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. **–** Star–dot–star. Any file, any filename extension. Used in some operating systems for the global copy, move or delete file operations under the specified directory. Also used in two other possible file combinations: any file with a particular file extension (for instance, *.doc), or a particular filename with any filename extension (dict.*).

1-2-3 – The name of the first publicly available spreadsheet program developed for personal computers by Lotus Corporation in 1982. The unusual name stands for the three basic functions of 1-2-3: graphics, spreadsheets and data management.

10-100 – Common name for a Ethernet/Fast Ethernet designation that has rates of both 10 and 100 Mbps, but not on the same port.

10Base2 **–** 10 Mbps Baseband 200 m. A kind of Ethernet LAN that uses 50-Ohm thin coaxial cable with a maximum length of 200 m per segment. See Fig. #-1.

10Base5 **–** 10 Mbps Baseband 500 m. A kind of Ethernet LAN that uses a thick coaxial cable (full specification) with up to 500-m-long segments. For longer-distance LANs, it is necessary to build in an appropriate number of re-peaters.

10BaseF – 10 Mbps Baseband Fiber. An IEEE Ethernet specification for fiber-optic cabling. See also 10BaseFB, 10BaseFL and 10BaseFP.

10BaseFB – 10 Mbps Baseband Fiber Backbone. A part of the IEEE 10BaseF specification that provides a synchronous signaling backbone, a maximum of 2000 m long, that allows extra network segments and repeaters to be connected to the network.

10BaseFL – 10 Mbps Baseband Fiber Link. A part of the IEEE 10BaseF speci-fication that provides an inter-repeater link, a maximum of 2000 m long.

10BaseFP **–** 10 Mbps Baseband Fiber Passive. A part of the IEEE 10BaseF specification that allows a number of computers to be organized in a star topology without repeaters. Segments can be up to 500 m long.

10BaseT – 10 Mbps Baseband Twisted Pair. An Ethernet that allows twisted pair cable as a backbone. The maximum speed of this kind of Ethernet is limited to 10 Mbps.

10BaseX **–** 10 Mbps Baseband any (X) Ethernet. A standard root for several baseband Ethernet specifications that operate at 10 Mbps or slower speeds. See 10Base2, 10Base5, 10BaseF and 10BaseT.

10Broad36 **–** 10 Mbps Broadband 36 MHz. An Ethernet network that uses a 75-Ohm coaxial cable based on the IEEE802.3 bus or a tree topology. It can operate at up to 10 Mbps. The distance supported is limited to 1800 m. Each of the two channels operates at 18 MHz, so the number 36 in the network name refers to twice 18 MHz.

Name	Cabling	Maximum segment distance
10Base2	thin coaxial	200 m
10Base5	thick coaxial	500 m
10BaseF	fiber cable	2000 m
10BaseFB	fiber cable	2000 m + extra segments
10BaseFL	fiber cable	2000 m + link
10BaseFP	fiber cable	500 m
10BaseT	twisted pair	100 m
100BaseFX	multimode fiber	400 m
100BaseT	unshielded twisted pair	100 m
100BaseT4	unshielded twisted pair 4	100 m
100BaseTX	twisted pair	100 m
100BaseVG	VG twisted pair	100–150 m
1000BaseCX	copper wire 150 □	25 m

Fig. #-1. Summary of baseband technologies

100BaseFX **–** 100 Mbps Baseband Fast Ethernet. The IEEE standard for Fast Ethernet (100 Mbps) over multimode fiber optic cabling. Segments can be up to 400 m long. See also 100BaseX.

100BaseT **–** 100 Mbps Baseband Twisted Pair. A series of IEEE802.3 standards for fast (100 Mbps) Ethernet using unshielded twisted pair cables.

100BaseT4 **–** 100 Mbps Baseband Twisted Pair (4). A series of IEEE802.3 standards for fast (100 Mbps) Ethernet using unshielded twisted pair cables with 4 wires.

100BaseTX **–** 100 Mbps Baseband Twisted Pair X. A Fast Ethernet specification based on twisted pair cables, either unshielded or shielded, with a

segment length up to 100 m. The first pair of wires is used to receive data and the second pair is used to transmit data.

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100BaseVG – 100 Mbps Baseband Voice Grade. An extension of 10BaseT Ethernet developed by HP and AT&T (IEEE802.12) based on voice grade (category 3) twisted pair cables (see UTP). Instead of CSMA/CD, used for ordinary Ethernet, 100BaseVG uses demand priority as the media access method. Furthermore, it requires 4-wire pairs and uses 5B/6B NRZ signal encoding. 100BaseVG/AnyLAN appears as an extension of 100BaseVG that can be used in either Ethernet or Token Ring in separated networks. It also supports isochronous data (e.g. voice or video). Compare with 10BaseT.

100BaseX – 100 Mbps Baseband any (X) Ethernet. The IEEE standard (IEEE-802.3u) for Fast Ethernet (100 Mbps based on Carrier Sense Multiple Access, see CSMA/CD). It appears in three variants (see 100BaseFX, 100BaseT4, and 100BaseTX).

1000BaseCX – 1000 Mbps Baseband Copper any (X) Ethernet. The IEEE standard (IEEE802.3z) for Fast Ethernet over copper cables.

1284 – The IEEE1284 parallel interface standard. See Enhanced Capability Port (ECP) and Enhanced Parallel Port (EPP).

1394 – A specification for a very fast external bus that supports data transfer rates of up to 400 Mbps. Also known as FireWire, which is a trademark of Apple for the original 1394 bus.

1G – First (1st)-Generation Wireless. A common name for an early wireless technology (from the late 1970s up to the late 1980s) based on radiotele-phony and analog voice encoding. Compare with 2G and 3G.

1GL – First (1st)-Generation Language. A common name for a machine lan-guage that consists of a set of instructions and data in the form of a string of 0s and 1s. Before the second, third, etc. (see 2GL, 3GL, 4GL and 5GL) generations of languages appeared, 1GL was the only way to program computers.

1NF – First (1st) Normal Form. Normal forms commonly representing an approach to structuring information in a relational database (1NF, 2NF, 3NF, etc.) or metalanguages that allow the description of other languages (see BNF). 1NF represents groups of records organized as a table in which each column (information field) contains a unique indivisible piece of information. The other normal forms of relational databases extend 1NF by additional relationships between the information fields (see 2NF, 3NF, 4NF, 5NF, BCNF and DKNF).

1ST – 1st (First). Filename extension for Microsoft Windows Readme (first) files. Such files are used, for example, as installation guidelines, descriptions of system requirements, etc.

2B+D – Two (2) Base channels + D channel. A term associated with the Basic Rate Interface in ISDN communications. See BRI and ISDN. Compare with PRI.
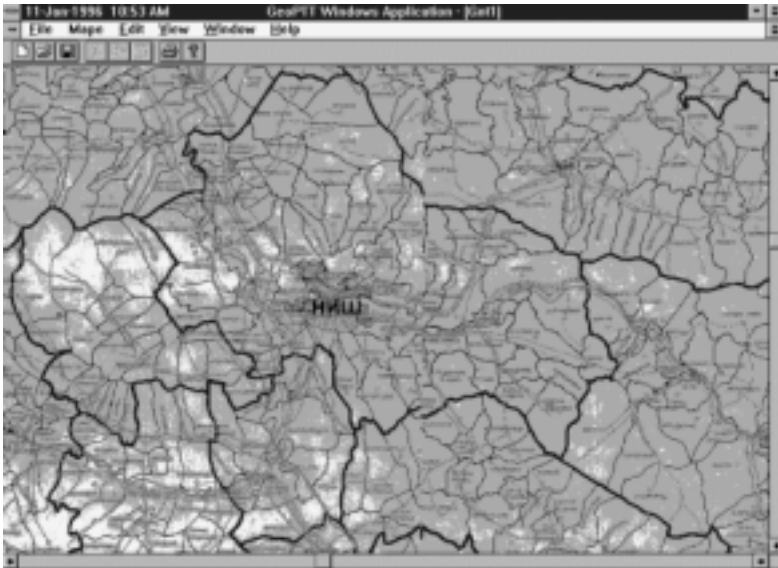

Fig. #-2. A map as an example of 2D graphics

2D – Two (2)-Dimensional. An umbrella term from the field of computer graphics that refers to a common attribute (two-dimensional, width and depth) of drawings, pictures, graphic systems, workstations, etc. 2D pictures can be native images (such as cartographic maps, as shown in Fig. #-2), schemes, or projections of 3D objects onto a particular plane.

2G – Second (2nd)-Generation Wireless. A common name for mobile wireless technology (first used in the 1990s) based on digital voice encoding. Examples are CDMA, TDMA and GSM. The technology is still under development in order to improve its bandwidth and routing, and include multimedia as well. With such capabilities the technology looks like something between 2G and 3G, so the term 2.5G is often used instead of 2G. Compare with 1G and 3G.

2GL – Second (2nd)-Generation Language. A common name for any assembly language (also known as an assembler) that uses particular processor-based commands and instructions at a higher level than that used by a 1GL. Such instructions are then translated into the machine-level code. For example, in GCOS6 (see GCOS) assembly language programming the instruction STORE $R1, LOC tells the computer to store the contents of register $R1 into a memory location with the symbolic name LOC. Compare with 1GL and 3GL.

2NF – Second (2nd) Normal Form. An approach to database design similar to 1NF but which introduces a primary key. More specifically, a relation R is in 2NF if it is in 1NF and also if every nonprime attribute is fully dependent on the primary key.
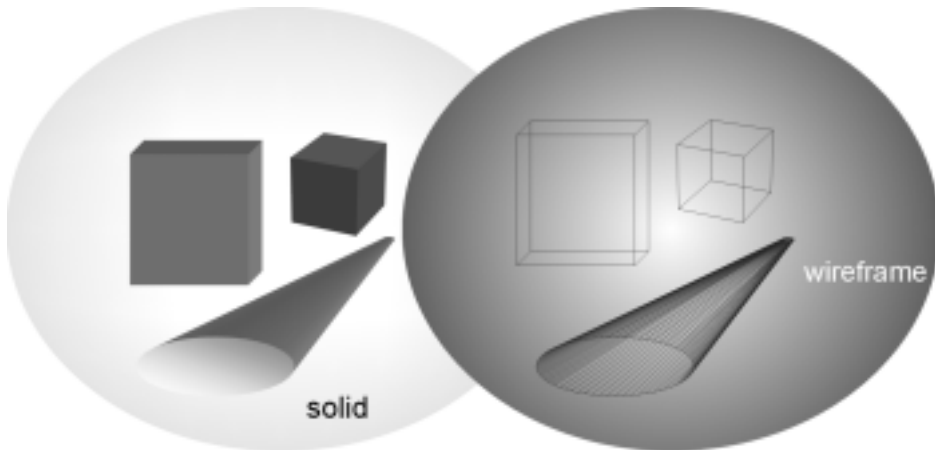

Fig. #-3. 3D graphics presentations

2PC – 2 (Two)-Phase Commit protocol. A protocol executed in distributed transactions to ensure atomicity (see ACID). It works as follows. When a transaction, initiated at a site, completes its execution, and all the sites at which the transaction has been executed inform the transaction coordinator that the transaction is completed, the transaction coordinator starts the 2PC protocol. During the first phase, 2PC asks transaction managers on sites where the transaction has been executed whether they are willing to commit their portion of the transaction. If the answer is "yes" from all the transaction managers called, 2PC commits the transaction in the second phase. If only

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one transaction manager answers "no", 2PC does not commit the trans-action at all. See also TM (Transaction Manager). Compare with 3PC.

3Com – **Computer, Communication and Compatibility.** One of the world's leading manufacturers of internetworking equipment founded in 1979 by Robert Metcalfe (http://www.3com.com).

3D – **3 (Three)-Dimensional.** A kind of computer graphics that allows object presentation in three dimensions, width, height and depth. Unlike 2D graphics, in addition to dimensions and colors, 3D graphics uses perspective, viewpoints, light sources etc. (see GKS-3D, VRC) to illustrate the real image of the object (scene). There are two techniques used, solid and wireframe, as shown in Fig. #-3.

3G – **Third (3rd)-Generation Wireless.** A common name for the next-generation wireless technology intended for fixed, mobile and portable communications. 3G systems should be able to operate from any location on Earth or over the Earth's surface, with rates greater than 2 Mbps and with routing using repeaters, satellites and LANs. All existing services are expected to be supported by 3G (paging, cellular phones, e-mail, web browsing, fax, videoconferencing, etc.). Enhanced multimedia capabilities are also required. It is expected that 3G will achieve full operability by the year 2005 in North America, Europe and Japan. The first attempt to offer 3G services happened on 1st October 2001, when NTT DoCoMo (http://www.docomo.com) launched its FOMA (Freedom of Mobile Multimedia Access), featuring plenty of bugs at that time. An article in "The Wall Street Journal" compared it with a powerful car which has bad styling, bad brakes, uses a lot of gas, etc. However, the technology pioneer didn't give up. "Mobile Media Japan" (http://mobilemediajapan.com) sent a message about DoCoMo. That part of NTT is expected to have 150,000 subscribers by the end of March 2002. Compare with 2G.

3GL – **Third (3rd)-Generation Languages.** A set of high-level language families that originated in the early 1960s. Typical examples are FORTRAN, COBOL and ALGOL. They introduced much improved programming possibilities compared to the low-level languages (assembly languages). They are more likely to be self-documented, they hide from programmers the low-level details of the target executing machine, the structure of the program follows the structure of the original problem under development rather than the structure of the processor design, architecture, etc. Due to their usefulness, legacy issues, and continuous standardization efforts, they have survived

down through the years. Figure #-4 illustrates the roots of famous 3GL families and their development tree from the 1960s up to today.

3NF – Third (3rd) Normal Form. In addition to 2NF features, 3NF requires that a relation has no transitive dependencies on nonprime key attributes.
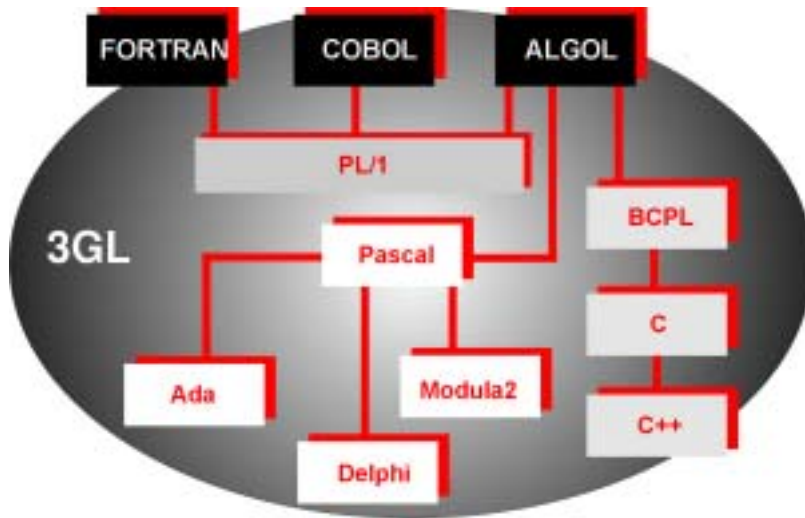

Fig. #-4. The 3GL family tree

3PC – 3 (Three)-Phase Commit protocol. A protocol executed in distributed transactions to ensure atomicity (see ACID). It is designed to avoid the possibility of blocking in a restricted case of possible failures. The first phase is identical to phase 1 of 2PC. In the second phase, in the case of a negative answer from any transaction manager, the transaction is aborted. If all transaction managers are ready to accept the committed transaction, 3PC precommits the phase, i.e. the transaction can still be aborted. Then, the transaction managers at the sites are informed that the transaction is in the precommit state. In the third phase, 3PC investigates whether a site has failed in the meantime and is waiting for an appropriate number of acknowledgments before making the final decision: commit transaction or abort transaction. See also 2PC.

3w – where, what and when. Term suggested (Djordjević-Kajan et al., 1997) for agent navigation in cyberspace when an agent requires some kind of interaction with other agents. Figure #-5 shows a typical example, where a mobile agent, in order to accomplish the delegated task, has to decide what

to do, where to go, and when (3w space). To do that, communication with other agents on possibly different platforms may be required (see UAA). See also KIF and KQML.
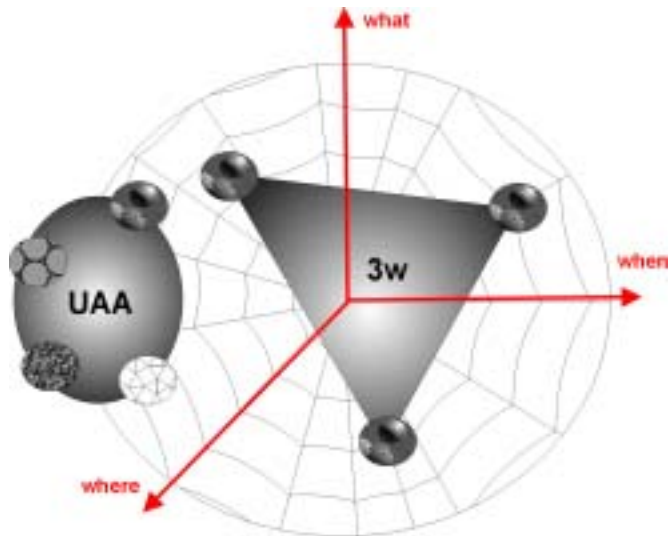

Fig. #-5. Mobile agent navigation in 3w space

404 – Not found. A status code returned by HTTP to a Web user when she/he tries to access a nonexistent site. Generally, there are two possible reasons for code 404, either the site no longer exists (also known as 404 limbo) or the wrong address was entered due to user typing errors. See also PURL.

4B/5B – 4-Bit/5-Bit local fiber. A fiber channel physical media and encoding scheme used for ATM and FDDI that allows speeds of up to 100 Mbps. In 4B/5B, every group of 4 bits is represented by a 5-bit symbol (explaining where the name comes from). This symbol is associated with a bit pattern that is then encoded using NRZI or another standard signal-encoding method. Sometimes abbreviated as TAXI (Transparent Asynchronous Transceiver/Receiver Interface). See also NRZI. Compare with 5B/6B and 8B/10B.

4GL – Fourth (4th)-Generation Languages. A common term related to programming languages that are oriented to end-users rather than to programming professionals. 4GLs speed up the application building process, minimize debugging problems, make user-friendly environments, reduce software maintenance costs, etc. They include application generators, report

generators, query languages, etc. (see Fig. #-6). Some examples of such languages, also explained in this book, or in the references (e.g. Martin, 1986), are ADS, ADF, ADRSII, APL, AS, CSP, QBE, QMF, SQL, etc.
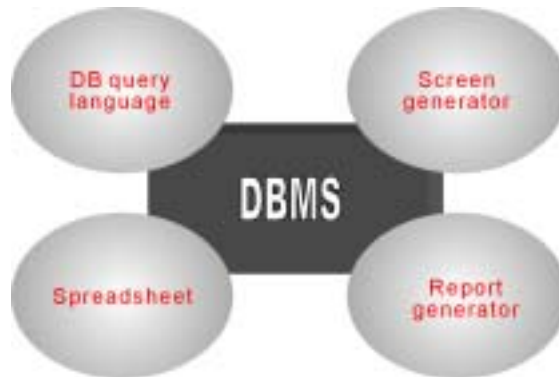
#

Fig. #-6. Some typical elements of a 4GL

4NF – Fourth (4th) Normal Form. A term from database design theory. A relation R is in 4NF if every nontrivial multivalued dependency is due to the keys. See 1NF, 2NF, 3NF and 5NF.

50X – 50 times X. The measurement term for the maximum data transfer rate in CD and DVD technologies. The term is expressed using a base of 150 KBps, which refers to the time required to read data from a compact disk in its original version (1X). Later improvements brought 2X, 4X, 8X, 12X, 24X, 32X, 40X and 50X.

5B/6B – 5-Bit/6-Bit encoding. An encoding scheme in 100BaseVG networks. In 5B/6B, every group of 5 bits is represented by a 6-bit symbol (explaining where the name comes from). This symbol is associated with a bit pattern that is then encoded using NRZI or another standard signal-encoding method. See also NRZI. Compare with 4B/5B and 8B/10B.

5GL – Fifth (5th)-Generation Languages. This term is used for programming languages having additional features compared with 4GLs. They originated in the field of artificial intelligence (see AI), especially in knowledge-based systems (see KBS), expert systems, speech recognition, decision support systems (see DSS), command, control, communication and intelligence systems (see C3I), active technologies such as mobile agents or active DBMS

(see ADBMS), etc. The pioneering language in this field was PROLOG. The common underlying language is LISP and its variations.

5NF – Fifth (5th) Normal Form. An approach to database design that assumes that every join dependency in the relation is implied by the candidate keys of that relation. Compare with 1NF, 2NF, 3NF and 4NF.

6bone – IPv6 Internet Backbone. An international experimental network that serves as a testbed for the next-generation Internet Protocol (see IP, IPv6 and IPng). 6bone has been in operation since mid-1996. It involves around 200 organizations in 30 countries. Figure #-7 shows part of the 6bone network. Additional information can be found at http://www.6bone.net
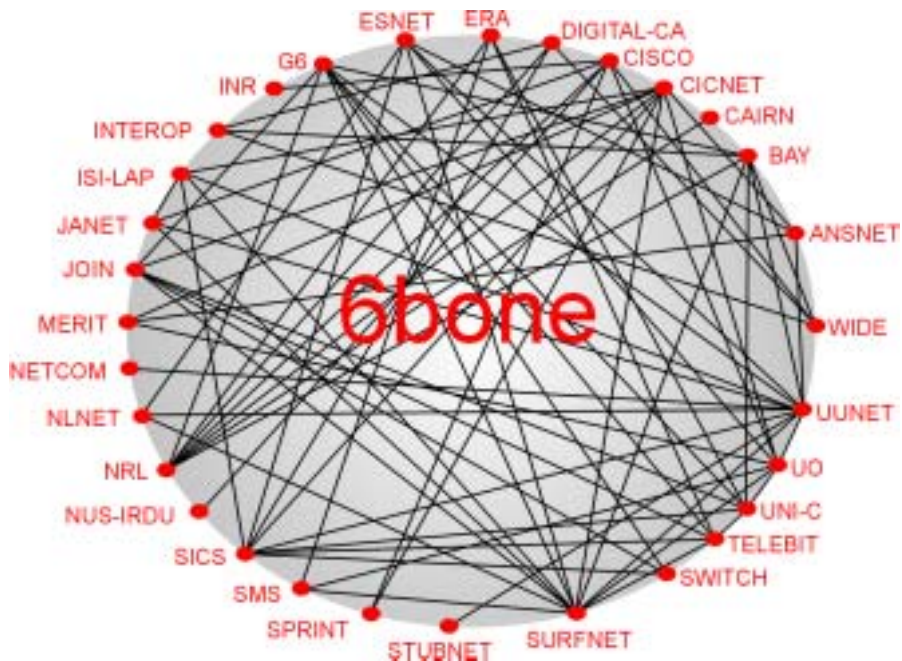

Fig. #-7. The 6bone backbone

6DOF – 6 Degrees Of Freedom. A term defining linear movement in either direction along each of three mutually perpendicular axes (i.e. x-, y- and z-axes), and rotation around each of the three axes in either direction. The term "Freedom" means that movement on any axis does not exclude any other simultaneous movement on any other axis; thus, a 6DOF device can interpret all possible motion within our 3-dimensional world.

6REN – IPv6 Research and Education Network. An initiative to promote IPv6   #
for high-quality high-performance operationally robust network services. See
also IPv6 and 6bone.

802.x – A set of standards developed by IEEE to define methods of access
and control of local area networks. They correspond to the ISO OSI
Reference Model in the physical and data-link layers, but they also split the
data-link layer into two sublayers (see LLC and MAC). The following are the
IEEE 802.x standards:

- 802.1 specifies standards for network management at the hardware
level. Adopted by ISO/IEC as the ISO/IEC8802-1 standard.

- 802.2 defines the operation of the LLC sublayer, making it transparent
to upper layers. In particular, framing, addressing and error control are
specified. Adopted by ISO/IEC as the ISO/IEC8802-2 standard.

- 802.3 describes the physical layer and the MAC sublayer for baseband
networks that use a bus topology and the CSMA/CD accessing protocol
(see CSMA/CD). Adopted by ISO/IEC as the ISO/IEC8802-3 standard.

- 802.3z describes the Ethernet at Gb speeds.

- 802.4 is similar to 802.3, but instead of CSMA/CD it uses token passing
accessing, and either CATV or fiber-optic cable. Adopted by ISO/IEC as
the ISO/IEC8802-4 standard. See also CATV.

- 802.5 describes the physical layer and the MAC sublayer for token ring
networks (see TR) that use a ring topology and the token passing
accessing protocol. Adopted by ISO/IEC as the ISO/IEC8802-5
standard.

- 802.6 describes standards for metropolitan area networks (see MAN).
See also DQDB. Adopted by ISO/IEC as the ISO/IEC8802-6 standard.

- 802.7 describes the minimal physical, electrical and mechanical
features of broadband cable, as well as the installation and maintenance
of such cable. Adopted by ISO/IEC as the ISO/IEC8802-7 standard.

- 802.8 describes the use of optical fiber in networks defined in the
standards 802.3–802.6. Adopted by ISO/IEC as the ISO/IEC8802-8
standard.

- 802.9 specifies the integration of voice and data over the same lines
(see IVD). Adopted by ISO/IEC as the ISO/IEC8802-9 standard.

- 802.10 specifies the security issues in LANs, as well as in architectures that are compatible with the OSI Reference Model (see OSI). Adopted by ISO/IEC as the ISO/IEC8802-10 standard.
- 802.11 addresses wireless networking standards (see WLAN). Adopted by ISO/IEC as the ISO/IEC8802-11 standard.
- 802.12 addresses the issues relating to the 100BaseVG proposal.

80X86 – A microprocessor family originally developed by Intel, introduced in 1982 with the first microprocessor 286 (80286). Since then the Intel brand names (286, 386, 486, 586) have become de facto standards for PC micro-processor architecture.

8B/10B – 8-Bit/10-Bit local fiber. A fiber channel physical media and encoding scheme that allows up to 149.76 Mbps datarates over multimode fiber (see MMF). In 8B/10B, every group of 8 bits is represented by a 10-bit symbol (explaining where the name comes from). This symbol is associated with a bit pattern that is then encoded using NRZI or another standard signal-encoding method. See also NRZI. Compare with 4B/5B and 5B/6B.

8N1 – Eight (8) data bits, No parity, one (1) stop bit. In serial communications, the term used for the most common serial port setup. It means that every element consists of eight bits, with no parity. The stop bit is a return to the idle value of the signal and it is mainly used as a confirmation that the transmission of the previous element is finished.

@ – at sign. The delimiter which separates the username and the hostname in an e-mail address (for instance, user@hostname). The "at" sign can be found on any computer keyboard and it is coded as a special character with ASCII code 40 HEX. This simple, but brilliant, choice by Ray Tomlinson allows e-mail users to easily remember e-mail addresses. See e-mail.