

Modem Terminology

2B1Q An encoding technique used on ISDN lines in which two binary bits (2B) are encoded in one quaternary (1Q) symbol.

A/D converter A device that converts analog signals to digital.

Amplifier A device used to increase the strength of an analog signal.

Analog Signal A signal, such as voice or music, that varies in a continuous manner. Contrast with digital signal.

ANSI (American National Standards Institute) An organization that develops and publishes standards for codes, alphabets, and signaling schemes.

ASCII (American Standard Code for Information Interchange) The data alphabet used in the IBM PC to determine the composition of the 7-bit string of 0's and 1's that represents each character (alphabetic, numeric, or special).

Asynchronous A method of transmission in which the time intervals between characters do not have to be equal. Start and stop bits are added to coordinate the transfer of characters.

Attenuation The difference between transmitted and received power due to transmission loss through equipment, lines, or other communication devices.

Bandwidth The range of frequencies a circuit will pass. Analog circuits typically have a bandwidth limited to that of the human voice (about 300 Hz to kHz). The square waves of a digital signal require a higher bandwidth. The higher the transmission rate, the greater the bandwidth requirement. Fiber-optic and coaxial cables have excellent bandwidths. Also, in common usage, *bandwidth* refers to the upper limit of the rate that information can be transferred over a network.

Basic Access The method whereby individual telephone instruments and terminals will be connected to a digital network.

Basic Rate Interface (BRI) The ISDN standard governing how a customer's desk-top terminals and telephones can connect to the ISDN switch. It specifies two B-channels that allow 64-kilobit-per-second simultaneous voice and data service, and one D-channel that carries call information and customer data at 16k bps.

Baud A measure of transmission speed; the reciprocal of the time duration of the shortest signal element in a transmission. In RS-232C ASCII, the signaling element is 1 bit.

BBS (Bulletin Board System) An electronic message system that provides tightly controlled network access over modems and telephone lines.

BCD (Binary-Coded Decimal) A coding scheme using a 6-bit (six-level) code.

bis Meaning second in Latin, this term is used as a suffix to denote a secondary version of a CCITT modem standard.

Bit The smallest unit of information. In digital signaling, this commonly refers to a 0 or a 1.

Bit Rate The speed at which bits are transmitted, usually expressed in bits per second. Note necessarily the same as baud rate.

Block A sequence of continuous data characters or bytes transmitted as a unit. A coding procedure is usually applied for synchronization or error control purposes.

BPS (bits per second) A measure of the information transfer rate of a data channel.

Bridge A device that connects LANs at the ISO data link level.

Broadband Signalling A method of signalling in which multiple signals share the bandwidth of the transmission media by the subdivision of the bandwidth into channels based on frequency.

BSC or BiSync (Binary Synchronous Communications) A communication protocol developed by IBM that has become an industry standard. It uses a defined set of control characters and control character sequences for synchronised transmission of binary coded data between stations in a data communications system.

Buffer A temporary storage space. Data may be stored in a buffer as it is received, before or after transmission. A buffer may be used to compensate for the differences between the speed of transmission and the speed of processing.

Byte A group of 8 bits.

Carrier A signal suitable for modulation by another signal containing information to be transmitted. The carrier is usually a sine wave for analog systems.

CCITT (Consultative Committee for International Telephone & Telegraph) A standards-making body whose recommendations are more closely followed in Europe than North America.

Channel, voice Grade A channel, generally with a frequency range of about 300 to 3400 Hz, suitable for transmission of speech or data in analog form. Data transmission rates of 9600 BPS can be achieved by modulation techniques that produce a baud rate of 2400.

Character A letter, figure, number, punctuation, or other symbol contained in a message or used in a control function.

Character Set The characters that can be coded and/or printed by a particular machine.

Code A set of unambiguous rules specifying the way in which characters can be represented.

Committed Information Rate The minimum operating rate supported by a frame relay service.

Common Carrier A company that furnishes communication services to the general public and that is regulated by appropriate state or federal agencies.

Conditioning, Line The addition of equipment to a leased voice-grade channel to improve analog characteristics to allow higher rates of data transmission.

Constellation Pattern The pattern got from plotting the location of each bit combination modulated by a modem through phase and amplitude changes.

Contention The facility provided by the dial network or a port selector that allows multiple terminal to compete on a first-come-first-served basis for a smaller number of computer ports.

CRC (cycle redundancy check) A numeric value derived from the bits in a message. The transmitting station uses one of several formulas to produce a number that is attached to message. The receiving station applies the same formula and should derive the same number. If the numbers are not the same, an error condition is declared.

D/A converter A device that changes digital pulses into analog signals.

Data Compression A technique that can move more data through the circuit than the signalling system would otherwise allow by transforming a set of data into a smaller representation of that data.

dB (Decibel) A logarithmic measure of the ratio between two powers, P1 and P2. The equation is $dB = 10 \log$

DB-25 The designation of a standard plug-and-jack set used in RS-232C wiring: 25-pin connectors, with 13 pins in one row and 12 in the other row.

dBm Decibel referenced to one milli watt. Used in communications circuits as a measure of signal power. Zero dBm equals one milli watt into a specified impedance, often 600 ohms.

DCE (Data Communications Equipment also Data Circuit-Terminating Equipment) The equipment that provides the functions required to establish, maintain, and terminate a connection, and provides the signal conversion required for communication between data terminal equipment and the telephone line or data circuit. Refers to any X.25 network component that implements the CCITT X.25 standard.

Delay Equalizer A corrective network that is designed to make the phase delay or envelope delay of a circuit or system substantially constant over a desired frequency range.

Delay, Propagation The time required for a signal to travel from one point to another in a component, circuit, or system.

Demodulation The process of retrieving data from a modulated carrier wave; the reverse of modulation.

Dial-Up Line A communications circuit established by dialling a destination over a commercial telephone system. Network switches create a temporary point-to-point connection that is broken down and relocated when the call ends.

Dialling Directory A module in a communications program that permits telephone numbers and descriptions of those numbers to be entered. Selecting an entry in the dialling directory results in the program dialling the number associated with the entry.

Dibit A group of two bits. In four-phase modulation, such as differential phase shift keying (DPSK), each possible dibit is encoded as one of four unique carrier phase shifts. The four possible states for a dibit are 00, 01, 10 and 11.

Digital In common use, on/off signalling; signals consist of 0's and 1's instead of a great multitude of analog-modulated frequencies.

Digital Repeater A data regenerator that, on the detection of the rise of a digital pulse's leading edge, regenerates the pulse.

Digital Signal A discrete or discontinuous signal; one whose various states are identified with discrete levels or values.

Distortion Any change to the transmitted signal. Distortion can be caused by cross-talk, delay, attenuation, or other factors.

Distortion, Delay Distortion resulting from non-uniform speed of transmission of the various frequency components of a signal through a transmission medium. Also called group delay.

Distortion, Harmonic The result of non-linearities in the communication channel that cause harmonics of the input frequencies to appear in the output.

Distortion, Linear (of Amplitude) An unwanted change in signal amplitude so that the output signal envelope is not proportional to the input signal envelope, but no frequency related distortion is involved.

DTE (data terminal equipment) A computer or business machine that provides data in the form of digital signals at its output. Refers to any end-user device that can access an X.25 network using the CCITT X.25 standard, LAP/LAB, and X.25 PAP.

Duplex 1. In communications circuits, the ability to transmit and receive at the same time; also referred to as full duplex. Half-duplex circuits can receive only or transmit only. 2. In terminals, a choice between displaying locally generated characters and echoed characters.

EBCDIC (Extended Binary Coded Decimal Interchange Code) The data alphabet used in all IBM computers except the PC; it determines the composition of the 8-bit string of 0's and 1's representing each character (alphabetic, numeric, or special).

Echo Suppressor A device that allows transmission in only one direction at a time. They are inserted in telephone circuits to attenuate echoes on long-distance circuits. They are not desirable in data communications circuits because they increase the turnaround time.

EISA (Extended Industry Standard Architecture) A PC bus system serves as an alternative to IBM's Micro Channel Architecture (MCA). The EISA architecture, backed by an industry consortium headed by Compaq, is compatible with the IBM AT bus; MCA is not.

Emulation Simulation of a system, function, or program.

Equalisation The process of reducing the effects of amplitude, frequency, and/or phase distortion of a circuit by inserting networks to compensate for the difference in attenuation and/or time delay at various frequencies in the transmission band.

Facsimile (Fax) The transmission of page images by a system that is concerned with patterns of light and dark rather than with specific characters. Older systems use analog signals; newer devices use digital signals and may interact with computers and other digital devices.

Fault Tolerance A method of ensuring continued operation through redundancy and diversity.

FCC Federal Communications Commission.

Filter A network designed to transmit electrical signals having frequencies within one or more frequency bands and to attenuate signals of other frequencies.

Firmware Frequently called software programs that are burned into a chip. The software contained in the firmware controls the functions of a system's hardware.

Flow Control A convention used to regulate communications between two nodes. Hardware and software techniques are available.

Frame Relay A packet switched service that does not provide for error detection and correction, resulting in minimal routing delays.

Frequency Division Multiplexer A device that divides the available transmission frequency range into narrower bands, each of which is used for a separate channel.

Frequency Response The change in attenuation with frequency relative to the attenuation at TA reference frequency. Also called attenuation distortion.

FSK (Frequency Shift Keying) A form of frequency modulation commonly used in low-speed modems in which the two states of the signal are transmitted as two separate frequencies.

FTP (File Transfer Protocol) A protocol that describes how one computer can host other computers to allow transferring files in either direction. Users can see directories of either direction. Users can see directories of either computer on the host and perform limited file-management functions. Software for the FTP client function is usually a part of TCP/IP packages for the PC; some vendors also provide FTP host software for the PC. *See TFTP.*

Full Duplex The ability for communications to flow both ways over a communications link at the same time.

Half Duplex 1. Alternating transmissions; each station can either transmit or receive, not both simultaneously. 2. In terminals, describes the condition when a terminal displays its own transmissions instead of a remote-end echo. 3. The configuration option in some modems all allowing local character echo.

Handshaking Exchange of control codes or specific characters to control data flow.

Inband Signalling A method of flow control in which a device transmits a character (usually an XOFF) to inform another device to suspend transmission and another character (usually an XON) to resume transmission.

Interface A shared boundary defined by common physical interconnection characteristics, signal characteristics, and meanings of interchanged signals.

Intermodulation Noise Spurious frequencies, such as sum and difference frequencies, which are the products of frequencies transmitted through a non-linear circuit.

Internet A collection of networks and gateways including ARPAnet, MILnet, and NSFnet (National Science Foundation net). Internet uses TCP/IP protocols.

Interrupt A signal that suspends a program temporarily, transferring control to the operating system when input or output is required. Interrupts may have priority levels, and higher-priority interrupts take precedence in processing.

I/O Input/output.

IRQ (interrupt request) A computer instruction that causes an interruption of a program for an I/O task.

ISDN (Integrated Services Digital Network) As officially defined by CCITT, “a limited set of standard interfaces to a digital communications network.” The result is a network that supplies end users with voice, data, and certain image services on end-to-end digital circuits. The plan is to provide two 64-kilobit-persecond channels over digital telephone lines to desktops world-wide.

ISO (International Standards Organization) A Paris-based organization that developed the Open Systems Interconnection (OSI) model.

Jitter A tendency toward lack of synchronisation caused by mechanical or electrical changes.

Kilostream A digital network that operates in the United Kingdom.

Leased Line A communications circuit reserved for the permanent use of a customer; also called a *private line*. Leased lines typically involve high front-end installation costs.

Line (1) A circuit between a customer terminal and the central office. (2) The portion of a transmission system, including the transmission media and associated repeaters, between two terminal locations.

Link A circuit or transmission path, including all equipment, between a sender and a receiver.

Loopback Test a test of communications link performed by connecting the equipment output on one direction to the equipment input of the other direction and testing the quality of the received signal.

Mark One of the two possible states of a binary information element. The closed circuit and idle state in a teleprinter circuit. See Space

MCA (Micro Channel Architecture) The basis for IBM Micro Channel bus, used in high-end models of IBM's PS/2 series of personal computers.

MNP (Microcom Network Protocol) A standard developed by Microcom for providing asynchronous-data error control for model products.

Modem (Modulator/Demodulator) A device that translates between electrical signals and some other means of signalling. Typically a modem translates between direct-current signals from a computer or terminal and analog signals sent over telephone lines. Other modems handle radio frequencies and light waves.

Modulation A process of varying signals to represent intelligent information. The frequency, amplitude, or phase of a signal may be modulated to represent an analog or digital signal.

Multiplex To interleave or simultaneously transmit two or more messages on a single channel.

Multistation Access Unit A device that enables workstations on a LAN to be cabled in a star configuration.

Noise Random electrical signals, introduced by circuit components or natural disturbances, which tend to generate errors in transmission.

Outband Signalling A method of flow control in which an RS232 control signal (usually Clear to Send) is lowered to inform a device to suspend transmission and raised to inform a device to resume transmission.

PABX (Private Automatic Branch Exchange) A device that is installed on a customer's premises and that permits a large number of telephones to automatically access the switched telephone network by using a smaller number lines connecting the PABX to the telephone company network.

Packet A block of data sent over the network transmitting the identities of the sending and receiving stations, error-control information, and a message.

Parity In ASCII, a check of the total number of 1 bits (as opposed to 0's) in a character's binary representation. A final eighth bit is set so that the count, when transmitted, is always even or

always odd. This even or odd state can easily be checked at the receiving end; an incorrect parity bit can help reveal errors in the transmission.

PBX (Private Branch Exchange) Telephone switching equipment dedicated to one customer and connected to the public switched network.

Personal Computer A computer with processing power based on a microprocessor and designed primarily for use by one person.

Polling The individual selection of multiple terminals by a controller to allow transmission of traffic to/from all terminals on a multidrop line in an orderly manner.

Port An interface on a computer configured as data terminal equipment and capable of having a modem attached for communication with a remote data terminal.

PPP (Point-to-Point Protocol) One of two TCP/IP routing protocols for communications over serial communications lines without intervening adapters such as modems or other types of terminating equipment. The other TCP/IP protocol is called SLIP or *Serial Line Protocol*.

Primary Access A multiplexing arrangement whereby many ISDN Basic access subscribers can be connected to a digital network over a common line facility.

Protocol A specification that describes the rules and procedures that products should follow to perform activities on a network, such as transmitting data. If they use the same protocols, products from different vendors can communicate on the same network.

Protocol Analyzer A device that decodes a bit stream being monitored into characters that represent the format and information content of a transmission protocol.

RAM (Random Access Memory) Also known as read-write memory; the memory used to execute application programs.

Redundancy The portion of the total information contained in a message that can be eliminated without loss of essential information.

Repeater A communication system component that amplifies or regenerates signals to compensate for losses in the system.

RJ-11, RJ-45 Designations for commonly used modular telephone connectors. RJ-11, is the 8-pin connector used in most voice connections. RJ-45 is the 8-pin connector used for data transmission over twisted-pair telephone wire.

RS-232C An electrical standard for the interconnection of equipment established by the Electrical Industries Association; the same as the CCITT code V.24. RS-232C is used for serial ports.

Serial Port An I/O port that transmits data 1 bit at a time; contrasted with a parallel port, which transmits multiple bits (usually 8) simultaneously. RS-232C is a common serial signalling protocol.

Serial Transmission A method of information transfer in which the bits comprising a character are sent in sequence one at a time.

Slow Scan Video The process whereby still video images are transmitted frequently to provide the appearance of video motion.

Space One of the two possible states of a binary information element. The open circuit or no current state of a teleprinter line. See Mark.

Start Bit or Element The first bit or element transmitted in the asynchronous transmission of a character to synchronize the receiver.

Statistical Multiplexer A multiplexer that uses the idle time of connected devices to carry data traffic from active devices.

Stop Bit or Element The last bit or element transmitted in the asynchronous transmission of a character to return the circuit to the at-rest or idle condition.

Symbol The graphical representation of some idea that is used by people. Letters and numbers are symbols.

Synchronous Refers to a transmission system in which characters are synchronised by the transmission of initial sync characters and a common clock signal. No stop or start bits are used.

TA (Terminal Adapter) A device that is used to permit equipment with a non-ISDN interface to be connected to that digital network.

TDM (Time Division Multiplexer) A device that permits the transmission of two or more independent data channels on a single high-speed circuit by interleaving the data from each channel on the circuit by time.

TE1 (Terminal Equipment 1) Devices that comply with the ISDN network interface and can be connected directly to the digital network.

TE2 (Terminal Equipment 2) Devices that do not have an ISDN interface and must be connected by using a TA (terminal adapter) to the digital network.

Ter Meaning third in Latin, this term is used as a suffix to denote a third version of a CCITT modem standard.

Terminal Emulation Software or firmware that enables a personal computer or terminal to duplicate the screen attributes of a terminal.

Transmission, Asynchronous Transmission in which each information character is individually synchronized, usually by the use of start and stop elements.

Transmission Synchronous Transmission in which the sending and receiving instruments are operating continuously at substantially the same frequency and in which the desired phase relationship can be maintained by means of correction.

Trellis Coded Modulation A modem modulation process in which one or more redundant bits is added to each group of bits used to generate a signal change. The extra bit or bits permits only certain sequences of signal points to be valid, resulting in a lowering of the error rate.

Turnaround Time The actual time required to reverse the direction of transmission from sender to receiver or vice versa when using a half-duplex circuit. Time is required for line propagation effects, modem timing, and computer reaction.

UART (Universal Asynchronous Receiver/Transmitter) A device that performs asynchronous communication functions by converting parallel digital output from a DTE into serial bit transmission and vice versa.

V.32 A CCITT standard that describes how modems should talk to each other using two-way signalling at 4,800 and 9,600 bps over dial-up telephone lines. A newer version, V.32bis, adds 7,200-, 12,000-, and 14,400-bps transfer rates.

V.32bis *See V.32*

V.42 A CCITT hardware-implemented asynchronous error-control standard.

V.42bis A CCITT-standard method of implementing data compression on the fly in hardware.

XMODEM A half-duplex file transfer protocol limited to transmitting one file at a time.

YMODEM A half-duplex file transfer protocol that supports the transfer of multiple files.

ZMODEM A full-duplex file transfer protocol that supports the transfer of multiple files and enables a previously interrupted transmission to be resumed at the point of interruption.