THE BRIEF HISTORY, DEVELOPMENT, TECHNICAL BASIS AND SPECIAL "PRIVATISATION" OF THE INTERNET

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Abstract
The last few years are deeply influenced by the Internet: extreme fast communication, data exchange, internet banking etc. This essay tries to summarise the internet's history, the birth of the so called World Wide Web, the special "privatisation" of the Internet and much more, also from a legal, not only technological point of view. The work also outlines the actual technical and legal issues of the Internet today, like the need of legal standardization, international coordination bodies and state interventions, real-time IP networks, telecommunications and Internet.

Key words
Internet, history of the Internet, technical basis of the Internet, Internet market opening, governmental interventions, Internet standardization, international organizations, international legal documents.

1. THE BEGINNINGS

It is the strategic and defence research associated with the Cold War era that was underlying the development of the technical bases which have eventually lead to the emergence of the Internet. The military change in strategy during the Cold War brought about new requirements in communications.

In the 1960s, one of the key elements of the new strategic concept of the United States has been to focus its defence powers previously "distributed" worldwide to its own territory and to establish the strategic system necessary for launching a destructive counterattack following a previous military strike potentially suffered by the United States. However, one of the most important factors of a successful, efficient counterattack and response is to ensure that the communications systems remain intact. It was evident to defence experts that a nuclear explosion in high altitudes would impair the high frequency (radio) information systems for hours and that a major damage to, or the destruction of, certain central switching systems of AT&T would be enough to make the remaining fixed-line networks non-functional. And in the case of an inoperative telecommunications network, the defence system developed for a counterattack including launching rockets would become de facto unusable.

It is important to note that in the 1960s computer network research was also conducted for other than military purposes, for example: Great Britain - National Physical Laboratory (1964), United States - Massachusetts Institute of Technology - MIT (1961). Nevertheless, the comprehensive results relating to the roots of the Internet have been achieved in the framework of defence-oriented research (Rand Corporation, the research management activity of ARPA).

The developmental process of the network system of the Internet was based upon the science and research management activity of ARPA (Advanced Research Projects Agency), which was founded in 1958 by the US Department of Defence (DoD) to supervise scientific and

technical research for military purposes. In 1972, the agency's name was changed to DARPA (Defence Advanced Research Projects Agency), to be termed ARPA again in 1993 and then again DARPA in 1996. The most general initial purpose of the foundation of ARPA was, on the one hand, to counterbalance the consequences of the lag that became obvious as the Soviet Union launched its satellite Sputnik 1 in 1957, and, on the other hand, to gradually realise the United States' supremacy in military, defence-oriented scientific, technical, and technological research.

The research programme on computer networks was launched in 1962 within the research management and support activity of the ARPA drawing on the research results and resources of the Massachusetts Institute of Technology (hereinafter as MIT). In the framework of the research, the principles of a digital communications system have been developed in which the data stream to be transmitted is packetized and each of these packets carry routing information. In addition, the system was to be designed in a way to be able to perfectly recover packets created in specific sizes – even in case of transmission errors.

Founded with the support of ARPA and relying on the research efforts of MIT, ARPANET was no longer envisaged to guarantee safe operations even in the case of a nuclear strike, which served as the initial objective. Instead, subsequent network research efforts extended to the robust and massive structure of the network as well as to guaranteed network operation upon the destruction of a major part of the network. The developmental process of the packet-switched data network showed significant results up to 1972 in the framework of ARPA.

The first network equipment using the principles of packet-switching (IMP - Interface Message Processor) was completed in the framework of the multi-centre packet-switched network plans of ARPANET in 1969 and was installed in Los Angeles (University of California) in the same year, and subsequently at three further locations (Stanford, Santa Barbara, Utah). Part of this project was the commissioning of the ARPANET network in 1969, with data transmission lines provided by AT&T. The development project of NCP (Network Control Protocol) was completed by December 1970. (NCP was the forerunner of TCP/IP in the network and the host-to-host protocol of ARPANET). The installation of NCP was completed by 1972 throughout the entire network. Electronic mail, the first real application system of the network was launched in 1972, the same year as ARPANET was first presented to the public.

2. OPEN ARCHITECTURE NETWORK: THE TCP/IP MODEL

To continue the ARPA project, with the DARPA programme the extensive development of technologies directed at the interconnection of different packet-switched networks was launched in 1973. One of the major goals of related research efforts was directed at the development of a communications protocol that enables transparent and uniform communication between the computers connected to the network through an unlimited number of data networks. Thus the objective of the research project was to develop a system of interconnected networks ("internetting").

In 1973, the development of a new open architecture protocol started as the NCP was suffering from a number of very serious limitations and operational errors. (E.g. ARPANET had no protection against line failures and the protocol froze in case of a packet loss.) Widely used also today, the new protocol was the TCP (Transmission Control Protocol). Some of the main principles that served as the basis for the development of TCP (allowing for the flexibility and continuous growth of the network) are as follows: a) The protocol must also be

able to communicate with unreliable connections and networks without the need to modify individual networks in order for such networks to be able to connect to ARPANET. b) It must be designed in a way that allows for endpoint-to-endpoint connections to be built on by both endpoints (the sender and the receiver, the two farthest elements of communication). c) Communication is of the best-effort type, meaning that the network does not provide any guarantees that the packet is actually delivered to the receiver, the control of which lays with the end system (the receiver must control it). (In this respect, it was based upon the principle that the source is able to re-send the information anyway.) d) There is no global control in the network. e) The network connection points (later gateways, then routers) are based upon simple operating principles and processes without recording or storing packets transmitted through them.

TCP as a completed system (which became a standard in 1981) has also featured several limitations. (The main reason for this was that neither the Ethernet nor the PC existed at the time of the design of TCP.) In other words, on the one hand, its address range was very limited and, on the other hand, only the virtual circuit version was accomplished but the circuit-free packet-based one was not.

TCP was suitable for different kinds of file transfer and remote login applications (remote access to the Internet), however, it was not able to operate or handle several applications such as voice transfer (which does not require the re-sending of lost packets). As a result, TCP was divided into two parts: TCP and IP, which are jointly referred to as TCP/IP. The IP standard was published in 1981 (RFC (Request for Comment) 791).

IP is one of the basic standards (protocols) of the Internet network system, working in a packet-switched system, thus building no connection between the source and the destination (end system, such as a PC), but using separate routing – controlling – mechanisms for each data packet.

According to the above principles related to the design of the TCP, IP does not detect, indicate or repair errors, the main aspect of its design being simplicity and uninterrupted operation (as part of which error control would unnecessarily involve or load routing nodes).

IP is a key element in realizing data transmission between Internet-related end systems, tools and end equipment. Therefore, IP is a connectionless and, in terms of the OSI model, a network level protocol. IP can handle network addressing and traffic control. On the other hand, TCP is connection-oriented and, in terms of the OSI model, a transport layer protocol, which provides reliable data transmission (host-to-host connection) regardless of the characteristics of the underlying network layer. TCP is to divide the bit stream originating from the end system and to be transmitted through the network into packets.

The resulting TCP/IP is a modular system, in which TCP is established on top of IP designed for simple operation every time the application requires reliability and virtual circuit design, in other words, connection-oriented operation. And if in the end-to-end data transmission a connectionless, datagram-type, packet-based operation is needed (or sufficient), then an UDP protocol is used on top of the IP (in the transfer layer according to the OSI system). (Particularly in those cases where the speed of sending the message is preferable to the reliability of its “arrival”.) UDP (User Datagram Protocol) specification was adopted as a standard in 1980. In certain Internet applications, UDP is used in place of TCP.

Therefore, the layer structure of the Internet (ARPANET) was/is different from the OSI standard. (The TCP/IP model of the Internet consists of five main layers – as opposed to the seven-layer OSI.) However, it must be emphasized that through the use of suitable procedures the TCP/IP model may be interconnected with systems developed in line with the OSI models. In 1982 DARPA designated the TCP/IP protocol set as an approved and applied protocol of ARPANET to replace the NCP protocol throughout the entire ARPANET in 1983.

From that time on, the open architecture interconnected network using the TCP/IP protocol family has been identifiable with the definition, mechanism and structure of what today is known as the Internet.

It is important to note, however, that it took a long time for TCP/IP protocols to become generally accepted and applied in the United States. As a result of vigorous developments in telecommunications, the need for technical standards and uniform open architecture and thus for standardization increased. Therefore, partly due to the increasing role of standardization, the US Department of Defence decided in 1988 to change to the OSI model in defence-oriented networks, simultaneously labelling the TCP/IP system merely a transition protocol family. This process involved the acceptance – in the United States – of a protocol architecture to be complied with by all products purchased by any government institutions (US Government OSI Profile - GOSIP). In 1990, as commissioned by the DoD, a software package was developed the main purpose of which was to enable OSI applications to run over the TCP/IP.

Nevertheless, the development and general economic importance of the telecommunications system as well as the increase and changing role of defence-oriented use related to the Internet-type network had a greater effect – also at government level – on the management of standardization carried out in line with more flexible principles. As a result of these developments, in 1994 the NIST (National Institute of Standards and Technology) initiated the acceptance of TCP/IP in GOSIP and the adoption of other models that ensured uniform network operation and complied with the general network cooperation to be operated alongside the complex structure of the OSI model. Thus in the United States – and gradually throughout the world –TCP/IP has become an approved standard also at government level.

3. THE BEGINNINGS OF THE “FREE” INTERNET

Based upon and due to a) the business opportunities of the network system afforded by the Internet, b) the great potential of Internet-related services, c) the gradually growing significance of open network principles also in the field of scientific research, and d) major developments in the IT industry, services and applications (such as the development of personal computers) increasingly interrelated with the unique process of telecommunications liberalization, in 1983 ARPANET was divided into two parts:

MILNET supporting defence and military purposes, and

ARPANET supporting private and commercial demands.

The fact that the “freedom” or “unregulatedness” of IT-based services, that is their market-based structure operating in the private sector, was consequentially maintained within the framework of the telecommunications liberalization in the United States also played a major role in the split of ARPANET.

Thus, the development of IT services and instruments, on the one hand, definitely encouraged telecommunications liberalization and, on the other hand, such development in the United States was not considered a "regulated", i.e. public-service-type system. It is a definite regulatory and telecommunications policy principle in the United States that the development of the IT market is best promoted if the state refrains from market invention or regulation. Therefore, the government had a relatively uniform position with respect to "pioneers" working on the development of IT instruments and services exclusively considering "unregulatedness" as the best contribution to the development and growth of the IT market (especially at the outset). (And the development of informatics – owing to its major social and economic effects – constituted an important goal also for the government.)

With respect to the separation of the military part of ARPANET, it must be highlighted that along the technical development of telecommunications, the tendency of independent parallel operation of closed – defence, military – networks (as opposed to open networks) may be regarded as the general process of telecommunications liberalization.

4. THE COMMERCIAL OPENING OF THE INTERNET

The market or commercial opening of the Internet – similarly to the aspects briefly mentioned in connection with frequency trading – does not fall under the definition of liberalization and may be regarded as privatization only in a wider sense of the word. The "market" and service system related to the Internet was established upon the private opening up of the Internet, and within the private sector. This means that the government's opening up of the set of tools developed within the scope of its defence duty, a purely public service duty, to commercial and business activities (upon almost complete withdrawal of government responsibility) may exclusively be regarded privatization only in a wider sense of the word with reference to the Internet.

It may be considered a specific privatization in the widest sense of the word to the extent that the government opened up (largely for free) to the public sector the Internet tools developed within the scope of its defence duty in order to ensure public use of the Internet. It must not, however, be regarded as liberalization in a wider sense of the word either, as instead of opening up the market structure of economic competition in a market of an operative public sector or market-based public service system, the government offered a tool to the economy and the society that could potentially contribute to the development of market processes based upon the given tool, i.e. the development of a new market structure.

This means that we cannot talk about liberalization without a market structure or an operating market, as liberalization (higher degree of market freedom) is an uninterpretable term without a market structure (of either the public or the private sector) being present. Moreover, in such cases liberalisation is uninterpretable because market development is far from being evident, i.e. economic or market mechanisms may not evolve or be facilitated based upon the given tool (e.g. there is no effective demand for it).

The process of liberalization remains an uninterpretable term after the private opening of the Internet as well, since the private, Internet-type network and service structure have evolved and gained momentum within the private sector in the market structure of economic competition. Thus, in the field of public or "commercial" Internet, the services did not qualify as government responsibilities and the service providers were not state-owned, either. Moreover, generally prevailing measures of the economic administration aimed at (public

power related) intervention in, or the legal regulation of, competitive market processes have not been introduced, either (or only very carefully or gradually).

5. POSSIBLE GOVERNMENTARY INTERVENTIONS VS. SELF REGULATION

It can generally be stated that throughout the world governments fundamentally refrain from intervention concerning the network system and the operation of the Internet (to the most necessary extent, regulation typically extends to restrictions based on public law). It is a generally accepted notion that, on the one hand, the Internet is one of the key network infrastructure bases of the freedom of expression, and that, on the other hand, it plays a fundamental role in economic and social development processes as well as in the efficient provision of public services and state functions of public interest. As a result, related legal regulations extend to:

the contents transmitted via the Internet (the scope of which is fundamentally limited by guarantees and institutions of rights to freedom within the freedom of expression (basic rights of communication), and

the provisions and legal institutions promoting the development and extensive use of the network infrastructure of, and the services related to, the Internet (the latter one falls clearly under the scope of telecommunications law).

It is important to note, however, that “freedom”, “unregulatedness” and the also commonly used term “self-regulation” of the Internet are typically overemphasized. Anyway, the term “self-regulation” is not elaborated. Moreover, this term is lacking logic by suggesting that there are special areas within the legal system that essentially operate independently of both the legal system and government intervention, in a structure of self-regulation. The rationale of using the term, however, is not justified when highlighting self-regulation and areas operating through self-regulation.

In terms exclusively of self-regulation and “freedom” within the state structure, it can be generally stated that within the framework of government intervention and the principles and regulations of economic administration, the Internet is no different from a) other sectors of the economy, and b) other defence-type basic rights as regards basic rights of communication (in terms of network contents and structure).

As regards the system of economic administration, governments will not intervene in the operation of the Internet to the extent affecting the market structure – similarly to other sectors appropriately operating under the mechanism of economic competition – because so far the market development of the Internet has proved to be functional based upon driving forces of the market. Thus, the lack of intervention is not regarded specific as opposed to other competitive market sectors, especially not to such an extent that the “degree of freedom” in question would require the introduction of special terms.

“Self-regulation” of the Internet within telecommunications may be understandable. However, it is not at all interpretable or is an unjustified category in terms of the economy and the economic administration. Other economic sectors (such as “shoe manufacturing”, telecommunications services, food industry and so on) are also “self-regulating” with regard to an endless number of aspects, while being regulated on the basis of other aspects. It works the same way for Internet service providers and the Internet. (E.g. satellite telecommunication

is also “self-regulating” in areas where it does not require regulation, but its significant frequency requirement for instance makes it regulated.)

In the United States, the distinction of regulated and unregulated market areas is of actual significance in terms of public services also from a theoretical point of view (a certain extent of regulation means public service and to some extent a lower degree of freedom in a number of sectors, including telecommunications). The network, market and service systems of the Internet are unregulated areas in the United States from a number of aspects, including particularly public service content and telecommunications administration. This approach, however, is not entirely acceptable in Europe, where public services are built upon totally different foundations. Moreover, public service is not even discussed separately within the framework of regulations. The Internet is, therefore, no more “self-regulating” than other areas of the economy operating in line with market competition.

Beyond the “simplifying and blurry perception of self-regulation”, the regulatory scheme of the Internet in fact requires a very thorough analysis of concepts and the application of law, still, the use of terms and categories of scientific value is a must. In other words, one should not unambiguously label the Internet using general terms or categories such as “self-regulating”, “freely operating” or “unregulated” either, as the network and the service system of the Internet, its related services, and the economic and telecommunications rules concerning the Internet represent a much more complex system.

The process of telecommunications liberalization in relation to the Internet is regulated in detail in line with the characteristics, special operational principles and market conditions of the Internet. Accordingly, the Internet is not unregulated in the framework of telecommunications administration. Instead, the basis and the goal of telecommunications regulation are in fact to promote the expansion of the Internet. (Consequently, there are obviously no detailed, sector-specific, telecommunications related requirements with reference to the Internet.)

From a different standpoint, however, besides the rules promoting the widespread use of the Internet, in a number of countries (including the United States), there is growing need for regulating telecommunications sector-specific liabilities concerning the Internet in terms of the development and economic power thereof. (E.g. the involvement and payment obligation of certain Internet service providers in the compensation and financing mechanism of the universal service.)

6. THE WORD WIDE WEB

The commercial success of the Internet was essentially based upon open network architecture and the robust operation of packet-switching. The following factors have also contributed to commercial or market success: a) On the one hand, the research efforts financed from defence funds resulting in operational principles, standards, and tools well-proven in practice and leading to the emergence of a systematically developed, extensive network system. b) On the other hand, development in technology and technical innovation, including particularly the development and widespread use of PCs (personal computers) and the appearance of the local network (LAN), which has rapidly expanded the system of interconnected networks and hosts. c) The mechanism of domain names introduced in 1984, which made the addressing of hosts significantly easier and widely usable.

The creation of the civil (market, economic, commercial) ARPANET enabled the rapid development of private and later of commercial applications. In 1985, the National Science Foundation (NSF) responsible for financing university research founded the computer bases for supporting TCP/IP-based research and developed the NSFNET network interconnecting several thousands of academic and research institutes (in operation until 1995). The NSF also played an important role in the expansion and development of the Internet by encouraging the different regional NSFNET branch networks to cater consumers' needs on a commercial basis.

Moreover, in 1991 the NSF lifted the bans and restrictions concerning the commercial use and market operation of the NSFNET, which at that time was already generally called the Internet. As a result, the convention and organization of CIX (Commercial Internet eXchange Association Inc.) was formed as an umbrella organization for network operators cooperating in market-based transmission of commercial information. In 1992, upon the initiative of the NSF, the Internet Society, a non-profit, non-governmental organization took over the following Internet-related functions a) coordination, b) technical and technological agency work, c) providing for operation and development, as well as d) promotion of simple applications for the society.

Market players then gradually established the operational and organizational framework for the commercial or market use of the Internet, such as: Based upon the economic growth, increasing significance and widespread use of the Internet as well as the growth of private and corporate networks and the networks of interconnected, "cooperating" non-profit and other organizations, the regional networks emerged as truly commercial branches of the NSF network. This gradually developing, uniform and "united" system of cooperation agreements concluded between regional private networks finally lead to the termination of the state-funded backbone of the Internet in 1995, which in fact constituted the "total privatisation" of the Internet.

The concept of the World Wide Web (www) was also published in 1991. It was developed by CERN in the framework of a kind of "supplementary" research with a view to enabling physicists to monitor the status of their experiments from offices located in several places (or countries). The original name of CERN – European Council for Nuclear Research (Conseil Européen pour la Recherche Nucléaire) refers to the meeting held about the formation of the organisation. CERN was officially founded in 1954 as the European Organization for Nuclear Research (Organisation Européen pour la Recherche Nucléaire). Nevertheless, the acronym CERN was retained. (The official English name of CERN is European Laboratory for Particle Physics.) CERN in an international organization founded by 12 European countries in 1954 (with Hungary joining in 1992). Its seat is near Geneva along the Franco-Swiss border. In 1993, CERN made the Web freely available to anyone. The Web makes the net of linked information relatively easy to manage with individual documents interconnected through hyperlinks.

Instead of the formerly used traditional menu system, the Web is built on the system of special procedures, including: a) URL (Uniform Resource Locator) describing the specific addresses of individual pages; b) HTTP (Hyper Text Transfer Protocol) referring to the process of information transfer between the server and the browser; c) Hypermedia, the extension of hypertext with video and audiovisual elements; and d) HTML (Hyper Text Markup Language) is an information encoding process to ensure the appearance of a given content in several media (media-independent).

Within the service system of the Internet, the networks of Internet service providers (ISPs) interconnect via so-called Internet eXchange Points (IXPs). Individual IXP centres are also linked with each other, thus their network form the national and international backbone of the Internet. (E.g. in Hungary, the IXP is the Budapest Internet Exchange - BIX, which provides network connection for Internet service providers providing service in Hungary or otherwise involved. One of the most general goals of the formation of BIX was to ensure traffic between Hungarian Internet service providers directly within the territory of Hungary. Without BIX, traffic between Hungarian Internet service providers would go through a given foreign IXP, bringing about extra costs and unnecessary network load.)

The internal structure of the networks of Internet service providers fundamentally consists of routing networks, which may as well form a multi-level hierarchic system, subject to the actual service provider's network. The users connect to the Internet service providers' networks via different access networks (e.g. ADSL, cable television network) through permanent or dial-up connection (e.g. modem). The internal networks of various organizations and institutions as well as other private networks (jointly referred to as internal networks: Intranet) may connect to the Internet in several ways, thus particularly: a) through the routers and network hierarchy of Internet service providers, b) through different call devices or c) by directly connecting to the Internet exchange points – IXP (e.g. major academic or research networks, large networks of cultural institutions).

7. ACTUAL LEGAL QUESTIONS AND INTERNATIONAL ORGANIZATIONS

Further important aspects to be noted in relation to the Internet that cannot be discussed here in greater detail for reasons of space are as follows:

IPv6 (Internet Protocol version 6). One of the most important reasons for the development of IPv6 was that the common IPv4 addresses available are quickly exhausted due to increased user requirements and that connection to the system would be impossible without the allocation of new IP addresses. The foundations of Ipv6 developments were published in 1998.

Real-time IP networks. The Internet was developed as a technically robust data transmission network and it remained such until today. In addition, the growing number of Internet users and the rapid development of the bandwidth used have gradually shown that in the long run traditional voice services may also be cheaper on IP-based networks than on the existing circuit switched infrastructure. The VoIP (Voice over IP - IP telephony) service system has, however, several drawbacks that could not be eliminated to date.

Mobile telecommunications and the Internet, including: ca) mobile access to the Internet, (mobile IP) and cb) mobile Internet.

In 1996, the NSF, various government institutions, several independent agencies, universities and a few private companies launched the programme Internet2.

Based upon the significant characteristics concerning the operation, market development and regulation of its network and service system, the Internet represents a definite "subdivision" within the field of telecommunications. However, owing to its network structure and operational principles, it plays a larger and more decisive role than ever in the development of telecommunications as a whole. In addition, the access to the service system of the Internet has also become a key element of economic and social development exerting a decisive effect

on telecommunications policy, the content of government intervention, and telecommunications regulation.

Furthermore, it can be generally assumed that, in the framework defined by the characteristics of the Internet, significant differences and decisive characteristics surface in the international coordination structure of the Internet, as part of the system of international cooperation in telecommunications. Owing to the “World Wide Web” characteristics of the Internet, international cooperation concerning the network structure of the Internet represents a very broad and complex system.

Examples of various fields requiring international coordination are as follows: a) A uniform and open system of technological development complying with accelerated progress and meeting user requirements. b) Specific identification management, including particularly domain name management and IP address management as well as the coordination of the use of such names and addresses and the development of related requirements. c) Network planning and standardization creating a basis for cooperation. d) Comprehensive development of the quality of service. e) Security aspects related to the network and service system of the Internet, constituting a precondition of use and market growth. f) International, uniform system of standardization. Although the “standardization” of the Internet has a distinct framework in terms of organization, research and functions within the system of telecommunications standardization, by now very close cooperation has been established with intergovernmental and non-intergovernmental telecommunications organizations as well as with state standardization bodies of the individual countries. In the early days of telecommunications liberalization, the framework of this coordination was not sufficiently extensive and appropriate, which was partly due to the fact that the intergovernmental state (telecommunications) standardization bodies were simply not able to keep up with the pace of the development of the Internet. Since then all this has gradually and slowly changed but, of course, due to structural, functional and other differences, state standardization bodies and international organizations are not able to attain the flexibility, promptness and rapid pace of development witnessed in the case of Internet organizations.

The “Internet community”, therefore, creates its own standards (today in close cooperation with other standardization bodies of the telecommunications sector) and publishes them in RFCs (Request for Comment) of different statuses (e.g. draft, proposed or established standards). The organizations of the Internet are usually market-based and cover their expenses from their service provision. These organisations are fundamentally characterized by open operation, which means that normally everyone can join the given organization.

The most important organizations concerning the growth, coordination, operation, development and standardization of the Internet at the international level include:

1. ISOC (Internet Society). A non-profit organization founded in 1992. Its main functions and goals: broad social and political acceptance, development of open Internet, promotion of the market development of the Internet, organizational and operational support to, and coordination of, IAB and IETF, providing for the budgets of these organisations, organization of conferences and workshops, provision of extensive information services, dissemination and publication of information concerning the Internet, etc., drafting and the publication of RFCs serving as the standardization bases of the Internet, other administrative functions. Seat: Washington D.C., in Europe: Geneva.

2. IAB (Internet Architecture Board). Main activities: development of the network system of the Internet, definition and oversight of architecture, other developments. Formally it was the advisory, coordinating and supervising body of ISOC. IAB was founded back in 1979 within the framework of DARPA (under the name of Internet Configuration Control Board - ICCB). Due to the growth of the Internet, in 1984 it was transformed into the Internet Advisory Board, which in 1986 was followed by another reorganization into the Internet Activities Board. Upon the formation of the ISOC and the related organizational reform, the Internet Activities Board was replaced by the Internet Architecture Board in 1992. IAB is responsible for the supervision of the activities of the IETF and the IRTF.

3. IETF (Internet Engineering Task Force). It was formally founded by the IAB in 1986 to cater for the advancement, extensive coordination, deployment and accelerated developmental needs of the Internet, with its first meeting held in San Diego, USA. IETF is the most important standardization, development, expert, research and analysis-purpose organization of the Internet. In terms of organization, IETF is closely linked to ISOC (acting as an advisory body, managing the development of standards, etc.) One of its important activities within the framework of IETF is the development of the individual RFCs. Development work is generally pursued in separate working groups organized along different topics. Working groups are grouped into fields. Field directors are members of IESG (Internet Engineering Steering Group), the executive body of IETF.

4. IRTF (Internet Research Task Force). It is a research body for Internet-related computer networks. Its activities are managed and coordinated by IRSG (Internet Research Steering Group). The activities of IRTF are supervised by IAB and there is also a close organizational cooperation between the two bodies. Main activities: development and research related to Internet protocols, network architecture, applications and technologies.

5. As already mentioned above, the name and address management in relation to Internet identifications works independently of state telecommunications identification management systems. The international, worldwide (global) organizations of Internet name and address management, registration, domain name as well as IP address allocation and database management are as follows:

    a. IANA (Internet Assigned Numbers Authority). The main responsibility of IANA is its registration function, including administration and coordination in relation to top-level IP addresses. The registration function concerning Internet addresses and names was already present in the DARPA programme. However, due to the evolution of the Internet, the registration function became a field of key importance by the end of the 1980s, necessitating – based upon the agreement between DARPA and ISI (Information Sciences Institute) – the launch of comprehensive operation and coordination of the registration functions concerning IP addressing, within the framework of IANA (formally established in 1988). Therefore, IANA was in a contractual relation with the organization and scope of authority of DoD. Nonetheless, based upon a) the progress in telecommunications liberalization, b) the increased market competition in relation to the Internet, c) the promotion of the widespread use of the Internet, and d) the protection of the freedom of content and economic competition, the intervention of IANA and thus DoD in the field of IP addressing was no longer sustainable and, as a result of market growth, the appropriate execution of significantly increased responsibilities, functions and user requirements related to IP addresses and domain names represented a heavy load on

the organization and operation of IANA. As a result of these (and several other) reasons:

b. ICANN (Internet Corporation for Assigned Names and Numbers) was established in 1998, which is in contractual relation with (and is supervised by) the United States Department of Commerce. ICANN has taken over almost all functions of IANA (with the exception of a few registration and coordination related functions with reference to certain critical IP addresses) and uniquely "integrated" IANA – control, operative management, etc. – in terms of organization. ICANN is a non-profit organization with its seat in Marina Del Ray, California.

c. The increased regional tasks in relation to Internet identifiers are executed by regional organizations in close cooperation and management with ICANN/IANA organizations but acting as independent organizations (Regional Internet Registry - RIR): a) ARIN - American Registry for Internet Numbers, b) RIPE/NCC - Réseaux IP Européens Network Coordination Centre, c) APNIC - Asia Pacific Network Information Centre, d) LACNIC - Latin American and Caribbean Internet Addresses Registry, e) AfriNIC - African Network Information Centre.

6. W3C or WWWC (World Wide Web Consortium, founded in 1994). Today it is administered by a) the MIT/CSAIL (Massachusetts Institute of Technology Computer Science and Artificial Intelligence Laboratory, United States), b) ERCIM (European Research Consortium for Informatics and Mathematics, France), and c) Keio University (Japan). Its main activities: www-related user interfaces of public interest, development activities related to technology, architecture and network systems as well as research management promoting the widespread use and development of the world wide web. The function of W3C is similar to the operation of IETF, with the exception that the activities of W3C extend to the web, while those of IETF concern the Internet in a wider sense of the word.

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