management (e.g., CP/M, MS-DOS, VM/370)

Optical disk A very-high-density information-storage medium that uses light to read information

Optical fiber Any filament or fiber, made of dielectric materials, that is used to transmit laser- or LED-generated light signals; optical fiber usually consists of a core, which carries the signal, and cladding, a substance with a slightly higher refractive index than the core, which surrounds the core and serves to reflect the light signal; see also Fiber optics

OS See Operating system

Oscillator An electronic device used to produce repeating signals of a given amplitude or frequency

OSI Open Systems Interconnection; referring to the OSI reference model, a logical structure for network operations standardized within the ISO; a seven-layer network architecture being used for the definition of network protocol standards to enable any OSI-compliant computer or device to communicate with any other OSI-compliant computer or device for a meaningful exchange of information; the layers are named (refer to each one for its specific definition): Physical, Data link, Network, Transport, Session, Presentation, Application

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

OS/2 Operating software that will run on the Personal System/2. OS/2 Standard Edition is a joint Microsoft/IBM development, while OS/2 Extended Edition is IBM's proprietary extension to include communications and database managers

Outgoing access The capability of a user in one network to communicate with a user in another network (CCITT)

Overhead In communications, all information, such as control, routing, and error-checking characters, that is in addition to user-transmitted data; includes information that carries network-status or operational instructions, network routing information, as well as retransmissions of user-data messages that are received in error

Overrun Loss of data because a receiving device is unable to accept data at the rate it is transmitted

P

Pacing group In IBM's SNA, the number of data units (path information units, or PIUs) that can be sent before a response is received; IBM term for window

Packet A sequence of data, with associated control information, that is switched and transmitted as a whole; refers mainly to the field structure and format defined within the CCITT X.25 recommendation

Packetized voice Digitized voice technology that lends itself to T1 and ISDN applications

Packet switching A data transmission technique whereby user information is segmented and routed in discrete data envelopes called packets, each with its own appended control information for routing, sequencing, and error checking; allows a communications channel to be shared by many users, each using the circuit only for the time required to transmit a single packet; describing a network that operates in this manner

PAD Packet assembler/disassembler; network interface device that allows multiple asynchronous and/or synchronous terminals or host-computer ports to interface to a packet-switching network; a protocol conversion device that allows user terminals not equipped for packet switching to communicate over an X.25-based channel; PAD operations and functions are fully delineated in CCITT recommendations

Pad characters In (primarily) synchronous transmission, characters that are inserted to ensure that the first and last characters of a packet or block are received correctly; inserted characters that aid in clock synchronization at the receiving end of a synchronous transmission link; also, fill characters

PAM Pulse-amplitude modulation

Paper tape A nearly obsolete recording medium for data, where data characters are encoded on paper as a series of holes; also, punched tape

P/AR Peak to average ratio; a standard analog transmission-line test that involves sending a test signal of varying frequencies and

amplitudes, which is then compared with the received signal; composite results are a weighted number from 1 to 100, with 100 being the maximum; used increasingly as a standard quick test of a telecommunications channel's comparative quality; per Bell standard, the minimal acceptable P/AR for "medium-speed" data transmission is 48

Parallel processing Concurrent or simultaneous execution of two or more processes, or programs, within the same processor, as contrasted with serial or sequential processing

Parallel sessions In IBM's SNA, two or more concurrently active sessions between the same two logical units (LUs) using different network addresses; each session can have different transmission parameters

Parallel transmission A type of data transfer in which all bits of a character, or multiple-bit data blocks, are sent simultaneously, either over separate communications lines or circuits, over a single channel using multiple frequencies, or over a multiple-conductor cable

Parity bit An additional noninformation bit appended to a group of bits, typically to a 7- or 8-bit byte, to make the number of ones in the group of bits either an odd or even number; a basic and elementary mechanism for error checking

Parity check Process of error checking using a parity method; varied methods include longitudinal parity check and transverse parity check; see Parity bit

Pass-through Describing the ability to gain access to one network element through another

Path-control layer In IBM's SNA, the network processing layer that handles, primarily, the routing of data units as they travel through the network and manages shared link resources

PBX Private branch exchange; telephone switch located on a customer's premises that primarily establishes circuits over tie-lines between individual users and the switched telephone network; typically also provides switching within a customer's premises and usually offers numerous other enhanced features such as least-cost routing and call-detail recording; also, PABX, for private automatic branch exchange

PCM Pulse-code modulation; digital transmission technique that involves sampling of an analog information signal at regular time intervals and coding the measured amplitude value into a series of binary values, which are transmitted by modulation of a pulsed, or intermittent, carrier; a common method of speech digitizing using 8-bit code words, or samples, and a sampling rate of (typically) 8 kHz

PDN Public data network; typically, a tariffed packet-switching data carrier

PDU Protocol Data Unit; ISO term referring to a packet of information exchanged between two network-layer entities

Peripheral device With respect to a particular processing unit, any equipment that provides the processor with outside communications (ISO); any device that is peripheral to the major function of its attached processor or other controlling device

Permanent virtual circuit A virtual circuit resembling a leased line in that invariant logical channel numbers allow it to be dedicated to a single user

Personal computer (PC) A generic term for a single-user microcomputer; PC also refers to IBM's Personal Computer, the first microcomputer to be widely accepted in business and still a standard for compatibility

Personal System/2 (PS/2) IBM's current family of microcomputers that, with OS/2, represents a higher level of performance, capacity, and software consistency than the firm's previous microcomputers, the IBM PCs

Phase hit In telephony, the unwanted and significant shifting in phase of an analog signal; as defined by Bell, any instance when the phase of a 1,004-Hz test signal shifts more than 20 degrees; error-causing events more severe than phase jitter, especially for data transmission equipment using PSK modulation

Phase jitter In telephony, the measurement, in degrees out of phase, that an analog signal deviates from the referenced phase of the main data-carrying signal; often caused by alternating-current components in a telecommunications network

Phaselock loop In electronics, a circuit that acts as a phase detector by comparing the frequency of a known oscillator with an incoming signal and then feeds back the output of the detector to keep the oscillator in phase with the incoming frequency

Phase modulation A data transmission encoding method by which the phase angle of the carrier wave is varied, usually by 90 or 180 degrees, to represent a different bit value to the receiver; the encoding technique used in phase-shift keying

Phase shift A change in the time that a signal is delayed with respect to a reference signal

Phase-shift keying (PSK) The phase-modulation encoding technique employed by many modems; see Phase modulation

Physical layer Within the OSI model, the lowest level (1) of network processing, below the link layer, that is concerned with the electrical, mechanical, and handshaking procedures over the interface that connects a device to a transmission medium; referring to an electrical interface, such as RS-232-C

Physical unit (PU) In IBM's SNA, the component that manages and monitors the resources of a node, such as attached links and adjacent link stations; PU types follow the same classification as node types; see Node type

Picosecond One-trillionth of a second; one-millionth of a microsecond

PIN Positive, intrinsic, negative; type of photodetector used to sense lightwave energy and then to convert it into electrical signals; also, personal identification number

PIU Path information unit; see Pacing group

Pixel Picture element; smallest unit of a graphics or video display, the light characteristics of which (color and intensity) can be

coded into an electrical signal for transmission

Plasma display Type of flat visual display in which selected electrodes, part of a grid of crisscrossed electrodes in a gas-filled panel, are energized, causing the gas to be ionized and light to be emitted

PL/1 Programming Language One (IBM)

Plotter A type of computer-peripheral printer that displays data in two-dimensional graphics form

Point of presence (POP) Since the AT&T divestiture, the physical-access location within a LATA of a long-distance and/or interLATA common carrier; the point to which the local telephone company terminates subscribers' circuits for long-distance dial-up or leased-line communications

Point-to-point Describing a circuit that interconnects two points directly, where there are generally no intermediate processing nodes, computers, or branched circuits, although there could be switching facilities; a type of connection, such as a phone-line circuit, that links two, and only two, logical entities; see Multipoint line, Broadcast

Polarity Any condition in which there are two opposing voltage levels or charges, such as positive and negative

Polarization Characteristic of electromagnetic radiation (e.g., lightwave, radio, or microwave) when the electric-field vector of the wave energy is perpendicular to the main direction, or vector, of the electromagnetic beam

Polling Communications control procedure by which a master station or computer systematically invites tributary stations on a multipoint circuit to transmit data; contrast with selection

Polling delay The specified interval at which a tributary device is polled by a master station; often a user-specified parameter

Port A point of access into a computer, a network, or other electronic device; the physical or electrical interface through which one gains access; the interface between a process and a communications or transmission facility

Presentation layer In the OSI model, Layer 6, which provides processing services to the application layer (7), allowing it to interpret the data exchanged, as well as to structure data messages to be transmitted in a specific display and control format

Prestel Videotex offering of British Telecom in the United Kingdom

Primary rate In North American ISDN, twenty-three 64-kbit/s, information-carrying D channels and one 64 Kbit/s B channel used for signaling (23B+D)

Primary station A network node that controls the flow of information on a link; the station that, for some period of time, has control of information flow on a communications link (in this case, primary status is temporary)

Primitives Basic units of machine instruction

Glossary

Print server An intelligent device used to transfer information to a series of printers

Prioritization The process of assigning different values to (network) users, so that a user with a higher priority value will be offered access or service before (or more often than) a user with a lower priority value; increasingly available as an added option with network operation; any procedure with different levels of precedence

Private line A leased line; a nonswitched circuit

Private network A network established and operated by a private organization or corporation for users within that organization or corporation; compare with public network

Programmable terminal A user terminal that has computational capability; also, intelligent terminal

PROM Programmable read-only memory

Propagation delay The time it takes a signal, composed of electromagnetic energy, to travel from one point to another over a transmission channel; usually most noticeable in communicating with satellites; normally, the speed-of-light delay

Protocol Formal set of rules governing the format, timing, sequencing, and error control of exchanged messages on a data network; may be oriented toward data transfer over an interface, between two logical units directly connected, or on an end-to-end basis between two users over a large and complex network

PSDS Public Switched Digital Service; a BOC service; AT&T's Circuit-Switched Digital Capability (CSDC), also known commercially as AT&T's Accunet Switched 56 service; allows full-duplex, dial-up, 56-kbit/s digital circuits on an end-to-end basis

Pseudo-random bit pattern Test message consisting of 511 or 2,047 bits ensuring that all possible bit combinations can pass through a network without error

PSK See Phase shift keying

PSTN Public switched telephone network; acronym for the dial-up telephone network

PTT Postal, Telegraph, and Telephone; government authority or agency that typically operates the public telecommunications network, sets standards and policy, and negotiates communications issues internationally for a particular country; not found in the United States; compare with common carrier

PU See Physical unit

Public network Generically, a network operated by common carriers or telecommunications administrations for the provision of circuit-switched, packet-switched, and leased-line circuits to the public; compare with private network

PUC Public Utility Commission

PWM Pulse-width modulation; the process, in communications, of encoding information based on variations of the duration of carrier pulses; also called pulse-duration modulation

Q

QAM, QSAM Quadrature amplitude modulation, quadrature sideband amplitude modulation; modulation technique, using variations in signal amplitude, that allows data-encoded symbols to be represented as any of 16 or 32 different states

Q bit The qualifier bit in an X.25 packet that allows the DTE to indicate that it wishes to transmit data on more than one level

QPSK Quadrature phase-shift keying

Quality of service (QOS) In network operation, a parameter specifying certain performance characteristics of a service, session, connection, or link

Queue Any group of items, such as computer jobs or messages, waiting for service

Queuing In telephony, a feature that allows calls to be "held" or delayed at the origination switch while waiting for a trunk to become available; sequencing of batch-data sessions

R

RACE In the European Community, research and development for advanced communications in Europe

RAM Random access memory

Raster A scanning pattern used in generating, recording, or reproducing television, facsimile, or graphics images on a screen; raster scanning

Rate center A defined geographic point used by telephone companies in determining distance measurements for interLATA mileage rates

RBOC Regional Bell operating company; one of the seven companies (Ameritech, Nynex, Bell Atlantic, BellSouth, Pacific Telesis, Southwestern Bell, and U S West) created to provide local communications service by the Justice Department's breakup of the old Bell System

Read-only memory (ROM) A data-storage device, the contents of which cannot normally be altered; storage in which writing over is prevented; also, permanent storage

Real time A transmission or data processing operating mode by which data is entered in an interactive session; pertaining to an application whereby response to input is fast enough to affect subsequent input, such as a process-control "system" or a computer-aided design "system" (IBM); describing processing in which the results are used to influence an ongoing process

Receive only (RO) Describing operation of a device, usually a page printer, that can receive transmissions but cannot transmit

Redundancy In data transmission, that portion of the gross information content of a message that can be eliminated without losing essential information; also, duplicate facilities

Reference noise The level of circuit noise that will produce a measured reading equal to that produced by 1 picowatt (-90 dBm) of electric power at 1,000 Hz

Refresh rate With conventional CRT displays, the rate per unit of time at which a displayed image is renewed in order to appear stable; typically, 50 times per second, or 50 Hz (in Europe), or 60 times per second, or 60 Hz (in the United States)

Relative transmission level The ratio, in decibels, of the test-tone signal power at one point in a transmission circuit to some other circuit point chosen as a reference (usually the transmission switch, which is taken as a zero-level reference point)

Remote job entry (RJE) The submission of data processing jobs via a data link

Remote station Any device that is attached to a controlling unit by a data link; also, a tributary station on a multipoint link

Repeater In digital transmission, equipment that receives a pulse train, amplifies it, retimes it, and then reconstructs the signal for retransmission; in fiber optics, a device that decodes a low-power light signal, converts it to electrical energy, and then retransmits it via an LED or laser light source; also, regenerative repeater

Residual error rate In communications, the remaining error rate after protocol-specified attempts at error correction have been exhausted (ISO)

Response An answer to an inquiry; in IBM's SNA, the control information sent from a secondary station to the primary station under SDLC

Response time For interactive sessions, the elapsed time between the end of an inquiry and the beginning of the response; the interval between a user data entry and the reply from a CPU or destination device

Retransmissive star In optical-fiber transmission, a passive component that permits the light signal on an input fiber to be retransmitted on multiple output fibers; formed by heating together a bundle of fibers to near the melting point; used mainly in fiber-based local area networks; also, star coupler

Retry In the Bisync protocol, the process of resending the current block of data a prescribed number of times or until it is accepted

Return to zero (RZ) Method of transmitting binary information in such a way that after each encoded bit, voltage returns to the zero level

Reverse channel A (typically) small-bandwidth channel used for supervisory or error-control signaling; signals are transmitted in the opposite direction to the one in which data is sent; also, the channel in a dial-up telephone circuit from the called party to the calling party

Reverse interrupt (RVI) With the Bisync protocol, a control-character sequence sent by a receiving station to request

premature termination of a transmission in progress

Revisable-form document An electronic document with its formatting information intact, readable, and modifiable

RF Radio frequency; describing transmission at any frequency at which coherent electromagnetic energy radiation is possible, usually above 150 kHz

RFI Request for information; general notification of an intended purchase of communications or computer equipment, sent to potential suppliers to determine interest and solicit product materials; also, radio-frequency interference

RFP Request for proposal; sent to interested vendors to solicit a configuration proposal that meets a user's requirements

Ring network A network topology in which each node is connected to two adjacent nodes

RISC Reduced Instruction Set Computing; internal computing architecture where processor instructions are pared down so that most can be performed in a single processor cycle, theoretically improving computing efficiency

RJE See Remote job entry

ROM See Read-only memory

Routing The process of selecting the correct circuit path for a message

RPG Report Program Generator (computer language)

RPQ Request for price quotation; solicitation for pricing of a specific device, software product, service, or configuration

RS-232-C An EIA-specified physical interface, with associated electrical signaling, between data circuit-terminating equipment (DCE) and data terminal equipment (DTE); the most commonly employed interface between computer devices and modems

RS-422-A Electrical characteristics of balanced-voltage digital interface circuits (EIA)

RS-423-A Electrical characteristics of unbalanced-voltage digital interface circuits (EIA)

RS-449 General-purpose 37-position and 9-position interface for data terminal equipment and data circuit-terminating equipment employing serial binary data interchange (EIA)

RTS Request to send; part of modem handshaking

S

Satellite communications The use of geostationary orbiting satellites to relay transmissions from one earth station to one or more other earth stations

Scattering Cause of lightwave signal loss in optical fiber trans-

mission; diffusion of a light beam caused by microscopic variations in the material density of the transmission medium

SCS SNA character string; type of transmission data format for IBM devices, consisting of EBCDIC control characters optionally mixed with user data, that is carried within an SNA request response unit

SDLC Synchronous data link control; bit-oriented IBM version of the HDLC protocol; the mainstay of SNA communications

Secondary station A station or node selected to receive transmission from a primary station; the secondary-station designation is usually temporary and only for the duration of the session or transaction; see Primary station

Selection The process by which a computer contacts a station to send it [the station] a message (IBM); see Polling

Sequencing The process of dividing a user data message into smaller frames, blocks, or packets for transmission, in which each has an integral sequence number for reassembly of the complete message at the destination end

Serial interface Usually, as pertains to computers or terminals, the mechanical and electrical components that allow data to be sent sequentially-by-bit over a transmission medium; in contrast to a parallel interface

Serial transmission The sequential transmission of the bits constituting an entity of data over a data circuit (ISO)

Serving area Region surrounding a broadcasting station where signal strength is at or above a stated minimum; the geographic area handled by a telephone central office

Session A connection between two stations that allows them to communicate (ISO); the time period that a user engages in a dialogue with an interactive computer; in IBM's SNA, the logical connection between two network addressable units (NAUs);

Session layer In the OSI model, the network-processing layer (5) responsible for binding and unbinding logical links between users and maintaining an orderly dialogue between them; also, serves the presentation layer (6)

SHF Super high frequency; portion of the electromagnetic spectrum in the microwave region, with frequencies ranging from about 2 to 20 GHz

Shielding Protective enclosure surrounding a transmission medium, such as coaxial cable, designed to minimize electromagnetic leakage and interference

Short-haul modem Generally, an LDM with transmission distances of less than a mile; see Limited distance modem

Signal converter An electronic device that takes input signal information and outputs it in another form

Signal-to-noise ratio (SNR) Relationship of the magnitude of a transmission signal to the noise of its channel; measurement of signal strength compared to error-inducing circuit noise; given in decibels

Simplex One-way data transmission, with no capability for changing direction

Single mode Describing an optical waveguide that is designed to propagate light of only a single wavelength and perhaps a single phase; essentially, an optical fiber that allows the transmission of only one light beam, or data-carrying lightwave channel, and is optimized for a particular lightwave frequency; compare with multimode

Single-sideband transmission Type of transmission in which one sideband of the carrier signal is transmitted while the other is suppressed; the main carrier wave itself may be either transmitted or suppressed

Sink Data "receptacle," such as a receiver

SITA *Société Internationale de Télécommunication Aéronautique*; the international data communications network used by many airlines

Skewing The time delay, or offset, between any two signals

Smart terminal Terminal that has local processing facilities as well as communications capabilities

SMDR Station message detail recording (AT&T); see Call-detail recording

SNA See Systems Network Architecture (IBM)

SNADS (Systems Network Architecture Delivery System) Applications-level architecture providing generalized, delayed store-and-forward delivery of documents through components called distribution service units

SNR See Signal-to-noise ratio

Software-defined network Network that gives users flexible, software-driven control over network topology, so that configurations can be reconfigured dynamically; see Virtual private network

SOH Start of header (heading); control character that delimits the beginning of the control section of a data block

SOM See Start of message

Sonet (Synchronous Optical Network) Bellcore-proposed protocol for fiber networks handling DS-3 transmission with some overhead; likely to become an official ANSI standard (T1X1); will be used by the RBOCs with large fiber trunks

Source code The form of a program as produced by a programmer; compare with object code

Space-division switching In telephony, a switching technology whereby a separate physical path through the switch is maintained for each call

SPOOL Simultaneous peripheral operation on line

Spot beam In satellite communications, a narrow and focused down-link transmission, typical of newer satellite designs, that allows the satellite to use different frequencies from, or reuse the

same frequencies as in, other down-link beams; covers a much smaller geographic area, or footprint, than older satellite down-link transmissions, which also enhances protection of the down-link from unauthorized reception

Spread spectrum A modulation technique in which the information content is spread over a wider bandwidth than the frequency content of the original information

SSCP See System Services Control Point

Starlan A local area network design and specification within the IEEE 802.3 standards subcommittee, characterized by 1-Mbit/s baseband data transmission over two-pair twisted-pair wiring

Start bit In asynchronous transmission, the first element in each character that prepares the receiving device to recognize the incoming information elements

Start of message (SOM) A control character or group of characters transmitted by a station, which indicates to other stations on the line that what follows are addresses of stations to receive the message

Start of text (STX) A transmission control character that designates the start of a message's text as well as (usually) the end of the message heading

Star topology The point-to-point wiring of network elements to a central node

Start-stop transmission Asynchronous transmission characterized by each byte containing its own start and stop bits of data elements that are preceded by a start and followed by a stop signal; reference employed to designate asynchronous transmission

Station Any DTE that receives or transmits messages on a data link, including network nodes and user devices

Step-index Referring to a type of optical fiber, which exhibits a uniform refractive index at the core and a sharp decrease in the refractive index at the core-cladding interface

Stop bit In asynchronous transmission, the last transmitted element in each character, which informs the receiver to come to an idle condition before accepting another character

Store and forward Describing operation of a data network where packets, messages, or frames are temporarily stored within a network node before being transmitted to the destination

STX See Start of text

Swift Society for Worldwide Interbank Financial Telecommunications

Switched line Communications link for which the physical path, established by dialing, may vary with each use (e.g., a dial-up telephone circuit)

Switched network backup An option in certain communications links, and with certain communications devices such as modems, by which a switched, or dial-up, line is used as an

alternate path if the primary, typically leased-line, path is unavailable

Symbol In data transmission, a discrete waveform, usually representing binary digits, modulated as appropriate to be understood by the receiver; see Baud

Sync bits Synchronizing bits in synchronous transmission; maintains synchronism between transmitter and receiver

Synchronous transmission Data communications in which characters or bits are sent at a fixed rate, with the transmitting and receiving devices synchronized; eliminates the need for start and stop bits basic to asynchronous transmission and significantly increases data throughput rates

Sysgen System generation (or generator); loading of an operating system in a CPU

System A logical collection of computers, peripherals, software, service routines, accounting and control procedures, terminals, and end users; a collection of men, machines, and methods organized to accomplish a set of specific functions (*American National Dictionary for Information Processing*); an assembly of components united by some form of regulated interaction to form an organized whole (IBM); generally, systems may include networks, but only to the limited degree that those networks connect users directly to system resources; see Network

System Services Control Point (SSCP) In IBM's SNA, a host-based network entity that manages the network configuration, coordinates network operator and problem-determination requests, maintains network address and mapping tables, and provides directory support and session services

Systems Network Architecture (SNA) In IBM networks, the layered logical structure, formats, protocols, and procedures that govern information transmission; somewhat analogous to the OSI reference model



TA Terminal adaptor; in ISDN, a device that provides conversion between a non-ISDN terminal device and the ISDN user/network interface

Table-driven Describing a logical computer process, widespread in the operation of communications devices and networks, in which a user-entered variable is matched against an array of predefined values; frequently used in network routing, access security, and modem operation; involves a table lookup, that is, reference to that array of predefined values

Tandem data circuit A data channel passing through more than two data circuit-terminating equipment (DCE) devices in series

Tandem office A telephone company's major switching center for the switched telephone network; a high-level switching center in the local exchange, or serving, area; a tandem exchange, or switch, interconnects local central offices as a central office interconnects individual subscriber lines

Glossary

Tariff The formal process whereby services and rates are established by and for communications common carriers; submitted by carriers for government regulatory approval, reviewed, often amended, and then (usually) approved; the published rate for a specific communications service, equipment, or facility that constitutes a contract between the user and the communications supplier or carrier

TASI Time-assigned speech interpolation; a method that increases the capacity of voice links by using the pauses between utterances to carry additional conversations

TAT-8 The eighth transatlantic telephone cable; the first to use single-mode fiber optic technology

TCAM See Telecommunications Access Method

T carrier A time-division-multiplexed, typically telephone-company-supplied, digital transmission facility, usually operating at an aggregate data rate of 1.544 Mbit/s and above

TCM See Time-compression multiplexing

TCP/IP Transmission Control Protocol/Internet Protocol; internetworking software suite originated on the Department of Defense's Arpanet network; IP corresponds to OSI network Level 3, TCP to OSI Layers 4 and 5

T1 AT&T term for a digital carrier facility used to transmit a DS-1 formatted digital signal at 1.544 Mbit/s

T3 A T carrier with an aggregate rate of 44.736 Mbit/s

TDM See Time-division multiplexing

TDMA Time-division multiple access; a satellite transmission technique in which several earth stations have use of total available transponder power and bandwidth, with each station in sequence transmitting in short bursts

Technical and Office Protocols (TOP) A Boeing version of the MAP protocol suite aimed at office and engineering applications

Telco Telephone central office, in most usages; but also, a generic abbreviation for telephone company

Telecommunications A term encompassing both voice and data communications in the form of coded signals over media

Telecommunications Access Method (TCAM) A widely employed communications-management software package from IBM that runs on IBM 370 and compatible mainframes; depending on version and options, can support either SNA or pre-SNA networking; supplanted by VTAM in recent years, especially where networks are primarily SNA

Telegraphy Aging data transmission technique characterized by maximum data rates of 75 bit/s and signaling where the direction, or polarity, of DC current flow is reversed to indicate bit states

Telephony Generic term describing voice telecommunications

Teleprocessing Remote-access data processing (ISO); the use of data link communications to accomplish a computer-based

task; distinguished from distributed data processing (DDP), in which remote communications is not a prerequisite to all processing

Teletex Akin to a higher-speed version of ASCII Telex, intended eventually to replace Telex

Teletext Generically, one-way data transmission designed for widespread broadcasting of graphics and textual information, for display on subscriber television sets or (typically) low-cost video terminals; a data communications technique akin to, but more limited than, two-way videotex, by which users can select from among many pages of information for viewing

Teletypewriter Generic term for a teleprinter terminal; Teletype is a trademark of the former Teletype Corp.

Telex Teleprinter exchange; a worldwide switched message-exchange service, characterized by Baudot-coded data (though numerous conversion facilities are now available)

Terminal A point in a network at which data can either enter or leave; a device, usually equipped with a keyboard, often with a display, capable of sending and receiving data over a communications link (IBM); generically the same as data terminal equipment (DTE)

Terminal node In IBM's SNA, a peripheral node that is not user-programmable, having less intelligence and processing capability than a cluster-controller node

Terminated line A telephone circuit with a resistance at the far end equal to the characteristic impedance of the line, so no reflections or standing waves are present when a signal is entered at the near end; compare with bridge tap

Terrestrial The term commonly applied to long-distance links that use earth-bound transmission facilities such as copper wire, optical fiber, or microwave, as opposed to satellite transmission

Test center A facility for detecting and diagnosing problems with communications lines and the equipment attached to them; a facility where a network manager or technician can gain access to (ideally) any circuit in a network for the purpose of running diagnostic testing; also, network control center

Text In communications, transmitted characters forming the part of a message that carries information to be conveyed, in some protocols, the character sequence between start-of-text (STX) and end-of-text (ETX) control characters; information for human, as opposed to computer, comprehension that is intended for presentation in a two-dimensional form (ISO)

Tie line A leased or private dedicated telephone circuit provided by common carriers that links two points together without using the switched telephone network

Tightly coupled Describing the interrelationship of processing units that share real storage, that are controlled by the same control program, and that communicate directly with each other (IBM); compare with loosely coupled

Time-compression multiplexing (TCM) Technology designed to allow high-speed data transmission over the local loop;

essentially, TCM involves alternating transmission (in Ping-Pong fashion) of high-speed digital data bursts

Time-division multiplexing (TDM) Interleaving digital data from many users onto one or two serial communications links by dividing channel capacity into time slices; two common techniques are bit interleaving and byte (by character) interleaving

Time-out Expiration of predefined time period, at which time some specified action occurs; in communications, timeouts are employed to avoid unnecessary delays and improve traffic flow; used, for example, to specify maximum response times to polling and addressing before a procedure is automatically reinitiated

Timesharing Describing the interleaved use of time on a computer that enables two or more users to execute computer programs concurrently (IBM); any concurrent use of the same processing resource by multiple users

Token bus A local area network access mechanism and topology in which all stations actively attached to the bus listen for a broadcast token or supervisory frame; stations wishing to transmit must receive the token before doing so; however, the next logical station to receive the token is not necessarily the next physical station on the bus; bus access is controlled by preassigned priority algorithms

Token ring A local area network access mechanism and topology in which a supervisory frame or token is passed from station to adjacent station sequentially; stations wishing to gain access to the network must wait for the token to arrive before transmitting data; in a token ring, the next logical station receiving the token is also the next physical station on the ring; compare with token bus

Toll center A Class 4 telephone central-office circuit-switching facility where time- and distance-based toll-charge information is collected; any Class 4 central office, typically one per metropolitan area

TOP See Technical and Office Protocols (Boeing)

Touch-Tone Registered AT&T trademark for push-button dialing; see DTMF

Transaction In communications, a message destined for an application program; a computer-processed task that accomplishes a particular action or result; in interactive communications, an exchange between two devices, one of which is usually a computer; in batch or remote job entry, a job or job step

Transceiver Generic term describing a device that can both transmit and receive

Transients Intermittent, short-duration signal impairments

Translator In telephony, a central-office device that converts dialed or tone digits into call-processing information

Transmission The dispatching of a signal, message, or other form of intelligence by wire, radio, telegraphy, telephony, facsimile, or other means (ISO); a series of characters, messages, or blocks, including control information and user data; the signaling of data over communications channels

Transparent mode (Typically) binary synchronous communications data transmission in which the recognition of control characters is suppressed; the operation of a (usually) digital transmission facility during which the user has complete and free use of the available bandwidth and is unaware of any intermediate processing; generally implies out-of-band signaling; see Clear channel

Transponder In satellite communications, the circuitry that receives an up-link signal, translates it to another, usually higher, frequency, amplifies it, and retransmits it as the down-link signal

Transport layer In the OSI model, Layer 4; the network processing entity responsible, in conjunction with the underlying network, data link, and physical layers, for the end-to-end control of transmitted data and the optimized use of network resources; also serves the session layer (5)

Transverse parity check Type of parity error checking performed on a group of bits in a transverse direction for each frame; see Parity check

Tree A network topology, characterized by the existence of only one route between any two network nodes; describing a network that resembles a branching tree, such as most CATV distribution networks

Trellis coding A method of forward-error correction used in certain high-speed modems whereby each signal element (baud) is assigned a coded binary value, which represents that element's phase and amplitude; allows the receiving modem to determine—based on the value of the preceding signal elements—whether or not a given signal element is received in error

Trunk A dedicated aggregate telephone circuit connecting two switching centers, central offices, or data concentration devices

Trunk group Multiple trunk circuits between the same two switching centers that can be accessed by dialing a single trunk number and use the same multiplexing equipment at each end

T-span A telephone circuit or cable through which a T carrier runs

T-tap A passive line interface used for extracting data from a circuit; also, a similar device for extracting optical signals from a fiber cable or electrical signals from a coaxial cable

TTY transmission Teletypewriter communications; generally, basic asynchronous ASCII-coded or Baudot-coded data communications

Turnaround time In communications, the time, measured at either the send or receive end, required to reverse the direction of transmission, from send to receive or vice versa, over a half-duplex channel; also, the elapsed time between submission of a transaction, or job, and the return of processed output; typically, the combined time required for line propagation, modem timing, and computer processing; see Response time

Twinaxial cable A shielded coaxial cable with two central conductors

Twisted pair A pair of insulated copper conductors that are twisted around each other, mainly to cancel the effects of electrical noise; typical of standard telephone wiring; unshielded twisted pair contains no outside wraparound conductor

Glossary

Two-way alternate Synonym for half-duplex communications

Two-way simultaneous Synonym for full-duplex communications

Two-wire Applies to the local-loop transmission path from the customer's premises to the central-office switch of a local exchange carrier (LEC); on a two-wire circuit, data is received and transmitted over the same wire loop; also applies to connections between data terminal equipment (DTE) and a private branch exchange (PBX)

TWX Teletypewriter exchange; a switched message service serving Canada and the United States provided by Western Union; employs ASCII-coded equipment

U

UART Universal asynchronous receiver/transmitter

UHF Ultra high frequency; portion of the electromagnetic spectrum ranging from about 300 MHz to about 3 GHz; the frequency band that includes television channels 14 through 83 and cellular radio frequencies

Unattended mode Describing the operation of any device, such as an auto-answer modem, designed to operate without the manual intervention of an operator

Unbalanced-to-ground Describing a two-wire circuit, where the impedance-to-ground on one wire is measurably different from that on the other; compare with balanced-to-ground

Unix Operating system originally designed for communicating multi-user, 32-bit minicomputers by AT&T Bell Laboratories; has come into wide commercial acceptance due to its predominance in academia and its programming versatility. AT&T Version V.3 and Berkeley System Development Version 4.3 are currently popular

Up-link Describing the earth-station transmission and the carrier signal used to transmit information to a geosynchronous satellite; complement of down-link

Uptime Colloquial expression for the period of time when network or computer resources are accessible and available to a user; the length of time between failures or periods of nonavailability

Upward compatible Describing any device that can be configured to function in either a different operating environment or some enhanced mode; a computer's capability to execute programs written for another computer without major alteration, but not vice versa (IBM)

USART Universal synchronous/asynchronous receiver/transmitter; integrated circuitry common to many data communications devices; converts data in parallel form from the CPU into serial form for transmission

USITA United States Independent Telephone Association

USRT Universal synchronous receiver/transmitter; integrated circuit that performs conversion of parallel data to serial form for transmission over a synchronous data channel

V

Value-added network (VAN) A network that provides services that go beyond the pure switching function

VAN See Value-added network

Variable quantizing level (VQL) A type of speech-encoding technique that quantizes and encodes an analog voice conversation for transmission, nominally at 32 kbit/s

Vertical redundancy check (VRC) An odd-parity check performed on each character of an ASCII block as the block is received

VHF Very high frequency; portion of the electromagnetic spectrum with frequencies between about 30 and 300 MHz; operating band for television channels 2 to 13 and most FM radio

Video teleconferencing The real-time, and usually two-way, transmission of digitized video images between two or more locations; requires a wideband transmission facility, for which satellite communications has become a popular choice; transmitted images may be freeze-frame (where a television screen is "repainted" every few seconds) or full-motion; bandwidth requirements for two-way videoconferencing range from 56 kbit/s (freeze-frame) to T1 rates (1.544 Mbit/s)

Vidiotex An interactive data communications application designed to allow unsophisticated users to converse with a remote database, enter data for transactions, and retrieve textual and graphics information for display on subscriber television sets or (typically) low-cost video terminals

Virtual circuit In packet switching, network facilities that give the appearance to the user of an actual end-to-end circuit; in contrast to a physical circuit, a dynamically variable network connection where sequential user data packets may be routed differently during the course of a "virtual connection"; virtual circuits enable transmission facilities to be shared by many users simultaneously

Virtual Machine Facility VM/370; an IBM control program, essentially an operating system, that controls the concurrent execution of multiple virtual machines on a single System/370 mainframe

Virtual private network A carrier-provided service in which the public switched network provides capabilities similar to those of private lines, such as conditioning, error testing, and higher-speed, full-duplex, four-wire transmission with a line quality adequate for data; see Software-defined network

Virtual storage The concept of storage space that may be viewed as addressable main storage to a computer user, but is actually auxiliary storage (usually peripheral mass storage) mapped into real addresses; amount of virtual storage is limited by the addressing scheme of the computer

VLF Very low frequency; that portion of the electromagnetic spectrum having continuous frequencies ranging from about 3 to 30 kHz

VLSI Very large-scale integration

VM Virtual memory; see Virtual storage

Voice digitization The conversion of an analog voice into digital symbols for storage or transmission

Voice frequency (VF) Describing an analog signal within the range of transmitted speech, typically from 300 to 3,400 Hz; any transmission supported by an analog telecommunications circuit

Voice-grade channel A telecommunications circuit used primarily for speech transmission but suitable for the transmission of analog or digital data or facsimile; typically supporting a frequency range of 300 to 3,400 Hz; also, voice band

Volatile storage Any storage device whose contents are lost when power is removed

VS See Virtual storage

VSAT Very small aperture terminal; in satellite communications, small-diameter receiver stations typically operated in the ku band

VTAM Virtual Telecommunications Access Method; IBM main-frame communications-software product, oriented toward managing SNA/SDLC communications and links

VTAME VTAM Entry (IBM)

V-series recommendations CCITT-specified standards dealing mainly with modem operation over an interface with the telephone network, including:

V.21 300-bit/s duplex modem standardized for use in the general switched telephone network

V.22 1.2-kbit/s duplex modem standardized for use in the general switched telephone network and on leased circuits

V.22bis 2.4-kbit/s duplex dial-up modem standard

V.23 600-bit/s and 1.2-kbit/s modem standardized for use in the general switched telephone network

V.24 List of definitions for interchange circuits between data terminal equipment and data circuit-terminating equipment

V.25 Automatic calling and/or answering equipment in the general switched telephone network, including disabling of echo suppressors on manually established calls

V.26 2.4-kbit/s modem standardized for use on four-wire leased circuits

V.26bis 1.2/2.4-kbit/s modem standardized for use in the general switched telephone network

V.26ter A standard for the 2.4-kbit/s full-duplex modem that uses echo cancellation techniques suitable for application to the public

switched telephone network

V.27 4.8-kbit/s modem with manual equalizer standardized for use on leased telephone-type circuits

V.27bis 2.4/4.8-kbit/s modem with automatic equalizer standardized for use on leased telephone-type circuits

V.27ter 2.4/4.8-kbit/s modem standardized for use in the general switched telephone network

V.29 9.6-kbit/s modem standardized for use on point-to-point leased telephone-type circuits

V.32 9.6-kbit/s two-wire duplex modem standard

W

WATS Wide Area Telephone Service; telephone-company service allowing reduced costs for certain telephone-call arrangements; may be In-WATS, or 800-number service, by which calls can be placed to a location from anywhere at no cost to the calling party, or Out-WATS, by which calls are placed out from a central location; cost is based on hourly usage per WATS circuit and on distance based on zones, or bands, to or from which calls are placed

Waveguide Specially constructed metallic pipe for containing, directing, and focusing microwave electromagnetic radiation for transmission

Wavelength Distance between successive peaks of a sinusoidal wave

Wavelength-division multiplexing (WDM) A technique in fiber optic transmission for using different light wavelengths to send data parallel-by-bit (one discrete wavelength per bit), serial-by-character; hence, one single multimode fiber can act as an 8-bit parallel bus

Wet T1 T1 with a BOC-powered interface

Wideband Generally, a communications channel offering a transmission bandwidth greater than a voice-grade channel; data transmission speeds on wideband facilities are typically in excess of 9.6 kbit/s and often at rates such as 56 kbit/s and 1.544 Mbit/s

Window A flow-control mechanism in data communications, the size of which is equal to the number of frames, packets, or messages that can be sent from a transmitter to a receiver before any reverse acknowledgment is required; called a pacing group in IBM's SNA

Wire center A spatial midpoint at the confluence of several cables

Wiring closet Termination point for customer premises wiring, offering access to service personnel; generally serves a specific area, with multiple wiring closets that are cross-connected

Word length The number of bits or characters in a word, which

Glossary

is usually determined as an optimal or convenient size for processing, storage, or transmission; word lengths are often based on the register size and internal operation of a computer (e.g., IBM System/370 uses 32-bit words; IBM PC employs 16-bit)

Working draft In ISO, the initial stage of a standards document describing the standard as envisioned by a working group of a standards committee or subcommittee

Workstation Input/output equipment at which an operator works; a station at which a user can send data to, or receive data from, a computer or other workstation for the purpose of performing a job

X

X The designation assigned to International Telegraph and Telephone Consultative Committee (CCITT, from the French *Comité Consultatif International Télégraphique et Téléphonique*) recommendations related to data transmission over public data networks, most notably:

X.3 Packet assembly/disassembly facility in a public data network

X.20 Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for start-stop transmission services on public data networks

X.20bis Used on public data networks of data terminal equipment (DTE) that is designed for interfacing to asynchronous duplex V-series modems

X.21 Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for synchronous operation on public circuit-switched data networks

X.21bis Used on public data networks of data terminal equipment (DTE) that is designed for interfacing to synchronous V-series modems

X.24 List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) on public data networks

X.25 A CCITT recommendation that specifies the interface between user data terminal equipment (DTE) and packet-switching data circuit-terminating equipment (DCE)

X.28 DTE/DCE interface for start-stop-mode data terminal equipment accessing the packet assembly/disassembly facility (PAD) in a public data network situated in the same country

X.29 Procedures for the exchange of control information and user data between a packet assembly/disassembly facility (PAD) and a packet-mode DTE or another PAD

X.32 Interface between data terminal equipment and data circuit-terminating equipment for terminals operating in the packet mode and accessing a packet-switched public data network through a public switched telephone network or a circuit-switched public data network

X.75 Terminal and transit call-control procedures and data transfer mechanisms on (typically) international circuits between packet-switched data networks

X.121 The CCITT's international numbering plan for public data networks

X.400 A series of protocol standards for international electronic-mail interexchange

X3 Sequence of data communications standards promulgated by the American National Standards Institute

X3.15 Bit sequencing of ASCII in serial-by-bit data transmission

X3.16 Character structure and character parity sense for serial-by-bit data communications in ASCII

X3.36 Synchronous high-speed data signaling rates between data terminal equipment and data circuit-terminating equipment

X3.79 Determination of the performance of data communications devices that use bit-oriented control procedures

X3.92 Data encryption algorithm

Xenix Microsoft trade name for a 16-bit microcomputer operating system derived from Bell Laboratories' Unix

XNS Xerox Network Systems; local area network protocol suite operating at ISO Network and Transport layers

X-off/X-on Transmitter off/transmitter on; a commonly used peripheral-device flow-control protocol, used extensively for modem control by an attached terminal or processor

X.PC Error-correcting protocol for modems, designed largely by Tymnet providing functions typical of the OSI Network Layer 3

Z

ZBTSI Zero Byte Time Slot Interchange; a technique used with the T-carrier extended superframe format (ESF) in which an area in the ESF frame carries information about the location of all-zero bytes (eight consecutive zeroes) within the data stream

Zero code suppression The insertion of a "one" bit to prevent the transmission of eight or more consecutive "zero" bits; used primarily with T1 and related digital telephone-company facilities, which require a minimum "ones density" in order to keep the individual subchannels of a multiplexed, high-speed facility active; several different schemes are currently employed and are being evaluated to accomplish this; see also Bit stuffing, Ones density

Zero transmission level point (0 TLP) In telephony, a reference point at which a zero dBm signal level is applied for measuring the signal power gain and loss of a telecommunications circuit; usually, though not always, referenced to the output signal level at the transmitting switch in a telephone circuit; the signal level reference unit dBm0