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АНГЛО-УКРАЇНСЬКИЙ НАВЧАЛЬНИЙ ТЛУМАЧНИЙ СЛОВНИК-МІНІМУМ З ІТ-ТЕРМІНОЛОГІЇ

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Англо-український навчальний тлумачний словник-мінімум з ІТ-термінології охоплює найуживанішу термінологічну лексику зі сфери інформаційних технологій, містить 300 термінів, аббревіатур та акронімів, які використовуються у сферах комп'ютерної техніки, програмування, а також в основних прикладних сферах. Видання призначено для фахівців з інформаційно-комунікативних технологій, зокрема студентів старших курсів напряму підготовки «Економічна кібернетика», та широкого кола користувачів, яких цікавить ця сфера.

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FIGURES

- ◆ **10BASE2** — архітектура Ethernet на основі стандартного 50-омного тонкого коаксіального кабелю — (also known as *Cheapernet*, *Thin Ethernet*, *Thinnet*, and *Thinwire*) a variant of Ethernet that uses thin coaxial cable, terminated with BNC connectors. For many years this was the dominant 10 Mbit/s Ethernet standard, but due to the immense demand for high speed networking, the low cost of Category 5 Ethernet cable and the popularity of 802.11 wireless networks, both 10BASE2 and 10BASE5 have become obsolete.

Example 1. In a **10BASE2** network, each segment of cable is connected to the transceiver using a BNC T-connector, with one segment connected to each female connector of the T.

Example 2. **10BASE2** networks could be difficult to maintain and were often replaced by **10BASE-T** networks, which also provided a good upgrade path to **100BASE-TX**.

- ◆ **10BASE5** — архітектура Ethernet на основі стандартного 50-омного товстого коаксійного кабелю — (also known as *Thicknet*) the original «full spec» variant of Ethernet cable, using special cable similar to RG-8/U coaxial cable. This is a stiff, 0.375-inch (9.5 mm) diameter cable with an impedance of 50 ohms (Ω), a solid center conductor, a form insulating filler, a shielding braid, and an outer jacket. The outer sheath is often yellow-to-orange / brown foam fluorinated ethylene propylene (for fire resistance) so it is often called «yellow cable», «orange hose».

Example 1. **10BASE5** has been superseded due to the immense demand for high speed networking, the low cost of Category 5 Ethernet cable, and the popularity of 802.11 wireless networks.

Example 2. Thick Ethernet, also called **10Base-5**, thicknet, or yellow Ethernet is an early form of networking hardware, designed to hook two or more devices together on one computer network.

- ◆ **10BASE-FB** — архітектура Ethernet на основі волоконно-оптичного кабелю — a network segment used to bridge network hubs.

Example 1. Due to the synchronous operation of **10BASE-FB**, delays normally associated with Ethernet repeaters are reduced, thus allowing segment distances to be extended without compromising the collision detection mechanism.

Example 2. The maximum allowable segment length for **10BASE-FB** is 2000 meters.

- ◆ **10BASE-FL** — архітектура Ethernet на основі волоконно-оптичного кабелю — the most commonly used 10BASE-F specification of Ethernet over optical fiber. It replaces the original FOIRL specification, but retains compatibility with FOIRL-based equipment. Maximum segment length values 2000 meters. Mixing it with FOIRL equipment, maximum segment length reduces to FOIRL's 1000 meters.

Example 1. The 10BASE-FL standard requires a duplex 62.5/125 μ m fiber optic cable for each link.

Example 2. In 10BASE-F standard, the 10 represents its maximum throughput of 10 Mbit/s, BASE indicates its use of baseband transmission, and F indicates that it relies on medium of fiber-optic cable.

- ◆ **10BASE-T** — архітектура Ethernet на основі немодульованих сигналів та двох витих пар категорії 3, 4 або 5 — derived from several characteristics of the physical medium. The 10 comes from the maximum transmission speed of 10 Mbit/s (millions of bits per second). It cannot generally be extended without breaking service temporarily for existing users and the presence of many joints in the cable also makes them very vulnerable to accidental or malicious disruption.

Example 1. Original Ethernet is sometimes referred to as 10Base-T, for 10 mbps baseband data transmission over twist pair.

Example 2. 10BASE-T is ideal for a small network of two or three machines, perhaps in a home where easily concealed wiring may be an advantage.

- ◆ **1000BASE-T** — специфікація 1000BASE-T; архітектура Gigabit Ethernet на основі 4-парного неекранованого кабелю категорії 5 (до 100 м) — refers to the use of cables that contain insulated copper wires twisted together in pairs for the physical layer of an Ethernet network — that is, a network in which the Ethernet protocol provides the data link layer. Other Ethernet cable standards use coaxial cable or optical fiber. The most widely used are 10BASE-T, 100BASE-TX, and 1000BASE-T (Gigabit Ethernet), running at 10 Mbit/s, 100 Mbit/s (also Mbs or Mbs⁻¹), and 1000 Mbit/s (1 Gbit/s) respectively.

Example 1. Sometimes, Ethernet is called 10BASE-T, 100BASE-TX, or 1000BASE-T, depending on the maximum speed of a particular cable. The cables usually used are four-pair twisted pair cable (though 10BASE-T and 10BASE-TX only actually require two of them).

Example 2. Each 1000BASE-T network segment can be a maximum length of 100 meters (328 feet), and must utilize Category 5 cable at a minimum.

A

- ◆ **Access control — контроль доступа** — one familiar use of authentication and authorization. A computer system supposed to be used only by those authorized must attempt to detect and exclude the unauthorized. Access to it is therefore usually controlled by insisting on an authentication procedure to establish with some established degree of confidence the identity of the user, thence granting those privileges as may be authorized to that identity.

Example 1. A PIN on an ATM system at a bank is another means of **access control**. The possession of **access control** is of prime importance when persons seek to secure important, confidential, or sensitive information and equipment.

Example 2. Several security companies specialize in providing **access control** systems and supporting hardware and software for companies of all sizes.

- ◆ **Access control list (ACL) — список контролю доступа** — a list of permissions attached to an a specified object which users or system processes are granted access to objects, as well as what operations are allowed to be performed on given objects.

Example 1. A key issue in the definition of any **ACL-based** security model is the question of how access control lists are edited, namely what users / processes are granted **ACL** modification access.

Example 2. In certain proprietary computer hardware an **Access Control List** refers to rules that are applied to port numbers or network daemon names that are available on a host or other layer 3 device, each with a list of hosts and/or networks permitted to use the service.

- ◆ **Access method — метод доступа** — a function of a mainframe operating system that enables access to data on disk, tape or other external devices. They were introduced in 1963 in IBM OS/360 operating system. Access methods provide an API for programmers to transfer data to or from device, and could be compared to device drivers in non-mainframe operating systems.

Example 1. Without **access methods**, a programmer must write a special program for an I/O channel, a processor dedicated to control peripheral storage device access and data transfer to and from main memory.

Example 2. Specifically, Virtual Storage **Access Method (VSAM)** can speed up access to file data by using a reverse index of records appended to files.

- ◆ **Acknowledgment ACK (Acknowledgment code)** — підтвердження — a signal used to indicate acknowledgment, specifically: ACK (TCP), a packet used in TCP to acknowledge receipt of a packet, acknowledge character, an ASCII control character.

Example 1. Negative-acknowledgment character is an ASCII control character.

Example 2. Cumulative Acknowledgment, Negative Acknowledgment (NACK) includes positive acknowledgment with retransmission (PAR) and selective acknowledgment (SACK).

- ◆ **Active Directory — служба каталогів** — a technology created by Microsoft that provides a variety of network services, including:
 - LDAP-like directory services;
 - Kerberos-based authentication;
 - DNS-based naming and other network information;
 - central location for network administration and delegation of authority;
 - information security and single sign-on for user access to networked based resources;
 - the ability to scale up or down easily;
 - central storage location for application data;
 - synchronization of directory updates amongst several servers.

Example 1. Active Directory was called NTDS (NT Directory Service) in older Microsoft documents. This name can still be seen in some Active Directory binaries.

Example 2. Active Directory was previewed in 1999, released first with Windows 2000 Server edition, and revised to extend functionality and improve administration in Windows Server 2003.

- ◆ **Adapter (or adaptor) — адаптер** — a device whose purpose is to convert attributes of one device or system to those of an otherwise incompatible device or system which have such physical and electrical attribute as:
 - An electrical adapter may enable connection of a socket used in one region to a plug used in another by offering connections for the disparate contact arrangements, while not changing the voltage.
 - A garden hose adapter can convert between threads and quick-release, «snap»-type connections.
 - One kind of serial port adapter enables connections between 25-contact and nine-contact connectors, but does not affect electrical power- and signalling-related attributes.

- A transformer adapts household electric current from high voltage (100 to 240 volts AC) to low voltage suitable for consumer electronics.

*Example 1. These **adapters** will warm through converting between direct current and alternating current.*

*Example 2. **Adapters** are safe to the environment and can withstand months of continuous prolonged activity.*

- ◆ **Address – адреса** – in computing and telecommunication may refer to an e-mail address, which identifies an Internet location that can receive e-mail, a network address, the coded representation of the source or destination of a message, a memory address, a unique identifier for a memory location at which a computer can write, read, or execute the contents.

*Example 1. More generally, it is a physical **address** in some storage device or computing system.*

*Example 2. The IP number is called an «**address**» because it serves the same purpose as a home **address** – it allows each machine on the Internet to be located by a numerical scheme.*

- ◆ **Address Resolution Protocol (ARP) – протокол перевизначення адрес** – a computer networking protocol for determining a network host's link layer or hardware address when only its Internet Layer (IP) or Network Layer address is known. This function is critical in local area networking as well as for routing internetworking traffic across gateways (routers) based on IP addresses when the next-hop router must be determined. ARP was defined by RFC 826 in 1982.

*Example 1. **ARP** has been implemented in many types of networks, such as Internet Protocol (IP) network, CHAOS, DECNET, Xerox PARC Universal Packet, Token Ring, FDDI, IEEE 802.11 and other LAN technologies, as well as the modern high capacity networks, such as Asynchronous Transfer Mode (ATM).*

*Example 2. To the overwhelming prevalence of IPv4 and Ethernet in general networking, **ARP** is most frequently used to translate IP addresses to Ethernet MAC addresses.*

- ◆ **Advanced Peer-to-Peer Networking (APPN) – поліпшений протокол однорангових мереж** – an extension to the Systems Network Architecture (SNA). It includes features such as these:
 - distributed network control;
 - dynamic exchange of network topology information to faster ease of connection – reconfiguration, and route selection;

- dynamic definition of network resources;
- automated resource registration and directory lookup.

Example 1. APPN was meant to complement IBM's Systems Network Architecture, a legacy from the mainframe era.

Example 2. APPN evolved to include a more efficient data routing layer which was called High Performance Routing (HPR).

- ◆ **American National Standards Institute (ANSI) — Національний інститут стандартизації США** — a private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States. The organization also coordinates U.S. standards with international standards so that American products can be used worldwide. For example, standards make sure that people who own cameras can find the film they need for that camera anywhere around the globe.

Example 1. ANSI accredits standards that are developed by representatives of standards developing organizations, government agencies, consumer groups, companies, and others.

Example 2. ANSI's membership comprises government agencies, organizations, corporations, academic and international bodies, and individuals.

- ◆ **American Standard Code for Information Interchange (ASCII) — американський стандартний код для обміну інформацією** — a character-encoding scheme based on the ordering of the English alphabet. ASCII codes represent text in computers, communications equipment, and other devices that use text. Most modern character-encoding schemes, which support many more characters than did the original, are based on ASCII.

Example 1. The American Standard Code for Information Interchange (ASCII) was developed under the auspices of a committee of the American Standards Association, called the X3 committee, by its X3.2 (later X3L2) subcommittee, and later by that subcommittee's X3.2.4 working group.

Example 2. Although there are a number of variants of ASCII, all of them are essentially the same and the ASCII encoding system is often praised by computer scientists for its simplicity and adaptability.

- ◆ **AppleTalk — мережна архітектура AppleTalk** — a proprietary suite of protocols developed by Apple Inc. for networking computers. It was included in the original Macintosh released in 1984, and is now unsupported with the release of Mac OS X

v10.6 in 2009 in favor of TCP/IP networking. AppleTalk's Datagram Delivery Protocol corresponds closely to the Network layer of the Open Systems Interconnection (OSI) communication model.

***Example 1.** The Network Utility provides nine core aspects of functionality: Info, Netstat, **AppleTalk**, Ping, Lookup, Traceroute, Whois, Finger, and Port Scan.*

***Example 2.** When **AppleTalk** was first introduced the dominant office computing platform was the PC compatible running MS-DOS.*

- ◆ **Application layer — прикладний рівень** — a term used in categorizing protocols and methods in architectural models of computer networking. Both the OSI model and the Internet Protocol Suite (TCP/IP) contain an application layer. In TCP/IP, the Application Layer contains all protocols and methods that fall into the realm of process-to-process communications via an Internet Protocol (IP) network using the Transport Layer protocols to establish underlying host-to-host connections.

***Example 1.** In the OSI model, the definition of its **Application Layer** is narrower in scope, distinguishing explicitly additional functionality above the Transport Layer at two additional levels: Session Layer and Presentation Layer.*

***Example 2.** The common **application layer** services provide semantic conversion between associated application processes.*

- ◆ **Application programming interface (API) — інтерфейс прикладного програмування** — an interface that a software program implements in order to allow other software to interact with it; much in the same way that software might implement a user interface in order to allow humans to interact with it.

***Example 1.** The practice of publishing **APIs** has allowed web communities to create an open architecture for sharing of content and data between communities and applications.*

***Example 2.** User information can be shared from web communities to outside applications, delivering new functionality to the web community that shared its user data via an open **API**. One of the best examples of this is the Facebook Application platform. Another is the Open Social platform.*

- ◆ **Application software — прикладне програмне забезпечення** — computer software designed to help the user perform a particular task. Such programs are also called **software applications**, **applications** or **apps**. Typical examples are word processors, spreadsheets, media players and database applications.

***Example 1. Application software** should be contrasted with system software (infrastructure) or middleware (computer services / processes integrators), which is involved in integrating a computer's various capabilities, but typically does not directly apply them in the performance of tasks that benefit the user.*

***Example 2. Application software** represents programs that allow users to do something besides simply run the hardware.*

- ◆ **Artificial intelligence (AI) — штучний інтелект** — the intelligence of machines and the branch of computer science which aims to create it. Textbooks define the field as «the study and design of intelligent agents», where an intelligent agent is a system that perceives its environment and takes actions which maximize its chances of success. John McCarthy, who coined the term in 1956, defines it as «the science and engineering of making intelligent machines».

***Example 1. Early AI** researchers developed algorithms that imitated the step-by-step reasoning that humans use when they solve puzzles, play board games or make logical deductions.*

***Example 2.** Most researchers hope that their work will eventually be incorporated into a machine with general intelligence (known as strong AI), combining all the skills above and exceeding human abilities at most or all of them.*

- ◆ **Asymmetric key algorithms — асиметричне шифрування** — where the key used to encrypt a message is not the same as the key used to decrypt it. Each user has a pair of cryptographic keys — a *public* key and a *private* key. The private key is kept secret, whilst the public key may be widely distributed. Messages are encrypted with the recipient's public key and can only be decrypted with the corresponding private key.

***Example 1.** The keys in **asymmetric key algorithms** are related mathematically, but the private key cannot be feasibly (i.e. in actual or projected practice) derived from the public key.*

***Example 2.** Symmetric key algorithms compared to **asymmetric key algorithms** are nearly always much less computationally intensive, it is common to exchange a key using a key-exchange algorithm and transmit data using that key and a symmetric key algorithm. PGP, and the SSL/TLS family of schemes do this, for instance, and are called hybrid cryptosystems in consequence.*

- ◆ **Asynchronous Transfer Mode (ATM) — режим асинхронної передачі [даних]** — an electronic digital data transmission technology. ATM is implemented as a network protocol and was

first developed in the mid 1980s. The goal was to design a single networking strategy that could transport real-time video conference and audio as well as image files, text and email. Two groups, the International Telecommunications Union and the ATM Forum were involved in the creation of the standards.

***Example 1.** ATM is a packet-oriented transfer method that uses asynchronous time division multiplexing (TDM) techniques.*

***Example 2.** The designers of ATM utilized small data cells to reduce jitter (delay variance, in this case) in the multiplexing of data streams.*

- ◆ **Attenuation — згасання [сигналу]; ослаблення** — an exponential function of the path length, usually measured in units of decibels per unit length of medium (dB/cm, dB/km, etc.) and is represented by the attenuation coefficient of the medium in question.

***Example 1.** Attenuation in ultrasound is the reduction in amplitude of the ultrasound beam as a function of distance through the imaging medium.*

***Example 2.** Ultrasound attenuation measurement in heterogeneous systems, like emulsions or colloids yields information on particle size distribution.*

- ◆ **Audit — аудит** — an evaluation of a person, organization, system, process, enterprise, project or product. Audits are performed to ascertain the validity and reliability of information; also to provide an assessment of a system's internal control. The goal of an audit is to express an opinion on the person / organization / system (etc.) in question, under evaluation based on work done on a test basis. Due to practical constraints, an audit seeks to provide only reasonable assurance that the statements are free from material error.

***Example 1.** Audit systems must adhere to generally accepted standards set by governing bodies regulating businesses; these standards simply provide assurance for third parties or external users that such statements present a company's financial condition and results of operations «fairly».*

***Example 2.** Auditing is the independent examination of financial information of any entity, whether profit oriented or not, and irrespective of its size or legal form, when such an examination is conducted with a view expressing an opinion thereon.*

- ◆ **Authorization — авторизація** — the function of specifying access rights to resources, which is related to information security and computer security in general and to access control in particular. More formally, «to authorize» is to define access policy.

Example 1. *HR staff are normally **authorized** to access employee records, and this policy is usually formalized as access control rules in a computer system.*

Example 2. *An AAA server refers to the process of authentication, **authorization** and accounting utilized by the Remote Authentication Dial In User Services (RADIUS) network protocol.*

B

- ◆ **Backup** (or the process of **backing up**) — резервне копіювання — refer to making copies of data so that these additional copies may be used to restore the original after a data loss event. These additional copies are typically called «backups».

Example 1. *Since a **backup** system contains at least one copy of all data worth saving, the data storage requirements are considerable.*

Example 2. *While **backing up**, before data is sent to its storage location, it is selected, extracted and manipulated.*

- ◆ **Bchannel (Bearer channel)** — В-канал — a telecommunications term which refers to the ISDN channel in which the primary data or voice communication is carried. It has a bit rate of 64 kbit/s in full duplex. The term is applied primarily in relation to the ISDN access interfaces (PRA or PRI and BRA or BRI), since deeper in the PSTN network an ISDN bearer channel is essentially indistinguishable from any other bearer channel.

Example 1. *Apart from any transmission errors, the purpose of the network is to carry the contents of the **Bchannel** transparently between the endpoints of the call.*

Example 2. *If one or more trunks on the route between the endpoints employs Robbed Bit Signalling, this will result in frequent bit errors in the least-significant bit of bytes transported by the **Bchannel**, effectively limiting the channel to 56 kbit/s.*

- ◆ **Backup Domain Controller (BDC)** — резервний контролер домена — a computer that has a copy of the user accounts database. Unlike the accounts database on the Primary Domain Controller (PDC), the BDC database is a read only copy. When changes are made to the master accounts database on the PDC, the PDC pushes the updates down to the BDCs.

Example 1. Most domains will have at least one BDC, often there are several BDCs in a domain.

Example 2. BDCs can also authenticate user logon requests — and take some of the authentication load from the PDC.

- ◆ **Bandwidth (BW) (or network bandwidth)** — пропускна здатність — a measure of available or consumed data communication resources expressed in bit/s or multiples of it (kbit/s, Mbit/s etc.). Bandwidth may refer to **bandwidth capacity** or **available bandwidth** in bit/s, which typically means the net bit rate, channel capacity or the maximum throughput of a logical or physical communication path in a digital communication system.

Example 1. **Bandwidth** test implies measuring the maximum throughput of a computer network.

Example 2. Digital **bandwidth** may also refer to: average bitrate (ABR) after multimedia data compression (source coding), defined as the total amount of data divided by the playback time.

- ◆ **Bandwidth Allocation Protocol** — протокол розподілу пропускної здатності — it is used to add and remove links in a multilink bundle over PPP, and specifying which peer is responsible for making decisions regarding bandwidth management.

Example 1. The **Bandwidth Allocation Protocol** was originally conceived by Craig Richards and Kevin Smith of Shiva Corporation and Ascend Communications respectively in 1997.

Example 2. The **Bandwidth Allocation Protocol** has since been implemented on a number of routers, including in Cisco's IOS.

- ◆ **Banyan VINES** — операційна система VINES — a computer network operating system and the set of computer network protocols it used to talk to client machines on the network. The Banyan company based the VINES operating system on Unix, and the network protocols on the archetypical Xerox XNS stack. VINES formed one of a group of XNS-based systems which also included Novell NetWare and ARCNET; like most of these earlier products it has since disappeared from the market, Banyan along with it.

Example 1. VINES ran on a low-level protocol known as VIP, the VINES Internetwork Protocol: essentially identical to the lower layers of XNS.

Example 2. A set of routing algorithms, however, set VINES apart from other XNS systems at this level. The key differentiator, ARP (Address Resolution Protocol), allowed VINES clients to automatically set up their own network addresses.

- ◆ **Baud** — бод — synonymous to symbols per second or pulses per second. It is the unit of symbol rate, also known as baud rate or modulation rate; the number of distinct symbol changes (signaling events) made to the transmission medium per second in a digitally modulated signal or a line code. The baud rate is related to but should not be confused with gross bit rate expressed in bit/s.

*Example 1. A **baud** rate of 1 kBd = 1,000 Bd is synonymous to a symbol rate of 1,000 symbols per second.*

*Example 2. The **baud** unit is named after Emile Baudot, the inventor of the Baudot code for telegraphy, and is represented as SI units are.*

- ◆ **Binary file** — двійковий файл — (commonly, but not necessarily, with the extension bin) a computer file which may contain any type of data, encoded in binary form for computer storage and processing purposes; for example, computer document files containing formatted text. Many binary file formats contain parts that can be interpreted as text; binary files that contain only textual data — without, for example, any formatting information — are called plain text files. In many cases, plain text files are considered to be different from binary files because binary files are made up of more than just plain text.

*Example 1. A **binary file** viewed with a hex editor will display the file contents as continuous blocks of bytes, or the digital equivalent of the source code.*

*Example 2. Some **binary files** contain headers, blocks of metadata used by a computer program to interpret the data in the file.*

- ◆ **BIND (Berkeley Internet Name Domain)** — служба доменів в Інтернеті — the most commonly used Domain Name System (DNS) server on the Internet On Unix-like systems it is the *de facto* standard. BIND was originally created by four graduate students at the Computer Systems Research Group at the University of California, Berkeley, and was first released with 4.3BSD. Paul Vixie started maintaining it in 1988 while working for DEC. Today, BIND is maintained by the Internet Systems Consortium.

*Example 1. Earlier versions of **BIND** offered no mechanism to store and retrieve zone data in anything other than flat text files.*

*Example 2. Like Sendmail, WU-FTPd and other systems dating back to the earlier days of the Internet (when security was not such an issue as it has since become) **BIND 4** and **BIND 8** have had a large number of serious security vulnerabilities over the years and as such their use is now strongly discouraged.*

- ◆ **Bit — біт** — a basic unit of information storage and communication (a contraction of «**binary digit**»). It is the maximum amount of information that can be stored by a device or other physical system that can normally exist in only two distinct states. These states are often interpreted (especially in the storage of numerical data) as the binary digits 0 and 1. They may be interpreted also as logical values, either «true» or «false»; or two settings of a flag or switch, either «on» or «off». In information theory, «one bit» is typically defined as the uncertainty of a binary random variable that is 0 or 1 with equal probability, or the information that is gained when the value of such a variable becomes known.

***Example 1.** In quantum computing, a quantum **bit** or qubit is a quantum system that can exist in superposition of two bit values, «true» and «false».*

***Example 2.** Bits can be implemented in many forms: in most modern computing devices, a **bit** is usually represented by an electrical voltage or current pulse, or by the electrical state of a flip-flop circuit.*

- ◆ **Bootstrap Protocol (or BOOTP) — протокол завантаження** — a network protocol used by a network client to obtain an IP address from a configuration server. The BOOTP protocol was originally defined in RFC 951. BOOTP is usually used during the bootstrap process when a computer is starting up. A BOOTP configuration server assigns an IP address to each client from a pool of addresses. BOOTP uses the User Datagram Protocol (UDP) as a transport on IPv4 networks only.

***Example 1.** **BOOTP** has also been used for Unix-like diskless workstations to obtain the network location of their boot image in addition to an IP address, and also by enterprises to roll out a pre-configured client installation to newly installed PCs.*

***Example 2.** The Dynamic Host Configuration Protocol (**DHCP**) is a more advanced protocol for the same purpose and has superseded the use of **BOOTP**.*

- ◆ **Bridging — створення мосту** — a forwarding technique used in packet-switched computer networks. Bridging makes no assumptions about where in a network a particular address is located. Instead, it depends on flooding and examination of source addresses in received packet headers to locate unknown devices. Once a device has been located, its location is recorded in a table where the MAC address is stored so as to preclude the need for further broadcasting.

*Example 1. The utility of **bridging** is limited by its dependence on flooding, and is thus only used in local area networks.*

*Example 2. Transparent **bridging** predominates in Ethernet networks, while source routing is used in token ring networks.*

- ◆ **Broadcast address — ширококомвна адреса** — a network address that allows information to be sent to all nodes on a network, rather than to a specific network host. In usage on Internet Protocol networks, broadcast addresses are formed by distinguished values for the host-number part (traditionally called the rest field) of an IP address. The exact notation can vary, but the standard is established in RFC 919. The value of a broadcast address should be one that is not likely to be assigned to any one host, such as the addresses consisting of all ones or all zeros in the rest field.

Example 1. An IP broadcast address is generally obtained by performing a bitwise OR operation between the bit complement of the subnet mask and the IP address.

*Example 2. Ethernet frames that contain IP broadcast packages are usually sent to **broadcast address**.*

Broadcast domain — широкомовний домен — a logical division of a computer network, in which all nodes can reach each other by broadcast at the data link layer. A broadcast domain can be within the same LAN or it can be routed towards other LAN segments.

*Example 1. Any computer connected to the same Ethernet repeater or switch is a member of the same **broadcast domain**.*

*Example 2. While any layer two network device is able to divide the collision domains, **broadcast domains** are only divided by layer 3 network devices such as routers or layer 3 switches.*

- ◆ **Broadcasting — широкомовлення; ширококомвна трансляція** — the distribution of audio and / or video signals which transmit programs to an audience. The audience may be the general public or a relatively large sub-audience, such as children or young adults. The sequencing of content in a broadcast is called a schedule. As with all technological endeavours, a number of technical terms and slang have developed. A list of these terms can be found at list of broadcasting terms. Television and radio programs are distributed through radio broadcasting or cable, often both simultaneously. By coding signals and having decoding equipment in homes, the latter also enables subscription-based channels and pay-per-view services.

***Example 1.** Webcasting of video / television and audio / radio streams offers a mix of traditional radio and television station **broadcast** programming with internet-dedicated webcast programming.*

***Example 2.** Economically there are a few ways in which stations are able to **broadcast** continually. Each differs in the method by which stations are funded.*

- ◆ **Bus — шина** — a subsystem that transfers data between computer components inside a computer or between computers. Early computer buses were literally parallel electrical buses with multiple connections, but the term is now used for any physical arrangement that provides the same logical functionality as a parallel electrical bus. Modern computer buses can use both parallel and bit-serial connections, and can be wired in either a multidrop (electrical parallel) or daisy chain topology, or connected by switched hubs, as in the case of USB.

***Example 1.** Computer **buses** were bundles of wire that attached memory and peripherals.*

***Example 2.** A **bus** controller accepted data from the CPU side to be moved to the peripherals side, thus shifting the communications protocol burden from the CPU itself.*

- ◆ **Byte — байт** — a unit of digital information in computing and telecommunications. It is an ordered collection of bits, in which each bit denotes the binary value of 1 or 0. Historically, a byte was the number of bits used to encode a character of text in a computer and it was for this reason the basic addressable element in many computer architectures. The size of a byte is typically hardware dependent, but the modern de facto standard is 8 bits, as this is a convenient power of 2. No formal definition exists however, and other sizes have been used in various computers historically. Major computing platforms, such as the IBM System/360, introduced in the 1960s, and the 8-bit microprocessors, introduced in the 1970s, have helped to popularize the 8-bit architecture.

***Example 1.** Architectures that did not have eight-bit **bytes** include the CDC 6000 series scientific mainframes that divided their 60-bit floating-point words into 10 six-bit **bytes**.*

***Example 2.** Factors behind the ubiquity of the eight bit **byte** include the popularity of the IBM System/360 architecture, introduced in the 1960s, and the 8-bit microprocessors, introduced in the 1970s.*

C

- ◆ **Cache — кеш** — a collection of data duplicating original values stored elsewhere or computed earlier, where the original data is expensive to fetch (owing to longer access time) or to compute, compared to the cost of reading the cache. In other words, a cache is a temporary storage area where frequently accessed data can be stored for rapid access. Once the data is stored in the cache, it can be used in the future by accessing the cached copy rather than re-fetching or recomputing the original data.

Example 1. Cache has proven to be extremely effective in many areas of computing because access patterns in typical computer applications have locality of reference.

*Example 2. When the **cache** client (a CPU, web browser, operating system) wishes to access a datum presumably in the backing store, it first checks the **cache**.*

- ◆ **Callback — зворотний виклик** — executable code that is passed as an argument to other code. It allows a lower-level software layer to call a subroutine (or function) defined in a higher-level layer. Callbacks have a wide variety of uses. For example, imagine a function that reads a configuration file and associates values with options. If the options are identified by a hash, writing it so that it takes a callback makes the function more flexible: the user of it can use whatever hashing algorithm he wishes and the function will continue to work, since it uses the callback to turn option names into hashes; thus, callbacks allow the user of a function to fine-tune it at runtime.

*Example 1. The form of a **callback** varies among programming languages.*

*Example 2. These languages provide **callbacks** without the need for separate software development tools.*

- ◆ **Carrier recovery system — система відновлення несучої (частоти)** — a circuit used to estimate and compensate for frequency and phase differences between a received signal's carrier wave and the receiver's local oscillator for the purpose of coherent demodulation.

*Example 1. Non-data-aided / «blind» **carrier recovery** methods do not rely on any knowledge of the modulation symbols. They are typically used*

for simple **carrier recovery** schemes or as the initial method of coarse carrier frequency recovery.

Example 2. For a quiet carrier or a signal containing a dominant carrier spectral line, **carrier recovery** can be accomplished with a simple band-pass filter at the carrier frequency and / or with a phase-locked loop.

- ◆ **Carrier Sense Multiple Access With Collision Detection (CSMA/CD) – множинний доступ з контролем несучої та виявленням конфліктів** – in computer networking, it is a network access method in which a carrier sensing scheme is used, a transmitting data station that detects another signal while transmitter waits for a random time interval (known as «backoff delay» and determined using the truncated binary exponential backoff algorithm) before trying to send that frame again. CSMA/CD is a modification of pure Carrier Sense Multiple Access (CSMA). Collision detection is used to improve CSMA performance by terminating transmission as soon as a collision is detected, and reducing the probability of a second collision on retry. Methods for collision detection are media dependent, but on an electrical bus such as Ethernet, collisions can be detected by comparing transmitted data with received data. If they differ, another transmitter is overlaying the first transmitter's signal (a collision), and transmission terminates immediately. A jam signal is sent which will cause all transmitters to back off by random intervals, reducing the probability of a collision when the first retry is attempted.

Example 1. Even when it has nothing to transmit, the **CSMA/CD MAC** sublayer monitors the physical medium for traffic by watching the carrier sense signal provided by the **PLS** (Physical layer signals to MAC layer).

Example 2. **CSMA/CD** is a layer 2 access method not a protocol OSI model.

- ◆ **Category 1 cable – кабель категорії 1** – a misnomer, probably adopted by those who assumed that TIA set up «Categories» for all types of cables originally defined by Anixter International, the distributor, under the grades called «Levels».

Example 1. **OUTv** is a Canadian English language **category 1 digital cable** specialty channel with lifestyle and general entertainment programming for LGBT audiences.

Example 2. Anixter «Level 1» (**category 1 cable**) was a grade of unshielded twisted pair cabling designed for telephone communications, and was the most common on-premises wiring.

- ◆ **Category 2 cable** (or simply **Cat 2**) — кабель категорії 2 — a misnomer, probably adopted by those who assumed that TIA set up «Categories» for all types of cables originally defined by Anixter, the distributor, under the grades called «Levels».

Example 1. Anixter «Level 2» (category 2 cable) was a grade of UTP cable capable of transmitting data at up to 4 Mbit/s.

Example 2. Cat 2 cable was frequently used on ARCnet and 4 Mbit/s token ring networks, but it is no longer commonly used.

- ◆ **Category 3 cable** (commonly known as **Cat 3**) — кабель категорії 3 — an unshielded twisted pair (UTP) cable designed to reliably carry data up to 10 Mbit/s, with a possible bandwidth of 16 MHz. It is part of a family of copper cabling standards defined jointly by the Electronic Industries Alliance and the Telecommunications Industry Association.

Example 1. Cat 3 is currently still in use in two-line telephone systems, and can easily be adapted to run VoIP as long as a dedicated LAN for the VoIP telephone sets is created.

Example 2. While Cat 5 or higher is often recommended for VoIP, the reality is that the 10 Mbit/s bandwidth a Cat 3 network can provide is far more than the 0.08 Mbit/s a VoIP phone needs at full load, and Cat 3 is even compatible with 802.3af PoE.

- ◆ **Category 4 — кабель категорії 4** — a description of a cable that consists of four unshielded twisted-pair (UTP) wires with a data rate of 16 Mbit/s and performance of up to 20 MHz.

Example 1. Category 4 was used in token ring networks, 10BASE-T, 100BASE-T4, and is no longer common or used in new installations.

Example 2. Category 4 was quickly superseded by Category 5/5e cable, both of which have 100 ± 15 ohm impedance.

- ◆ **Category 5 cable — кабель категорії 5** — a twisted pair high signal integrity cable type often referred to as **Cat5**. Most cables are unshielded relying on the twisted pair design for noise rejection, and some are shielded. Category 5 has been superseded by the Category 5 specification structured cabling for computer networks such as Ethernet, and is also used to carry many other signals such as basic voice services, token ring, and ATM (at up to 155 Mbit/s, over short distances).

Example 1. Cat 5 cable is an enhanced version of Cat 5 that adds specifications for far end crosstalk.

Example 2. The performance of this new 350 MHz cable was slightly better it was an easy way to sell the consumer on future proofing their needs

while charging around 15% more and leading to a higher margin on the 350 MHz cable than **the standard 5 cable**.

- ◆ **CCNA certification** — **сертифікований спеціаліст з мереж Cisco** — a second-level Cisco Career certification that indicates a foundation in apprentice knowledge of networking. CCNA certification validates the ability to install, configure, operate, and troubleshoot medium-size routed and switched networks, including implementation and verification of connections to remote sites in a WAN.

***Example 1.** To become a CCNA, a passing score on the 640–802 exam must be achieved, or combined passing scores on both the ICND1 640–822 and ICND2 640–816 exams.*

***Example 2.** CCNA certifications (including specialties) are valid for three years.*

- ◆ **Central office** — **центральна АТС** — the physical building used to house inside plant equipment including telephone switches, which make telephone calls «work» in the sense of making connections and relaying the speech information. The term «exchange» can also be used to refer to an area served by a particular switch (typically known as a wire center in the US telecommunications industry). It is sometimes confused with other concepts of telephone geography, such as NPA or area code. More narrowly, in some areas it can refer to the first three digits of the local number. In the three-digit sense of the word, other obsolete Bell System terms include «office code» and «NXX». In the United States, the word «exchange» can also have the legal meaning of a local access and transport area under the Modification of Final Judgment (MFJ).

***Example 1.** With manual service, the customer lifts the receiver off-hook and asks the operator to connect the call to a requested number. Provided that the number is in the same **central office**, the operator connects the call by plugging into the jack on the switchboard corresponding to the called customer's line.*

***Example 2.** If the call is to another **central office**, the operator plugs into the trunk for the other office and asks the operator answering (known as the «inward» operator) to connect the call.*

- ◆ **Challenge-Handshake Authentication Protocol (CHAP)** — **протокол автентифікації з передчасним узгодженням виклику** — authenticates a user or network host to an authenticating entity. That entity may be, for example, an Internet access provider. RFC 1994: PPP Challenge Handshake Authentication

Protocol (CHAP) defines the protocol. CHAP is an authentication scheme used by Point to Point Protocol (PPP) servers to validate the identity of remote clients. CHAP periodically verifies the identity of the client by using a three-way handshake. This happens at the time of establishing the initial link, and may happen again at any time afterwards. The verification is based on a shared secret (such as the client user's password).

***Example 1.** CHAP provides protection against playback attack by the peer through the use of an incrementally changing identifier and of a variable challenge-value.*

***Example 2.** CHAP requires that both the client and server know the plaintext of the secret, although it is never sent over the network.*

◆ **Channel — канал** — in communications (sometimes called communications channel) refers to the medium used to convey information from a sender (or transmitter) to a receiver. A channel can take many forms, including ones suitable for storage which can communicate a message over time as well as space. A channel can be modelled physically by trying to calculate the physical processes which modify the transmitted signal. For example in wireless communications the channel can be modelled by calculating the reflection off every object in the environment. A sequence of random numbers might also be added in to simulate external interference and/or electronic noise in the receiver.

***Example 1.** Statistically a communication **channel** is usually modelled as a triple consisting of an input alphabet, an output alphabet, and for each pair of input and output elements a transition probability.*

***Example 2.** Channel models may be continuous **channel** models in that there is no limit to how precisely their values may be defined.*

◆ **Cipher (or cypher) — шифр** — an algorithm for performing encryption or decryption — a series of well-defined steps that can be followed as a procedure. An alternative, less common term is encipherment. When using a cipher the original information is known as plaintext, and the encrypted form as ciphertext. The ciphertext message contains all the information of the plaintext message, but is not in a format readable by a human or computer without the proper mechanism to decrypt it; it should resemble random gibberish to those not intended to read it.

***Example 1.** The operation of a **cipher** usually depends on a piece of auxiliary information, called a key or, in traditional NSA parlance, a cryptovariable.*

***Example 2.** Simple **ciphers** were replaced by polyalphabetic substitution **ciphers** which changed the substitution alphabet for every letter.*

- ◆ **Circuit (electronic) — канал** — a closed path or paths formed by the interconnection of electronic components through which an electric current can flow. Physically, an electronic circuit can be as small as a pin point or cover many miles. They are constructed by connecting electronic components together with conductors, which allow electricity to flow between the components. Integrated circuits are small circuits constructed from a piece of semiconductor housed in a protective package. While larger circuits may be built by assembling electronic components onto a printed circuit board (PCB), which is used to mechanically support and electrically connect the components. Integrated circuits are typically used as components in larger circuits built onto PCBs. When components are connected using wire as the conductor, the circuit may be extended to cover or connect a large area.

***Example 1.** Electronic **circuits** can display highly complex behaviors, even though they are governed by the same laws of physics as simpler circuits.*

***Example 2.** The basic components of analog **circuits** are resistors, capacitors, inductors, memristors, diodes, and transistors.*

- ◆ **Circuit switching — комутація каналів** — network that establishes a circuit (or channel) between nodes and terminals before the users may communicate, as if the nodes were physically connected with an electrical circuit. The bit delay is constant during a connection, as opposed to packet switching, where packet queues may cause varying packet transfer delay. Each circuit cannot be used by other callers until the circuit is released and a new connection is set up. Even if no actual communication is taking place in a dedicated circuit that channel remains unavailable to other users. Channels that are available for new calls to be set up are said to be idle. There is a common misunderstanding that circuit switching is used only for connecting voice circuits (analog or digital). The concept of a dedicated path persisting between two communicating parties or nodes can be extended to signal content other than voice. Its advantage is that it provides for non-stop transfer without requiring packets and without most of the overhead traffic usually needed, making maximal and optimal use of available bandwidth for that communication. The disadvantage of inflexibility tends to reserve it

for specialized applications, particularly with the overwhelming proliferation of internet-related technology.

***Example 1. Circuit switching** contrasts with packet switching which splits traffic data (for instance, digital representation of sound, or computer data) into chunks, called packets, that are routed over a shared network.*

***Example 2. Virtual circuit switching** is a packet switching technology that may emulate **circuit switching**, in the sense that the connection is established before any packets are transferred, and that packets are delivered in order.*

- ◆ **Cisco Certified Internet Expert (CCIE) – сертифікований спеціаліст із міжмережного обміну Cisco** – the highest level of professional certification that Cisco currently provides and is considered one of the hardest certifications in the world. Cisco began its CCIE program in 1993 originally with a two day lab, later changing it to the one day format used today. Fewer than 3% of Cisco certified individuals attain CCIE certification, and on average will spend thousands of dollars and 18 months studying before passing. Many candidates build mock-labs at home using old Cisco equipment, selling it again to other candidates after passing. Alternatively candidates may rent «rack time» on-line and practice lab scenarios on Cisco equipment hosted on the Internet for that purpose.

***Example 1.** There are no formal prerequisites for the **CCIE** exam, but Cisco recommends one has at least 3–5 years experience in networking before attempting to become a **CCIE**. **CCIE** was the first Cisco Certified qualification, and as such there were no other certifications that could be taken prior.*

***Example 2.** A lower number indicates that the **CCIE** was awarded some time back, a higher number indicated a more recently awarded certification.*

- ◆ **Cisco IOS (originally Internetwork Operating System) – операційна система Cisco** – the software used on the vast majority of Cisco Systems routers and current Cisco network switches. IOS is a package of routing, switching, internetworking and telecommunications functions tightly integrated with a multitasking operating system. Cisco IOS has a characteristic command line interface (CLI), whose style has been widely copied by other networking products. The IOS CLI provides a fixed set of multiple-word commands – the set available is determined by the «mode» and the privilege level of the current user.

Example 1. Cisco IOS releases meant for use on Catalyst switches are available as «standard» versions (providing only basic IP routing), «enhanced» versions, which provide full IPv4 routing support, and «advanced IP services» versions, which provide the enhanced features as well as IPv6 support.

Example 2. Routing and other protocols run as Cisco IOS processes and contribute to the Routing Information Base (RIB).

- ◆ **Classless Inter-Domain Routing (CIDR) – безкласова міждоменна маршрутизація** – a methodology of allocating IP addresses and routing Internet Protocol packets. It was introduced in 1993 to replace the prior addressing architecture of classful network design in the Internet with the goal to slow the growth of routing tables on routers across the Internet, and to help prevent the rapid exhaustion of IPv4 addresses. IP addresses are described as consisting of two groups of bits in the address: the most significant part is the network address which identifies a whole network or subnet and the least significant portion is the host identifier, which specifies a particular host interface on that network. CIDR is principally a bitwise, prefix-based standard for the interpretation of IP addresses. It facilitates routing by allowing blocks of addresses to be grouped together into single routing table entries. These groups, commonly called CIDR blocks, share an initial sequence of bits in the binary representation of their IP addresses. IPv4 CIDR blocks are identified using a syntax similar to that of IPv4 addresses: a four-part dotted-decimal address, followed by a slash, then a number from 0 to 32: A.B.C.D/N. The dotted decimal portion is interpreted, like an IPv4 address, as a 32-bit binary number that has been broken into four octets. The number following the slash is the prefix length, the number of shared initial bits, counting from the most significant bit of the address. When emphasizing only the size of a network, terms like / 20 are used, which is a CIDR block with an unspecified 20-bit prefix.

Example 1. ExaAn IP address is part of a CIDR block, and is said to match the CIDR prefix if the initial N bits of the address and the CIDR prefix are the same.

Example 2. CIDR is used with IPv6 addresses and the syntax semantic is identical.

- ◆ **Client / server computing (or networking) – система клієнт / сервер** – a distributed application architecture that partitions tasks or work loads between service providers (servers) and ser-

vice requesters, called clients. Often clients and servers operate over a computer network on separate hardware. A server machine is a high-performance host that is running one or more server programs which share its resources with clients. A client does not share any of its resources, but requests a server's content or service function. Clients therefore initiate communication sessions with servers which await (listen to) incoming requests. Client-server describes the relationship between two computer programs in which one program, the client program, makes a service request to another, the server program.

***Example 1.** The **client-server model** has become one of the central ideas of network computing.*

***Example 2.** Under the structure of the **client-server architecture**, a business's computer network will have a server computer, which functions as the «brains» of the organization, and a group of client computers, which are commonly called workstations.*

- ◆ **Cluster — кластер** — a group of linked computers, working together closely so that in many respects they form a single computer. The components of a cluster are commonly, but not always, connected to each other through fast local area networks. Clusters are usually deployed to improve performance and / or availability over that of a single computer, while typically being much more cost-effective than single computers of comparable speed or availability.

***Example 1.** High-availability **clusters** (also known as **Failover Clusters**) are implemented primarily for the purpose of improving the availability of services which the cluster provides.*

***Example 2.** Grids are usually computer **clusters**, but more focused on throughput like a computing utility rather than running fewer, tightly-coupled jobs.*

- ◆ **Coaxial cable (or coax) — коаксіальний кабель** — an electrical cable with an inner conductor surrounded by a tubular insulating layer typically of a flexible material with a high dielectric constant, all of which are surrounded by a conductive layer called the *shield* (typically of fine woven wire for flexibility, or of a thin metallic foil), and finally covered with a thin insulating layer on the outside. The term coaxial comes from the inner conductor and the outer shield sharing the same geometric axis. Coaxial cable was invented by English engineer and mathematician Oliver Heaviside, who first patented the design in 1880. Coaxial cable is used as a transmission line for radio frequency

signals, in applications such as connecting radio transmitters and receivers with their antennas, computer network (Internet) connections, and distributing cable television signals. One advantage of coax over other types of transmission line is that in an ideal coaxial cable the electromagnetic field carrying the signal exists only in the space between the inner and outer conductors. This allows coaxial cable runs to be installed next to metal objects such as gutters without the power losses that occur in other transmission lines, and provides protection of the signal from external electromagnetic interference. Coaxial cable should not be confused with other shielded cable used for carrying lower frequency signals such as audio signals. Shielded cable is similar in that it consists of a central wire or wires surrounded by a tubular shield conductor, but it is not constructed with the precise conductor spacing needed to function efficiently as a radio frequency transmission line.

***Example 1.** There is variety in the shield. Conventional **coaxial cable** has braided copper wire forming the shield. This allows the cable to be flexible, but it also means there are gaps in the shield layer, and the inner dimension of the shield varies slightly because the braid cannot be flat. Sometimes the braid is silver plated.*

***Example 2.** For better shield performance, some **coaxial cables** have a double-layer shield. The shield might be just two braids, but it is more common now to have a thin foil shield covered by a wire braid.*

◆ **Collision domain — колізійний домен** — a physical network segment where data packets can «collide» with one another for being sent on a shared medium, in particular in the Ethernet networking protocol. A network collision is a scenario wherein one particular device sends a packet on a network segment, forcing every other device on that same segment to pay attention to it. Meanwhile, another device does the same, and the two competing packets are discarded and resent one at a time. This becomes a source of inefficiency in the network. Computers on the network detect collisions by looking for abnormally changing voltages.

***Example 1.** Only one device in the **collision domain** may transmit at any one time, and the other devices in the domain listen to the network in order to avoid data collisions.*

***Example 2.** To relieve the network of **collision domains**, it is recommended to use a network switch which increases the number of collision domains, but decreases each collision domain's size. This is because each port on a switch is its own collision domain.*

- ◆ **Connectionless Protocol** — протокол, що не є орієнтованим на встановлення з'єднання — describes communication between two network end points in which a message can be sent from one end point to another without prior arrangement. The device at one end of the communication transmits data to the other, without first ensuring that the recipient is available and ready to receive the data. The device sending a message simply sends it addressed to the intended recipient. As such there are more frequent problems with transmission than with connection-oriented protocols and it may be necessary to resend the data several times. Connectionless protocols are often disfavored by network administrators because it is much harder to filter malicious packets from a connectionless protocol using a firewall. The Internet Protocol (IP) and User Datagram Protocol (UDP) are connectionless protocols, but TCP/IP (the most common use of IP) is connection-oriented.

Example 1. Connectionless protocols are usually described as stateless because the endpoints have no protocol-defined way to remember where they are in a «conversation» of message exchanges.

Example 2. The alternative to the connectionless approach uses connection-oriented protocols, which are sometimes described as stateful because they can keep track of a conversation.

- ◆ **Console (VC)** (also known as a **virtual terminal (VT)** — консоль — a conceptual combination of the keyboard and display for a computer user interface. It is a feature of some operating systems such as UnixWare, Linux and BSD, in which the system console of the computer can be used to switch between multiple virtual consoles to access unrelated user interfaces. Virtual consoles date back at least to Xenix in the 1980s. Usually in Linux, the first six virtual consoles provide a text terminal with a login prompt to a Unix shell. The graphical X Window System starts in the seventh virtual console. In Linux, the switching is performed with a key combination of Alt plus a function key — for example Alt+F1 to access the virtual console number 1. Alt+Left arrow changes to the previous virtual console and Alt+Right arrow to the next virtual console. To switch from the X Window System, Ctrl+Alt+function key works. The need for virtual consoles has lessened now that most applications work in the graphical framework of the X Window System, where each program has a window and the text mode programs can be run in terminal-emulator windows. If several sessions of the X Window System are required to run in parallel, such as in the case of fast user

switching or when debugging X programs on a separate X server, each X session usually runs in a separate virtual console. GNU Screen is a program that can change between several text-mode programs in one textual login. There are also other graphical frameworks such as Y Window System, and Fresco.

***Example 1.** The program starts the X Window System on a new virtual **console**. There are also other graphical programs that can start from the **console**, such as LinuxTV and MPlayer.*

***Example 2.** Programs can access the virtual **consoles** by the device special files. In text mode, writing to the file displays text on the virtual **console** and reading from the file returns text the user writes to the virtual **console**.*

- ◆ **Convergence — конвергенция** — an important notion for a set of routers that engage in dynamic routing. For a set of routers to have converged, they must have collected all available topology information from each other via the implemented routing protocol, the information they gathered must not contradict any other router's topology information in the set, and it must reflect the real state of the network. In other words: In a converged network all routers «agree» on what the network topology looks like. All Interior Gateway Protocols rely on convergence to function properly; it is the normal state of an operational autonomous system. The Exterior Gateway Routing Protocol BGP typically never converges because the Internet is too big for changes to be communicated fast enough.

***Example 1.** **Convergence** time is a measure of how fast a group of routers reach the state of convergence. It is one of the main design goals and an important performance indicator for routing protocols to implement a mechanism that allows all routers running this protocol to quickly and reliably converge.*

***Example 2.** Certain configuration and hardware conditions will prevent a network from ever **converging**.*

- ◆ **Cracker (in common usage, a hacker) — крякер** — a person who breaks into computers, usually by gaining access to administrative controls. The subculture that has evolved around hackers is often referred to as the computer underground. Proponents claim to be motivated by artistic and political ends, and are often unconcerned about the use of illegal means to achieve them. Other uses of the word *hacker* exist that are not related to computer security (computer programmer and home computer hobbyists), but these are rarely used by the mainstream media.

*Example 1. Some would argue that the people that are now considered **hackers** are not **hackers**, as before the media described the person who breaks into computers as a **hacker** there was a **hacker** community.*

*Example 2. This community was a community of people who had a large interest in computer programming, often creating open source software. These people now refer to the cyber-criminal hackers as «**crackers**».*

◆ **Crossover cable** — **перекручений кабель** — means a practical interconnecting solution of two devices of the same type, DTE-DTE or DCE-DCE, by modified version of a cable called a crosslink, as these devices are usually connected asymetrically: DTE-DCE. Such distinction of devices was introduced by IBM.

The crossing wires in a cable or in a connector adaptor brings the possibilities:

- to connect two devices directly, output of one to input of the other;
- let two terminal (DTE) devices communicate without any interconnecting hub knot, i.e. PCs;
- to uplink two or more hubs, switches or routers (DCE) together, possibly to work as one wider device.

*Example 1. Other technologies use different pairs to transmit data, so **crossover cables** for them have different configurations to swap the transmit and receive pairs.*

*Example 2. Twisted pair Token ring uses T568B pairs 1 and 3 (the same as T568A pairs 1 and 2), so a **crossover cable** to connect two Token Ring interfaces must swap these pairs, connecting pins 4, 5, 3, and 6 to 3, 6, 4, and 5 respectively.*

◆ **Cryptography** (or **cryptology**) — **криптографія** — (from Greek κρυπτός, *kryptos*, «hidden, secret»; and γράφω, *gráphō*, «I write», or -λογία, *-logia*, respectively) the practice and study of hiding information. Modern cryptography intersects the disciplines of mathematics, computer science, and engineering. Applications of cryptography include ATM cards, computer passwords, and electronic commerce. Until modern times cryptography referred almost exclusively to encryption, which is the process of converting ordinary information (plaintext) into unintelligible gibberish. Decryption is the reverse, in other words, moving from the unintelligible ciphertext back to plaintext. A cipher (or cypher) is a pair of algorithms which create the encryption and the reversing decryption. The detailed operation of a cipher is controlled both by the algorithm and in each instance by

a key. This is a secret parameter (ideally known only to the communicants) for a specific message exchange context.

***Example 1.** Some use the terms **cryptography** and **cryptology** interchangeably in English, while others (including US military practice generally) use **cryptography** to refer specifically to the use and practice of cryptographic techniques and **cryptology** to refer to the combined study of **cryptography** and cryptanalysis.*

***Example 2.** **Cryptography** presents various methods for taking legible, readable data, and transforming it into unreadable data for the purpose of secure transmission, and then using a key to transform it back into readable data when it reaches its destination.*

- ◆ **CSU/DSU (Channel Service Unit / Data Service Unit) – прилад обслуговування каналу** – a digital-interface device used to connect a Data Terminal Equipment device or DTE, such as a router, to a digital circuit (for example a T1 or T3 line). A CSU/DSU operates at the physical layer (layer 1) of the OSI model. CSU/DSUs are also made as separate physical products; CSUs and DSUs. The DSU or both functions may be included as part of an interface card inserted into a DTE. If the CSU/DSU is external, the DTE interface is usually compatible with the V.xx or RS-232C or similar serial interface.

***Example 1.** The **CSU** provides termination for the digital signal and ensures connection integrity through error correction and line monitoring. Another functions of the **CSU** are protecting the user equipment and the line from electrical hazards (like lightning, electrical spikes), keeping track of statistics or providing loopback capabilities.*

***Example 2.** The **DSU** converts the data encoded in the digital circuit into synchronous serial data for connection to a DTE device and provides timing to each end.*

- ◆ **Customer-premises equipment (or customer-provided equipment) (CPE) – обладнання користувача** – any terminal and associated equipment located at a subscriber's premises and connected with a carrier's telecommunication channel(s) at the demarcation point («demarc»). The demarc is a point established in a building or complex to separate customer equipment from telephone company equipment. CPE generally refers to telephones, DSL modems or cable modems, or purchased set-top boxes for use with Communications Service Providers' services. Also included are key telephone systems and most private branch exchanges. Excluded from CPE are overvoltage protection equipment and pay telephones.

Example 1. Cellular carriers may sometimes internally refer to cellular phones a customer has purchased without a subsidy or from a third party as «customer provided equipment».

Example 2. It is also notable that the fully qualified domain name and the PTR record of DSL and cable lines connected to a residence will often contain CPE.

- ◆ **Cybernetics – кібернетика** – the interdisciplinary study of the structure of regulatory systems. Cybernetics is closely related to control theory and systems theory. Both in its origins and in its evolution in the second-half of the 20th century, cybernetics is equally applicable to physical and social (that is, language-based) systems. Cybernetics is preeminent when the system under scrutiny is involved in a closed signal loop, where action by the system in an environment causes some change in the environment and that change is manifest to the system via information, or feedback, that causes the system to adapt to new conditions: the system changes its behaviour.

Example 1. On the one hand a company is approached as a system in an environment. On the other hand cybernetic factory can be modeled as a control system.

Example 2. Contemporary cybernetics began as an interdisciplinary study connecting the fields of control systems, electrical network theory, mechanical engineering, logic modeling, evolutionary biology, neuroscience, anthropology, and psychology in the 1940s, often attributed to the Macy Conferences.

- ◆ **Cyborg (cybernetic organism) – кібор** – an organism that has enhanced abilities due to technology, but this perhaps oversimplifies the category of feedback. Fictional cyborgs are portrayed as a synthesis of organic and synthetic parts, and frequently pose the question of difference between human and machine as one concerned with morality, free will, and empathy. Fictional cyborgs may be represented as visibly mechanical (e.g. the Cybermen in the Doctor Who franchise or The Borg from Star Trek); or as almost indistinguishable from humans (e.g. the «Human» Cylons from the re-imagining of Battlestar Galactica).

Example 1. The 1970s television series the Six Million Dollar Man featured one of the most famous fictional cyborgs. Cyborgs in fiction often play up a human contempt for over-dependence on technology, particularly when used for war, and when used in ways that seem to threaten free will.

Example 2. Cyborgs are also often portrayed with physical or mental abilities far exceeding a human counterpart (military forms may have inbuilt weapons, among other things).

- ◆ **Cyclic redundancy check (CRC)** – контроль з використанням циклічного надлишкового коду – a non-secure hash function designed to detect accidental changes to raw computer data, and is commonly used in digital networks and storage devices such as hard disk drives. A CRC-enabled device calculates a short, fixed-length binary sequence, known as the CRC code or just *CRC*, for each block of data and sends or stores them both together. When a block is read or received the device repeats the calculation; if the new CRC does not match the one calculated earlier, then the block contains a data error and the device may take corrective action such as rereading or requesting the block be sent again. CRCs are so called because the check (data verification) code is a redundancy (it adds zero information) and the algorithm is based on cyclic codes.

*Example 1. It is often falsely assumed that when a message and its **CRC** are received from an open channel and the **CRC** matches the message's calculated **CRC** then the message cannot have been altered in transit.*

*Example 2. Although **CRCs** share a problem with message digests in that there cannot be a 1:1 relationship between all possible input messages and all possible outputs (**CRC** checksums), the **CRC** function fares worse because it is not a trapdoor function.*

D

- ◆ **Daemon** – демон – a computer program that runs in the background, rather than under the direct control of a user; they are usually initiated as background processes. Typically daemons have names that end with the letter «d»: for example, `syslogd`, the daemon that handles the system log which handles incoming SSH connections. In a Unix environment, the parent process of a daemon is often (but not always) the `init` process (`PID=1`). Processes usually become daemons by forking a child process and then having their parent process immediately exit, thus causing `init` to adopt the child process. Convenience rou-

times such as daemon (3) exist in some UNIX systems for that purpose.

***Example 1.** Systems often start (or «launch») **daemons** at boot time: they often serve the function of responding to network requests, hardware activity, or other programs by performing some task.*

***Example 2.** **Daemons** can also configure hardware (like devfsd on some GNU / Linux systems), run scheduled tasks (like cron), and perform a variety of other tasks.*

- ◆ **Data — дані** — groups of information that represent the qualitative or quantitative attributes of a variable or set of variables. Data (plural of «datum», which is seldom used) are typically the results of measurements and can be the basis of graphs, images, or observations of a set of variables. Data are often viewed as the lowest level of abstraction from which information and knowledge are derived.

***Example 1.** An analog computer represents a **datum** as a voltage, distance, position, or other physical quantity.*

***Example 2.** A computer program is a collection of **data**, which can be interpreted as instructions. Most computer languages make a distinction between programs and the other **data** on which programs operate, but in some languages, notably Lisp and similar languages, programs are essentially indistinguishable from other **data**.*

- ◆ **Data center bridging — центральний міст даних** — enhancements to Ethernet local area networks for use in data center environments. The Data Center Bridging (DCB) Task Group of the IEEE 802.1 Working Group conducts standard setting efforts. Traditional Ethernet is the primary network protocol in data centers for computer to computer communications. However, Ethernet is designed to be a best-effort network that may drop packets or deliver packets out of order when the network or devices are busy.

***Example 1.** Two different terms have been used to describe enhanced Ethernet which refer to implementations based on the underlying **Data Center Bridging** standards.*

***Example 2.** DCE (Data Center Ethernet) referred to Ethernet enhancements for the **Data Center Bridging** standards, and also including a Layer 2 Multipathing implementation based on the IETF's Transparent Interconnection of Lots of Links (TRILL) proposal.*

- ◆ **Data Encryption Standard (DES) — стандарт шифрування даних** — a block cipher (a form of shared secret encryption) that

was selected by the National Bureau of Standards as an official Federal Information Processing Standard (FIPS) for the United States in 1976 and which has subsequently enjoyed widespread use internationally. It is based on a symmetric-key algorithm that uses a 56-bit key. The algorithm was initially controversial with classified design elements, a relatively short key length, and suspicions about a National Security Agency (NSA) backdoor. DES consequently came under intense academic scrutiny which motivated the modern understanding of block ciphers and their cryptanalysis.

***Example 1.** DES is now considered to be insecure for many applications.*

***Example 1.** The algorithm is believed to be practically secure in the form of Triple DES, although there are theoretical attacks. In recent years, the cipher has been superseded by the Advanced Encryption Standard (AES).*

- ◆ **Data-flow diagram (DFD) – діаграма потоку даних** – a graphical representation of the «flow» of data through an information system. DFDs can also be used for the visualization of data processing (structured design). On a DFD, data items flow from an external data source or an internal data store to an internal data store or an external data sink, via an internal process. A DFD provides no information about the timing or ordering of processes, or about whether processes will operate in sequence or in parallel. It is therefore quite different from a flowchart, which shows the flow of control through an algorithm, allowing a reader to determine what operations will be performed, in what order, and under what circumstances, but not what kinds of data will be input to and output from the system, nor where the data will come from and go to, nor where the data will be stored (all of which are shown on a DFD).

***Example 1.** It is common practice to draw a context-level **data flow diagram** first, which shows the interaction between the system and external agents which act as data sources and data sinks.*

***Example 2.** On the context diagram (also known as the **Level 0 DFD**) the system's interactions with the outside world are modelled purely in terms of data flows across the system boundary.*

- ◆ **Data Link Layer (DLL) – каналний рівень** – Layer 2 of the seven-layer OSI model of computer networking. It corresponds to or is part of the link layer of the TCP/IP reference model. The Data Link Layer is the protocol layer which transfers data

between adjacent network nodes in a wide area network or between nodes on the same local area network segment. The Data Link Layer provides the functional and procedural means to transfer data between network entities and might provide the means to detect and possibly correct errors that may occur in the Physical Layer. Examples of data link protocols are Ethernet for local area networks (multi-node), the Point-to-Point Protocol (PPP), HDLC and ADCCP for point-to-point (dual-node) connections.

*Example 1. The **Data Link Layer** is concerned with local delivery of frames between devices on the same LAN.*

*Example 2. Switched Ethernet is the most common **Data Link Layer** implementation on local area networks.*

- ◆ **Data terminal equipment (DTE)** — **термінальне обладнання** — an end instrument that converts user information into signals or reconverts received signals. These can also be called tail circuits. A DTE device communicates with the data circuit-terminating equipment (DCE). The DTE/DCE classification was introduced by IBM. Two different types of devices are assumed on each end of the interconnecting cable for a case of simply adding DTE to the topology (e.g. to a hub, DCE), which also brings a less trivial case of interconnection of devices of the same type: DTE-DTE or DCE-DCE. Such cases need crossover cables, such as for the Ethernet or null modem for RS-232. A DTE is the functional unit of a data station that serves as a data source or a data sink and provides for the data communication control function to be performed in accordance with link protocol.

*Example 1. The **data terminal equipment** may be a single piece of equipment or an interconnected subsystem of multiple pieces of equipment that perform all the required functions necessary to permit users to communicate.*

Example 2. A general rule is that DCE devices provide the clock signal (internal clocking) and the DTE device synchronizes on the provided clock (external clocking). D-sub connectors follow another rule for pin assignment.

- ◆ **Data warehouse** — **база даних** — a repository of an organization's electronically stored data. Data warehouses are designed to facilitate reporting and analysis. A data warehouse houses a standardized, consistent, clean and integrated form of data sourced from various operational systems in use in the organization, structured in a way to specifically address the reporting

and analytic requirements. This definition of the data warehouse focuses on data storage. However, the means to retrieve and analyze data, to extract, transform and load data, and to manage the data dictionary are also considered essential components of a data warehousing system. Many references to data warehousing use this broader context. Thus, an expanded definition for data warehousing includes business intelligence tools, tools to extract, transform, and load data into the repository, and tools to manage and retrieve metadata.

***Example 1.** The concept of **data warehousing** dates back to the late 1980s when IBM researchers Barry Devlin and Paul Murphy developed the «business data warehouse».*

***Example 2.** The skills necessary to achieve either method of **data warehouse** integration include advanced data management, information system skills, and programming.*

- ◆ **Datagram** — дейтаграма — a formatted unit of data carried by a packet mode computer network. Computer communications links that do not support packets, such as traditional point-to-point telecommunications links, simply transmit data as a series of bytes, characters, or bits alone. When data is formatted into packets, the bitrate of the communication medium can better be shared among users than if the network were circuit switched. By using packet switched networking it is also harder to guarantee a lowest possible bitrate. A packet consists of two kinds of data: control information and user data (also known as payload). The control information provides data the network needs to deliver the user data, for example: source and destination addresses, error detection codes like checksums, and sequencing information. Typically, control information is found in packet headers and trailers, with user data in between.

***Example 1.** **Datagram** uses different conventions for distinguishing between the elements and for formatting the data. In Binary Synchronous Transmission, the packet is formatted in 8-bit bytes, and special characters are used to delimit the different elements.*

***Example 2.** Other **datagrams**, like Ethernet, establish the start of the header and data elements by their location relative to the start of the packet. Some protocols format the information at a bit level instead of a byte level.*

- ◆ **Default route** (also known as the **gateway of last resort**) — маршрут за замовчуванням — the network route used by a router when no other known route exists for a given IP packet's

destination address. All the packets for destinations not known by the router's routing table are sent to the default route. This route generally leads to another router, which treats the packet the same way: If the route is known, the packet will get forwarded to the known route. If not, the packet is forwarded to the default-route of that router which generally leads to another router. And so on. Each router traversal adds a one-hop distance to the route.

***Example 1.** Routers in an organization generally point the **default route** towards the router that has a connection to a network service provider.*

***Example 2.** The **default route** in IPv4 (in CIDR notation) is 0.0.0.0/0, often called the quad-zero routes.*

- ◆ **Demarcation point** — точка демаркації — the point at which the telephone company network ends and connects with the wiring at the customer premises. A demarcation point is also referred to as the demarc, DMARC, MPOE (minimum point of entry or main point of entry). The demarcation point varies between countries and has changed over time.

***Example 1.** This junction block usually includes a lightning arrestor (which requires a wire to earth ground). In multi-line installations such as businesses or apartment buildings, the **demarcation point** may be a punch-down block.*

***Example 2.** As the local loop becomes upgraded, with fiber optic and coaxial cable technologies sometimes replacing the original unshielded twisted pair to the premises, the **demarcation point** has grown to incorporate the equipment necessary to interface the original premises POTS wiring and equipment to the new communication channel.*

- ◆ **Department of Defense (DOD or DoD)** — Міністерство оборони США — the federal department charged with coordinating and supervising all agencies and functions of the government relating directly to national security and the military.

***Example 1.** The organization and functions of the **DOD** are set forth in Title 10 of the United States Code.*

***Example 2.** The command structure of the **Department of Defense** is defined by the Goldwater-Nichols Act of 1986 (PL 99-433), signed into law by President Ronald Reagan on 1 October 1986.*

- ◆ **Dial-up Internet access** — комутований інтернет-ресурс — a form of Internet access that uses telephone lines. The user's computer or router uses an attached modem connected to a telephone line to dial into an Internet service provider's (ISP)

node to establish a modem-to-modem link, which is then used to route Internet Protocol packets between the user's equipment and hosts on the Internet.

***Example 1.** Dial-up connections to the Internet require no infrastructure other than the telephone network.*

***Example 2.** Dial-up access may also be an alternative for users on limited budgets as it is offered for free by some ISPs, though broadband is increasingly available at lower prices in many countries due to market competition.*

- ◆ **Digital – цифровой** – systems that represent signals as discrete levels, rather than as a continuous range. In most cases the number of states is two, and these states are represented by two voltage levels: one near to zero volts and one at a higher level depending on the supply voltage in use. These two levels are often represented as «Low» and «High». Fundamental advantage of digital techniques stem from the fact it is easier to get an electronic device to switch into one of a number of known states than to accurately reproduce a continuous range of values. Digital electronics are usually made from large assemblies of logic gates, simple electronic representations of Boolean logic functions. One advantage of digital circuits when compared to analog circuits is that signals represented digitally can be transmitted without degradation due to noise. For example, a continuous audio signal, transmitted as a sequence of 1s and 0s, can be reconstructed without error provided the noise picked up in transmission is not enough to prevent identification of the 1s and 0s. An hour of music can be stored on a compact disc as about 6 billion binary digits. In a digital system, a more precise representation of a signal can be obtained by using more binary digits to represent it. While this requires more digital circuits to process the signals, each digit is handled by the same kind of hardware. In an analog system, additional resolution requires fundamental improvements in the linearity and noise characteristics of each step of the signal chain.

***Example 1.** Computer-controlled **digital** systems can be controlled by software, allowing new functions to be added without changing hardware. Often this can be done outside of the factory by updating the product's software. So, the product's design errors can be corrected after the product is in a customer's hands.*

***Example 2.** Information storage can be easier in **digital** systems than in analog ones. The noise-immunity of **digital** systems permits data to be stored and retrieved without degradation. In a **digital** system, as long as*

the total noise is below a certain level, the information can be recovered perfectly.

- ◆ **Directory service — служба каталогів** — simply the software system that stores, organizes and provides access to information in a directory. In software engineering, a directory is a map of the differences between names and values. It allows the look up of values given a name, similar to a dictionary. As a word in a dictionary may have multiple definitions, in a directory, a name may be associated with multiple, different pieces of information. Likewise, as a word may have different parts of speech and different definitions, a name in a directory may have many different types of data.

Example 1. Directories may be very narrow in scope, supporting only a small set of node types and data types, or they may be very broad, supporting an arbitrary or extensible set of types.

*Example 2. In a telephone **directory**, the nodes are names and the data items are telephone numbers.*

- ◆ **Domain Name System (DNS) — служба імені домена** — a hierarchical naming system for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participants. Most importantly, it translates domain names meaningful to humans into the numerical (binary) identifiers associated with networking equipment for the purpose of locating and addressing these devices worldwide. An often used analogy to explain the Domain Name System is that it serves as the «phone book» for the Internet by translating human-friendly computer hostnames into IP addresses.

*Example 1. The **Domain Name System** makes it possible to assign domain names to groups of Internet users in a meaningful way, independent of each user's physical location.*

*Example 2. The **Domain Name System** distributes the responsibility of assigning domain names and mapping those names to IP addresses by designating authoritative name servers for each domain.*

- ◆ **Dumb terminal — неінтелектуальний термінал** — can vary depending on the context in which it is used. In the context of traditional computer terminals that communicate over a serial RS-232 connection, dumb terminals are those that can interpret a limited number of control codes (CR, LF etc.) but do not have the ability to process special escape sequences that perform

functions such as clearing a line, clearing the screen, or controlling cursor position. In this context dumb terminals are sometimes dubbed glass teletypes, for they essentially have the same limited functionality as does a mechanical teletype. This type of dumb terminal is still supported on modern Unix-like systems by setting the environment variable TERM to dumb.

***Example 1.** In the broader context that includes all forms of keyboard / screen computer communication devices, including personal computers, diskless workstations, network computers, thin clients, and X Terminals, the term **dumb terminal** is sometimes used to refer to any type of traditional computer terminal that communicates serially over a RS-232 connection that does not locally process data or execute user programs.*

***Example 2.** The term **dumb terminal** sometimes also refers to public computer terminals that are limited to monochrome text-only capabilities, or to terminals that transmit each character as it is typed rather than waiting until it is polled by a host computer.*

◆ **Dynamic Host Configuration Protocol (DHCP) – протокол динамічного конфігурування хостів** – a computer networking protocol used by devices (DHCP clients) which dynamically distributes the IP address to the destination host. Dynamic Host Configuration Protocol automates network-parameter assignment to network devices from one or more fault-tolerant DHCP servers. Even in small networks, DHCP is useful because it can make it easy to add new machines to the network. When a DHCP-configured client (a computer or any other network-aware device) connects to a network, the DHCP client sends a broadcast query requesting necessary information from a DHCP server. The DHCP server manages a pool of IP addresses and information about client configuration parameters such as default gateway, domain name, the DNS servers, other servers such as time servers, and so forth. On receiving a valid request, the server assigns the computer an IP address, a lease (length of time the allocation is valid), and other IP configuration parameters, such as the subnet mask and the default gateway. The query is typically initiated immediately after booting, and must complete before the client can initiate IP-based communication with other hosts.

***Example 1.** A network administrator assigns a range of IP addresses to **DHCP**, and each client computer on the LAN has its IP software configured to request an IP address from the **DHCP** server during network initialization.*

***Example 2.** The **DHCP** server permanently assigns a free IP address to a requesting client from the range defined by the administrator.*

E

- ◆ **Encoding – кодування** – the process of transforming information from one format into another. The opposite operation is called **decoding**. This is often used in many digital devices. There are a number of more specific meanings that apply in certain contexts.

***Example 1. Encoding** (in cognition) is a basic perceptual process of interpreting incoming stimuli; technically speaking, it is a complex, multi-stage process of converting relatively objective sensory input (e.g. light, sound) into subjectively meaningful experience.*

***Example 2.** A content format is a specific **encoding** format for converting a specific type of data to information.*

- ◆ **Ethernet – специфікація локальної мережі** – standardized as IEEE 802.3. The combination of the twisted pair versions of Ethernet for connecting end systems to the network, along with the fiber optic versions for site backbones, is the most widespread wired LAN technology. It has been in use from around 1980 to the present, largely replacing competing LAN standards such as token ring, FDDI, and ARCNET. A standard 8P8C (often called RJ45) connector used most commonly on cat5 cable, a type of cabling used primarily in Ethernet networks.

***Example 1.** The experimental **Ethernet** described in the 1976 paper ran at 3,000,000 bits per second (3 Mbit/s) and had eight-bit destination and source address fields, so the original **Ethernet** addresses were not the MAC addresses they are today.*

***Example 2.** In the **Ethernet** camp, it put at risk the market introduction of the Xerox Star workstation and 3Com's Ethernet LAN products. With such business implications in mind, David Liddle (General Manager, Xerox Office Systems) and Metcalfe strongly supported a proposal of Fritz Ruscheisen for an alliance in the emerging office communication market, including Siemens' support for the international standardization of **Ethernet**.*

- ◆ **Enterprise software** (also known as **enterprise application software (EAS)** – **корпоративне програмне забезпечення** – software intended to solve an enterprise problem (rather than a departmental problem) and often written using an Enterprise Software Architecture. Due to the cost of building what is often proprietary software, only large enterprises attempt to build such

enterprise software that models the entire business enterprise and is the core IT system of governing the enterprise and the core of communication within the enterprise.

***Example 1.** As business enterprises have similar departments and systems in common, **enterprise software** is often available as a suite of programs that have attached enterprise development tools to customize the programs to the specific enterprise.*

***Example 2.** **Enterprise software** is often designed and implemented by an Information Technology (IT) group within an enterprise.*

F

- ◆ **Fast Ethernet – швидкий Ethernet** – a collective term for a number of Ethernet standards that carry traffic at the nominal rate of 100 Mbit/s, against the original Ethernet speed of 10 Mbit/s. Of the 100 megabit Ethernet standards 100baseTX (T=«Twisted» Pair Copper) is by far the most common and is supported by the vast majority of Ethernet hardware currently produced. Full duplex fast Ethernet is sometimes referred to as «200 Mbit/s» though this is somewhat misleading as that level of improvement will only be achieved if traffic patterns are symmetrical.

***Example 1.** A **fast Ethernet** adapter can be logically divided into a Media Access Controller (MAC) which deals with the higher level issues of medium availability and a Physical Layer Interface (PHY).*

***Example 2.** While **FastEthernet** improved network speed ten-fold, it is now only a mid-range Ethernet architecture.*

- ◆ **Fault-tolerant design (also known as fail-safe design) – відмовостійкість** – a design that enables a system to continue operation, possibly at a reduced level (also known as graceful degradation), rather than failing completely, when some part of the system fails. The term is most commonly used to describe computer-based systems designed to continue more or less fully operational with, perhaps, a reduction in throughput or an increase in response time in the event of some partial failure. That is, the system as a whole is not stopped due to problems either in the hardware or the software.

*Example 1. Providing **fault-tolerant design** for every component is normally not an option.*

*Example 2. A **fault-tolerant design** may allow for the use of inferior components, which would have otherwise made the system inoperable.*

- ◆ **Fiber distributed data interface (FDDI) — розподілений інтерфейс передачі даних по волоконно-оптичних каналах** — provides a standard for data transmission in a local area network that can extend in range up to 200 kilometers (124 miles). Although FDDI topology is a token ring network, it does not use the IEEE 802.5 token ring protocol as its basis; instead, its protocol is derived from the IEEE 802.4 token bus timed token protocol. In addition to covering large geographical areas, FDDI local area networks can support thousands of users. As a standard underlying medium it uses optical fiber (though it can use copper cable, in which case one can refer to CDDI). FDDI uses a dual-attached, counter-rotating token ring topology. FDDI, as a product of American National Standards Institute X3T9.5 (now X3T12), conforms to the Open Systems Interconnection (OSI) model of functional layering of LANs using other protocols.

*Example 1. A **FDDI** network contains two token rings, one for possible backup in case the primary ring fails. The primary ring offers up to 100 Mbit/s capacity.*

*Example 2. When a **FDDI** network has no requirement for the secondary ring to do backup, it can also carry data, extending capacity to 200 Mbit/s.*

- ◆ **Fiber-optic cable — волоконно-оптичний кабель** — a cable containing one or more optical fibers. The optical fiber elements are typically individually coated with plastic layers and contained in a protective tube suitable for the environment where the cable will be deployed.

*Example 1. A few decades later, the first set of bundled **fiber optics cables** was developed, though it was not called «**fiber optics**» at the time.*

*Example 2. In a Verizon press release dated 19 November 2007, the company announced successfully transmitting a video broadcast along **fiber optic cable** at a whopping 100 gigabits per second (gbps).*

- ◆ **File Transfer Protocol (FTP) — протокол передачі файлів** — a standard network protocol used to exchange and manipulate files over a TCP/IP based network, such as the Internet. FTP is built on a client-server architecture and utilizes separate control

and data connections between the client and server applications. Client applications were originally interactive command-line tools with a standardized command syntax, but graphical user interfaces have been developed for all desktop operating systems in use today. FTP is also often used as an application component to automatically transfer files for program internal functions. FTP can be used with user-based password authentication or with anonymous user access.

***Example 1.** In active mode, the **FTP** client opens a dynamic port, sends the FTP server the dynamic port number on which it is listening over the control stream and waits for a connection from the FTP server.*

***Example 2.** When the **FTP** server initiates the data connection to the FTP client it binds the source port to port 20 on the FTP server.*

- ◆ **Filter — фільтр** — a computer program to process a data stream. Some operating systems such as Unix are rich with filter programs. Even Windows has some simple filters built in to its command shell, most of which have significant enhancements relative to the similar filter commands that were available in MS-DOS.

***Example 1.** The similarity with Unix extends to **filters** used as elements of pipelines. The pipe operator on a command line signifies that the main output of the command to the left is passed as main input to the command on the right. From the early days of DOS based computers, the two classic **filters** are **find** and **sort**.*

***Example 2.** For use in the same command shell environment, there are many more **filters** available than those built in to Windows.*

- ◆ **Firewall — брандмауер** — a part of a computer system or network that is designed to block unauthorized access while permitting authorized communications. It is a device or set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out) computer traffic between different security domains based upon a set of rules and other criteria. Firewalls can be implemented in either hardware or software, or a combination of both. Firewalls are frequently used to prevent unauthorized Internet users from accessing private networks connected to the Internet, especially intranets. All messages entering or leaving the intranet pass through the firewall, which examines each message and blocks those that do not meet the specified security criteria.

***Example 1.** A **firewall** is a dedicated appliance, or software running on a computer, which inspects network traffic passing through it, and denies or permits passage based on a set of rules.*

***Example 2.** A **firewall**'s basic task is to regulate some of the flow of traffic between computer networks of different trust levels. Typical examples are the Internet which is a zone with no trust and an internal network which is a zone of higher trust. A zone with an intermediate trust level, situated between the Internet and a trusted internal network, is often referred to as a «perimeter network» or Demilitarized zone (DMZ).*

- ◆ **Flooding** — **хвильове поширення пакетів; лавинна передача** — a simple routing algorithm in which every incoming packet is sent through every outgoing link.

Its main advantages include the following items:

- If a packet can be delivered, it will (probably multiple times).
- This algorithm is very simple to implement.

Its disadvantages are the following:

Duplicate packets may circulate forever, unless certain precautions are taken:

- Use a hop count or a time to live count and include it with each packet. This value should take into account the number of nodes that a packet may have to pass through on the way to its destination.
- Have each node keep track of every packet seen and only forward each packet once.

***Example 1.** Since **flooding** naturally utilizes every path through the network, it will also use the shortest path.*

***Example 2.** **Flooding** can be costly in terms of wasted bandwidth and, as in the case of a Ping flood or a Denial of service attack, it can be harmful to the reliability of a computer network.*

- ◆ **Flow** (or alternatively, **flow of control**) — **порядок** — refers to the order in which the individual statements, instructions, or function calls of an imperative or functional program are executed or evaluated. Within an imperative programming language, a control flow statement is a statement whose execution results in a choice being made as to which of two or more paths should be followed. For non-strict functional languages, functions and language constructs exist to achieve the same result, but they are not necessarily called control flow statements.

The kinds of control flow statements supported by different languages vary, but can be categorized by their effect:

- continuation at a different statement (unconditional branch or jump);
- executing a set of statements only if some condition is met (choice — i.e. conditional branch);

- executing a set of statements zero or more times, until some condition is met (i.e. loop — the same as conditional branch);
- executing a set of distant statements, after which the flow of control usually returns (subroutines, coroutines, and continuations);
- stopping the program, preventing any further execution (unconditional halt).

***Example 1.** Interrupts and signals are low-level mechanisms that can alter the **flow** of control in a way similar to a subroutine, but usually occur as a response to some external stimulus or event (that can occur asynchronously), rather than execution of an «in-line» control flow statement.*

***Example 2.** At the level of machine or assembly language, control **flow** instructions usually work by altering the program counter. For some CPUs the only control **flow** instructions available are conditional or unconditional branches (sometimes called jumps).*

◆ **Fragment — фрагмент** — the data necessary to generate a single pixel's worth of a drawing primitive in the frame buffer. This data may include, but is not limited to:

- raster position;
- depth;
- interpolated attributes (color, texture coordinates, etc.);
- stencil;
- alpha;
- window ID.

As a scene is drawn, drawing primitives are rasterized into fragments which are textured and combined with the existing frame buffer. How a fragment is combined with the data already in the frame buffer depends on various settings. In a typical case, a fragment may be discarded if it is farther away than the pixel that is already at that location (according to the depth buffer).

***Example 1.** If it is nearer than the existing pixel, it may replace what is already there, or, if alpha blending is in use, the pixel's color may be replaced with a mixture of the **fragment**'s color and the pixel's existing color, as in the case of drawing a translucent object.*

***Example 2.** In general, a **fragment** can be thought of as the data needed to shade the pixel, plus the data needed to test whether the fragment survives to become a pixel (depth, alpha, stencil, scissor, window ID, etc.).*

- ◆ **Fragmentation — фрагментація** — a phenomenon in which storage space is used inefficiently, reducing storage capacity and in most cases performance. The term is also used to denote the wasted space itself. There are three different but related forms of fragmentation: external fragmentation, internal fragmentation, and data fragmentation. Various storage allocation schemes exhibit one or more of these weaknesses. Fragmentation can be accepted in return for increase in speed or simplicity.

*Example 1. Internal **fragmentation** occurs when storage is allocated without ever intending to use it. This space is wasted.*

*Example 2. A drive with a lot of **fragmentation** will be harder to recover in the event of a crash.*

- ◆ **Frame — кадр** — a digital data transmission unit on the Layer 2 of the OSI model. RFC 1122 defines a frame as «the unit of transmission in a link layer protocol, and consists of a link-layer header followed by a packet.» Frames are used for data exchange between two points via a direct physical or logical link. Depending on the Layer 2 protocol employed, the receiver of frames uses one of several multiplex techniques to distinguish more than one logical data streams (sometimes dubbed virtual circuits) which run over a single shared medium.

*Example 1. The **frame-relay** network handles the transmission over a frequently-changing path transparent to all end-users.*

*Example 2. With the advent of MPLS, VPN and dedicated broadband services such as cable modem and DSL, the end may loom for the **frame** relay protocol and encapsulation.*

- ◆ **Full-duplex (or sometimes double-duplex system) — дуплексний зв'язок** — allows communication in both directions, and, unlike half-duplex, allows this to happen simultaneously. Land-line telephone networks are full-duplex, since they allow both callers to speak and be heard at the same time. A good analogy for a full-duplex system would be a two-lane road with one lane for each direction.

Example 1. Full-duplex Ethernet connections work by making simultaneous use of two physical pairs of twisted cable (which are inside the jacket), wherein one pair is used for receiving packets and one pair is used for sending packets (two pairs per direction for some types of Ethernet), to a directly-connected device.

Example 2. Double-duplex system effectively makes the cable itself a collision-free environment and doubles the maximum data capacity that can be supported by the connection.

- ◆ **Fully qualified domain name (FQDN)** (sometimes referred to as an **absolute domain name**) — повністю детерміноване ім'я домена — a domain name that specifies its exact location in the tree hierarchy of the Domain Name System (DNS). It specifies all domain levels, including the top-level domain, relative to the root domain. A fully qualified domain name is distinguished by this absoluteness in the name space.

Example 1. Some applications, such as web browsers will try to resolve the domain name part of a Uniform Resource Locator (URL) if the resolver cannot find the specified domain or if the **domain name** is clearly not **fully qualified** by appending frequently used top-level domains and testing the result.

Example 2. For example, given a device with a local hostname myhost and a parent domain name example.com, the **fully qualified domain name** is written as myhost.example.com. This **fully qualified domain name** therefore uniquely identifies the host — while there may be many resources in the world called myhost, there is only one myhost.example.com.

G

- ◆ **Gigabit — riraбiт** — a unit of digital information storage, with the symbol **Gbit** (or **Gb**). $1 \text{ gigabit} = 10^9 = 1,000,000,000 \text{ bits}$ (which is equal to 125 decimal megabytes or 122 binary mebibytes, as 8 bits equals one byte). The gigabit is closely related to the gibibit, which is unambiguously equal to $2^{30} \text{ bits} = 1,073,741,824 \text{ bits}$.

Example 1. Note that the difference between a billion bits and a gibibit is greater than 7%. This is sufficient to make it economically compelling to represent certain classes of storage devices in (true) **gigabits** or gigabytes rather than gibibits / gibibytes.

Example 2. The **gigabit** is not often used in data transmission rates, as most devices push information at slower kilobyte and megabyte speeds.

- ◆ **Gigabyte — riraбaйт** — an SI-multiple of the unit byte for digital information storage. The prefix giga means 10^9 , therefore 1 gigabyte is 1000000000 bytes. The unit symbol for the gigabyte is **GB** or **Gbyte**, but not **Gb** (lower case b) which is used for the gigabit.

*Example 1. Today the usage of the unit **gigabyte** is still ambiguous: its value may depend on the context of usage.*

*Example 2. Hence, the difference between a gigabit and a **gigabyte** is that the latter is 8x greater, or eight billion bits.*

- ◆ **Gigahertz (GHz) – rirarepu** – refers to frequencies in the billions of cycles per second range. *Giga* is the standard multiplier for 1 billion, and *Hertz* is the standard unit for measuring frequencies, expressed as cycles or occurrences per second. One GHz is equivalent to one thousand megahertz (MHz). GHz is commonly used when discussing computer performance or radio frequencies. In computers, GHz most often refers to the clock speed of the central processing unit, or CPU; the faster the CPU clock can tick, the faster, in general, the computer can process data and instructions. In 2000, Intel and Advanced Micro Devices achieved a marketing and technical milestone by releasing the first CPUs to run at 1 GHz. Speeds have subsequently reached 4 GHz.

*Example 1. The use of **GHz** frequencies for communications was made possible by advances in semiconductor technologies.*

*Example 2. L-Band, between 1 and 2 **GHz**, is used for satellite communications and Global Positioning Systems, or **GPS**.*

- ◆ **Global Positioning System (GPS) – глобальна система позиціонування** – a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. GPS is made up of three parts: between 24 and 32 satellites in Medium Earth Orbit, four control and monitoring stations on Earth, and the actual navigation devices users own. GPS satellites broadcast signals from space that GPS receivers use to provide three-dimensional location (latitude, longitude, and altitude) plus the time.

*Example 1. **GPS** has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, tracking and surveillance, and hobbies such as geocaching and waymarking.*

*Example 2. **GPS** has become a mainstay of transportation systems worldwide, providing navigation for aviation, ground, and maritime operations.*

- ◆ **GNOME (GUI Network Object Model Environment)** – графічний інтерфейс та група прикладних програм операційної системи **Linux** – a graphical user interface which runs on top of a computer operating system-composed entirely of free and open source software. It is an international project that includes creating software development frameworks, selecting application software for the desktop, and working on the programs which manage application launching, file handling, and window and task management.

Example 1. GNOME is part of the GNU Project and can be used with various Unix-like operating systems, most notably those built on top of the Linux kernel and the GNU userland, and as part of Java Desktop System in Solaris.

Example 2. The GNOME project puts heavy emphasis on simplicity, usability, and making things «just work».

- ◆ **Graphical user interface (GUI)** – графічний інтерфейс користувача – a type of user interface item that allows people to interact with programs in more ways than typing such as computers; hand-held devices such as MP3 Players, Portable Media Players or Gaming devices; household appliances and office equipment with images rather than text commands. A GUI offers graphical icons, and visual indicators, as opposed to text-based interfaces, typed command labels or text navigation to fully represent the information and actions available to a user. The actions are usually performed through direct manipulation of the graphical elements.

Example 1. GUI is historically restricted to the scope of two-dimensional display screens with display resolutions capable of describing generic information, in the tradition of the computer science research at Palo Alto Research Center (PARC).

Example 2. The term GUI earlier might have been applicable to other high-resolution types of interfaces that are non-generic, such as video-games, or not restricted to flat screens, like volumetric displays.

- ◆ **Gross bit rate (raw bitrate, line rate or data signaling rate)** – бітова швидкість передачі даних – the total number of physically transferred bits per second over a communication link, including useful data as well as protocol overhead. The gross bit rate is related to, but should not be confused with, the baud rate in symbols/s or pulses/s. Gross bit rate can be used interchangeably with «baud rate» only when each modulation transition of

a data transmission system carries exactly one bit of data; something not true for modern modem modulation systems.

Example 1. For most line codes and modulation methods: *Baud rate* \leq **Gross bit rate**.

Example 2. More specifically, a line code representing the data using pulse-amplitude modulation with 2^N different voltage levels, or a digital modulation method using 2^N different symbols, for example 2^N amplitudes, phases or frequencies, can transfer N bit/symbol, or N bit/pulse. This results in: **Gross bit rate** = *Baud rate* $\cdot N$.

- ◆ **Group – група** – generally refers to a grouping of users. In principle, users may belong to none, one, or many groups (although in practice some systems place limits on this.) The primary purpose of user groups is to simplify access control to computer systems.

Example 1. A computer **group** has a network which is shared by students and academics.

Example 2. The department has made a list of directories which the **group** of students is permitted to access and another list of directories which the staff are permitted to access.

- ◆ **Groupware – програмне забезпечення колективного використання** – software designed to help people involved in a common task achieve their goals. Collaborative software is the basis for computer supported cooperative work. Such software systems as email, calendaring, text chat, wiki, and bookmarking belong to this category. The more general term social software applies to systems used outside the workplace, for example, on-line dating services and social networks like Friendster, Twitter and Facebook.

Example 1. **Groupware** should support the individuals that make up the team and the interactions between them during the group decision making process.

Example 2. **Groupware** is considered to be a tenant of collaboration, with the rapid exchange of ideas facilitating the group decision making process.

H

- ◆ **Hacker** — **хакер** — a person who breaks into computers, usually by gaining access to administrative controls. The subculture that has evolved around hackers is often referred to as the computer underground. Proponents claim to be motivated by artistic and political ends, and are often unconcerned about the use of illegal means to achieve them.

*Example 1. These people now refer to the cyber-criminal **hackers** as «crackers».*

*Example 2. The type of **hacker** who breaks into bank accounts or a company's network does exist, but the meaning is entirely different from that of a professional **hacker**.*

- ◆ **Hardware abstraction layer (HAL)** — **рівень апаратних абстракцій** — an abstraction layer, implemented in software, between the physical hardware of a computer and the software that runs on that computer. Its function is to hide differences in hardware from most of the operating system kernel, so that most of the kernel-mode code does not need to be changed to run on systems with different hardware. On a PC, HAL can basically be considered to be the driver for the motherboard and allows instructions from higher level computer languages to communicate with lower level components, such as directly with hardware.

*Example 1. The Windows NT operating system has a **HAL** in the kernel space, between hardware and kernel, drivers, executive services.*

*Example 2. **Hardware abstraction layers** are of an even lower level in computer languages than application programming interfaces (API) because they interact directly with hardware instead of a system kernel, therefore **HALs** require less processing time than APIs.*

- ◆ **Hash function** — **хеш-функція** — any well-defined procedure or mathematical function which converts a large, possibly variable-sized amount of data into a small datum, usually a single integer that may serve as an index to an array. The values returned by a hash function are called hash values, hash codes, hash sums, or simply hashes. Hash functions are mostly used to speed up table lookup or data comparison tasks such as finding items in a database, detecting duplicated or similar records in a large file, finding similar stretches in DNA sequences.

Example 1. A hash function may map two or more keys to the same hash value.

Example 2. The HashKeeper database maintained by the National Drug Intelligence Center, for instance, is more aptly described as a catalog of file fingerprints than of hash values.

- ◆ **Header — заголовок** — refers to supplemental data placed at the beginning of a block of data being stored or transmitted. In data transmission, the data following the header are sometimes called the payload or body. It is vital that header composition follow a clear and unambiguous specification or format, to allow for parsing.

Example 1. In a data packet sent via the Internet, the data (payload) are preceded by header information such as the sender's and the recipient's IP addresses, the protocol governing the format of the payload and several other formats.

Example 2. The header's format is specified in the Internet Protocol.

- ◆ **Hertz (symbol: Hz) — герц** — a unit of frequency. It is defined as the number of complete cycles per second. It is the basic unit of frequency in the International System of Units (SI), and is used worldwide in both general-purpose and scientific contexts. Hertz can be used to measure any periodic event; the most common uses for hertz are to describe radio and audio frequencies, more or less sinusoidal contexts in which case a frequency of 1 Hz is equal to one cycle per second. The unit hertz is defined by the International System of Units (SI) such that the hyperfine splitting in the ground state of the caesium 133 atom is exactly 9,192,631,770 hertz, ν (hfs Cs) = 9,192,631,770 Hz. Equivalently, $1 \text{ Hz} = \frac{1}{9,192,631,770} \nu$ (hfs Cs). This definition is derived from the SI definition of the second. Hertz are inverse, s^{-1} . In practice, the hertz simply replaced the older cycle per second.

Example 1. To avoid confusion, periodically varying angles are typically not expressed in hertz but rather in an appropriate angular unit such as radians per second.

Example 2. When an SI unit is spelled out in English, it should always begin with a lowercase letter (hertz), except where any word would be capitalized, such as at the beginning of a sentence or in capitalized material such as a title. Note that «degree Celsius» conforms to this rule because the «d» is lowercase.

- ◆ **Hexadecimal** (also base-16, **hexa**, or **hex**) — **шістнадцяткова система обчислення** — a numeral system with a radix, or base, of 16. It uses sixteen distinct symbols, most often the symbols 0–9 to represent values zero to nine, and A, B, C, D, E, F (or a through f) to represent values ten to fifteen. Its primary use is as a human-friendly representation of binary coded values, so it is often used in digital electronics and computer engineering.

Example 1. Since each **hexadecimal** digit represents four binary digits (bits) — also called a **nibble** — it is a compact and easily translated shorthand to express values in base two.

Example 2. Donald Knuth introduced the use of a particular typeface to represent a particular **Hexadecimal** radix in his book *The TeXbook*.

- ◆ **High-Level Data Link Control (HDLC)** — **високорівневий протокол управління каналом** — a bit-oriented synchronous data link layer protocol developed by the International Organization for Standardization (ISO). The original ISO standards for HDLC are:

- ISO 3309 — Frame Structure.
- ISO 4335 — Elements of Procedure.
- ISO 6159 — Unbalanced Classes of Procedure.
- ISO 6256 — Balanced Classes of Procedure.

Example 1. The current standard for **HDLC** is **ISO 13239**, which replaces all of those standards. **HDLC** provides both connection-oriented and connectionless service.

Example 2. **HDLC** can be used for point to multipoint connections, but is now used almost exclusively to connect one device to another, using what is known as **Asynchronous Balanced Mode (ABM)**.

- ◆ **Hop** — **ретрансляція** — a lispy programming language by Manuel Serrano for web 2.0 and also the name of the web broker that implements this language. It is written in Bigloo Scheme. A web broker is program that can act like both a web server and a web proxy. Hop is a stratified language, which means that a single program file contains instructions for both the server and the client.

Example 1. The server executes **Hop** demanding computations and operations that require system privileges for accessing files or other **resources**.

Example 2. **Hop** is based on Scheme. Therefore a **Hop** program is essentially a list of words and / or lists that start and end with parentheses.

- ◆ **Host** (or **Internet node**) — **хост** — a computer connected to the Internet — or more generically — to any type of data network. A

network host can host information resources as well as application software for providing network services. Every Internet host has one or more IP addresses uniquely assigned to the host. The addresses are assigned either manually by the computer administrator, or automatically at start-up by means of the Dynamic Host Configuration Protocol (DHCP).

***Example 1.** Every **host** is a physical network node (i.e. a network device), but not every physical network node is a **host**. Network devices such as modems and network switches are usually not assigned **host** addresses, and are not considered **hosts**.*

***Example 2.** Devices such as network printers and hardware routers are assigned IP addresses, but since they are not general-purpose computers, they are sometimes not considered as **hosts**.*

- ◆ **Host address (or the host ID portion of an IP address)** — **адреса хоста** — the portion of the address used to identify hosts (any device requiring a Network Interface Card, such as a PC or networked printer) on the network. The network ID, by contrast, is the portion of the address that refers to the network itself.

***Example 1.** Your local network has a **host address** of 192.168.1.0/30 (using CIDR notation for this subnet).*

***Example 2.** Your network ID is the first 30 bits, in bold below. The **host portion** is the last two bits: 11000000.10101000.00000001.000000 01.*

- ◆ **HTML (Hypertext Markup Language)** — **мова розмітки гіпертексту** — the predominant markup language for web pages. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists etc as well as for links, quotes, and other items. It allows images and objects to be embedded and can be used to create interactive forms. It is written in the form of HTML elements consisting of «tags» surrounded by angle brackets within the web page content. It can include or can load scripts in languages such as JavaScript which affect the behavior of HTML processors like Web browsers; and Cascading Style Sheets (CSS) to define the appearance and layout of text and other material. The W3C, maintainer of both HTML and CSS standards, encourages the use of CSS over explicit presentational markup.

***Example 1.** **Hyper Text Markup Language (HTML)** is the encoding scheme used to create and format a web document.*

***Example 2.** The last **HTML** specification published by the W3C is the **HTML 4.01 Recommendation**, published in late 1999.*

- ◆ **Hub (or repeater hub) – концентратор** – a device for connecting multiple twisted pair or fiber optic Ethernet devices together and thus making them act as a single network segment. Hubs work at the physical layer (layer 1) of the OSI model. The device is thus a form of multiport repeater. Repeater hubs also participate in collision detection, forwarding a jam signal to all ports if it detects a collision. Hubs also often come with a BNC and / or AUI connector to allow connection to legacy 10BASE2 or 10BASE5 network segments. The availability of low-priced network switches has largely rendered hubs obsolete but they are still seen in older installations and more specialized applications.

*Example 1. A network **hub** is a fairly unsophisticated broadcast device.*

*Example 2. **Hubs** do not manage any of the traffic that comes through them, and any packet entering any port is broadcast out on all other ports.*

- ◆ **Hybrid neural network – гібридна нейронна мережа** – artificial neural networks with a symbolic part (or, conversely, symbolic computations with a connectionist part) that means an attempt to combine the advantages of two paradigms: incorporating elements of symbolic computation and artificial neural networks into one model while avoiding the shortcomings. Symbolic representations have advantages with respect to explicitly, direct control, fast initial coding, dynamic variable binding and knowledge abstraction.

*Example 1. Representations of **artificial neural networks**, on the other hand, show advantages for biological plausibility, learning, robustness (fault-tolerant processing and graceful decay), and generalization to similar input.*

*Example 2. Since the early 1990s many attempts have been made to reconcile the two approaches in **hybrid neural network**.*

- ◆ **Hyperlink (or link) – гіперпосилання** – a reference to a document that the reader can directly follow. The reference points to another document or to a specific element within a document. Hypertext is text with hyperlinks. Such text is usually viewed with a computer. A software system for viewing and creating hypertext is a hypertext system. A hyperlink has an «anchor», which is a location within a document from which the hyperlink can be followed; that document is known as its source document. The target of a hyperlink is the document, or location within a document, that the hyperlink leads to. The

user can follow the link when its anchor is shown by activating it in some way (often, by touching it or clicking on it). Following has it the effect of displaying its target, often with its context.

***Example 1.** The most common example of hypertext today is the World Wide Web: webpages contain **hyperlinks** to webpages.*

***Example 2.** The effect of following a **hyperlink** may vary with the hypertext system and sometimes on the link itself; for instance, on the World Wide Web, most **hyperlinks** cause the target document to replace the document being displayed, but some are marked to cause the target document to open in a new window.*

- ◆ **Hypertext Transfer Protocol (HTTP)** – протокол прикладного рівня для передачі гіпертексту – an application-level protocol for distributed, collaborative, hypermedia information systems. There are two major versions, HTTP/1.0 that uses a separate connection for every document and HTTP/1.1 that can reuse the same connection to download, for instance, images for the just served page. Hence HTTP/1.1 may be faster as it takes time to set up such connections. The standards development of HTTP has been coordinated by the World Wide Web Consortium and the Internet Engineering Task Force (IETF), culminating in the publication of a series of Requests for Comments (RFCs) which defines HTTP/1.1, the version of HTTP in common use.

***Example 1.** Support for pre-standard **HTTP**/1.1 based on the then developing RFC 2068 was rapidly adopted by the major browser developers in early 1996.*

***Example 2.** **HTTP** is a request / response standard as is typical in client-server computing. The client is an application (e.g. web browser, spider etc) on the computer used by an end-user, the server is an application running on the computer hosting the web site.*

I

- ◆ **ICANN (the Internet Corporation for Assigned Names and Numbers)** – Організація з призначення імен та адрес Інтернету – Headquartered in Marina Del Rey, California, United States, ICANN is a non-profit corporation that was created on

September 18, 1998 and incorporated September 30, 1998 in order to oversee a number of Internet-related tasks previously performed directly on behalf of the U.S. government by other organizations, notably the Internet Assigned Numbers Authority (IANA). ICANN's tasks include responsibility for Internet Protocol (IP) address space allocation, protocol identifier assignment, generic (gTLD) and country code (ccTLD) top-level domain name system management, and root server system management functions. More generically, ICANN is responsible for managing the assignment of domain names and IP addresses. To date, much of its work has concerned the introduction of new generic top-level domains (TLDs). The technical work of ICANN is referred to as the IANA function. ICANN's primary principles of operation have been described as helping preserve the operational stability of the Internet; to promote competition; to achieve broad representation of global Internet community; and to develop policies appropriate to its mission through bottom-up, consensus-based processes.

Example 1. On November 3, 2007, Peter Dengate Thrush replaced Vint Cerf as Chairman of the ICANN Board of Directors.

Example 2. On July 1, 2009 Rod Beckstrom was appointed as CEO/President of ICANN, succeeding Paul Twomey who served in the position from March 27, 2003 until July 1, 2009.

- ◆ **IEEE (read eye-triple-e) (Institute of Electrical and Electronic Engineers) – Інститут інженерів з електротехніки та радіоелектроніки (США)** – an international non-profit, professional organization for the advancement of technology related to electricity. It has the most members of any technical professional organization in the world, with more than 365,000 members in around 150 countries.

Example 1. The IEEE is incorporated in the State of New York, United States. It was formed in 1963 by the merger of the Institute of Radio Engineers (IRE, founded 1912) and the American Institute of Electrical Engineers (AIEE, founded 1884).

Example 2. It manages a separate organizational unit (IEEE-USA) which recommends policies and implements programs specifically intended to benefit the members, the profession and the public in the United States.

- ◆ **IEEE 802.11n-2009 – протокол IEEE для локальних мереж** – an amendment to the IEEE 802.11-2007 wireless networking standard to improve network throughput over previous standards, such as 802.11b and 802.11g, with a significant increase

in the maximum raw OSI physical layer (PHY) data rate from 54 Mbit/s to a maximum of 600 Mbit/s with the use of four spatial streams at a channel width of 40 MHz. Since 2007, the Wi-Fi Alliance has been certifying interoperability of «draft-N» products based on what was draft 2.0 of IEEE 802.11n specification. The Alliance has upgraded its suite of compatibility tests for some enhancements finalized after Draft 2.0. Furthermore, it has affirmed that all draft-n certified products remain compatible with the products conforming to the final standards.

Example 1. IEEE 802.11n builds on previous 802.11 standards by adding multiple-input multiple-output (MIMO) and 40 MHz channels to the physical (PHY) layer, and frame aggregation to the MAC layer. MIMO is a technology which uses multiple antennas to coherently resolve more information than possible using a single antenna.

Example 2. Two important benefits it provides to 802.11n are antenna diversity and spatial multiplexing.

- ◆ **Individual Address Block (IAB) — Координаційна рада мереж Інтернет** — a block of identifiers that is formed by concatenating a 24-bit Organizationally Unique Identifier (OUI) that is owned by the IEEE Registration Authority with an additional 12-bit extension identifier that is assigned by the IEEE Registration Authority and then reserving an additional 12 bits for use by the assignee. The resulting 48-bit identifier uniquely identifies the assignee of the IAB and provides 4096 unique EUI-48 numbers for use by the organization that purchased the IAB. The assignee may create unique identifiers by concatenating a 12-bit extension identifier that is assigned by the organization that purchases the IAB in the bit positions occupied by the 12 additional bits mentioned previously. The purpose of the IAB is to allow organizations to purchase smaller blocks of identifiers at a reduced price.

Example 1. Example of EUI-48 created within an IAB: An EUI-48 identifier is formed by combining the 36-bit IEEE assigned **IAB** base value with a 12-bit extension identifier assigned by the organization — e.g., if the IEEE assigned **IAB** base value is FF-FF-FF-FF-F0-00 and the 12-bit extension identifier is hhh_{16} , then the EUI-48 value generated by combining these two numbers is FF-FF-FF-FF-Fh-hh.

Example 2. There are also IAB based CDI-40 sequences that are formed by combining the 36-bit IEEE assigned IAB base value with the 4-bit extension identifier assigned by the organization — e.g., if the IEEE assigned IAB base value is FF-FF-FF-FF-F0-00 and the 4-bit extension identifier is $0h_{16}$, then the CDI-40 value generated by combining these two numbers is FF-FF.

- ◆ **Information technology (IT) — інформаційна технологія; IT** — the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information. Today, the term *information* has ballooned to encompass many aspects of computing and technology, and the term has become very recognizable. IT professionals perform a variety of duties that range from installing applications to designing complex computer networks and information databases. A few of the duties that IT professionals perform may include data management, networking, engineering computer hardware, database and software design, as well as the management and administration of entire systems.

*Example 1. Information technology is a general term that describes any technology that helps to produce, manipulate, store, communicate, and/or disseminate information. Presumably, when speaking of **Information Technology (IT)** as a whole, it is noted that the use of computers and information are associated.*

*Example 2. In recent days ABET and the ACM have collaborated to form accreditation and curriculum standards for degrees in **Information Technology** as a distinct field of study separate from both Computer Science and Information Systems.*

- ◆ **Instruction register — перістр команд** — the part of a CPU's control unit that stores the instruction currently being executed or decoded. In simple processors each instruction to be executed is loaded into the instruction register which holds it while it is decoded, prepared and ultimately executed, which can take several steps.

*Example 1. More complicated processors use a pipeline of **instruction registers** where each stage of the pipeline does part of the decoding, preparation or execution and then passes it to the next stage for its step.*

*Example 2. Decoding the opcode in the **instruction register** includes determining the instruction, determining where its operands are in memory, retrieving the operands from memory, allocating processor resources to execute the command (in superscalar processors), etc.*

- ◆ **Integrated services digital network (ISDN) — цифровий зв'язок з комплексними послугами** — a set of communications standards enabling traditional telephone lines to carry voice, digital network services, and video. Prior to ISDN, the phone system

was viewed as a way to transport voice, with some special services available for data. The key feature of the ISDN is that it integrates speech and data on the same lines, adding features that were not available in the classic telephone system. There are several kinds of access interfaces to ISDN defined as basic rate interface (BRI), primary rate interface (PRI) and broadband ISDN (B-ISDN).

Example 1. *ISDN is a circuit-switched telephone network system, which also provides access to packet switched networks, designed to allow digital transmission of voice and data over ordinary telephone copper wires, resulting in better voice quality than an analog phone.*

Example 2. *ISDN should not be mistaken for its use with a specific protocol, such as Q.931 whereby ISDN is employed as the network, data-link and physical layers in the context of the OSI model.*

- ◆ **International Organization for Standardization** (Organisation internationale de normalisation) — **Міжнародна організація стандартизації** — (widely known as **ISO**) an international-standard-setting body composed of representatives from various national standards organizations. Founded on 23 February 1947, the organization promulgates worldwide proprietary industrial and commercial standards. It has its headquarters in Geneva, Switzerland. While ISO defines itself as a non-governmental organization, its ability to set standards that often become law, either through treaties or national standards, makes it more powerful than most non-governmental organizations.

Example 1. *ISO's main products are the International Standards. ISO also publishes Technical Reports, Technical Specifications, Publicly Available Specifications, Technical Corrigenda, and Guides.*

Example 2. *In practice, ISO acts as a consortium with strong links to governments.*

- ◆ **Internet Assigned Numbers Authority (IANA)** — **агентство з виділення імен та унікальних параметрів протоколів Інтернету** — the entity that oversees global IP address allocation, root zone management for the Domain Name System (DNS), media types, and other Internet Protocol related assignments. It is operated by the Internet Corporation for Assigned Names and Numbers, better known as ICANN.

Example 1. *IANA delegates local registrations of IP addresses to Regional Internet Registries (RIRs).*

Example 2. *IANA is broadly responsible for the allocation of globally-unique names and numbers that are used in Internet protocols that are published as RFC documents.*

- ◆ **Internet backbone — магистраль Інтернету** — the main «trunk» connections of the Internet. It is made up of a large collection of interconnected commercial, government, academic and other high-capacity data routes and core routers that carry data across the countries, continents and oceans of the world.

*Example 1. The resilience of the **Internet backbone** is made due to its core architectural feature of storing network state in the network elements and relying on the endpoints of communication to handle most of the processing to ensure data integrity, reliability, and authentication.*

*Example 2. The **Internet «backbone»** consists of many different networks and is usually used to describe large networks that interconnect with each other and may have individual ISPs as clients.*

- ◆ **Internet Control Message Protocol (ICMP) — протокол регулюючих посилань в Інтернеті** — one of the core protocols of the Internet Protocol Suite. It is chiefly used by networked computers' operating systems to send error messages - indicating, for instance, that a requested service is not available or that a host or router could not be reached. ICMP relies on IP to perform its tasks, and it is an integral part of IP. It differs in purpose from transport protocols such as TCP and UDP in that it is typically not used to send and receive data between end systems. It is usually not used directly by user network applications, with some notable exceptions being the ping tool and traceroute. ICMP for Internet Protocol version 4 (IPv4) is also known as ICMPv4. IPv6 has a similar protocol, ICMPv6.

*Example 1. **Internet Control Message Protocol** is part of the Internet Protocol Suite as defined in RFC 792.*

*Example 2. **ICMP** messages are contained within standard IP datagrams, **ICMP** messages are usually processed as a special case, distinguished from normal IP processing, rather than processed as a normal sub-protocol of IP.*

- ◆ **Internet Engineering Steering Group (IESG) — Виконавчий комітет IETF** — a body composed of the Internet Engineering Task Force (IETF) Chair and Area Directors:
 - Applications Area (app).
 - Internet Area (int).
 - Operations & Network Management Area (ops).
 - Routing Area (rtg).
 - Real-time Applications and Infrastructure Area (rai).
 - Security Area (sec).
 - Transport Area (tsv).

and Liaison and Ex-officio Members:

- Internet Architecture Board (IAB) Chair and Liaison.
- IETF Executive Director.
- Internet Assigned Numbers Authority (IANA) liaison.
- Request for Comments (RFC) Editor liaison.

Example 1. *IESG provides the final technical review of Internet standards and is responsible for day-to-day management of the IETF.*

Example 2. *It receives appeals of the decisions of the working groups, and the IESG makes the decision to progress documents in the standards track.*

- ◆ **Internet Engineering Task Force (IETF) – Виконавчий комітет IETF** – develops and promotes Internet standards, cooperating closely with the W3C and ISO/IEC standard bodies and dealing in particular with standards of the TCP/IP and Internet protocol suite. It is an open standards organization, with no formal membership or membership requirements. All participants and managers are volunteers, though their work is usually funded by their employers or sponsors; for instance, the current chairperson is funded by VeriSign and the U.S. government's National Security Agency.

Example 1. *The IETF is organized into a large number of working groups and informal discussion groups (BoF)s, each dealing with a specific topic.*

Example 2. *The working groups of IETF are organized into areas by subject matter. Current areas include: Applications, General, Internet, Operations and Management, Real-time Applications and Infrastructure, Routing, Security, and Transport. Each area is overseen by an area director (AD), with most areas having two co-ADs.*

- ◆ **Internet Information Services (IIS) (formerly called Internet Information Server)** – програма web та FTP-сервера компаній Microsoft, яка працює під керівництвом Windows NT 2000 – a set of Internet-based services for servers created by Microsoft for use with Microsoft Windows. It is the world's second most popular web server in terms of overall websites behind the industry leader Apache HTTP Server. As of April 2009 it served 29.27% of all websites according to Netcraft. The services provided currently include FTP, FTPS, SMTP, NNTP, and HTTP/HTTPS.

Example 1. *Earlier versions of IIS were hit with a number of vulnerabilities, chief among them CA-2001-19 which led to the infamous Code Red worm; however, both versions 6.0 and 7.0 currently have no reported issues with this specific vulnerability.*

***Example 2.** There are various built-in security features from Microsoft. Many companies offer third-party security tools and features, also known as «Web App Firewalls, or Web Application Firewalls». The advantage of such tools is that they offer much more comprehensive elements (such as easy-to-use GUI, etc.) that aid in protecting an IIS installation with an additional layer of protection at a higher level.*

- ◆ **Internet Protocol Security (IPsec) – протокол захисту інтернету** – a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a data stream. IPsec also includes protocols for establishing mutual authentication between agents at the beginning of the session and negotiation of cryptographic keys to be used during the session.

***Example 1.** IPsec can be used to protect data flows between a pair of hosts (e.g. computer users or servers), between a pair of security gateways (e.g. routers or firewalls), or between a security gateway and a host.*

***Example 2.** IPsec is a dual mode, end-to-end, security scheme operating at the Internet Layer of the Internet Protocol Suite or OSI model Layer 3.*

Internet Protocol version 6 (IPv6) – протокол IPv6 – the next-generation Internet Protocol version designated as the successor to IPv4, the first implementation used in the Internet and still in dominant use currently. It is an Internet Layer protocol for packet-switched internetworks. The main driving force for the redesign of Internet Protocol was the foreseeable IPv4 address exhaustion. IPv6 was defined in December 1998 by the Internet Engineering Task Force (IETF) with the publication of an Internet standard specification, RFC 2460.

***Example 1.** IPv6 has a vastly larger address space than IPv4.*

***Example 2.** IPv6 also implements new features that simplify aspects of address assignment (stateless address autoconfiguration) and network renumbering (prefix and router announcements) when changing Internet connectivity providers.*

- ◆ **Internet Research Steering Group (IRSG) – науково-дослідна група мережі інтернет** – manages and advises the Internet Research Task Force (IRTF) and so steers the long-term technological development of the Internet. Members of the IRSG are the chair of the IRTF, the leaders of the different research groups of the IRTF, as well as further persons from the appropriate research areas.

*Example 1. The task of the **IRSG** is to create good conditions for the research.*

*Example 2. Apart from the advisory activity, the **IRSG** from time to time arranges workshops with experts from the research areas being worked on.*

- ◆ **Internet service provider (ISP)** (also sometimes referred to as an **Internet access provider (IAP)** – **провайдер послуг інтернет** – a company that offers its customers access to the Internet. The ISP connects to its customers using a data transmission technology appropriate for delivering Internet Protocol datagrams, such as dial-up, DSL, cable modem, wireless or dedicated high-speed interconnects. ISPs may provide Internet e-mail accounts to users which allow them to communicate with one another by sending and receiving electronic messages through their ISP's servers. As a part of their e-mail service, ISPs usually offer the user an e-mail client software package, developed either internally or through an outside contract arrangement. ISPs may provide other services such as remotely storing data files on behalf of their customers, as well as other services unique to each particular ISP.

*Example 1. **Internet service providers** charge different fees depending on the type of Internet service offered and the tier purchased.*

*Example 2. Today, an **Internet service provider** can offer DSL at prices comparable to what dial-up cost throughout the 1990s.*

- ◆ **Internet Society (or ISOC)** – **суспільство інтернет** – an international, nonprofit organization founded during 1992 to provide direction in Internet related standards, education, and policy. It states that its mission is «to assure the open development, evolution and use of the Internet for the benefit of all people throughout the world». The Internet Society has offices near Washington, DC, USA, and in Geneva, Switzerland. It has a membership base comprising more than 80 organizational and more than 28,000 individual members. Members also form «chapters» based on either common geographical location or special interests. There are currently more than 90 chapters around the world.

*Example 1. The **Internet Society** will be a non-profit organization and will be operated for international educational, charitable, and scientific purposes.*

*Example 2. Many of the main forces of the **Internet Society**, such as the Internet Engineering Task Force (**IETF**), were (and still remain) very informal organizations from a legal perspective.*

- ◆ **Ipconfig (internet protocol configuration)** – утиліта командного рядка у Windows NT/2000 з метою отримання конфігураційної інформації TCP/IP для мережного адаптера – in Microsoft Windows it is a console application that displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol DHCP and Domain Name System DNS settings.

Example 1. Ipconfig in Mac OS X serves as a wrapper to the IPConfiguration agent, and can be used to control the BootP and DHCP client from the command line interface.

*Example 2. Like most UNIX-based operating systems, Mac OS X also uses **ipconfig** for more direct control over network interfaces, such as configuring static IP addresses.*

- ◆ **International Telecommunication Union – ITU-T – Міжнародне об'єднання телекомунікації, сектор стандартів телекомунікації** – coordinates standards for telecommunications on behalf of the International Telecommunication Union (ITU) and is based in Geneva, Switzerland. The standardization work of ITU dates back to 1865, with the birth of the International ITU has been an intergovernmental public-private partnership organization since its inception and now has a membership of 191 countries (Member States) and over 700 public and private sector companies as well as international and regional telecommunication entities, known as Sector Members and Associates, which undertake most of the work of the Sector. ITU-T has a permanent secretariat, the Telecommunication Standardization Bureau (TSB), based at the ITU HQ in Geneva, Switzerland.

Example 1. The international standards that are produced by the ITU-T are referred to as «Recommendations» (with the word ordinarily capitalized to distinguish its meaning from the ordinary sense of the word «recommendation»), as they become mandatory only when adopted as part of a national law.

Example 2. Since the ITU-T is part of the ITU, which is a United Nations specialized agency, its standards carry more formal international weight than those of most other standards development organizations that publish technical specifications of a similar form.

J

- ◆ **Java — мова програмування** — a number of computer software products and specifications from Sun Microsystems that together provide a system for developing application software and deploying it in a cross-platform environment. Java is used in a wide variety of computing platforms from embedded devices and mobile phones on the low end, to enterprise servers and supercomputers on the high end. Java is nearly ubiquitous in mobile phones, Web servers and enterprise applications, and while less common on desktop computers, Java applets are often used to provide improved and secure functionalities while browsing the World Wide Web.

*Example 1. Writing in the **Java** programming language is the primary way to produce code that will be deployed as **Java** bytecode, though there are bytecode compilers available for other languages such as JavaScript, Python, Ruby and Scala, and a native **Java** scripting language called Groovy.*

*Example 2. **Java** syntax borrows heavily from C and C++ but it eliminates certain low-level constructs such as pointers and has a very simple memory model where every object is allocated on the heap and all variables of object types are references.*

- ◆ **Java Virtual Machine (JVM) — віртуальна машина Java** — a set of computer software programs and data structures that use a virtual machine model for the execution of other computer programs and scripts. The model used by a JVM accepts a form of computer intermediate language commonly referred to as Java bytecode. This language conceptually represents the instruction set of a stack-oriented, capability architecture. Sun claims there are over 4.5 billion JVM-enabled devices.

*Example 1. **Java Virtual Machines** operate on Java bytecode, which is normally (but not necessarily) generated from Java source code; a JVM can also be used to implement programming languages other than Java.*

Example 2. The JVM is a crucial component of the Java Platform. Because JVMs are available for many hardware and software platforms, Java can be both middleware and a platform in its own right — hence the trademark write once, run anywhere.

- ◆ **JPEG** (named after the **Joint Photographic Experts Group** that created the standard) — розповсюджений формат графічних

файлів — a commonly used method of compression for photographic images. The degree of compression can be adjusted, allowing a selectable tradeoff between storage size and image quality. JPEG typically achieves 10:1 compression with little perceptible loss in image quality. JPEG compression is used in a number of image file formats. JPEG/Exif is the most common image format used by digital cameras and other photographic image capture devices.

***Example 1.** JPEG/JFIF is the most common format for storing and transmitting photographic images on the World Wide Web.*

***Example 2.** These format variations are often not distinguished, and are simply called JPEG.*

K

- ◆ **Kerberos** — **метод забезпечення безпеки** — a computer network authentication protocol, which allows nodes communicating over a non-secure network to prove their identity to one another in a secure manner. It is also a suite of free software published by Massachusetts Institute of Technology (MIT) that implements this protocol. Its designers aimed primarily at a client-server model, and it provides mutual authentication — both the user and the server verify each other's identity. Kerberos protocol messages are protected against eavesdropping and replay attacks.

***Example 1.** Kerberos builds on symmetric key cryptography and requires a trusted third party.*

***Example 2.** Extensions to Kerberos can provide for the use of public-key cryptography during certain phases of authentication.*

- ◆ **Kilobit** — **кілобіт** — an expression of grouped bits meaning 1,000 (10^3) bits. Use of the term to denote a kibibit, although the most common use due to the nature of bits (binary digits), is deprecated and contrary to international standard. The term «kilobit» is most commonly used in the expression of data rates (digital communication speeds) in the abbreviated form «kbps», «kb/s», or «kbit/s», meaning «kilobits per second». For example, «a 56 kbit/s PSTN», or «a 512 kbit/s broadband Internet connection».

*Example 1. The abbreviation **kb** (for **kilobit**) should not be confused with the abbreviation of the term kilobyte (abbreviated to **kB** or **KB**, with an upper case **B**).*

*Example 2. The prefix «kilo-» is often (contrary to international standard) used to indicate 1,024 when used with Bytes, the decimal definition (1 **kilobit** per second = 1,000 bits per second) is used uniformly in the context of telecommunication transmission speeds.*

- ◆ **Kilobyte — кілобайт** — (derived from the SI prefix «kilo-», meaning 1,000) a unit of digital information storage equal to either 1,000 bytes (10^3) or 1,024 bytes (2^{10}), depending on context. It is abbreviated in a number of ways: **KB**, **kB**, **K** and **Kbyte**. The exact number of bytes in a kilobyte has traditionally been ambiguous. Locations in electronic memory circuits are identified by binary numbers, which means that the number of addressable locations naturally becomes a power of 2, and memory sizes are therefore not integer multiples (or fractions) of 1000.

Example 1. The abbreviation «kb» has historically been used for both «kilobyte» and «kilobit».

*Example 2. Using an uppercase **B** for byte («**kB**») and «bit» for a binary digit («kbit») prevents this ambiguity.*

L

- ◆ **Latency — затримка** — a measure of time delay experienced in a system, the precise definition of which depends on the system and the time being measured. Latency in a packet-switched network is measured either one-way (the time from the source sending a packet to the destination receiving it), or round-trip (the one-way latency from source to destination plus the one-way latency from the destination back to the source). Round-trip latency is more often quoted, because it can be measured from a single point. Note that round trip latency excludes the amount of time that a destination system spends processing the packet.

*Example 1. Many software platforms provide a service called ping that can be used to measure round-trip **latency**.*

*Example 2. In practice, this minimal **latency** is further augmented by queuing and processing delays.*

- ◆ **Layer — рівень** — a collection of conceptually similar functions that provide services to the layer above it and receives service from the layer below it. On each layer an instance provides services to the instances at the layer above and requests service from the layer below. For example, a layer that provides error-free communications across a network provides the path needed by applications above it, while it calls the next lower layer to send and receive packets that make up the contents of the path. Conceptually two instances at one layer are connected by a horizontal protocol connection on that layer.

The Open System Interconnection Reference Model (OSI Reference Model or OSI Model) is an abstract description for layered communications and computer network protocol design. It was developed as part of the Open Systems Interconnection (OSI) initiative. In its most basic form, it divides network architecture into seven layers which, from top to bottom, are the Application, Presentation, Session, Transport, Network, Data-Link, and Physical Layers. It is therefore often referred to as the OSI Seven Layer Model.

*Example 1. Each entity interacts directly only with the **layer** immediately beneath it, and provides facilities for use by the layer above it.*

*Example 2. Service definitions abstractly describe the functionality provided to an (N)-**layer** by an (N-1) **layer**, where N is one of the seven **layers** of protocols operating in the local host.*

- ◆ **Leased line — виділена лінія** — a symmetric telecommunications line connecting two locations. It is sometimes known as a «Private Circuit» or «Data Line» in the UK. Unlike traditional PSTN lines it does not have a telephone number, each side of the line being permanently connected to the other. Leased lines can be used for telephone, data or Internet services. Some are ringdown services, and some connect two PBXes.

*Example 1. **Leased line** differs from a permanent telephone connection between two points set up by a telecommunications common carrier.*

*Example 2. The user can divide the connection into different lines for multiplexing data and voice communication, or use the channel for one high speed data circuit. Increasingly, **leased lines** are being used by companies, and even individuals, for Internet access because they afford faster data transfer rates and are cost-effective for heavy users of the Internet.*

- ◆ **Legacy system — успадкована система** — an old method, technology, computer system, or application program that continues to be used, typically because it still functions for the users’

needs, even though newer technology or more efficient methods of performing a task are now available. A legacy system may include procedures or terminology which are no longer relevant in the current context, and may hinder or confuse understanding of the methods or technologies used.

Example 1. Legacy systems often run on obsolete (and usually slow) hardware, and spare parts for such computers may become increasingly difficult to obtain.

Example 2. Legacy systems can be hard to maintain, improve, and expand because there is a general lack of understanding of the system; the staff who were experts on it have retired or forgotten what they knew about it, and staff who entered the field after it became «legacy» never learned about it in the first place.

- ◆ **Lightweight Directory Access Protocol (LDAP) – спрощений протокол служби каталогів** – an application protocol for querying and modifying directory services running over TCP/IP. A directory is a set of objects with attributes organized in a logical and hierarchical manner. A simple example is the telephone directory, which consists of a list of names (of either persons or organizations) organized alphabetically, with each name having an address and phone number associated with it.

Example 1. An LDAP directory tree often reflects various political, geographic, and / or organizational boundaries, depending on the model chosen.

Example 2. LDAP deployments today tend to use Domain name system (DNS) names for structuring the topmost levels of the hierarchy.

- ◆ **Link – канал** – an open source text and graphic web browser with a pull-down menu system. It renders complex pages, has partial HTML 4.0 support (including tables and frames and support for multiple character sets such as UTF-8), supports color and monochrome terminals and allows horizontal scrolling.

Example 1. A link is oriented toward visual users who want to retain many typical elements of graphical user interfaces (pop up windows, menus etc.) in a text-only environment.

Example 2. The focus on intuitive usability makes a link suitable as a web browser for low-end terminals in libraries, Internet cafes etc.

- ◆ **Link-state routing protocol – протокол маршрутизації на основі стану кабелю** – one of the two main classes of routing protocols used in packet switching networks for computer communications, the other major class being the distance-vector routing protocol.

Examples of link-state routing protocols include OSPF and IS-IS. The link-state protocol is performed by every switching node in the network (i.e. nodes that are prepared to forward packets; in the Internet, these are called routers). The basic concept of link-state routing is that every node constructs a map of the connectivity to the network, in the form of a graph, showing which nodes are connected to which other nodes. Each node then independently calculates the next best logical hop from it to every possible destination in the network. The collection of best next hops will then form the node's routing table.

***Example 1.** The first **link-state routing concept** was invented in 1978 by John M. McQuillan (then at Bolt, Beranek and Newman) as a mechanism that would calculate routes more quickly when network conditions changed, and thus lead to more stable routing.*

***Example 2.** More recently, this hierarchical technique was applied to wireless mesh networks using the optimized **link-state routing protocol**.*

- ◆ **Linux** — операційна система, створена Лінусом Торвальдом — a generic term referring to Unix-like computer operating systems based on the Linux kernel. Their development is one of the most prominent examples of free and open source software collaboration; typically all the underlying source code can be used, freely modified, and redistributed, both commercially and non-commercially, by anyone under the terms of the GNU GPL.

***Example 1.** **Linux** is predominantly known for its use in servers, although can be installed on a wide variety of computer hardware, ranging from embedded devices, mobile phones and even some watches to supercomputers.*

***Example 2.** Commonly-used applications with desktop **Linux** systems include the Mozilla Firefox web-browser and the OpenOffice.org office application suite.*

- ◆ **Load** — **завантаження** — a measure of the amount of work that a computer system performs. The load average represents the average system load over a period of time. It conventionally appears in the form of three numbers which represent the system load during the last one, five, and fifteen -minute periods.

***Example 1.** Systems calculate the **load** average as the exponentially damped / weighted moving average of the **load** number. The three values of **load** average refer to the past one, five, and fifteen minutes of system operation.*

***Example 2.** Many systems generate the **load** average by sampling the state of the scheduler periodically, rather than recalculating on all pertinent scheduler events.*

- ◆ **Local area network (LAN) — локальна мережа** — a computer network covering a small physical area, like a home, office, or small group of buildings, such as a school, or an airport. The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic area, and lack of a need for leased telecommunication lines.

***Example 1.** At the Network Layer, the Internet Protocol has become the standard. However, many different options have been used in the history of LAN development and some continue to be popular in niche applications.*

***Example 2.** LANs may have connections with other LANs via leased lines, leased services, or by tunneling across the Internet using virtual private network technologies.*

- ◆ **Local loop (also referred to as a subscriber line) — локальна петля** — the physical link or circuit that connects from the demarcation point of the customer premises to the edge of the carrier or telecommunications service provider's network. At the edge of the carrier access network in a traditional PSTN (Public Switched Telephone Network) scenario, the local loop terminates in a circuit switch housed in an ILEC (Incumbent Local Exchange Carrier) CO (Central Office). Traditionally, the local loop was wireline in nature from customer to central office, specifically in the form of an electrical circuit (i.e., loop) provisioned as a single twisted pair in support of voice communications.

***Example 1.** Where the number of local loops was restricted, different customers could share the same loop, known as a party line.*

***Example 2.** A local loop may be provisioned to support data communications applications, or combined voice and data such as digital subscriber line (DSL).*

- ◆ **Logical address — логічна адреса** — the address at which an item (memory cell, storage element, network host) appears to reside from the perspective of an executing application program. A logical address may be different from the physical address due to the operation of an address translator or mapping function. Such mapping functions may be, in the case of a computer memory architecture, a memory management unit (MMU)

between the CPU and the memory bus, or an address translation layer, e.g., the Data Link Layer, between the hardware and the internetworking protocols (Internet Protocol) in a computer networking system.

***Example 1.** The access triggers special functions of the operating system which reprogram the MMU to map the address to some physical memory, perhaps writing the old contents of that memory to disk and reading back from disk what the memory should contain at the new **logical address**.*

***Example 2.** The **logical address** may be referred to as a virtual address.*

- ◆ **Logical Link Control (LLC)** – керування логічним каналом [зв'язку] – the upper sub-layer of the Data Link Layer specified in the seven-layer OSI model (layer 2). It provides multiplexing and flow control mechanisms that make it possible for several network protocols (IP, IPX) to coexist within a multipoint network and to be transported over the same network media.

***Example 1.** The LLC sub-layer acts as an interface between the Media Access Control (MAC) sub-layer and the network layer. It is the same for the various physical media (such as Ethernet, token ring, and WLAN).*

***Example 2.** As the Ethertype in an Ethernet II framing formatted frame is used to multiplex different protocols on top of the Ethernet MAC header it can be seen as LLC identifier.*

- ◆ **Logical Topology** (also referred to as **Signal Topology**) – логічна топологія – a network computing term used to describe the arrangement of devices on a network and how they communicate with one another. How devices are connected to the network through the actual cables that transmit data, or the physical structure of the network, is called the physical topology.

***Example 1.** Logical topologies are bound to network protocols and describe how data is moved across the network.*

***Example 2.** Internet topology refers to the **logical topology** of the internet.*

- ◆ **Login** or **logon** (also called **logging in** or **on** and **signing in** or **on**) – реєстрація – the process by which individual access to a computer system is controlled by identification of the user using credentials provided by the user. A user can log in to a system to obtain access and can then **log out** or **log off** (perform a **logout** / **logoff**) when the access is no longer needed. To log out is to close off one's access to a computer system after having previously logged in.

*Example 1. The online checkbook register is accessed using **login** credentials that usually include at least a user name and password, with some online registers requiring a third level of data before allowing entry to the saved register..*

*Example 2. The Kerberos based approach involves the process granting an end user a ticket when the **login** attempt is made, assuming the **login** credentials entered are recognized by the system.*

- ◆ **Loop — цикл, петля** — a sequence of statements which is specified once but which may be carried out several times in succession. The code «inside» the loop is obeyed a specified number of times, or once for each of a collection of items, or until some condition is met. In functional programming languages, such as Haskell and Scheme, loops can be expressed by using recursion or fixed point iteration rather than explicit looping constructs. Tail recursion is a special case of recursion which can be easily transformed to iteration.

Example 1. Most programming languages have constructions for repeating a loop a certain number of times.

Example 2. In many programming languages, only integers can be reliably used in a count-controlled loop.

- ◆ **Loopback (sometimes spelled loop-back) — тест зворотної петлі** — it is generally used to describe methods or procedures of routing electronic signals, digital data streams, or other flows of items, from their originating facility quickly back to the same source entity without intentional processing or modification. This is primarily intended as a means of testing the transmission or transportation infrastructure.

*Example 1. Packets sent in an IP network with a source address belonging to the **loopback** interface can cause a number of problems for older or buggy network software.*

*Example 2. A patch cable applied manually or automatically, remotely or locally facilitates a **loop-back** test.*

M

- ◆ **Mac OS – операційна система** – the trademarked name for a series of graphical user interface-based operating systems developed by Apple Inc. (formerly Apple Computer, Inc.) for their Macintosh line of computer systems. The Macintosh user experience is credited with popularizing the graphical user interface. The original form of what Apple would later name the «Mac OS» was the integral and unnamed system software first introduced in 1984 with the original Macintosh, usually referred to simply as the System software.

*Example 1. Apple deliberately downplayed the existence of the operating system **Mac OS** in the early years of the Macintosh to help make the machine appear more user-friendly and to distance it from other operating systems such as MS-DOS, which was more arcane and technically challenging.*

*Example 2. Early versions of the **Mac OS** were compatible only with Motorola 68000-based Macintoshes.*

- ◆ **Machine code (or machine language) – машинна мова** – a system of instructions and data executed directly by a computer's central processing unit. Machine code may be regarded as a primitive (and cumbersome) programming language or as the lowest-level representation of a compiled and / or assembled computer program. Programs in interpreted languages are not represented by machine code however, although their interpreter (which may be seen as a processor executing the higher level program) often is. Machine code is sometimes called native code when referring to platform-dependent parts of language features or libraries. Machine code should not be confused with so called «bytecode», which is executed by an interpreter.

*Example 1. Every processor or processor family has its own **machine code** instruction set. Instructions are patterns of bits that by physical design correspond to different commands to the machine.*

*Example 2. A much more readable rendition of **machine language**, called **assembly language**, uses mnemonic codes to refer to **machine code** instructions, rather than simply using the instructions' numeric values.*

- ◆ **Mainframes – мейнфрейм** – computers used mainly by large organizations for critical applications, typically bulk data processing such as census, industry and consumer statistics, enterprise resource planning, and financial transaction processing.

Example 1. Today in practice, the term usually refers to computers compatible with the IBM System/360 line, first introduced in 1965. (IBM System z10 is the latest incarnation). Otherwise, large systems that are not based on the System/360 but are used for similar tasks are usually referred to as servers or even supercomputers. However, «server», «super-computer» and «mainframe» are not synonymous.

Example 2. Modern **mainframe** computers have abilities not so much defined by their single task computational speed (usually defined as MIPS — Millions of Instructions Per Second) as by their redundant internal engineering and resulting high reliability and security, extensive input-output facilities, strict backward compatibility with older software, and high utilization rates to support massive throughput. These machines often run for years without interruption, with repairs and hardware upgrades taking place during normal operation.

- ◆ **Management information base (MIB) — база даних керуючої інформації** — stems from the OSI/ISO Network management model and it is a type of database used to manage the devices in a communications network. It comprises a collection of objects in a (virtual) database used to manage entities (such as routers and switches) in a network. Objects in the MIB are defined using a subset of Abstract Syntax Notation One (ASN.1) called «Structure of Management Information Version 2 (SMIV2)» RFC 2578. The software that performs the parsing is a MIB compiler.

Example 1. The database is hierarchical (tree-structured) and entries are addressed through object identifiers. Internet documentation RFCs discuss MIBs.

Example 2. MIBs are periodically updated to add new functionality, remove ambiguities and to fix defects.

- ◆ **MAU (Media Access Unit, also called Multistation Access Unit, MSAU) — модуль багатостанційного [множинного] доступу** — a device to attach multiple network stations in a star topology in a Token ring network, internally wired to connect the stations into a logical ring.

Example 1. The MAU contains relays to short out nonoperating stations. Multiple MAUs can be connected into a larger ring through their Ring In/ Ring Out connectors.

Example 2. MAU's are also called the «Ring in a Box».

- ◆ **MAU (Medium Attachment Unit, also known as «transceiver») — пристрій підключення до середовища** — converts signals on an Ethernet cable to and from Attachment Unit Interface (AUI)

signals. On original 10BASE5 (Thick) Ethernet, the MAU was typically clamped to the Ethernet cable. With later standards (10Base2 and later) it was generally integrated into the card and eventually as there was pressure to drive down costs the entire Ethernet controller was often integrated into a single chip.

***Example 1.** In most modern switched or hubbed Ethernet systems, neither the MAU nor the AUI interfaces exist (apart, perhaps as notional entities for the purposes of thinking about layering the interface), and the CAT5 cable connects directly into an Ethernet socket on the host or router.*

***Example 2.** For backwards compatibility with equipment which still has external AUI interfaces, MAUs are still available with 10BASE2 or 10BASE-T connections.*

- ◆ **Maximum transmission unit (MTU)** – максимальний блок, що передається – the size (in bytes) of the largest protocol data unit that it can pass onwards. MTU parameters usually appear in association with a communications interface (NIC, serial port, etc.). The MTU may be fixed by standards (as is the case with Ethernet) or decided at connect time (as is usually the case with point-to-point serial links).

***Example 1.** A higher MTU brings greater efficiency because each packet carries more user data while protocol overheads, such as headers or underlying per-packet delays remain fixed, and higher efficiency means a slight improvement in bulk protocol throughput. The MTUs in this section are given as the maximum size of IP packet that can be transmitted without fragmentation including IP headers but excluding headers from lower levels in the protocol stack.*

***Example 2.** The MTU is often confused with the maximum datagram size (size of reassembled packet), the minimum value of which is 576 for IPv4 (RFC 791) and 1500 for IPv6 (RFC 2460).*

- ◆ **Mbone («multicast backbone»)** – частина Internet для передачі мультимовних (мультитрансляційних) повідомлень – was an experimental backbone for IP Multicast traffic across the Internet developed in the early 1990s. It required specialized hardware and software. Since most Internet routers have IP Multicast disabled due to concerns of bandwidth tracking and billing, the Mbone evolved to connect multicast-capable networks over the existing Internet infrastructure.

***Example 1.** Mbone is a virtual network built on top of the Internet; Invented by Van Jacobson, Steve Deering and Stephen Casner in 1992. The purpose of Mbone is to minimize the amount of data required for multipoint audio / video-conferencing.*

Example 2. Mbone is currently of practical use for shared communication such as videoconferences or shared collaborative workspaces.

- ◆ **Media Access Control address (MAC address)** — **адреса керування доступом до середовища** — a unique identifier assigned to most network adapters or network interface cards (NICs) by the manufacturer for identification, and used in the Media Access Control protocol sublayer. If assigned by the manufacturer, a MAC address usually encodes the manufacturer's registered identification number. It may also be known as an Ethernet Hardware Address (EHA), hardware address, adapter address, or physical address.

Example 1. There are three numbering spaces, managed by the Institute of Electrical and Electronics Engineers (IEEE), which are in common use for formulating a MAC address: MAC-48, EUI-48, and EUI-64.

Example 2. A host cannot determine from the MAC address of another host whether that host is on the same OSI Layer 2 network segment as the sending host, or on a network segment bridged to that network segment.

- ◆ **Megabit** — **мегабіт** — an SI-multiple of the unit of bit for digital information storage or transmission. The International Electrotechnical Commission's standard IEC 60027 specifies the symbol to be Mbit, but Mb is also in common use.

1 megabit = 1000^2 bits = 10^6 bits = 1000000bits.

Example 1. A megabit (Mb) actually has two different values depending on what the term is being used to describe. When used to describe data storage, a megabit (Mb) is the equivalent of 2^{20} or 1,048,576 bits. However, when used to describe data transfer rates, one Mb equals 1,000,000 bits.

Example 2. The megabit is commonly used when referring to data transfer rates of computer networks or telecommunications systems, e.g., a 100 Mbit/s (megabit per second) Fast-Ethernet connection, or a 10 Mbit/s Internet access service.

- ◆ **Megabyte** — **мегабайт** — an SI-multiple of the unit byte for digital information storage or transmission and is equal to 10^6 (1000000) bytes. However, due to historical usage in computer-related fields it is still often used to represent 2^{20} (10241024 or 1048576) bytes. In rare cases, it is used to mean 10001024 (1024000) bytes. It is commonly abbreviated as Mbyte or MB (compare Mb, for the megabit).

Example 1. The term «megabyte» is ambiguous because it is commonly used to mean either 1000^2 bytes or 1024^2 bytes.

*Example 2. As a point of reference, one **Megabyte** is 8,192 kilobits so transferring one **Megabyte** of data over dial-up can take close to three minutes.*

- ◆ **Message** — **послання, повідомлення** — in its most general meaning it is an object of communication. It is a vessel which provides information. Yet, it can also be this information. Therefore, its meaning is dependent upon the context in which it is used; the term may apply to both the information and its form. A communiqué is a brief report or statement released by a public agency.

*Example 1. In communications science, a **message** is information which is sent from a source to a receiver.*

*Example 2. A nonverbal **message** is communicated through actions or behaviors rather than words. Examples include the use of body language and the actions made by an individual idea.*

- ◆ **Messaging Application Programming Interface (MAPI)** — **інтерфейс прикладного програмування електронної пошти** — a messaging architecture and a Component Object Model based API for Microsoft Windows. MAPI allows client programs to become (e-mail) messaging-enabled, -aware, or -based by calling MAPI subsystem routines that interface with certain messaging servers. While MAPI is designed to be independent of the protocol, it is usually used with MAPI/RPC, the proprietary protocol that Microsoft Outlook uses to communicate with Microsoft Exchange.

*Example 1. Simple **MAPI** is a subset of 12 functions which enable developers to add basic messaging functionality.*

*Example 2. Extended **MAPI** allows complete control over the messaging system on the client computer, creation and management of messages, management of the client mailbox, service providers, and so forth.*

- ◆ **Metadata (meta data, or sometimes metainformation)** — **метадані** — «data about data», of any sort in any media. Metadata is text, voice, or image that describes what the audience wants or needs to see or experience. The audience could be a person, group, or software program. Metadata is important because it aids in clarifying and finding the actual data. An item of metadata may describe an individual datum, or content item, or a collection of data including multiple content items and hierarchical levels, such as a database schema. In data processing, metadata provides information about, or documentation of, other data managed within an application or environment.

***Example 1. Metadata** commonly defines the structure or schema of the primary data.*

***Example 2.** Associated with every file on the storage medium is metadata that records the date the file was created, the date it was last modified and the date the file (or indeed the **metadata** itself) was last accessed.*

- ◆ **Metropolitan area network (MAN) — міська мережа** — a large computer network that usually spans a city or a large campus. A MAN usually interconnects a number of local area networks (LANs) using a high-capacity backbone technology, such as fiber-optical links, and provides up-link services to wide area networks and the Internet.

***Example 1.** A MAN is optimized for a larger geographical area than a LAN, ranging from several blocks of buildings to entire cities.*

***Example 2.** MANs can also depend on communications channels of moderate-to-high data rates. A MAN might be owned and operated by a single organization, but it usually will be used by many individuals and organizations.*

- ◆ **Microsoft Certified Professional (MCP) — сертифікований спеціаліст Microsoft** — broadly refers to all Microsoft certifications. But it can also refer to an individual who completes any exam within the program (subject to some exclusions). The MCP program offers multiple certifications, based on different areas of technical expertise. To attain these certifications, a candidate must pass a series of exams within the program. The current generation of certifications are Microsoft Certified Technology Specialist (MCTS), Microsoft Certified Professional Developer (MCPD), Microsoft Certified IT Professional (MCITP), the Microsoft Certified Architect (MCA), Microsoft Certified Systems Administrator (MCSA) and Microsoft Certified Systems Engineer (MCSE).

***Example 1.** Popular previous generation certifications (Previous generation certifications are still supported) include Microsoft Certified Systems Engineer (MCSE), Microsoft Certified Solution Developer (MCSd) and Microsoft Certified Database Administrator (MCDBA).*

***Example 2.** Some employers require or prefer certain MCP certifications for specific jobs that involve Microsoft products and technologies.*

- ◆ **Modem (modulator-demodulator) — модем** — a device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. The goal is to produce a signal that can be

transmitted easily and decoded to reproduce the original digital data. Modems can be used over any means of transmitting analog signals, from driven diodes to radio.

***Example 1. Modems** are generally classified by the amount of data they can send in a given time, normally measured in bits per second (bit/s, or bps).*

***Example 2. Faster modems** are used by Internet users every day, notably cable modems and ADSL modems.*

◆ **Multicast address** — **групова адреса** — an identifier for a group of hosts that have joined a multicast group.

***Example 1. Multicast addressing** can be used in the Link Layer (OSI Layer 2), such as Ethernet Multicast, as well as at the Internet Layer (OSI Layer 3) as IPv4 or IPv6 Multicast.*

***Example 2. Ipv4 multicast addresses** are in the group historically called Class D, based on the leading bits of these addresses.*

◆ **Multiplexing** (also known as **muxing**) — **мультиплексування** — a process where multiple analog message signals or digital data streams are combined into one signal over a shared medium. The aim is to share an expensive resource. For example, in telecommunications, several phone calls may be transferred using one wire. It originated in telegraphy, and is now widely applied in communications. The multiplexed signal is transmitted over a communication channel, which may be a physical transmission medium.

***Example 1. The multiplexing** divides the capacity of the low-level communication channel into several higher-level logical channels, one for each message signal or data stream to be transferred.*

***Example 2. A device that performs the multiplexing** is called a multiplexer (MUX), and a device that performs the reverse process is called a demultiplexer (DEMUX).*

- ◆ **Name resolution** (also called **name lookup**) — **дозвіл імені** — can contain identifiers. The semantics of such expressions depend on the entities that the identifiers refer to. The algorithm that determines what an identifier in a given context refers to is part of the language definition.

The complexity of these algorithms is influenced by the sophistication of the language. For example, name resolution in assembly language usually involves only a single simple table lookup, while name resolution in C++ is extremely complicated as it involves:

- namespaces, which make it possible for an identifier to have different meanings depending on its associated namespace;
- scopes, which make it possible for an identifier to have different meanings at different scope levels, and which involves various scope overriding and hiding rules. visibility rules, which determine whether identifiers from specific namespaces or scopes are visible from the current context;
- overloading, which makes it possible for an identifier to have different meanings depending on how it is used, even in a single namespace or scope;
- accessibility, which determines whether identifiers from an otherwise visible scope are actually accessible and participate in the name resolution process.

***Example 1.** At the most basic level **name resolution** usually attempts to find the binding in the smallest enclosing scope.*

***Example 2.** In computer networks, **name resolution** is used to find a lower level address (such as an IP address) that corresponds to a given higher level address (such as a hostname).*

- ◆ **Name server** (also spelled **nameserver**) — **сервер імені** — consists of a program or computer server that implements a name-service protocol. It maps a human-recognizable identifier to a system-internal, often numeric, identification or addressing component. For example, on the Internet, a special case of name servers, so called Domain Name System (DNS) servers, are used to translate a hostname or a domain name (for example, «en.wikipedia.org») to its corresponding binary identifier or vice versa.

***Example 1.** An authoritative **name server** is a name server that gives answers that have been configured by an original source, for example,*

the domain administrator or by dynamic DNS methods, in contrast to answers that were obtained via a regular DNS query to another name server.

Example 2. An authoritative-only **name server** only returns answers to queries about domain names that have been specifically configured by the administrator.

- ◆ **Network Basic Input/Output System – NetBIOS – мережна базова система вводу-виводу** – provides services related to the session layer of the OSI model allowing applications on separate computers to communicate over a local area network. As strictly an API, NetBIOS is not a networking protocol. Older operating systems ran NetBIOS over IEEE 802.2 and IPX/SPX using the NetBIOS Frames (NBF) and NetBIOS over IPX/SPX (NBX) protocols, respectively. In modern networks, NetBIOS normally runs over TCP/IP via the NetBIOS over TCP/IP (NBT) protocol. This results in each computer in the network having both a NetBIOS name and an IP address corresponding to a (possibly different) host name.

Example 1. In 1985, IBM went forward with the token ring network scheme and a NetBIOS emulator was produced to allow **NetBIOS**-aware applications from the PC-Network era to work over this new design.

Example 2. The name NetBEUI should have died there, considering that at the time, the **NetBIOS** implementations by other companies were known simply as NetBIOS regardless of whether they incorporated the API extensions found in that emulator.

- ◆ **NetWare – мережна операційна система** – a network operating system developed by Novell, Inc. It initially used cooperative multitasking to run various services on a personal computer, and the network protocols were based on the archetypal Xerox Network Systems stack. NetWare has been superseded by Open Enterprise Server (OES). The latest version of NetWare is v6.5 Support Pack 8, which is identical to OES 2 SP1, NetWare Kernel.

Example 1. Novell had introduced limited TCP/IP support in **NetWare** v3.x (circa 1992) and v4.x (circa 1995), consisting mainly of FTP services and UNIX-style LPR/LPD printing (available in NetWare v3.x), and a Novell-developed webserver (in NetWare v4.x).

Example 2. Native TCP/IP support for the client file and print services normally associated with **NetWare** was introduced in NetWare v5.0 (released in 1998). OS stations to connect to a server and access the shared server hard drive.

- ◆ **NetWare Core Protocol (NCP)** — трансляція адрес мереж — a network protocol used in some products from Novell, Inc. It is usually associated with the NetWare operating system, but parts of it have been implemented on other platforms such as Linux, Windows NT and various flavors of Unix.

Example 1. NCP is used to access file, print, directory, clock synchronization, messaging, remote command execution and other network service functions. TCP/IP and IPX/SPX (obsoleted, technical support is provided only for NetWare platform) are the supported underlying protocols.

Example 2. Novell eDirectory uses NCP for synchronizing data changes between the servers in a directory service tree.

- ◆ **NetWare Loadable Module (NLM)** — завантажений модуль NetWare — a binary code module that can be loaded into Novell's NetWare operating system for execution.

Example 1. NLMs were supported beginning with the Intel 80386-based NetWare version 3.x. Prior versions of NetWare had a monolithic kernel, and significant hardware or functionality changes required re-linking the kernel from object modules.

Example 2. Due to stability issues with early third-party NLMs, they never became popular for server application programming, with few exceptions like antivirus programs, backup programs and certain database products.

- ◆ **Network administrator** — мережний адміністратор — a modern profession responsible for the maintenance of computer hardware and software that comprises a computer network. This normally includes the deployment, configuration, maintenance and monitoring of active network equipment. A related role is that of the network specialist, or network analyst, who concentrates on network design and security.

Example 1. The Network Administrator is usually the highest level of technical / network staff in an organization and will rarely be involved with direct user support.

Example 2. The Network Administrator will concentrate on the overall health of the network, server deployment, security, and ensuring that the network connectivity throughout a company's LAN/WAN infrastructure is on par with technical considerations at the network level of an organization's hierarchy.

- ◆ **Network analyzer** — мережний аналізатор — an instrument used to analyze the properties of electrical networks, especially

those properties associated with the reflection and transmission of electrical signals known as scattering parameters (S-parameters). Network analyzers are used mostly at high frequencies; operating frequencies can range from 9 kHz to 110 GHz.

*Example 1. Special types of **network analyzers** can also cover lower frequency ranges down to 1 Hz.*

*Example 2. A new category of **network analyzer** is the Microwave Transition Analyzer (MTA) or Large Signal Network Analyzer (LSNA), which measure both amplitude and phase of the fundamental and harmonics.*

- ◆ **Network Driver Interface Specification (NDIS) – специфікація стандартного інтерфейсу адрес мереж** – an application programming interface (API) for network interface cards (NICs). It was jointly developed by Microsoft and 3Com Corporation, and is mostly used in Microsoft Windows, but the open-source NDISwrapper and Project Evil driver wrapper projects allow many NDIS-compliant NICs to be used with Linux, FreeBSD and NetBSD, respectively. magnussoft ZETA, a derivative of BeOS, supports a number of NDIS drivers.

*Example 1. The **NDIS** is a Logical Link Control (LLC) that forms the upper sublayer of the OSI data link layer (layer 2 of 7) and acts as an interface between layer 2 and 3 (the Network Layer).*

*Example 2. The **NDIS** is a library of functions often referred to as a «wrapper» that hides the underlying complexity of the NIC hardware and serves as a standard interface for level 3 network protocol drivers and the hardware level MAC drivers.*

- ◆ **Network file system – мережна операційна система** – any computer file system that supports sharing of files, printers and other resources as persistent storage over a computer network. The first file servers were developed in the 1970s. In 1976 Digital Equipment Corporation created the File Access Listener (FAL), an implementation of the Data Access Protocol as part of DECnet Phase II which became the first widely used network file system. In 1985 Sun Microsystems created the file system called «Network File System» (NFS) which became the first widely used Internet Protocol based network file system. Other notable network file systems are Andrew File System (AFS), Apple Filing Protocol (AFP), NetWare Core Protocol (NCP), and Server Message Block (SMB) which is also known as Common Internet File System (CIFS).

*Example 1. Ideally, a **network file system** should appear to its users to be a conventional, centralized file system.*

*Example 2. The multiplicity and dispersion of **network file system** servers and storage devices should be made invisible.*

- ◆ **Network interface device (NID) — мережний інтерфейс** — a device that serves as the demarcation point between the carrier's local loop and the customer's premises wiring. Generically, NIDs may also be called a network interface unit (NIU) or telephone network box. A smartjack is a type of NID which has capabilities beyond simple electrical connection (such as diagnostics). An optical network terminal (ONT) is a type of NID used with fiber-to-the-premises applications.

Example 1. The simplest NIDs are essentially just a specialized set of wiring terminals.

Example 2. Most NIDs also include «circuit protectors», which are surge protectors for a telephone line protecting customer wiring, equipment, and personnel from any transient energy on the line, such as from a lightning strike to a telephone pole.

- ◆ **Network Layer — мережний рівень** — Layer 3 of the seven-layer OSI model of computer networking. The Network Layer is responsible for end-to-end (source to destination) packet delivery including routing through intermediate hosts, whereas the Data Link Layer is responsible for node-to-node (hop-to-hop) frame delivery on the same link.

*Example 1. The **Network Layer** provides the functional and procedural means of transferring variable length data sequences from a source to a destination host via one or more networks while maintaining the quality of service and error control functions.*

*Example 2. Within the service layering semantics of the OSI network architecture the **Network Layer** responds to service requests from the Transport Layer and issues service requests to the Data Link Layer.*

- ◆ **Network-neutral data centers — мережні нейтральні центри даних** — commercial buildings (or carrier hotels) where multiple telecommunication carriers can house their network equipment for the primary purpose of accessing and developing network connections with one another.

*Example 1. **Network-neutral data centers** are operated and supported by a neutral, third-party provider.*

*Example 2. Location, size and power of **network-neutral data centers** vary, but all handle the exchange of traffic that originates on one network to terminate on another.*

- ◆ **Network science — наука про мережу** — a new and emerging scientific discipline that examines the interconnections among diverse physical or engineered networks, information networks, biological networks, cognitive and semantic networks, and social networks. This field of science seeks to discover common principles, algorithms and tools that govern network behavior. The National Research Council defines Network Science as «the study of network representations of physical, biological, and social phenomena leading to predictive models of these phenomena».

*Example 1. More recently other **network science** efforts have focused on mathematically describing different network topologies.*

*Example 2. **Network science** holds the promise of increasing collaboration across disciplines, by sharing data, algorithms, and software tools.*

- ◆ **Networking operating system (NOS) — мережна операційна система** — an operating system that contains components and programs that allow a computer on a network to serve requests from other computer for data and provide access to other resources such as printer and file systems.

*Example 1. Some device operating systems, including Mac OS X and all versions of Microsoft Windows since Windows 2000, include **NOS** features.*

*Example 2. A **NOS** is an OS that has been specifically written to implement and maintain networks.*

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- ◆ **Open Data-Link Interface (ODI) — відкритий каналний інтерфейс** — developed by Apple and Novell, serves the same function as Microsoft and 3COM's Network Driver Interface Specification (NDIS). Originally, ODI was written for NetWare and Macintosh environments.

*Example 1. Like NDIS, **ODI** provides rules that establish a vendor-neutral interface between the protocol stack and the adapter driver. It resides in Layer 2, the Data Link layer, of the OSI model.*

*Example 2. **Open data-link interface** also enables one or more network drivers to support one or more protocol stacks.*

- ◆ **Open Shortest Path First (OSPF)** – відкритий протокол SPF – a dynamic routing protocol for use in Internet Protocol (IP) networks. Specifically, it is a link-state routing protocol and falls into the group of interior gateway protocols, operating within a single autonomous system (AS).

Example 1. OSPF is perhaps the most widely-used interior gateway protocol (IGP) in large enterprise networks; IS-IS, another link-state routing protocol, is more common in large service provider networks.

Example 2. OSPF detects changes in the topology, such as link failures, very quickly and converges on a new loop-free routing structure within seconds.

- ◆ **Operating system (OS)** – операційна система – an interface between hardware and user which is responsible for the management and coordination of activities and the sharing of the resources of the computer that acts as a host for computing applications run on the machine.

*Example 1. As a host, one of the purposes of an **operating system** is to handle the details of the operation of the hardware.*

*Example 2. **Operating systems** offer a number of services to application programs and users. Applications access these services through application programming interfaces (APIs) or system calls.*

P

- ◆ **Packet** – пакет – a formatted unit of data carried by a packet mode computer network. Computer communications links that do not support packets, such as traditional point-to-point telecommunications links, simply transmit data as a series of bytes, characters, or bits alone.

*Example 1. When data is formatted into **packets**, the bitrate of the communication medium can better be shared among users than if the network were circuit switched.*

*Example 2. By using **packet** switched networking it is also harder to guarantee a lowest possible bitrate.*

- ◆ **Packet switching** – комутація пакетів – a digital network communications method that groups all transmitted data, irrespec-

tive of content, type, or structure into suitably-sized blocks, called packets. The network over which packets are transmitted is a shared network which routes each packet independently from all others and allocates transmission resources as needed. The principal goals of packet switching are to optimize utilization of available link capacity, minimize response times and increase the robustness of communication. When traversing network adapters, switches and other network nodes, packets are buffered and queued, resulting in variable delay and throughput, depending on the traffic load in the network.

***Example 1.** By sending a large file in several small chunks over a network, **packet switching** minimizes the impact of data transmission errors.*

***Example 2.** When employing **packet switching**, the network routing software divides the file into several small packets of data of between 1,000 and 1,500 bytes each, labeling each packet with header information.*

- ◆ **Password Authentication Protocol (PAP)** — **протокол автентифікації пароля** — a simple authentication protocol used to authenticate a user to a network access server used for example by internet service providers. PAP is used by Point to Point Protocol.

***Example 1.** PAP transmits unencrypted ASCII passwords over the network and is therefore considered insecure.*

***Example 2.** PAP is used as a last resort when the remote server does not support a stronger authentication protocol, like CHAP or EAP (while the last is actually a framework).*

- ◆ **Patch** — **заплата** — a piece of software designed to fix problems with, or update a computer program or its supporting data. This includes fixing security vulnerabilities and other bugs, and improving the usability or performance.

***Example 1.** Patch management is the process of using a strategy and plan of what patches should be applied to which systems at a specified time.*

***Example 2.** Programmers publish and apply **patches** in various forms. Because proprietary software authors withhold their source code, their patches are distributed as binary executables instead of source.*

- ◆ **Patch panel** (or **patch bay**) — **комутаційна панель** — a panel, typically rackmounted, that houses cable connections. One typically shorter patch cable will plug into the front side, whereas the back holds the connection of a much longer and more permanent cable. The assembly of hardware is arranged so that a number of circuits, usually of the same or similar type, appear

on jacks for monitoring, interconnecting, and testing circuits in a convenient, flexible manner.

Example 1. Patch panels offer the convenience of allowing technicians to quickly change the path of select signals, without the expense of dedicated switching equipment.

Example 2. This was first used by early telephone exchanges, where the telephone switchboard (a massive array of **patch panels**) and a large room full of telephone operators running it was ubiquitous.

- ◆ **Peer-to-peer** (commonly abbreviated to **P2P**) – **однорангова обробка** – distributed network architecture composed of participants that make a portion of their resources (such as processing power, disk storage or network bandwidth) directly available to other network participants, without the need for central coordination instances (such as servers or stable hosts).

Example 1. Peers are both suppliers and consumers of resources, in contrast to the traditional client-server model where only servers supply, and clients consume.

Example 2. Peer-to-peer was popularized by file sharing systems like Napster.

- ◆ **Personal digital assistant (PDA)** – **цифровий персональний помічник** – a mobile device, also known as a palmtop computer. Newer PDAs commonly have color screens and audio capabilities, enabling them to be used as mobile phones (smartphones), web browsers, or portable media players. Many PDAs can access the Internet, intranets or extranets via Wi-Fi, or Wireless Wide Area Networks (WWANs). Many PDAs employ touchscreen technology.

Example 1. The first **PDA** is considered to be the Casio PF-15115-36 released in May 1983. GO Corp. was also pioneering in the field. The term was first used on January 7, 1992 by Apple Computer CEO John Sculley at the Consumer Electronics Show in Las Vegas, Nevada, referring to the Apple Newton.

Example 2. Today the vast majority of all **PDAs** are smartphones, selling over 150 million units while non-phone («stand-alone») **PDAs** sell only about 3 million units per year.

- ◆ **Physical Layer** – **фізичний рівень** – the first and lowest layer in the seven-layer OSI model of computer networking.

Example 1. The **Physical Layer** consists of the basic hardware transmission technologies of a network.

***Example 2.** The **Physical Layer** defines the means of transmitting raw bits rather than logical data packets over a physical link connecting network nodes.*

- ◆ **Ping** — міжмережний аналізатор пакетів — a computer network tool used to test whether a particular host is reachable across an IP network; it is also used to self test the network interface card of the computer, or as a latency test. It works by sending ICMP «echo request» packets to the target host and listening for ICMP «echo response» replies.

***Example 1.** The word **ping** is also frequently used as a noun or verb, where it is used to refer to the round-trip time, or measuring the round-trip time.*

***Example 2.** The tool is also used in a type of simple denial-of-service attack, known as a **ping** flood, in which the attacker overwhelms the victim with ICMP echo request packets.*

- ◆ **Point-to-multipoint communication** — з'єднання від точки до точки — a term that is used in the telecommunications field which refers to communication which is accomplished via a specific and distinct type of multipoint connection, providing multiple paths from a single location to multiple locations.

***Example 1.** **Point-to-multipoint** is often abbreviated as **P2MP**, **PTMP**, or **PMP**.*

***Example 2.** **Point-to-multipoint telecommunications** is most typically used in wireless Internet and IP Telephony via gigahertz radio frequencies.*

- ◆ **Point-to-Point Protocol (PPP)** — протокол передачі даних «точка-точка» — a data link protocol commonly used to establish a direct connection between two networking nodes. It can provide connection authentication, transmission encryption privacy, and compression.

***Example 1.** **PPP** is used over many types of physical networks including serial cable, phone line, trunk line, cellular telephone, specialized radio links, and fiber optic links such as **SONET**.*

***Example 2.** Most Internet service providers (**ISPs**) use **PPP** for customer dial-up access to the Internet.*

- ◆ **Post Office Protocol (POP)** — протокол електронної пошти — an application-layer Internet standard protocol used by local e-mail clients to retrieve e-mail from a remote server over a TCP/IP connection. POP and IMAP (Internet Message Access Protocol) are the two most prevalent Internet standard proto-

cols for e-mail retrieval. Virtually all modern e-mail clients and servers support both. The POP protocol has been developed through several versions, with version 3 (POP3) being the current standard.

***Example 1.** The design of **POP** and its procedures supports end-users with temporary Internet connections, such as dial-up access, allowing these users to retrieve e-mail when connected and then to view and manipulate the retrieved messages when offline*

***Example 2.** Many e-mail clients support **POP** as well as **IMAP** to retrieve messages; however, fewer Internet Service Providers (ISPs) support **IMAP**.*

- ◆ **Presentation Layer — представницький рівень** — Layer 6 of the seven-layer OSI model of computer networking. The Presentation Layer is responsible for the delivery and formatting of information to the application layer for further processing or display.

***Example 1.** The **Presentation Layer** relieves the application layer of concern regarding syntactical differences in data representation within the end-user systems.*

***Example 2.** The **Presentation Layer** is the lowest layer at which application programmers consider data structure and presentation, instead of simply sending data in form of datagrams or packets between hosts.*

- ◆ **Pretty Good Privacy (PGP) — висока конфіденційність** — a computer program that provides cryptographic privacy and authentication. PGP is often used for signing, encrypting and decrypting e-mails to increase the security of e-mail communications.

***Example 1.** There are several levels of confidence which can be included in such signatures. Although many programs read and write this information, few (if any) include this **PGP** level of certification when calculating whether to trust a key.*

***Example 2.** The web of trust protocol was first described by Zimmermann in 1992 in the manual for **PGP** version 2.0.*

- ◆ **Primary Domain Controller (PDC) — первісний контролер домену** — a server computer in a pre-Windows 2000 NT server Domain. A domain is a concept used in NT server operating systems whereby a user may be granted access to a number of computer resources with the use of a single username and password combination.

***Example 1.** The **BDCs** exist in order to provide a backup to the **PDC**, and can also be used to authenticate users logging on to the network.*

***Example 2.** In Active Directory domains, the concept of **Primary** and **Backup Domain Controllers** doesn't exist. Instead, the domain controllers in these domains are all considered to be equal in that all controllers have full access to the accounts databases stored on their machines.*

- ◆ **Primary rate interface (PRI)** – інтерфейс основного рівня – a telecommunications standard for carrying multiple DS0 voice and data transmissions between a network and a user.

***Example 1.** The **Primary Rate Interface (PRI)** consists of 23 B-channels and one 64 kbit/s D-channel using a T1 line (North American and Japanese standard) or 30 B-channels and one D-channel using an E1 line (Europe/Rest of World).*

***Example 2.** A T1 **Primary Rate Interface** user would have access to a 1.472 Mbit/s data service. An E1 **Primary Rate Interface** user would have access to a 1.920 Mbit/s data service.*

- ◆ **Protocol** – протокол – a set of rules which is used by computers to communicate with each other across a network. A protocol is a convention or standard that controls or enables the connection, communication, and data transfer between computing endpoints.

***Example 1.** **Protocols** may be implemented by hardware, software, or a combination of the two.*

***Example 2.** **Protocols** apply to different layers of sophistication such as which physical connections to use, how hosts listen, how to interrupt, how to say good-bye, and in short how to communicate, what language to use and many others.*

- ◆ **Protocol stack** (sometimes **communications stack**) – стек протоколів – a particular software implementation of a computer networking protocol suite. This modularization makes design and evaluation easier. Because each protocol module usually communicates with two others, they are commonly imagined as layers in a stack of protocols. The lowest protocol always deals with «low-level», physical interaction of the hardware. Every higher layer adds more features. User applications usually deal only with the topmost layers.

***Example 1.** In practical implementation, **protocol stacks** are often divided into three major sections: media, transport and applications.*

***Example 2.** It is easier to leave the base protocols alone, and design a protocol that can work on top of any of them (the Internet Protocol is an example). This will make two **stacks** of two **protocols** each.*

- ◆ **Proxy server — проксі (сервер-посередник)** — a server (a computer system or an application program) that acts as an intermediary for requests from clients seeking resources from other servers. A client connects to the proxy server, requesting some service, such as a file, connection, web page, or other resource, available from a different server.

*Example 1. The **proxy server** evaluates the request according to its filtering rules. For example, it may filter traffic by IP address or protocol.*

*Example 2. A **proxy server** can be placed in the user's local computer or at various points between the user and the destination servers on the Internet.*

- ◆ **Public-key cryptography — шифр з відкритим ключем** — a cryptographic approach, employed by many cryptographic algorithms and cryptosystems, whose distinguishing characteristic is the use of asymmetric key algorithms instead of or in addition to symmetric key algorithms.

*Example 1. Using the techniques of **public key-private key cryptography**, many methods of protecting communications or authenticating messages formerly unknown have become practical.*

*Example 2. The distinguishing technique used in **public key cryptography** is the use of asymmetric key algorithms, where the key used to encrypt a message is not the same as the key used to decrypt it.*

- ◆ **Public switched telephone network (PSTN) — комутована телефонна мережа загального користування** — the network of the world's public circuit-switched telephone networks, in much the same way that the Internet is the network of the world's public IP-based packet-switched networks. Originally a network of fixed-line analog telephone systems, the PSTN is now almost entirely digital and includes mobile as well as fixed telephones.

*Example 1. The **PSTN** is largely governed by technical standards created by the ITU-T, and uses E.163/E.164 addresses (more commonly known as telephone numbers) for addressing.*

*Example 2. Many observers believe that the long term future of the **PSTN** is to be just one application of the Internet. However, the Internet has some way to go before this transition can be made.*

Q

- ◆ **Quantum bit (or qubit) — квантовий біт** — a unit of quantum information. It is the quantum analogue of the classical bit. It is described by a state vector in a two-level quantum-mechanical system, which is formally equivalent to a two-dimensional vector space over the complex numbers.

*Example 1. A **qubit** has some similarities to a classical bit, but is overall very different.*

*Example 2. Like a bit, a **qubit** can have two possible values — normally a 0 or a 1.*

- ◆ **Quantum mechanics (QM) — квантова механіка** — a set of principles describing the physical reality at the atomic level of matter (molecules and atoms) and the subatomic (electrons, protons, and even smaller particles). These descriptions include the simultaneous wave-like and particle-like behavior of both matter and radiation («wave–particle duality»).

*Example 1. **Quantum Mechanics** is a mathematical description of reality, like any scientific model.*

*Example 2. **QM** says that the most complete description we can make of a system is its wavefunction, which is just a number varying between time and place.*

- ◆ **Quarterdeck Office Systems (later Quarterdeck Corporation) — офісна система Quarterdeck** — was an American computer software company. Their offices were initially located at 150 Pico Boulevard in Santa Monica, California and later at 13160 Mindanao Way in Marina Del Rey, California, as well as a sales and technical support unit located in Clearwater, Florida. In the 1990s they had a European office in Dublin, Ireland.

*Example 1. **Quarterdeck Office Systems**' most famous products were the Quarterdeck Expanded Memory Manager, DESQview, CleanSweep, DESQview/X, Quarterdeck Mosaic, and Manifest.*

*Example 2. In 1997, **Quarterdeck** acquired Datastorm Technologies Inc., publishers of ProComm, and relocated its technical support and development operations from California and Florida, to Datastorm's Columbia, Missouri headquarters.*

R

- ◆ **RAID** — надлишковий набір незалежних дисків — an acronym first defined by David A. Patterson, Garth A. Gibson, and Randy Katz at the University of California, Berkeley in 1987 to describe a redundant array of inexpensive disks, a technology that allowed computer users to achieve high levels of storage reliability from low-cost and less reliable PC-class disk-drive components, via the technique of arranging the devices into arrays for redundancy.

Example 1. Marketers representing industry **RAID** manufacturers later reinvented the term to describe a redundant array of independent disks as a means of dissociating a «low cost» expectation from **RAID** technology.

Example 2. «**RAID**» is now used as an umbrella term for computer data storage schemes that can divide and replicate data among multiple hard disk drives.

- ◆ **Random-access memory (RAM)** — пам'ять з довільним доступом — a form of computer data storage. Today, it takes the form of integrated circuits that allow stored data to be accessed in any order (i.e., at random). The word random thus refers to the fact that any piece of data can be returned in a constant time, regardless of its physical location and whether or not it is related to the previous piece of data.

Example 1. The word **RAM** is often associated with volatile types of memory (such as **DRAM** memory modules), where the information is lost after the power is switched off.

Example 2. Many other types of memory are **RAM**, too, including most types of **ROM** and a type of flash memory called **NOR-Flash**.

- ◆ **Read-only memory (ROM)** — пам'ять тільки для читання — a class of storage media used in computers and other electronic devices. Because data stored in **ROM** cannot be modified (at least not very quickly or easily), it is mainly used to distribute firmware (software that is very closely tied to specific hardware, and unlikely to require frequent updates).

Example 1. In its strictest sense, **ROM** refers only to mask **ROM** (the oldest type of solid state **ROM**), which is fabricated with the desired data permanently stored in it, and thus can never be modified. However, more modern types such as **EPROM** and flash **EEPROM** can be erased and re-programmed multiple times; they are still described as «**read-**

only memory» (ROM) because the reprogramming process is generally infrequent, comparatively slow, and often does not permit random access writes to individual memory locations.

Example 2. Despite the simplicity of mask ROM, economies of scale and field-programmability often make reprogrammable technologies more flexible and inexpensive, so mask ROM is rarely used in new products.

- ◆ **Remote Authentication Dial In User Service (RADIUS)** – служба віддаленої автентифікації комутованого користувача – a networking protocol that provides centralized Authentication, Authorization, and Accounting (AAA) management for computers to connect and use a network service. RADIUS was developed by Livingston Enterprises, Inc., in 1991 as an access server authentication and accounting protocol and later brought into the IETF standards.

Example 1. RADIUS is a client / server protocol that runs in the application layer, using UDP as transport.

Example 2. The Remote Access Server, the Virtual Private Network server, the Network switch with port-based authentication, and the Network Access Server, are all gateways that control access to the network, and all have a RADIUS client component that communicates with the RADIUS server.

- ◆ **Remote procedure call (RPC)** – виклик віддаленої процедури – an Inter-process communication technology that allows a computer program to cause a subroutine or procedure to execute in another address space (commonly on another computer on a shared network) without the programmer explicitly coding the details for this remote interaction.

Example 1. An RPC is initiated by the client sending a request message to a known remote server in order to execute a specified procedure using supplied parameters.

Example 2. An important difference between remote procedure calls and local calls is that remote calls can fail because of unpredictable network problems.

- ◆ **Repeater – повторювач** – an electronic device that receives a signal and retransmits it at a higher level and / or higher power, or onto the other side of an obstruction, so that the signal can cover longer distances.

Example 1. The term «repeater» originated with telegraphy and referred to an electromechanical device used to regenerate telegraph signals.

***Example 2.** Repeaters are often used in trans-continental and submarine communications cables, because the attenuation (signal loss) over such distances would be unacceptable without them.*

- ◆ **Request for Comments (RFC)** — **запити на коментарі** — a memorandum published by the Internet Engineering Task Force (IETF) describing methods, behaviors, research, or innovations applicable to the working of the Internet and Internet-connected systems.

***Example 1.** Through the Internet Society, engineers and computer scientists may publish discourse in the form of an **RFC**, either for peer review or simply to convey new concepts, information, or (occasionally) engineering humor.*

***Example 2.** The IETF adopts some of the proposals published as **RFCs** as Internet standards.*

- ◆ **Reverse Address Resolution Protocol (RARP)** — **протокол визначення мережної адреси** — a computer networking protocol used by a host computer to request its Internet Protocol (IPv4) address from an administrative host, when it has available its Link Layer or hardware address, such as an Ethernet address.

***Example 1.** **RARP** is described in Internet Engineering Task Force (IETF) publication RFC 903.*

***Example 2.** **Reverse ARP** differs from the Inverse Address Resolution Protocol (**InARP**) described in RFC 2390, which is designed to obtain the IP address associated with another host's MAC address.*

- ◆ **Routing (or routeing)** — **маршрутизація** — the process of selecting paths in a network along which to send network traffic. Routing is performed for many kinds of networks, including the telephone network, electronic data networks (such as the Internet), and transportation networks. This article is concerned primarily with routing in electronic data networks using packet switching technology.

***Example 1.** In packet switching networks, **routing** directs packet forwarding, the transit of logically addressed packets from their source toward their ultimate destination through intermediate nodes; typically hardware devices called routers, bridges, gateways, firewalls, or switches.*

***Example 2.** General-purpose computers with multiple network cards can also forward packets and perform **routing**, though they are not specialized hardware and may suffer from limited performance.*

S

- ◆ **Scalability – масштабованість** – a desirable property of a system, a network, or a process, which indicates its ability to either handle growing amounts of work in a graceful manner or to be readily enlarged.

Example 1. Scalability, as a property of systems, is generally difficult to define and in any particular case it is necessary to define the specific requirements for scalability on those dimensions which are deemed important.

Example 2. Scalability is a highly significant issue in electronics systems, database, routers, and networking.

- ◆ **Sequential access memory (SAM) – база даних облікових записів** – a class of data storage devices that read their data in sequence. This is in contrast to random access memory (RAM) where data can be accessed in any order. Sequential access devices are usually a form of magnetic memory.

Example 1. While sequential access memory is read in sequence, accesses can still be made to arbitrary locations by «seeking» to the requested location.

Example 2. Magnetic sequential access memory is typically used for secondary storage in general-purpose computers due to their higher density at lower cost compared to RAM, as well as resistance to wear and non-volatility.

- ◆ **Service Advertising Protocol (SAP) – протокол повідомлення про послуги** – included in the Internetwork Packet Exchange (IPX) protocol. SAP makes the process of adding and removing services on an IPX internetwork dynamic. SAP is maintained by Novell.

Example 1. As servers are booted up, they may advertise their services using SAP; when they are brought down, they use SAP to indicate that their services will no longer be available.

Example 2. All entities that use SAP must broadcast a name and Service Type that (together) are unique throughout the entire IPX internetwork.

- ◆ **Serial communication – послідовна комунікація** – the process of sending data one bit at one time, sequentially, over a communication channel or computer bus. This is in contrast to parallel communication, where several bits are sent together, on a link with several parallel channels.

***Example 1.** Serial communication is used for all long-haul communication and most computer networks, where the cost of cable and synchronization difficulties make parallel communication impractical.*

***Example 2.** In many cases, serial communication is a better option because it is cheaper to implement.*

- ◆ **Server — сервер** — a computer program that delivers a service to clients. The server and client programs are usually, but not necessarily, running on different computers communicating over a network.

***Example 1.** A web server delivers a web page when requested by a web browser (called client in this context). The predefined way a server and client communicates is called a protocol.*

***Example 2.** Virtually every action taken by an ordinary Internet user requires one or more interactions with one or more servers.*

- ◆ **Service Profile Identifier (SPID) — ідентифікатор послуги та лінії** — a number issued by ISDN service providers in North America that identifies the services and features of an ISDN circuit. Service providers typically assign each B channel a unique SPID. A SPID is derived from the telephone number assigned to the circuit, and in the U.S. it typically follows a generic, 14-digit format. A SPID tells equipment at the phone company's central office about the capabilities of each terminal (computer or phone) on the B-channels. A Basic Rate home or business user may divide service into two B-channels with one used for normal phone service and the other for computer data. The SPID tells the phone company whether the terminal accepts voice or data information. Technically, the SPID is a numeric string from 3 to 20 digits in length. A SPID (or more than one, if necessary) is assigned when you order the ISDN Basic Rate Interface (BRI) from the phone company.

***Example 1.** Beginning in 1998, some ISDN manufacturers began to provide non-initializing terminals (NITs) that do not require the entering of a SPID.*

***Example 2.** Manufacturers also are delivering terminals with automated SPID selection in which the correct SPID is downloaded to the terminal rather than having to be specified by the user.*

- ◆ **Session Layer — сеансовий рівень** — Layer 5 of the seven-layer OSI model of computer networking. The Session Layer provides the mechanism for opening, closing and managing a session between end-user application processes, i.e. a semi-permanent dialogue.

***Example 1.** Communication sessions consist of requests and responses that occur between applications. **Session Layer** services are commonly used in application environments that make use of remote procedure calls (RPCs).*

***Example 2.** Within the service layering semantics of the OSI network architecture, the **Session Layer** responds to service requests from the Presentation Layer and issues service requests to the Transport Layer.*

- ◆ **Simple Mail Transfer Protocol (SMTP) – простий протокол електронної пошти** – an Internet standard for electronic mail (e-mail) transmission across Internet Protocol (IP) networks. SMTP was first defined in RFC 821 (STD 15), and last updated by RFC 5321 (2008) which includes the extended SMTP (ESMTP) additions, and is the protocol in widespread use today. SMTP is specified for outgoing mail transport and uses port 25.

***Example 1.** While electronic mail servers and other mail transfer agents use **SMTP** to send and receive mail messages, user-level client mail applications typically only use **SMTP** for sending messages to a mail server for relaying.*

***Example 2.** **SMTP** is a relatively simple, text-based protocol, in which a mail sender communicates with a mail receiver by issuing simple command strings and supplying necessary data over a reliable ordered data stream channel, typically a Transmission Control Protocol (TCP) connection.*

- ◆ **Sliding Window Protocols – протоколи ковзного (змінного) вікна** – a feature of packet-based data transmission protocols. They are used in the data link layer (OSI model) as well as in TCP (transport layer of the OSI model).

***Example 1.** **Sliding Window Protocols** are used to keep a record of the frame sequences sent, and their respective acknowledgements received, by both the users.*

***Example 2.** The additional feature of **Sliding Window Protocols** over a simpler protocol is that can allow multiple packets to be «in transmission» simultaneously, rather than waiting for each packet to be acknowledged before sending the next.*

- ◆ **Software development process – процес розробки програмного забезпечення** – a structure imposed on the development of a software product. Synonyms include software life cycle and software process. There are several models for such processes, each describing approaches to a variety of tasks or activities that take place during the process.

*Example 1. A decades-long goal has been to find repeatable, predictable **software development processes** that improve productivity and quality.*

*Example 2. Composed of line practitioners who have varied skills, the group is at the center of the collaborative effort of everyone in the organization who is involved with **software development process** improvement.*

- ◆ **Solaris** — операційна система на основі UNIX — a UNIX-based operating system introduced by Sun Microsystems in 1992 as the successor to SunOS. Solaris is known for its scalability, especially on SPARC systems, and for originating many innovative features such as DTrace and ZFS. Solaris supports SPARC-based and x86-based workstations and servers from Sun and other vendors, with efforts underway to port to additional platforms.

Example 1. Solaris is certified against the Single Unix Specification.

Example 2. Solaris uses a common code base for the platforms it supports: SPARC and i86pc (which includes both x86 and x86-64).

- ◆ **Spanning Tree Protocol (STP)** — протокол з'єднувального дерева — a link layer network protocol that ensures a loop-free topology for any bridged LAN. It is based on an algorithm invented by Radia Perlman while working for Digital Equipment Corporation.

*Example 1. In the OSI model for computer networking, STP falls under the OSI layer-2. **Spanning tree** allows a network design to include spare (redundant) links to provide automatic backup paths if an active link fails, without the danger of bridge loops, or the need for manual enabling/disabling of these backup links.*

*Example 2. The spanning tree that the bridges compute using the **Spanning Tree Protocol** can be determined using the following rules.*

- ◆ **Split-horizon route advertisement** — оголошення з маршрутом розщеплення горизонту — a method of preventing routing loops in distance-vector routing protocols by prohibiting a router from advertising a route back onto the interface from which it was learned.

*Example 1. Split-horizon routing with poison reverse is a variant of **split-horizon route advertising** in which a router actively advertises routes as unreachable over the interface over which they were learned.*

*Example 2. The **split-horizon** method is effective and simple to implement, and is therefore used by most distance-vector protocols.*

- ◆ **Store-and-forward** — з проміжним зберіганням — a telecommunications technique in which information is sent to an intermediate station where it is kept and sent at a later time to the final destination or to another intermediate station.

*Example 1. In general, **store-and-forward** technique is used in networks with intermittent connectivity, especially in the wilderness or environments requiring high mobility.*

*Example 2. **Store-and-forward** technique may also be preferable in situations when there are long delays in transmission and variable and high error rates, or if a direct, end-to-end connection is not available.*

- ◆ **Systems Network Architecture (SNA)** — системна мережна архітектура — IBM's proprietary networking architecture created in 1974. It is a complete protocol stack for interconnecting computers and their resources. SNA describes the protocol and is, in itself, not actually a program. The implementation of SNA takes the form of various communications packages, most notably Virtual telecommunications access method (VTAM) which is the mainframe package for SNA communications.

Example 1. SNA is still used extensively in banks and other financial transaction networks, as well as in many government agencies.

Example 2. While IBM is still providing support for SNA, one of the primary pieces of hardware, the 3745/3746 communications controller has been withdrawn from marketing by the IBM Corporation.

T

- ◆ **Telnet** — стандартний протокол емуляції терміналу — a network protocol used on the Internet or local area networks to provide a bidirectional interactive communications facility. Typically, telnet provides access to a command-line interface on a remote host via a virtual terminal connection which consists of an 8-bit byte oriented data connection over the Transmission Control Protocol (TCP). User data is interspersed in-band with TELNET control information.

The term *telnet* may also refer to the software that implements the client part of the protocol. Telnet client applications are available for virtually all computer platforms. Most network

equipment and operating systems with a TCP/IP stack support a Telnet service for remote configuration (including systems based on Windows NT). Because of security issues with Telnet, its use has waned in favor of SSH for remote access.

*Example 1. On many systems, a **Telnet** client application may also be used to establish interactive raw-TCP sessions.*

*Example 2. When **Telnet** was initially developed in 1969, most users of networked computers were in the computer departments of academic institutions, or at large private and government research facilities.*

- ◆ **Terabyte – терабайт** – a SI-multiple (see prefix tera) of the unit byte for digital information storage and is equal to 10^{12} (1000000000000) bytes or 1000 gigabytes.

*Example 1. The unit symbol for the **terabyte** is **TB**.*

*Example 2. The designation **terabyte** is rarely used to refer to the tebibyte, its binary prefix analogue, because only recent (since 2007) disk drives have this capacity.*

- ◆ **Terminal adapter (TA) – термінальний адаптер** – a device that connects a terminal (computer) to the ISDN network. The TA therefore fulfills a similar function to the one a modem has on the POTS network, and is therefore sometimes called an ISDN modem. The latter term, however, is partially misleading as there is no modulation or demodulation performed.

Example 1. There are devices on the market that combine the functions of an ISDN TA with those of a classical modem (with an ISDN line interface).

Example 2. These combined TA / modems permit connections from both ISDN and analog-line / modem counterparts.

- ◆ **Time-division multiplexing (TDM) – мультиплексування з розподілом часу** – a type of digital or (rarely) analog multiplexing in which two or more signals or bit streams are transferred apparently simultaneously as sub-channels in one communication channel, but are physically taking turns on the channel.

Example 1. One TDM frame consists of one timeslot per sub-channel.

Example 2. TDM can be further extended into the time division multiple access (TDMA) scheme, where several stations connected to the same physical medium, for example sharing the same frequency channel, can communicate.

- ◆ **Time to live (TTL) – час життя** – a limit on the period of time or number of iterations or transmissions in computer and

computer network technology that a unit of data (e.g. a packet) can experience before it should be discarded.

Example 1. *In theory, time to live is measured in seconds, although every host that passes the datagram must reduce the **TTL** by at least one unit.*

Example 2. In practice, the **TTL** field is reduced by one on every hop. To reflect this practice, the field is named hop limit in *IPv6*.

- ◆ **Thin client** (sometimes also called a **lean** or **slim client**) — тонкий клієнт — a computer or a computer program which depends heavily on some other computer (its server) to fulfill its traditional computational roles. This stands in contrast to the traditional fat client, a computer designed to take on these roles by itself. The exact roles assumed by the server may vary, from providing data persistence (for example, for diskless nodes) to actual information processing on the client's behalf.

Example 1. *The most common sort of modern **thin client** is a low-end microcomputer which concentrates solely on providing a graphical user interface to the end-user.*

Example 2. *Thin clients occur as components of a broader computer infrastructure, where many clients share their computations with the same server.*

- ◆ **Throughput** (or **network throughput**) — пропускна здатність — the average rate of successful message delivery over a communication channel. This data may be delivered over a physical or logical link, or pass through a certain network node. The throughput is usually measured in bits per second (bit/s or bps), and sometimes in data packets per second or data packets per time slot.

Example 1. *The system **throughput** or aggregate **throughput** is the sum of the data rates that are delivered to all terminals in a network.*

Example 2. *The **throughput** can be analyzed mathematically by means of queueing theory, where the load in packets per time unit is denoted arrival rate λ , and the throughput in packets per time unit is denoted departure rate μ .*

- ◆ **Trailer** — трейлер — supplemental data placed at the end of a block of data being stored or transmitted, which may contain information for the handling of the data block, or just mark its end. In data transmission, the data preceding the trailer is sometimes called the payload or body. It is vital that trailer composition follow a clear and unambiguous specification or format, to allow for parsing.

*Example 1. If a **trailer** is not removed properly, or part of the payload is removed thinking it is a trailer, it can cause confusion.*

*Example 2. In data transfer, the OSI data link layer adds a **trailer** at the end of the data encapsulating.*

- ◆ **Transceiver** — **трансивер** — a device that has both a transmitter and a receiver which are combined and share common circuitry or a single housing. If no circuitry is common between transmit and receive functions, the device is a transmitter-receiver.

*Example 1. A number of factors can influence the utility of a **transceiver**, determining which frequencies it can use, and how far it can transmit.*

*Example 2. There are a number of different types of **transceivers** designed for an assortment of uses, and the **transceiver** is the cornerstone of wireless communication.*

- ◆ **Transmission Control Protocol (TCP)** — **протокол управління передачею** — one of the core protocols of the Internet Protocol Suite. TCP is one of the two original components of the suite (the other being Internet Protocol, or IP), so the entire suite is commonly referred to as TCP/IP.

*Example 1. In particular, **TCP** provides reliable, ordered delivery of a stream of bytes from a program on one computer to another program on another computer.*

*Example 2. Besides the Web, other common applications of **TCP** include e-mail and file transfer.*

- ◆ **Transport Layer** — **транспортний рівень** — a group of methods and protocols within a layered architecture of network components within which it is responsible for encapsulating application data blocks into data units (datagrams, segments) suitable for transfer to the network infrastructure for transmission to the destination host, or managing the reverse transaction by abstracting network datagrams and delivering their payload to an application.

*Example 1. **Transport layers** are contained in both the TCP/IP model (RFC 1122), which is the foundation of the Internet, and the Open Systems Interconnection (OSI) model of general networking.*

*Example 2. The definitions of the **Transport Layer** are slightly different in these two models. This article primarily refers to the TCP/IP model.*

- ◆ **Trap** — **переривання** — a type of synchronous interrupt typically caused by an exceptional condition (e.g. division by zero or invalid memory access) in a user process. A trap usually results

in a switch to kernel mode, wherein the operating system performs some action before returning control to the originating process.

*Example 1. In some usages, the term **trap** refers specifically to an interrupt intended to initiate a context switch to a monitor program or debugger.*

*Example 2. In SNMP, a **trap** is a type of PDU used to report an alert or other asynchronous event about a managed subsystem.*

- ◆ **Tunneling protocol — протокол тунелювання** — when one network protocol (the delivery protocol) encapsulates a different payload protocol. By using tunneling one can (for example) carry a payload over an incompatible delivery-network, or provide a secure path through an untrusted network.

*Example 1. **Tunneling protocol** typically contrasts with a layered protocol model such as those of OSI or TCP/IP.*

*Example 2. **Tunneling protocols** may use data encryption to transport insecure payload protocols over a public network (such as the Internet), thereby providing VPN functionality.*

U

- ◆ **Unicast transmission — одноадресна передача** — the sending of messages to a single network destination host on a packet switching network. The term unicast is formed in analogy to the term broadcast which means transmitting the same data to all possible destinations. Another multi-destination distribution method, multicasting, sends data only to interested destinations by using special address assignments.

*Example 1. **Unicast messaging** is used for all network processes in which a private or unique resource is requested.*

*Example 2. Certain network applications which are mass-distributed are too costly to be conducted with **unicast transmission** since each network connection consumes computing resources on the sending host and requires its own separate network bandwidth for transmission.*

- ◆ **Uniform Resource Locator (URL) — уніфікований покажчик ресурсу** — a subset of the Uniform Resource Identifier (URI) that specifies where an identified resource is available and the

mechanism for retrieving it. In popular usage and in many technical documents and verbal discussions it is often incorrectly used as a synonym for URI.

***Example 1.** Every **URL** is made up of some of the following: the scheme name, followed by a colon, then, depending on scheme, a hostname, a port number, the pathname of the file to be fetched or the program to be run, then a query string and with **HTML** files, an anchor (optional) for where the page should start to be displayed.*

***Example 2.** An absolute **URL** is one that points to the exact location of a file. It is unique, meaning that if two absolute **URLs** are identical, they point to the same file.*

- ◆ **Uninterruptible power supply (UPS)** (also known as a **battery backup**) — пристрій безперебійного електроживлення — provides emergency power and, depending on the topology, line regulation as well to connected equipment by supplying power from a separate source when utility power is not available.

***Example 1.** While not limited to safeguarding any particular type of equipment, a **UPS** is typically used to protect computers, data centers, telecommunication equipment or other electrical equipment where an unexpected power disruption could cause injuries, fatalities, serious business disruption or data loss.*

***Example 2.** **UPS** units range in size from units to back up single computers without monitor (around 200 VA) to units powering entire data centers, buildings, or even cities (several megawatts).*

- ◆ **Unix (officially trademarked as UNIX, sometimes also written as Unix with small caps)** — текстова операційна система — a computer operating system originally developed in 1969 by a group of AT&T employees at Bell Labs, including Ken Thompson, Dennis Ritchie, Brian Kernighan, Douglas McIlroy, and Joe Ossanna.

***Example 1.** Today the term **Unix** is used to describe any operating system that conforms to Unix standards, meaning the core operating system operates the same as the original Unix operating system.*

***Example 2.** Today's **Unix** systems are split into various branches, developed over time by AT&T as well as various commercial vendors and non-profit organizations.*

- ◆ **USB (Universal Serial Bus)** — універсальна послідовна шина — a specification to establish communication between devices and a host controller (usually personal computers). USB is intended to replace many varieties of serial and parallel ports. USB can

connect computer peripherals such as mice, keyboards, digital cameras, printers, personal media players, flash drives, and external hard drives.

***Example 1.** For many of those devices, **USB** has become the standard connection method. **USB** was designed for personal computers, but it has become commonplace on other devices such as smartphones.*

***Example 2.** Usually, the **USB** connectors on each end of the cable are quite different, making it necessary to know which of the **USB** connectors goes to your computer, and which gets plugged into the device.*

- ◆ **User Datagram Protocol (UDP) — протокол дейтаграм користувачів** — one of the core members of the Internet Protocol Suite, the set of network protocols used for the Internet. With UDP, computer applications can send messages, in this case referred to as datagrams, to other hosts on an Internet Protocol (IP) network without requiring prior communications to set up special transmission channels or data paths. UDP is sometimes called the Universal Datagram Protocol. The protocol was designed by David P. Reed in 1980 and formally defined in RFC 768.

***Example 1.** **UDP** uses a simple transmission model without implicit hand-shaking dialogues for guaranteeing reliability, ordering, or data integrity.*

***Example 2.** **UDP**'s stateless nature is also useful for servers that answer small queries from huge numbers of clients. Unlike **TCP**, **UDP** is compatible with packet broadcast (sending to all on local network) and multicasting (send to all subscribers).*

U

- ◆ **VINES (for Virtual Integrated Network Service) — віртуальна мережна операційна система** — was a computer network operating system and the set of computer network protocols it used to talk to client machines on the network. The Banyan company based the VINES operating system on Unix, and the network protocols on the archetypical Xerox XNS stack. VINES formed one of a group of XNS-based systems which also included Novell NetWare and ARCNET; like most of these earlier products it has since disappeared from the market, Banyan along with it.

Example 1. VINES client-software ran on most PC-based operating systems, including MS-DOS and earlier versions of Microsoft Windows.

Example 2. VINES was able to link embassies around the world. VINES also came with built-in point-to-point and group chat capability that was useful for basic communication over secure lines.

- ◆ **Virtual circuit (VC) (virtual connection, virtual channel) — віртуальний канал** — a connection-oriented communication service that is delivered by means of packet mode communication. After a connection or virtual circuit is established between two nodes or application processes, a bit stream or byte stream may be delivered between the nodes. A virtual circuit protocol hides the division into segments, packets or frames from higher level protocols.

Example 1. Virtual circuit communication resembles circuit switching, since both are connection oriented, meaning that in both cases data is delivered in correct order, and signalling overhead is required during a connection establishment phase.

Example 2. Many virtual circuit protocols, but not all, provide reliable communication service, by means of data retransmissions because of error detection and automatic repeat request (ARQ).

- ◆ **Virtual LAN (commonly known as a VLAN) — віртуальна локальна мережа** — a group of hosts with a common set of requirements that communicate as if they were attached to the Broadcast domain, regardless of their physical location. A VLAN has the same attributes as a physical LAN, but it allows for end stations to be grouped together even if they are not located on the same network switch. Network reconfiguration can be done through software instead of physically relocating devices.

Example 1. Virtual LANs are essentially Layer 2 constructs, compared with IP subnets which are Layer 3 constructs.

Example 2. By using VLANs, one can control traffic patterns and react quickly to relocations. VLANs provide the flexibility to adapt to changes in network requirements and allow for simplified administration.

- ◆ **Virtual private network (VPN) — віртуальна приватна мережа** — a computer network that is implemented in an additional software layer (overlay) on top of an existing larger network for the purpose of creating a private scope of computer communications or providing a secure extension of a private network into an insecure network such as the Internet.

***Example 1.** The links between nodes of a **virtual private network** are formed over logical connections or virtual circuits between hosts of the larger network.*

***Example 2.** The Link Layer protocols of the **virtual network** are said to be tunneled through the underlying transport network.*

- ◆ **Virus (computer virus) – bipy** – a computer program that can copy itself and infect a computer. The term «virus» is also commonly but erroneously used to refer to other types of malware, adware, and spyware programs that do not have the reproductive ability. A true virus can only spread from one computer to another (in some form of executable code) when its host is taken to the target computer; for instance because a user sent it over a network or the Internet, or carried it on a removable medium such as a floppy disk, CD, DVD or USB drive. Viruses can increase their chances of spreading to other computers by infecting files on a network file system or a file system that is accessed by another computer.

The term «computer virus» is sometimes used as a catch-all phrase to include all types of malware. Malware includes computer viruses, worms, trojans, most rootkits, spyware, dishonest adware, crimeware, and other malicious and unwanted software, including true viruses. Viruses are sometimes confused with computer worms and Trojan horses, which are technically different. A worm can exploit security vulnerabilities to spread itself to other computers without needing to be transferred as part of a host, and a Trojan horse is a program that appears harmless but has a hidden agenda. Worms and Trojans, like viruses, may cause harm to either a computer system's hosted data, functional performance, or networking throughput, when they are executed. Some viruses and other malware have symptoms noticeable to the computer user, but many are surreptitious or go unnoticed.

***Example 1.** A program called «Rother J» was the first computer **virus** to appear «in the wild» — that is, outside the single computer or lab where it was created.*

***Example 2.** If two macro **viruses** simultaneously infect a document, the combination of the two, if also self-replicating, can appear as a «mating» of the two and would likely be detected as a **virus** unique from the «parents».*

- ◆ **Voice over Internet Protocol (VoIP)** — передача мовлення по мережі Internet; телефонія на основі IP — a general term for a family of transmission technologies for delivery of voice communications over IP networks such as the Internet or other packet-switched networks. Other terms frequently encountered and synonymous with VoIP are IP telephony, Internet telephony, voice over broadband (VoBB), broadband telephony, and broadband phone.

Example 1. VoIP systems employ session control protocols to control the set-up and tear-down of calls as well as audio codecs which encode speech allowing transmission over an IP network as digital audio via an audio stream.

Example 2. Voice over IP has been implemented in various ways using both proprietary and open protocols and standards.

- ◆ **Volume** — том; розділ жорсткого диска — the term used to describe a single accessible storage area with a single file system, typically (though not necessarily) resident on a single partition of a hard disk. Similarly, it refers to the logical interface used by an operating system to access data stored on some media using a single instance of a filesystem. «Volume» can be used in place of the term «drive» where it is desirable to indicate that the entity in question is not a physical disk drive, but rather the corporate data stored using a filesystem there. «Logical drive» and «volume» should be considered synonymous, however «volume» and «partition» are not synonymous. In Linux systems, volumes are usually handled by the Logical Volume Manager or the Enterprise Volume Management System. The term is also used in NT-based versions of Microsoft Windows, where they are handled by the kernel and managed using the Disk Management MMC snap-in.

Example 1. A floppy disk might be accessible as a volume, even though it does not contain a partition, as floppy disks cannot be partitioned with most modern computer hardware.

Example 2. Also, an OS can recognize a partition without recognizing any volume associated with it, as when the OS cannot interpret the filesystem stored there.

- ◆ **Web server — Web-сервер** — a computer program that delivers (serves) content, such as this web page, using the Hypertext Transfer Protocol. The term web server can also refer to the computer or virtual machine running the program.

*Example 1. The primary function of a **web server** is to deliver web pages (HTML documents) and associated content (e.g. images, style sheets, JavaScripts) to clients.*

*Example 2. A client, commonly a web browser or web crawler, makes a request for a specific resource using HTTP and, if all goes well, the **web server** responds with the content of that resource.*

- ◆ **Wide area network (WAN) — глобальна мережа** — a computer network that covers a broad area (i.e., any network whose communications links cross metropolitan, regional, or national boundaries). This is in contrast with personal area networks (PANs), local area networks (LANs), campus area networks (CANs), or metropolitan area networks (MANs) which are usually limited to a room, building, campus or specific metropolitan area (e.g., a city) respectively.

Example 1. WANs are used to connect LANs and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations.

Example 2. Many WANs are built for one particular organization and are private.

- ◆ **Windows (Microsoft Windows) — операційна система Windows** — a series of software operating systems and graphical user interfaces produced by Microsoft. Microsoft first introduced an operating environment named Windows in November 1985 as an add-on to MS-DOS in response to the growing interest in graphical user interfaces (GUIs). Microsoft Windows came to dominate the world's personal computer market, overtaking Mac OS, which had been introduced previously.

Example 1. Windows implemented an elaborate, segment-based, software virtual memory scheme, which allowed it to run applications larger than available memory.

Example 2. The early versions of Windows were often thought of as simply graphical user interfaces, mostly because they ran on top of MS-DOS and used it for file system services.

Х

- ◆ **X.25 – стандарт організації ITU-T** – an ITU-T standard protocol suite for packet switched wide area network (WAN) communication. An X.25 WAN consists of packet-switching exchange (PSE) nodes as the networking hardware, and leased lines, Plain old telephone service connections or ISDN connections as physical links.

Example 1. X.25 is a family of protocols that was used especially during the 1980s by telecommunications companies and in financial transaction systems such as automated teller machines. X.25 was originally defined by the International Telegraph and Telephone Consultative Committee.

Example 2. X.25 is today to a large extent replaced by less complex protocols, especially the Internet protocol (IP) although some telephone operators offer X.25-based communication via the signaling (D) channel of ISDN lines.

- ◆ **X.500 – набір стандартів розподіленої служби каталогів** – a series of computer networking standards covering electronic directory services. The X.500 series was developed by ITU-T, formerly known as CCITT. The directory services were developed in order to support the requirements of X.400 electronic mail exchange and name lookup.

Example 1. ISO was a partner in developing the X.500 standards, incorporating them into the Open Systems Interconnection suite of protocols. ISO/IEC 9594 is the corresponding ISO identification.

Example 2. X.509, the portion of the standard providing for an authentication framework.

- ◆ **X Window System (commonly X or X11) – протокол [система, стандарт] X Window** – a computer software system and network protocol that provides a graphical user interface (GUI) for networked computers, and was initially developed as part of Project Athena. It implements the X display protocol and provides windowing on raster graphics (bitmap) computer displays and manages keyboard and pointing device control functions.

Example 1. In its standard distribution, X Window System is a complete, albeit simple, display and human interface solution, but also delivers a standard toolkit and protocol stack for building graphical user interfaces.

***Example 2.** X features network transparency: the machine where an application program (the client application) runs can differ from the user's local machine (the display server).*

- ◆ **Xerox Network Services (XNS)** – **мережний стандарт Xerox** – a protocol suite developed by Xerox within the Xerox Network Systems Architecture. It provided general purpose network communications, internetwork routing and packet delivery, including higher level functions such as a reliable stream, and remote procedure calls.

***Example 1.** XNS predated and influenced the development of the Open Systems Interconnect (OSI) networking model.*

***Example 2.** XNS was developed at Xerox PARC in the early 1980s, based heavily on the earlier PARC Universal Packet (PUP) protocol.*

Z

- ◆ **Zoning – зона** – the partitioning of a Fibre Channel fabric into smaller subsets to restrict interference, add security, and to simplify management. While a SAN makes available several virtual disks (LUNs), each system connected to the SAN should only be allowed to a controlled subset of the LUNs.

***Example 1.** Zoning applies only to the switched fabric topology (FC-SW), it does not exist in simpler Fibre Channel topologies.*

***Example 2.** Zoning is sometimes confused with LUN masking, because it serves the same goals.*

NOTES

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Англо-український навчальний тлумачний словник-мінімум з ІТ-термінології охоплює найуживанішу термінологічну лексику зі сфери інформаційних технологій, містить 300 термінів, аббревіатур та акронімів, які використовуються у сферах комп'ютерної техніки, програмування, а також в основних прикладних сферах. Видання призначено для фахівців з інформаційно-комунікативних технологій, зокрема студентів старших курсів напряму підготовки «Економічна кібернетика», та широкого кола користувачів, яких цікавить ця сфера.

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