Chapter 2

The Internet as information infrastructure

2.1 Introduction

The main objective of this chapter is to introduce readers to the basic concepts of the Internet, so as to ensure that they grasp the full extent of the evolution of the information technology. In addition, this chapter is used to lay the foundation of all subsequent chapters.

In so doing, this chapter is used to address the following sub-problems:

- What major historical events marked the inception years of the Internet?
- How are the main concepts underpinning the Internet to be defined?
- What are the salient features of the Internet?
- How will the future of the Internet possibly evolve?

2.2 Defining the Internet

According to Turban (2000: 507), the Internet can be defined as a "self-regulated network connecting millions of computer networks around the globe". It becomes evident from this definition, therefore, that the Internet truly is a uniquely dynamic organism, which bears looking at in a myriad of ways. Not only does it provide a solid framework for a multitude of services and a wonderful medium for endless creativity and innovation, but, most importantly perhaps, it also remains ever-changing (Federal Networking Council, 1995).

For the purposes of this study, the Internet will be viewed as a global network of networks, enabling computers of all kinds directly and transparently to communicate and share services and information. Because the Internet is such an enormously valuable and empowering capability for so many people and organisations, it also constitutes a shared global resource of information and knowledge and a means of collaboration and co-operation among countless diverse communities.

2.3 History of the Internet

The Internet has, on occasion, been described as "both a young pup and an old dog" (Borden, 2000: 34). This seemingly contradictory statement can, however, be attributed to the fact that, at any point in time during the last ten years, a large proportion of the world population has just begun interacting with

the Internet. For this reason, the Internet will perpetually be old hat to some users yet brand new to others. The question of how long the Internet has been around, still makes for heated debates between researchers and authors alike.

An earlier "birthday" for the Internet may, for instance, hark back to 1972, when the first connection was opened between the Advanced Research Project Agency Network ("ARPANET", for short) and another network, ALOHAnet in Hawaii, or even to 1969, when the first four nodes of ARPANET were connected to each other, or to the meeting of the Association of Computing Machinery ("ACM", for short) in 1967, when Larry Roberts read the first public paper describing the ARPANET design. It is possible to go back even further, though, to, for example, Paul Baran's work on robust networks for Research And Development ("RAND", for short) in the mid-1960s, or (albeit less convincingly) to the launch of Sputnik in 1957, which led to the convening of the Advanced Research Projects Agency (Thomas, 1999: 682).

According to Mowery (2002), however, the history of the Internet's development should best be divided into three phases (see figure 2.1 below):

Time period	Critical developments
1960-1985	Invention of digital packet-switching and associated standards/protocols Birth of Internet self-governance institutions
1986-1995	Growth of NSFNET and parallel private infrastructure Growth in installed base of PCs and LANs
1996- the present	Diffusion of the World Wide Web Privatisation of the Internet infrastructure and commercialisation of the Internet content

Figure 2.1: Evolution of the Internet (Mowery, 2002)

The following section contains a discussion on each of these phases.

2.3.1 Phase 1 (1960 - 1985): Early computer networks

The setting was the early 1960s, with the American economy experiencing a boom time of wealth and prosperity, but with Communist thinking gaining ground rapidly elsewhere in the world, and with it, the idea of creating weapons of mass destruction. Faced with a possible full-scale atomic and/or nuclear attack from the Communist regimes, the American Air Force formed the Advanced Research Project Agency (ARPA). This small, élite group of researchers' core task was to create a communications network that could survive a nuclear attack.

In essence, the main requirement was that the network should not have had any centralised point of control. Meeting this strategic requirement was what ultimately led to the development of a distributed network, in terms of which the connection would continue to be effective, even in the absence of one or more of its parts (Keefer, 2001: 91).

(a) Packet switching

The basic concept of "packet switching" can be traced back to the basic telephone networks, in terms of which human operators manually connected telephone lines through patch panels. These patch panels accepted patch cords from each telephone line and electrically connected two lines through the panel that operated, in effect, like a switch, thus creating a circuit switch. These circuit switches, albeit reliable for voice communication, were not suited to connecting a network of computers.

During the early 1960s, several researchers, including Leonard Kleinrock at the Massachusetts Institute of Technology ("MIT", for short), Paul Baran of Research And Development ("RAND", for short) and Donald Davies at the National Physical Laboratories in the UK, developed various aspects of the theory of packet switching. Digital packet switching offered performance and reliability advantages over analogue networks for data communications and was attractive to researchers hoping to construct a communications network less vulnerable to a targeted attack than the centrally switched telephone network.

In order to benefit from these advantages, however, computer science researchers had to develop communication protocols and devices that did not utilise the circuit-switched infrastructure operated by established telecommunications companies. By the late 1960s, the theoretical work and early experiments of Baran, Kleinrock, Davies and others led the Defence Advanced Research Projects Agency ("DARPA", for short) of the US Department of Defence to fund the construction of a prototype network. In December 1968, DARPA granted a contract to the Cambridge Massachusetts-based engineering firm of Bolt, Beranek and Newman to build the first packet switch. The switch was called "Interface Message Processor" ("IMP", for short) and was used to link computers at several major computing facilities over what is now called a "Wide-Area Network" ("WAN", for short) (Mowery, 2002: 1372).

The connection was made possible by linking the computers through dial-up telephone lines. A small computer (host) inserted between each participating computer and telephone line formed the basis for the IMP. IMPs can, therefore, be described as small, special-purpose computers connected to each other through telephone lines. They provide the sub-network through which hosts communicate (Lynch, 1993: 6).

(b) The Advanced Research Project Agency Network ("ARPANET")

The ARPANET evolved from being a lab experiment, exploring the possibility of creating a network consisting of a few geographically dispersed computers, to a system in terms of which many different networks could interconnect. In order to accomplish that sort of linkage, researchers needed to come up with something that could span the full array of the different manufacturers' network protocols, data lines hardware, etc – in layman's terms: something that would allow the networks to communicate with each other (Lynch, 1993: 9).

Network communication is effected by a variety of communication protocols. A "communication protocol" can be defined as a set of rules of agreement on how to communicate. The messages are passed along computer nodes (routers) that act as a sorter of the messages. In 1973, Robert Kahn and Vinton Cerf, two DARPA-funded engineers, developed a communication protocol (Mowery, 2002: 1372). This improved data-networking protocol, called the "Transmission Control Protocol" or "TCP", for short, served to simplify routing, eliminating the need for an IMP and allowing distinct networks to interconnect with one another. The TCP was later split into two distinct pieces and was renamed "TCP/IP" (the current "Transmission Control Protocol/Internet Protocol"). The main reasons behind the invention of TCP/IP were as follows:

- Interoperability between heterogeneous systems.
- End-to-end communication across a multitude of diverse networks.
- Robust and automatic operation in the face of failures of data links.

The following section will be devoted to a discussion on the second phase in the growth and development of the Internet infrastructure.

2.3.2 Phase 2 (1986 - 1995): Infrastructure development and growth

During the initial stages of Internet development, it could only be accessed by scientists, researchers and engineers. In 1983, however, DARPA had split the ARPANET into two parallel yet distinct networks, namely the ARPANET and the MILNET. As the name suggests, the MILNET was used exclusively for military application, whilst the ARPANET remained true to its initial concept, primarily responsible for linking research networks over physically dispersed locations.

In 1985, the National Science Foundation ("NSF", for short) mandated that any university receiving NSF funding for an Internet connection must use TCP/IP on its NSFNET network. This mandate strengthened the position of the TCP/IP as the dominant network protocol. Later in that same year, all the federal agencies, including DARPA, NSF, the Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA), created and established the Federal Internet Exchange ("FIX", for short). The FIX provided a connection point that allowed the above agencies to share their infrastructures.

It would be safe to say, therefore, that this P2P model for the exchange of traffic became a fundamental feature of the core Internet infrastructure. In 1990, the original ARPANET was decommissioned and its users and hosts were transferred to the NSFNET. It should be noted that, prior to 1991, the NSF prohibited the use of the NSFNET for commercial use; but that commercial users, in association with academic institutions, continued to attach them to the network. The commercial users' lobbying led the NSF to abandon its above-mentioned stance.

The demand for corporate networks encouraged public and private research into networking technology, which, in turn, led to the creation of firms such as Novell and expanded the installed base of users that could benefit from a connection to the NSF's *network of networks* (Mowery, 2001: 1376).

The growth of regional networks, combined with advances within the NSFNET backbone, inspired a number of innovations that improved the overall performance of the Internet.

These improvements included the following:

- The speed of access to the basic Internet.
- The Domain Name Server ("DNS", for short). Introduced in 1984, the DNS maps the Internet domain names to the numerical network address scheme utilised by the TCP/IP (see table 2.1 below).
- The hierarchical classification scheme for sub-networks, thereby effectively preventing the saturation of IP addresses.

Table 2.1: Some of the basic top-level DNS domains (Obiztek, 2004)

Domain	Description
. aero	An organisation in the air-transport industry.
. biz	A business.
. com	Generally a commercial organisation, business or company.
. coop	A non-profit business co-operative, such as a rural electric coop.
. edu	A 4-year higher-education institution.
. gov	A non-military United States federal governmental entity, usually federal.
. info	An informational site for an individual organisation, without restriction.
. int	An international organisation.
. mil	A United States military organisation.
. museum	A museum.
. name	An individual.
. net	Suggested for a network administration, but actually used by a wide variety of sites.
. org	Suggested for a non-profit organisation, but actually used by a wide variety of sites.
. pro	A professional, such as an accountant, a lawyer or a physician.

The final event marking the second phase of Internet development was the invention of the World Wide Web ("WWW", for short). In 1991, two physicists, Tim Berners-Lee and Robert Cailliau, created and released a new type of document format known as "Hyper-Text Markup Language" ("HTML", for short) and the associated document retrieval protocol, called HTTP.

HTML allows for the incorporation of multimedia into electronic documents. In addition, HTML allows for authors to specify links, that is, in words, phrases or images, which will direct users to their documents. The WWW can be accessed and used via a connection to the Internet, through application software known as a "browser", to retrieve and display documents in HTML format.

2.3.3 Phase 3 (1996 - the present): Creating commercial content and applications

The invention of the WWW catalysed the development of commercial content and applications by simplifying the Internet and by providing a set of standard protocols for delivering a wide variety of content to almost any desktop (Mowery, 2001: 1378). A surge in Internet-related entrepreneurial activities, which focused on the implementation of various forms of electronic commerce ("e-commerce", for short), was seen. This commercialisation was fuelled by a booming American economy and the potential of the long-run benefits of Internet technologies.

Next, a discussion on a number of applications running on the Internet.

2.4 Applications utilising the Internet

Following, a list of the most popular applications making use of the Internet as an infrastructure, as well as a discussion on each application (Anon., 2004a):

- Electronic mail (e-mail)
- The World Wide Web (WWW)
- File Transfer Protocol (FTP)
- Newsgroups
- List serves.

2.4.1 Electronic mail (e-mail)

E-mail is, by definition, the electronic version of the written letter. Anon. (2004b) concurs and adds that the messages, usually consisting of text, are sent from one person to another via computer. E-mail can also be sent automatically to a large number of addresses. E-mail's core objective or function is, therefore, the efficient, inexpensive and speedy means of sending and responding to messages.

The potential of e-mail has hardly been tapped, for its sheer speed and ease of use allows one to carry on a "conversation" with someone, regardless of his/her physical location. In addition, e-mail can be utilised to receive regular, specialist information in, for instance, a newsletter format. In addition, the information is digital, making it easy to organise, store and search.

2.4.2 The World Wide Web (WWW)

The World Wide Web, commonly referred to as “the Web”, can be seen as the multimedia section of the Internet, as it allows the individual searcher to explore a seemingly unlimited worldwide digital “web” of information, expanding by tens of thousands of Websites each day. Therefore, in order fully to utilise the information available on the WWW, a specialised search mechanism is required, called the “Web search engine”.

A formal definition of the WWW may include the following: …*wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents* (Hughes, 1993). A Web search engine can, therefore, by definition be seen as a tool that finds Web resources by searching a database for Websites based on keywords that the searcher has entered. The database is created by software that "crawls" from Website to Website, indexing electronic resources that it finds based on keywords.

Table 2.2 below lists some examples of popular Web search engines.

Table 2.2: Examples of popular Web search engines (Shannon, 2000)

Search engine	Uniform Resource Locator (URL)
Google	http://www.google.com/
Alta Vista	http://altavista.digital.com
Excite!	http://www.excite.com
Lycos	http://www.lycos.com
Webcrawler	http://www.webcrawler.com
Infoseek	http://www.infoseek.com
Northern Light	http://www.northernlight.com
Alltheweb	http://www.alltheweb.com
Yahoo	http://www.yahoo.com

2.4.2.1 Difference between the Internet and the World Wide Web

Many people use the terms “Internet” and “World Wide Web” interchangeably, while they are, in fact, not even synonymous. The Internet and the Web are two separate yet related entities.

It can be said that the Internet is a large network of networks; in other words, that maze of phones and cable lines, satellites and network cables that interconnect computers around the world, thereby creating a global network in terms of which any computer could communicate with any other computer, as long as they are both connected to the Internet.

The WWW presents us with a way in which to represent information on the Internet. Information resources are located by using a Uniform Resource Locator (URL). This is an information-sharing model that is built on top of the Internet. The WWW, therefore, needs the Internet, and not *vice versa*. The WWW uses the HTTP to share information across the Internet. The Web also uses browsers, such as Internet Explorer or Netscape, to access Web documents called “Web pages”, which are linked via hyperlinks. Web documents can also contain graphics, sound, text and video (Webopedia, 2002).

2.4.3 Electronic commerce (E-commerce)

Electronic commerce, or E-commerce, for short, is an emerging concept that describes the process of buying and selling or exchanging products, services and information via computer networks, including the Internet (Turban, 2000: 4).

Kalakota (1997) defines electronic commerce from the following perspectives:

- From a communications perspective, E-commerce is “the delivery of information, products/services or payments over telephone lines, computer networks or any other electronic means”.
- From a business-process perspective, E-commerce is “the application of technology towards the automation of business transactions and workflow”.
- From a services perspective, E-commerce is “a tool that is used to address the need of firms, consumers and management to cut service costs, whilst improving the quality of goods and increasing the speed of service delivery”.
- From an online perspective, E-commerce provides “the capability of buying

and selling products and information on the Internet and other online services".

2.4.4 File Transfer Protocol (FTP)

One of the reasons why the Internet was established was to facilitate the transfer of files between computers (Colantonio, 2004). The process of FTP or allows an individual to connect to another computer and to perform certain functions, including the listing of files in a directory and the copying or downloading of all types of computer files, such as text and sound files. It should also be noted that thousands of what are termed "anonymous FTP servers" are in place across the WWW, which can be used to obtain copies of files at no cost.

To retrieve a file-using FTP, all one needs to know is where it is located. For organisations that wish to distribute information or other electronic products over a large geographic area, anonymous FTP represents a significant cost saving, in comparison with other methods of distribution. Companies also make use of FTP frequently as an efficient and a fast means of transferring files between offices.

2.4.5 Newsgroups

Another service available on the Internet is that of networked news, with "news" referring to discussions or postings on various topics, ranging from recipes to computers to politics, by interest groups and conferences transmitted via the USENET network. In this way, "Internet mailing lists (can) essentially (be defined) as closed discussion groups…" (Colantonio, 2004). These groups represent a canvas for free expression and thought. In addition, newsgroups are organised into a hierarchical structure, with the top-level word in the name specifying the category the group pertains to. At present, there are seven major hierarchical categories, as indicated in table 2.3 below:

Table 2.3: Major categories of newsgroups (Laquey, 1995: 68)

Category	Explanation
Comp.	Computer hardware, software and protocol discussions.
Misc.	Topics that do not fit anywhere else, such as job-hunting, investment, real estate & fitness.
News.	Groups that deal with USENET software, network administration, informative documents & announcements.
Rec.	Recreational subjects and hobbies, such as aviation, games, music & cooking.

Sci.	Topics in the established sciences, such as space, research, logic, mathematics & physics.
Soc.	Groups for socialising or discussing social issues or world culture.
Talk.	Lengthy debates and discussions on various current events/issues, e.g., politics & religion.

Care should be taken, however, not to confuse USENET with the Internet or the WWW. Although closely related, the only connection between the Internet and USENET is the fact that most of the traffic on USENET travels across the Internet. Enzer (1994), in fact, points out that USENET is "completely decentralised, with over 10 000 discussion areas, called 'newsgroups' ".

2.4.6 List serve

A "list serve", by definition, is an automatic discussion service. In addition, a list server (mailing list server) is a program that handles subscription requests for a mailing list and distributes new messages, newsletters or other postings from the members of the list to the entire list of subscribers as they occur or are scheduled. In this way, the message the user sends to the e-mail list address will be distributed automatically to every member on that list (Colantonio, 2004). A list server should not, however, be confused with an e-mail server, which handles incoming and outgoing e-mail for Internet users.

2.4.7 Peer-to-Peer computing

The fundamental concept of P2P computing can be traced back to the inception of the Internet. As with the Internet, the basics of P2P computing are grounded in the collaboration between computers in a network. The computers in this architecture share data and resources without using a central server.

An in-depth analysis and description of all the aspects and functions of the P2P computing phenomenon will be undertaken in chapter 4.

Because of the way in which the Internet and the Web are evolving, this section has been dedicated to defining some of the most relevant applications provided via the Internet. These services and applications will form an important part of an analysis of the various uses of the Internet, which analysis is to be undertaken in chapter 5.

Next, a discussion on the main features of the Internet.

2.5 The main features of the Internet

According to Williams (2001, 19-52), the following can be deemed the main features that set the Internet apart from other information networks:

- Seamlessness
- Currency
- Global reach
- Comprehensiveness
- Interactivity.

Following, a discussion on each of the above-mentioned features.

2.5.1 Seamlessness

One of the core defining characteristics of the Internet is that of facilitating hyperlinking. This characteristic can be defined as "the facility that links related concepts, so that users can move from electronic file to electronic file of their choice".

The following can be deemed advantages of hyperlinking (Ewing, 2001: 31, Williams, 2001: 19-52):

- Enabling rapid navigation between one website and another.
- Liberation of the linear process of identifying and assimilating information, thus providing the ultimate in personalised information-seeking.
- Provides the means for cross-referencing information obtained via the Internet.

Although the revolutionary concept of hyperlinking may seem to be flawless, its negative side should also be mentioned. The biggest problem with hyperlinking is that of pursuing dead links. By definition, these are links that no longer function properly, because a page or site has been moved from a server.

2.5.2 Currency

According to the literature cited, another attraction of the Internet (WWW, FTP or newsgroups) is that of currency and speed of delivery. "Currency" refers to the timeliness of information (Kirk, 1996). Many end-users assume that material on the Internet *has* to be current, generally on the grounds that, firstly, the medium itself, like the Web, is relatively new and, secondly, that the dissemination of information on the Net is, as with the broadcast media,

instantaneous. The Computer Science and Telecommunications Board (2001) concurs and states that "…the currency of the Internet has been in the realm of information". A study of Web content at City University, however, shows that it is often no more up to date than hard-copy equivalents. In some cases, material on the Web was actually found to be either obsolete or, at best, outdated (Williams, 2001: 23).

One of the major concerns regarding the currency of information on the Web is the tendency to use search engines when assimilating and gathering information, rather than accessing a known information source Webpage. It is obvious that the use of a Web search engine ("keyword search") to gather relevant, up-to-date information is limited to the indexing of the Internet by the various search engine spiders. Most search engines rank the result of a search in reverse chronological order. This means that most users of the search engines are unaware of the currency limitations of the search (Williams, 2001: 23). This is one more reason to be wary of the currency of the information available on the Web.

2.5.3 Global reach

The fact that the Internet has a global reach is one of the features of the Internet with possibly the greatest impact on our modern-day Information Society. The key feature of the Internet is that, once a person is linked to any part of it, he/she can communicate with all of it (Fajardo, 2002). Electronic information and documents can, therefore, readily be accessed from any location, be it on the server in an organisation or at a location halfway around the world. Although physical location is, therefore, no longer an obstacle, global reach has a downside too, the first and most obvious of which is that of information overload.

Information overload can mean many different things to different people. For this reason, there could never be a universally accepted definition for this phenomenon. The pioneering work of Shannon and Weaver as quoted by Meadow (1997: 699) in this field, however, has gone a long way towards providing a basic definition for "information", and, with it, a possible definition for "information overload".

The final negative aspect of the Internet's global reach is, of course, the dissemination of racist, sexist, pornographic and extremist information.

2.5.4 Comprehensiveness

The Internet touches every aspect of our lives and/or industries, be it governmental, military, commercial, educational, entertainment or legal. Several factors contribute to the Internet's growing subject and topic inclusiveness, which factors can be summarised as follows (Williams, 2001: 34):

- The exponential growth of organisational Websites of all kinds, including those of a governmental, a commercial, an academic and a non-profit-making nature.
- An exponential increase of information on the Web available from such organisations, so that today, the Internet represents the only dissemination channel for some information.
- The migration of information from one format, such as pamphlets or other printed copy, to an electronic format, with the result that the Internet simply becomes a new information medium.
- The exponential growth of personal information and communication on the Internet. This aspect of the Internet, while obviously adding to its comprehensiveness, may not at first appear to be of interest to those seeking information, but there are, in fact, a number of ways in which information from this source type may be used, and even exploited.
- Its embrace of academic, professional, personal and leisure sources.

With more Web presence, the Internet is fast becoming the "one-stop shop" for all information and research needs. In addition, the comprehensive nature of the Internet allows it to host information that is exclusive to it, in other words, information that has never appeared in any other format than the online version.

2.5.5 Interactivity

As the heading suggests, the Internet provides a truly unique way for users to interact with each other, an interactivity that has not been replicated in any other known medium. Doherty (1998) states in this regard that "…the types of interaction a user can have with the Internet are numerous".

The most common means of interactivity include the following (Williams, 2001: 50):

- Bulletin boards. Hosting a variety forum on various subjects, allowing the participants to place a message on the board.
- Reader-to-information provider connections. The authors of published articles and research make themselves available for response via e-mail on the topic of research.
- Reader-to-public figure connections. This can be viewed in the same light as the above, with the only difference being that, in some cases, a mediator, usually the information provider, is put into place.

2.6 The future of the Internet

Predicting the future development of the Internet is not easy and could, naturally, never be seen as an exact science. The current Internet infrastructure and protocols are capable of handling today's Internet traffic, but the question does arise: for how long? According to Turban (2000: 389), two consortiums, as well as various telecom and commercial companies such as Cisco, are in the process of constructing the New World Network (see table 2.4).

Table 2.4: The Internet *vs* next-generation Internet (Stresing, 2003)

The Internet[2]
The first of the consortiums is the University Corporation for Advanced Internet Development ("UCAID", for short).
This consortium has 146 university members, including various non-profit affiliates.
The consortium is responsible for the development of a research network called "the Internet[2]".
The architecture of the Internet[2] is based on a series of interconnected gigapops – the regional, high-capacity points of presence that serve as aggregation points for traffic from participating institutions (Turban, 2000: 389).
The backbone infrastructure of the National Science Foundation ("NSF", for short) forms the connection point for the above-mentioned gigapops.
According to Turban (2000: 389), the ultimate objective of the Internet[2] is to link universities, so that a 30-volume encyclopaedia could be transmitted in less than a second and, in addition, to support applications such as distance learning, digital libraries, video teleconferencing, teleimmersion and collaborative tools.
Next-generation Internet (NGI)
Started by the Clinton administration, the second effort to develop a new-world network is the government-initiated and -sponsored Next Generation Internet.
Included in this research effort are agencies such as DARPA, the Department of Energy (DOE), etc.
These agencies have earmarked research funds that will support the creation of a high-speed network, interconnecting various research facilities across the country (Turban, 2000: 390).
The principal aim of the Next Generation Internet is to support the next-generation applications, such as (Turban, 2000: 390) • health care • national security • energy research.

In the next five to ten years, the Internet is expected to be substantially bigger than it is today. It will be more pervasive than the older technologies and it will penetrate more homes than television and radio. Many of the devices connected to the Internet will be Internet-enabled appliances (cell phones, fax machines, household appliances, hand-held organisers, digital cameras, etc, as well as traditional Notebooks and desktop computers) (Kahn, 1999).

2.7 Summary

This chapter was devoted to a discussion on some of the concepts pertaining to the Internet, with the first part focussing on the history of the Internet. From there, the basic concepts pertaining to the Internet, that is, its definition and

salient features, came under discussion. Lastly, a brief glimpse was offered at possible ways in which the Internet could transmogrify in future.

The main objective of this chapter was to introduce readers to the key concepts, onto which will hinge an analysis of the use of the Internet, to be undertaken in the next chapter.

In the said analysis, aspects such as the global village and online communities, which form an integral part of the Internet, will come under discussion.