

NEWTON'S TELECOM DICTIONARY

**The Official Dictionary of
Telecommunications & the Internet**

- ◆ IP Telephony ◆ LANs & Intranets ◆ Call Centers & Computer Telephony
- ◆ Fiber Optics, SONET and DWDM ◆ Satellites
- ◆ Voice, Data, Image & Video Networking
- ◆ Wired and Wireless Telecom ◆ VoIP
- T-1, T-3, T-4, E-1, E-3 ◆ ISDN & ADSL
- Cable Modems ◆ Cellular, PCS & GSM
- Windows 95, 98, NT, NetWare, Apple,
Sun & Unix Networking ◆ Ecommerce



by Harry Newton

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Published in the United States by
Telecom Books,
An Imprint of Miller Freeman, Inc.
12 West 21 Street
New York, NY 10010
212-691-8215 Fax 212-691-1011
1-800-999-0345 and 1-800-LIBRARY

ISBN Number 1-57820-023-7

October, 1998

Manufactured in the United States of America

Fourteenth Considerably Expanded and Updated Edition
Cover Design by Saul Roldan
Printed at Command Web, Secaucus, New Jersey
www.commandweb.com

execution of an application under development. At the basic level, a debugger lets you look at running machine code and fiddle around with the contents of memory — great if you understand machine code (and are looking at machine code you've written from scratch). Not great if you don't know machine code, or are looking at machine code output by a source-level language compiler (e.g., C++ compiler). A basic debugger references the symbol table of an executable, providing readable variable names, function entry points, etc., more or less as they appear in source. Easier for source-level language folks (because of the labels). Not much for high-level language folks, because you're still dealing with machine code. A source-level symbolic debugger references both the symbol table of an executable and various tables produced during compilation; and lets you work with source-level language source directly, during target program execution. Fully-integrated debuggers like this are built into Visual/X products. Functions common to most debuggers include the ability to set "breakpoints" (i.e., run the program until you reach this step, then stop), "watch variables" (i.e., show me how the value of this variable changes), "possibly stop if it assumes a predetermined value", "step execution" (i.e., do this step and stop), change variable values in mid-execution, etc.

Symbolic Language A computer programming language that expresses addresses and instructions with symbols convenient to humans rather than machines.

Symbolic Logic The discipline in which valid arguments and derivations are dealt with using an artificial language designed to avoid the ambiguities and logical inadequacies of natural languages.

Symmetric Balanced in proportion. In the networked world, symmetric or symmetrical (either is acceptable) can refer to a balance of bandwidth. For example, ISDN BRI provides symmetric bandwidth, as each of the two B channels provides bandwidth in each direction and the D channel operates at 16 Kbps in each direction. Symmetric also can refer to the physiology of the network. For example, a point-to-point connection connects one device directly to one other device symmetrically; on the other hand, refers to something which is not symmetrically balanced. See the next several definitions. See **Asymmetric**.

Symmetric Connection A connection with the same bandwidth value specified for both directions.

Symmetric Multiprocessing SMP. A type of multiprocessing in which more than one processor can execute kernel code at the same time. The degree of symmetry can vary, where there is very little concurrency of execution. Theoretically ideal fully-symmetric system where execution can be executed on any processor at any time. Processors within the same system share all processing, including disk I/O, network I/O and memory. Compare to **Asymmetric Multiprocessing**, wherein processors on one or different systems are dedicated to specific tasks, including disk I/O, network I/O or memory management. They are responsible for running the operating system. Each processor usually has its own dedicated memory. See **SMP**.

Symmetric Channel A channel in which the send and receive directions of transmission have the same data rate.

Symmetric Compression A compression system that requires equal processing capability for compression and decompression of an image. This form of compression is

used in applications where both compression and decompression will be utilized frequently. Examples include: still-image debiasing, still-image transmission (color fax), video production, video mail, videophones, and videoconferencing.

Symmetrical Digital Subscriber Line See **SDSL**.

Symmetrical Pair A balanced transmission line in a multipair cable having equal conductor resistances per unit length, equal impedances from each conductor to earth, and equal impedances to other lines.

Syn, Syn Character, Synchronous Idle In synchronous transmission. Control character in character-oriented protocols used to maintain synchronization and as a time-fill character in the absence of data. The sequence of two SYN characters in succession is used to maintain synchronization following each line turnaround. Contrast with flag.

Syn 1. Synchronization character.

Syn 2. The portion of an encoded video signal that occurs during blanking and is used to synchronize the operation of cameras, monitors, and other equipment. Horizontal sync occurs within the blanking period in each horizontal scanning line, and vertical sync occurs within the vertical blanking period.

Syn Bits Synchronizing bits (more properly bytes or characters) used in synchronous transmission to maintain synchronization between transmitter and receiver.

Syn Generator A video term. A device that generates synchronizing pulses need by video source equipment to provide proper equipment or studio timing. Pulses typically produced by a sync generator include subcarrier, burst flag, sync, blanking, H & V drives, color frame identification, and color black.

Syn Pulse Timing pulses added to a video signal to keep the entire video process synchronized in time.

Synchronous Service Dedicated point to point and multipoint digital data transmission service offered by BellSouth at speeds of 2.4, 4.8, 9.6, 19.2, 56 and 64 Kbps.

Synchronization 1. A networking term which means that the entire network is controlled by one master clock and transmissions arrive and depart at precise times so that information is neither lost nor jumbled. For a bigger explanation, see **NETWORK SYNCHRONIZATION** and **SYNCHRONOUS**.

2. An uninterruptible power supply (UPS) definition. Specially designed circuitry is "synchronized" to your AC power outlet to ensure continuity of power. Without this feature, power reversal can occur on the input.

3. A multimedia term. Synchronization is very precise real-time processing, down to the millisecond. Some forms of multimedia, such as audio and video, are time critical. Time delays that might not be noticeable in text or graphics delivery, but are unacceptable for audio and video. Workstations and networks must be capable of transmitting this kind of data in a synchronized manner. Where audio and video are combined, they must be time stamped so that they can both play back at the same time.

4. Start with a database on your server. Now, take a copy of part of it on your laptop — for example, your very own sales leads. Go traveling. Come back in a week. You want to update the database with your changes. But you don't want to destroy other people's changes. Some people are calling this "file synchronization." Synchronization is a critical part of what is increasingly being called "Groupware." See also **REPLICATION**.

5. A video term referring to the timing of the vertical and horizontal presentation of the multiple still images. Vertical sync prevents the picture from flipping, or scrolling unnaturally. Horizontal sync keeps the picture from twisting. If both vertical and horizontal are out of sync, the picture looks truly wretched.

Synchronization Bit A binary bit used to synchronize the transmission and receipt of characters in data communications.

Synchronization Bits Bits transmitted from source to destination for the purpose of synchronizing the clocks of the transmitting and receiving devices. The term "synchronization bit" is usually applied to digital data streams, whereas the term "synchronization pulse" is usually applied to analog signals.

Synchronization Code In digital systems, a sequence of digital symbols introduced into a transmission signal to achieve or maintain synchronism.

Synchronization Pulses Bits transmitted from source to destination for the purpose of synchronizing the clocks of the transmitting and receiving devices. The term "synchronization pulse" is usually applied to analog signals, whereas the term "synchronization bit" is usually applied to digital data streams.

Synchronize The word synchronize means "to cause to match exactly." When you're synchronizing, you're causing one file on one computer to precisely match another one on another computer. Why would you want to do this? Let's say you have a database of sales contacts on a file server. One of your salesman takes a copy of his sales contacts with him on his laptop. He travels and makes changes to his contacts. Now he dials into the office via modem and wants to "synchronize" his changed database with the now-changed main database, and make them both the same, i.e. into sync. This process is far more difficult than it sounds because it means allowing for the changes made at the server and by the salesman. You have to set up elaborate rules.

In operating systems, such as Windows NT, the word "synchronize" has a narrower meaning. Windows NT instruction manual defines "synchronize" as "to replicate the domain controller to one server of the domain, or to all the servers of a domain. This is usually performed automatically by the system, but can also be invoked manually by an administrator." See also **REPLICATE**.

Synchronizing Achieving and maintaining synchronism. In facsimile, achieving and maintaining predetermined speed relations between the scanning spot and the recording spot within each scanning line.

Synchronizing Pilot In FDM, a reference frequency used for achieving and maintaining synchronization of the oscillators of a carrier system or for comparing the frequencies or phases of the currents generated by those oscillators.

Synchronous The condition that occurs when two events happen in a specific time relationship with each other and both are under control of a master clock. Synchronous transmission means there is a constant time between successive bits, characters or events. The timing is achieved by the sharing of a single clock. Each end of the transmission synchronizes itself with the use of clocks and information sent along with the transmitted data. Synchronous is the most popular communications method to and from mainframes. In synchronous transmission, characters are spaced by time, not by start and stop bits. Because you don't have to add these bits, synchronous transmission of a message will take fewer bits (and therefore less time) than asynchronous transmission. But because precise clocks and careful timing are needed in synchronous transmission, it's usually more expensive to set up synchronous transmission. Most networks are synchronous these days. See **ASYNCHRONOUS** and **NETWORK SYNCHRONIZATION**.

Synchronous Completion A computing domain issues a service request and need not wait for it to complete. If the computing domain waits for this completion, this is known as **SYNCHRONOUS**, but if it is sent off to another system entity

electromagnetic waves by scattering as a result of irregularities or discontinuities in the physical properties of the troposphere. A method of transhorizon communications using frequencies from approximately 350 MHz to approximately 8400 MHz. The propagation mechanism is still not fully understood, though it includes several distinguishable but changeable mechanisms such as propagation by means of random reflections and scattering from irregularities in the dielectric gradient density of the troposphere, smooth-Earth diffraction, and diffraction over isolated obstacles (knife-edge diffraction).

Tropospheric Wave A radio wave that is propagated by reflection from a place of abrupt change in the dielectric constant or its gradient in the troposphere. In some cases, the ground wave may be so altered that new components appear to arise from reflection in regions of rapidly changing dielectric constant. When these components are distinguishable from the other components, they are called "tropospheric waves."

Trouble Number Display The operator will know what the trouble is with the phone system by seeing a number pop up on her/his console. That number may pop up automatically or the operator may have to hit the ALM (for ALARM) or similar button.

Trouble Ticket Form used to report problems. Often incorrectly filled-in. Check.

Trouble Unit A weighting figure applied to telephone circuit or circuits to indicate expected performance in a given period.

Troubles Per Hundred Troubles per hundred is a criterion for acceptable customer service which telephone companies and public utility commissions have agreed upon. It's measured in terms of the number of complaints received per hundred telephones in one month. Six complaints per hundred is considered the maximum for acceptable service. See QUALITY OF SERVICE.

TRS-80 Tandy Radio Shack-80. One of the early PCs. It was introduced by Tandy Corporation through its Radio Shack stores. It was based on the Zilog Z80 chip and began selling in the late 1970s. Along with Apple and Commodore it proved the viability of personal computers. The TRS-80 helped ensure the success of later generations of PCs by introducing a spreadsheet called Visicalc, word processing such as Electric Pencil, WordStar and databases such as dBASE. It also was one of Microsoft's earliest customers for their Basic language package. There were several TRS-80 models including the original Model 1, Model 2, Xenix (UNIX), Model 3 with integrated drives and Model 4. Some of the models could run CP/M or TRSDOS. Tandy later also introduced the Model 100 which was, arguably the first Laptop/Notebook, and for which Bill Gates is alleged to have written much of the software code. Detractors of the TRS-80 referred to it as the "Trash-80." The TRS-80 Model 2 actually had a cage designed for the specific purpose of accepting printed circuit cards. Sadly, Radio Shack never released the technical specs on the cage. No one (including Radio Shack itself) produced cards and the machine was quickly superseded by the IBM PC. In short, Radio Shack once had the market for PCs right at its fingertips. But blew an incredible opportunity. Sad.

TRU Inside a telephone system, the TRU (the Tone Receiver Unit) is used to retrieve and interpret touch-tone data received. Those tones might be sent by a TSU — Tone Sender Unit.

TrueSpeech TrueSpeech is a low-bandwidth method of digitizing speech, which was created by a company called DSP Group, Inc. Santa Clara, CA. TrueSpeech uses compression to drop one minute of voice down to 62 kilobytes with remarkably little degradation. It is used in many digital telephone

answering devices for storing and reproducing voice. TrueSpeech's compression is not meant for high fidelity music. But it is more than acceptable for such business applications as voice mail, voice annotation, dictation, and education and training. The small file size means that it can be transferred more easily to other users by using either a corporate network. The DSP Group describe TrueSpeech an enabling technology for speech compression in personal computers and future personal communications devices. Speech compression is key technology to the effective convergence of personal computers and telephony. TrueSpeech compression is a technology based on complex mathematical algorithms which are derived from the way airflow from our lungs is shaped by the throat, mouth, and tongue when we speak. This shaping is what our ear finally hears. TrueSpeech is 5 to 15 times more efficient than other methods of digital speech compression. For example, a one minute long speech file which uses other PC audio technology would consume as much as 960 kilobytes. With TrueSpeech, the same file would be just over 60 kilobytes. TrueSpeech is used in the Microsoft Sound System, which also lets you choose the voice sampling you wish when you're recording material. Here is Microsoft Sound System's recording options:

Sampling Rate Technology

TrueSpeech	62K per minute	8 KHz	Proprietary
Voice	234K per minute	8 KHz	ADPCM
Radio	322K per minute	11 KHz	ADPCM
Tape	1291K per minute	22 KHz	PCM
CD	5176K per minute	44 KHz	PCM

The above is for mono recordings. For stereo, double the amount of space.

TrueType A Windows 3.1 feature. Fonts that are scalable and sometimes generated as bitmaps or soft fonts, depending on the capabilities of your printer. TrueType fonts can be sized to any height, and they print exactly as they appear on the screen. Using TrueType, you'll be able to create documents that retain their format and fonts on any Windows 3.1 machine — even if the fonts aren't installed on that computer. This makes Windows 3.1 documents portable.

Truevoice 1. In the fall of 1993, AT&T announced that it was introducing new voice quality throughout its long distance network. And that it was calling that quality "true voice." AT&T set up a demo line. Some people thought they could notice an improvement. Some thought they couldn't. I personally thought true voice sounded pretty good.

2. The trademark name of Centigram's text-to-speech product, which they acquired from SpeechPlus.

Trumpet Winsock A once-popular Windows 3.xx communications program and TCP/IP stack which allowed people to dial into the Internet and use browsers to surf the Internet. I never liked the program and had great difficulty with it. Fortunately the program has effectively been killed by dial up networking capabilities now part of every Windows 95.

Truncated Binary Exponential Back Off Another name for exponential back off used in IEEE 802.3 local area networks. In an exponential back-off process, the time delay between successive attempts to transmit a specific frame is increased exponentially.

Truncation In data processing, the deletion or omission of a leading or a trailing portion of a string in accordance with specified criteria.

Trunk A communication line between two switching systems. The term switching systems typically includes equipment in a central office (the telephone company) and PBXs. A

tie trunk connects PBXs. Central office trunks connect a PBX to the switching system at the central office.

Trunk Access Number 1. The number of the trunk over which a call is to be routed.

2. The number that needs to be dialed in order to gain access to an outbound trunk. This applies to both local and local distance trunks, as the access number can be different.

Trunk Answer A phone system feature. This feature allows a ringing call to be answered from any telephone in the system. Typically the feature must be activated in phone system programming.

Trunk Answer From Any Phone A phone system feature. When a call comes in, something rings. You can now answer the incoming call from any phone. To do so, you must dial a special code or hit a special feature button on your phone. When my office phone system bells ring, all we have to do is to touch "6" on any phone and we can answer the incoming call. Typically the feature must be activated in phone system programming.

Trunk Data Module TDM. Provides the interface between the DCP signal and a modem or Digital Service Unit (DSU).

Trunk Direct Termination An option on switchboards which terminates a trunk group on one key (or button) on the console.

Trunk Encryption Device TED. A bulk encryption device used to provide secure communication over a wideband digital transmission link. It is usually located between the output of a trunk group multiplexer and a wideband radio or cable facility.

Trunk Exchange A telephone exchange dedicated primarily to interconnecting trunks.

Trunk Group A group of essentially like trunks that go between the same two geographical points. They have similar electrical characteristics. A trunk group performs the same function as a single trunk, except that on a trunk group you can carry multiple conversations. You use a trunk group when your traffic demands it. Typically, the trunks in a trunk group are accessed the same way. You dial your Band 5 WATS trunk group by dialing 62, for example. If the first trunk of that group is busy, you choose the second, then the third, etc. See TRUNK HUNTING.

Trunk Group Alternate Route The alternate route for a high-usage trunk group. A trunk group alternate route consists of all the trunk groups in tandem that lead to the distant terminal of the high-usage trunk group.

Trunk Group Multiplexer TGM. A time division multiplexer whose function is to combine individual digital trunk groups into a higher rate bit stream for transmission over wideband digital communication links.

Trunk Group Warning Alerts the attendant when a preset number of trunks in a group are busy. See TRUNK GROUP.

Trunk Holding Time The length of time a caller is connected with a voice processing system. Defined from the time when the system goes off-hook to the time the port (i.e. the trunk) is placed back on hook.

Trunk Hunting Switching incoming calls to the next consecutive number if the first called number is busy.

Trunk Make Busy A fancy name for saying that, by punching a few buttons on the console, you can make any trunks in your PBX or key system busy, effectively putting the trunk out of service. You may want to do this if your trunk is acting up. By busying it out at the console, you are effectively denying its use to anyone in the company. Thus you are protecting yourself from further complaints. Hopefully, it will

be repaired promptly.

Trunk Monitoring Feature which allows individual trunk testing to verify supervision and transmission. You dial an access code and then the specific trunk number from the attendant console. You want the ability to test a specific trunk because normally you might be only accessing a trunk group when you dial an access code. Thus, each time you dial into the trunk group, you might end up on another individual trunk. Some PBXs have a variation of trunk monitoring, whereby if a user encounters a bad trunk, he can dial a specific code, then hang up. The PBX recognizes these digits and makes a trouble report on that specific trunk, possibly reporting it to the operator, keeping it in memory for later analysis or dialing a remote diagnostic center and reporting its agony.

Trunk Number Display The specific trunk number of an incoming call can be displayed on the attendant console, enabling your attendant to instantly identify the origin of certain calls. For example, if you have several tie lines to branch offices, your attendant knows immediately which office is calling. Many newer PBXs have displays on individual telephones, which show the actual trunk being used for outgoing and incoming calls. This provides an additional measure of control. You might, for example, speak faster if you knew the call was coming in on your IN-WATS line. You might also answer the call differently if you know what trunk it's coming in on. For example, you might be running several, totally-separate businesses from the same console. Each business has a different number. The only way you know what to answer — Joe's Bakery or Mary's Real Estate — is by the trunk.

Trunk Occupancy The percentage of time (normally an hour) that trunks are in use. Trunk occupancy may also be expressed as the carried CCS per trunk.

Trunk Order A document (or data system equivalent) used in an operating telephone company to request a change to a trunk group.

Trunk Queuing A feature whereby your phone system automatically stacks requests for outgoing circuits and processes those requests on, typically, a first-in/first-out basis. See QUEUING THEORY.

Trunk Reservation The attendant can hold a single trunk in a group and then extend it to a specific phone. This means, for example, that a WATS line can be held for someone special — a heavy caller, the president of the firm, etc.

Trunk Restriction Some people may not be allowed to use certain trunks at certain times. The sophistication of trunk restriction depends on the switch and the way it's programmed.

Trunk Segment The main segment of cable in an Ethernet network is called the trunk segment.

Trunk Side Connection A carrier term. Trunk side connections are within the carrier network. InterMachine Trunks (IMTs) connect carrier switches to other carrier switches. Such switches include circuit switches such as Central Offices (COs) and Tandem switches, Frame Relay switches and routers, packet switches, and ATM switches. End user organizations can lease local loops with trunk side connections, as well; such a loop would appear to the carrier network as being a part of it, and would be used for access to ANI (Automatic Number Identification) information. Compare with Line Side Connection.

Trunk Type TT. Trunks that use the same type of equipment going to the same terminating location.

Trunk Type Master File TTMF. An MCI definition. A comprehensive listing of all trunk assignments on the MCI