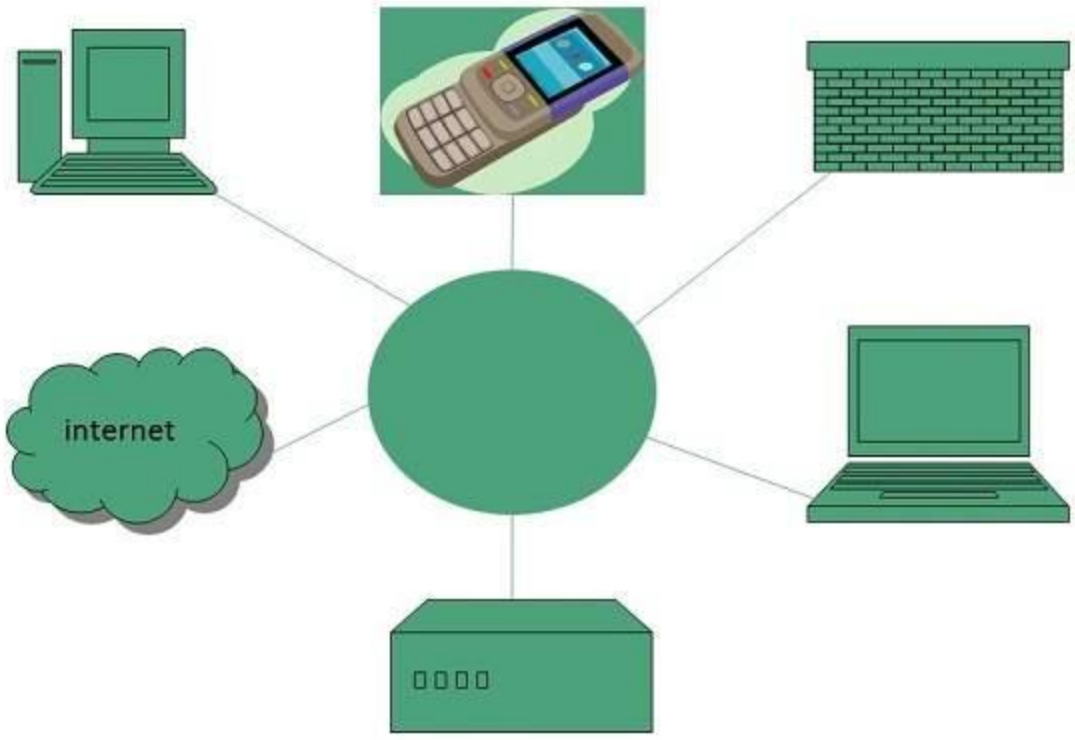
INTERNET

Internet is defined as an Information super Highway, to access information over the web. However, It can be defined in many ways as follows:

- Internet is a world-wide global system of interconnected computer networks.
- Internet uses the standard Internet Protocol (TCP/IP).
- Every computer in internet is identified by a unique IP address.
- IP Address is a unique set of numbers (such as 110.22.33.114) which identifies a computer location.
- A special computer DNS (Domain Name Server) is used to give name to the IP Address so that user can locate a computer by a name.
- For example, a DNS server will resolve a name **http://www.tutorialspoint.com** to a particular IP address to uniquely identify the computer on which this website is hosted.
- Internet is accessible to every user all over the world.



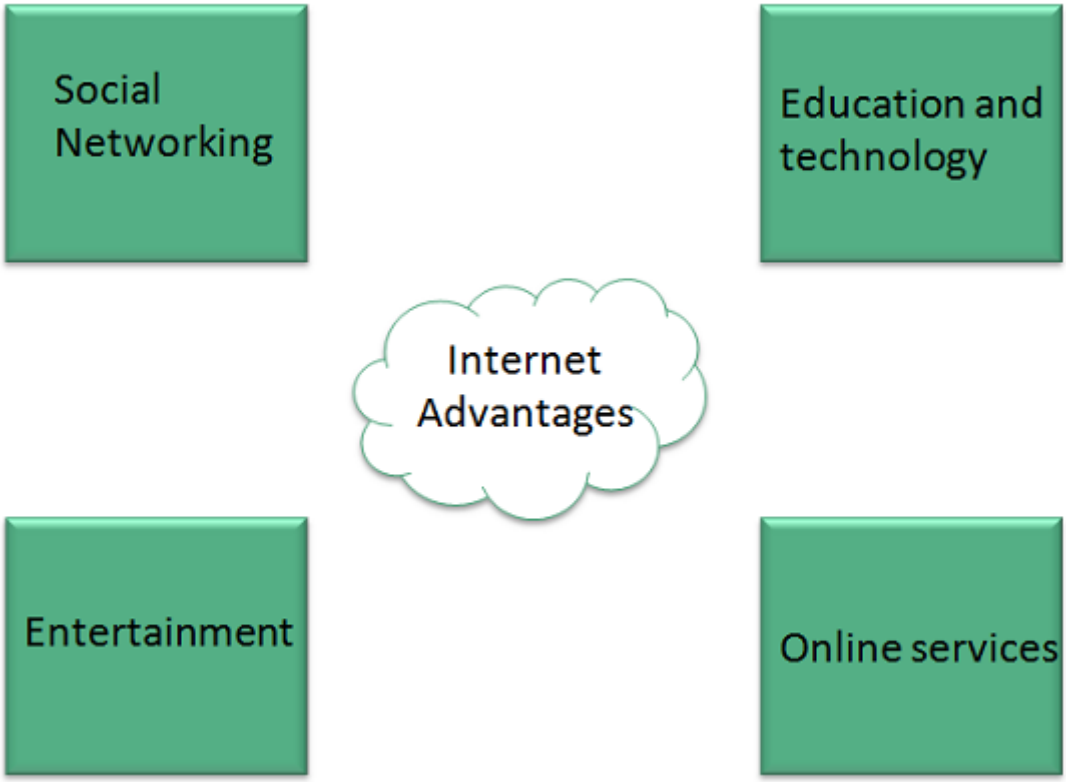
Evolution

The concept of Internet was originated in 1969 and has undergone several technological & Infrastructural changes as discussed below:

- The origin of Internet devised from the concept of **Advanced Research Project Agency Network (ARPANET).**
- **ARPANET** was developed by United States Department of Defense.
- Basic purpose of ARPANET was to provide communication among the various bodies of government.
- Initially, there were only four nodes, formally called **Hosts.**
- In 1972, the **ARPANET** spread over the globe with 23 nodes located at different countries and thus became known as **Internet.**
- By the time, with invention of new technologies such as TCP/IP protocols, DNS, WWW, browsers, scripting languages etc.,Internet provided a medium to publish and access information over the web.

Advantages

Internet covers almost every aspect of life, one can think of. Here, we will discuss some of the advantages of Internet:



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- Internet allows us to communicate with the people sitting at remote locations. There are various apps available on the wed that uses Internet as a medium for communication. One can find various social networking sites such as:
    - Facebook
    - Twitter
    - Yahoo
    - Google+
    - Flickr
    - Orkut
- One can surf for any kind of information over the internet. Information regarding various topics such as Technology, Health & Science, Social Studies, Geographical Information, Information Technology, Products etc can be surfed with help of a search engine.
- Apart from communication and source of information, internet also serves a medium for entertainment. Following are the various modes for entertainment over internet.
    - Online Television
    - Online Games
    - Songs
    - Videos
    - Social Networking Apps
- Internet allows us to use many services like:
    - Internet Banking
    - Matrimonial Services
    - Online Shopping
    - Online Ticket Booking
    - Online Bill Payment
    - Data Sharing
    - E-mail
- Internet provides concept of **electronic commerce**, that allows the business deals to be conducted on electronic systems

Disadvantages

However, Internet has proved to be a powerful source of information in almost every field, yet there exists many disadvantages discussed below:

- There are always chances to loose personal information such as name, address, credit card number. Therefore, one should be very careful while sharing such information. One should use credit cards only through authenticated sites.
- Another disadvantage is the **Spamming**.Spamming corresponds to the unwanted e-mails in bulk. These e-mails serve no purpose and lead to obstruction of entire system.
- **Virus** can easily be spread to the computers connected to internet. Such virus attacks may cause your system to crash or your important data may get deleted.
- Also a biggest threat on internet is pornography. There are many pornographic sites that can be found, letting your children to use internet which indirectly affects the children healthy mental life.

- There are various websites that do not provide the authenticated information. This leads to misconception among many people.

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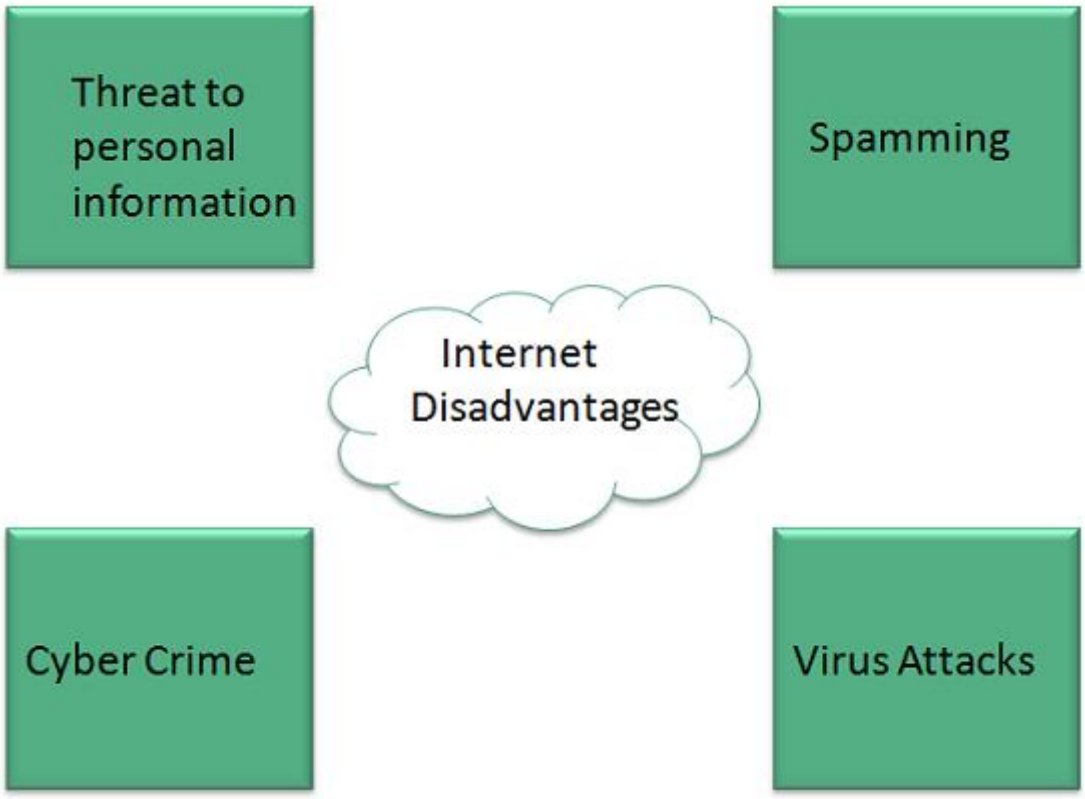

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THE GROWTH OF THE INTERNET

The first two nodes to connect were at University of California Los Angeles (UCLA) and at the Stanford Research Institute. This was in 1969. At first, the Internet ran on ARPANET, a small US Government backbone. The main users were scientists and researchers employed by the US Government. However, in 1986, the US National Science Foundation (NSF) established NSFNET, substantially increasing the transmission capacity in order to link five US supercomputing centres. This increase in capacity and expansion of US academic networks effectively opened up the Internet to non-governmental involvement – first universities, and then commercial interests. ii
This initial investment in the Internet backbone also granted the US a first-mover advantage in Internet use and capacity, and the US still has the largest backbone capacity in the world. However, other countries, Norway and the Netherlands among them, have taken advantage of technology and their smaller size to provide Internet access to more of their population than has the US.

The impact NSFNET had on Internet growth can be seen easily in the increase in Internet hosts (i.e. connected computers): less than two thousand in 1985, two thousand three hundred in 1986, nearly twenty-five thousand in 1987, and nearly sixty thousand in 1988. Internet growth continues to be astronomical; as of 2008 it is estimated that there are half a billion host

Linking Network

Although the US conducted much of the original Internet research, other countries also established packet networks and, as these networks grew, connected them to the Internet. The first international connection to the ARPANET was established between the US and Norway in 1973, followed soon after by the US with the UK. When TCP/IP became the standard protocol for the Internet in 1982 the rate of international connections increased rapidly. At this time the network was called the "Internetwork", later shortened to "Internet." There was never any central, coordinated plan for how nations or regions would develop their networks and connect them. Thus, the global spread of the Internet has been organic and untidy – one could argue that the very lack of central organisation has been a blessing, enabling the Internet to expand so vastly and quickly, without being stalled by the need to conform to strict standards or plans, or being subject to the control of one, single agency. Even so, this rapid, organic growth is also at the root of many of the current concerns regarding security, reliability, preservation and information management.

The capacity of a country to connect with the global Internet depends on that country's own internal network capacity. Much of Africa, for example, lacked investment and thus had only very slow and narrowly distributed technology for data communications in the early 1990s, inhibiting the ability to connect internationally. This situation has improved; in 1996, the Leland Project, financed by the United States Agency for International Development (USAID), began upgrading elements of Africa's digital infrastructure and thus improving Internet connectivity. This is only one of many projects looking at increasing Internet access in the emerging economy.

Using the Network

One of the earliest applications for the Internet was electronic mail (e-mail), first adapted for ARPA in 1972. E-mail allowed remote users to send messages to each other, and the success of this application alone was enough to inspire continued investment and development. E-mail was followed by Telecommunication network (Telnet), which enabled users to connect to other computers remotely, and File Transfer Protocol (FTP), which enabled them to transfer files from one computer to another. At first difficult to use, these applications developed standardized commands and thus became more widespread, especially among communities such as scientists, academics, and librarians. However, they were still not user-friendly as we understand the term, lacking graphical interfaces and mouse control. Another problem was the difficulty searching and organizing information on the network. Essentially one had to hunt through a long list of
UNIX files, with truncated or ambiguous names.
In 1991, Tim Berners-Lee proposed the concept of the World-Wide Web, wherein different forms of files residing on computer hosts could be represented through a common language (Hypertext Mark-up Language – HTML) and connected through a common protocol (Hypertext Transfer Protocol – HTTP). This would allow information to be represented in a more human-accessible

format, and also allow information to be connected through semantic, hierarchical or other relationships according to the creator's intentions.

It took a couple of years for the community to develop the tools and software to take advantage of HTML/HTTP. The real breakthrough came with the introduction of Mosaicin 1993. Mosaic was one of the first browsers, and enabled creators and readers of the World-Wide Web greater scope in using graphics and layout effects to display information. It also enabled the crossover from the UNIX operating system – which was the then standard for the Internet – to a Microsoft Windows operating system – which was the most popular operating system for home computers.

What this really meant was that users – and not just users in universities, but users at home as well - instead of being confronted with a directory tree containing dozens of ambiguously labelled files and non-intuitive commands to access them, now had a graphical view of meaningfully-labelled files organized in context. And furthermore, through hyperlinking one could follow the thread of one file on one computer to a related file on another. The significance of this development cannot be over-emphasized – the user of the World-Wide Web now had a coherent view of a library of files distributed across host computers all over the world.

The explosion of the World-Wide Web also created an increased demand for means to search the information, taking advantage of hypertext linking. Lycos was created in 1993, followed by Yahoo! and Alta Vista in 1995, and then Google in 1998. These days, it may be hard to remember that there were other search engines than Google; this illustrates how rapidly the technology of the Internet has changed, and continues to change, and how the change can be sudden and even ruthless.

Emerging Economies

The Internet is a global phenomenon, and much of its technology is globally distributed and accessible; however, some essential elements, such as bandwidth and connectivity, are still geographically or nationally bound, with wealthier nations having greater capacity and denser networks. Consequently, emerging economies tend to have connected to the Internet later than other nations, and in a more limited fashion. China was one of the first emerging economies to connect to the Internet, with an email link established in 1987. Brazil and India connected in 1990, South Africa and Tunisia in1991, Cameroon, Ecuador and Venezuela in 1992, and in 1993 – the year that Mosaic exploded the popularity of the World Wide Web – Costa Rica, Egypt, Fiji, Ghana, Guam, Indonesia, Kazakhstan, Kenya and Peru all connected. At this time there were about two million hosts worldwide, and the number was doubling every year.

Internet penetration as a percentage of population in emerging economies lags that in OECD countries, but the rate of increase is substantially greater in emerging economies, and the total number of users in emerging economies is now greater than the total number of users in OECD countries. In other words, the Internet is fast becoming an emerging economy phenomenon. Nevertheless, citizens of the emerging economies are often unable to take full advantage of the Internet's potential. With more limited access to computers and less available bandwidth, most citizens of emerging economies cannot utilize the range of daily household functions available through the Internet (shopping, banking, finding directions, making appointments and keeping up with current events) that OECD citizens take for granted. And, of course, one of the greatest strengths of the Internet – its ability to facilitate the creation of communities of individuals geographically distant but linked by common interests and concerns – is not available to the very communities who would benefit from this the most: citizens of emerging economies living in isolated towns and villages. This disparity – sometimes called the Digital Divide - is generally attributed to three factors:

1. **Bandwidth**: Most developing nations do not have the high-capacity bandwidth available to developed world consumers. The issue is only partly due to the limitations of the internal telephone networks, and in fact the deployment of wireless phone networks in many countries in Africa and Asia is reducing this barrier (and it is fascinating how the idea of using a cell phone as a mobile Internet host is further advanced in many emerging economies than it is in most OECD nations). However, the international gateways that connect developing nations and regions to the Internet often do not have the capacity to support widespread consumer access to high-speed connections. One must remember that many of the most valuable information aggregates (dealing with health, finance, economics, human rights etc) maintained by governments and international organizations are located in OECD countries, and one needs to connect to those host networks in order to get access to these resources. Without high-bandwidth connections to OECD networks, even with an adequate national infrastructure, actual Internet accessibility for an emerging economy will be limited.
Investment in additional infrastructure is part of the solution. For example, O3b Networks has recently announced it is working with Google and other partners to deploy a new communications infrastructure to bring high-capacity low-cost Internet connectivity to emerging economies. A principle of network economics is that the larger the network the greater the potential economic payoff, hence, private firms participate in these kinds of projects because they increase their potential customer base. This is important - projects such as this one are often supported by foreign aid, but because the private sector is the most efficient and effective at actually carrying out the necessary engineering work, there needs to be incentive for its involvement.

2. **Computer equipment**: In October 2008, one can purchase a high-quality Dell personal computer with monitor for less than US$500, a remarkably low price, but still far more than what most citizens of developing countries can afford. A number of solutions are being employed, such as recycling older equipment by donating it to developing nations, the hundred-dollar laptop initiative, the custom of communal use - wherein a single computer can be purchased by a group (through micro lending, for example) and used to serve the group - and establishment ofcybercafés. In addition, the increased use of cell phones, and their elevated capacity to handle data transmissions and display also provides a mobile alternative to personal computers.

3. **Training**: Availability of training is limited in emerging economies, and, whereas in OECD countries generations of children are growing up with school and home life integrated with computer technology, children in emerging economies do not have the same exposure. Again, developing countries are countering this obstacle, both with increased funding and aid to support computers in classrooms, and also through students going overseas to study.viii However, the lack of training is perhaps the most significant factor of the Digital Divide, particularly with the explosion of Web 2.0 software, which is changing our interactions with the Internet from specific, niche activities to an “always on” accompaniment to daily life. The degree to which children and youth are becoming comfortable and facile with computer technology is a major social development in the developed world, and the impact this social change will have, both nationally but also internationally, and how it may act as a social divider, is still not apparent.

OWNERS OF THE INTERNET

Who owns the Internet?

1. Imagine you're in a room full of people from different countries, and everyone only speaks his or her native language. In order to communicate, you'd have to come up with a standard set of rules and vocabulary. That's what makes the Internet so remarkable: It's a system that lets different computer networks communicate with each other using a standardized set of rules. Without rules, these computer networks wouldn't be able to communicate with each other.

Think for a minute about the scope of the Internet. It's a collection of inter-networked computer systems that spans the entire globe. It depends on several sets of rules called **protocols**. These protocols make it possible for computer communication across networks. It also relies on a huge infrastructure of routers, **Network Access Points** (**NAPs**) and computer systems. Then there are the satellites, miles of cable and hundreds of wireless routers that transmit signals between computers and networks.

It's a truly global system. Cables crisscross countries and oceans, crossing borders and linking some of the world's most remote locations to everyone else. And the Internet is still growing. More computers link to it every day, and various organizations and companies are working to extend Internet access to countries that aren't yet connected.

2. The Internet is a giant system made up of much smaller systems. If it's one thing, does it have a single owner? Is there some person or entity that controls the Internet? Is it possible for someone to own something that spans nations and oceans? Keep reading to find out

So who actually owns the Internet? There are two answers to this question:

1. Nobody
2. Lots of people

If you think of the Internet as a unified, single entity, then no one owns it. There are organizations that determine the Internet's structure and how it works, but they don't have any ownership over the Internet itself. No government can lay claim to owning the Internet, nor can any company. The Internet is like the telephone system -- no one owns the whole thing.

From another point of view, thousands of people and organizations own the Internet. The Internet consists of lots of different bits and pieces, each of which has an owner. Some of these owners can control the quality and level of access you have to the Internet. They might not own the entire system, but they can impact your Internet experience.

The physical network that carries Internet traffic between different computer systems is the **Internet backbone**. In the early days of the Internet, ARPANET served as the system's backbone. Today, several large corporations provide the routers and cable that make up the Internet backbone.

These companies are upstream **Internet Service Providers** (**ISPs**). That means that anyone who wants to access the Internet must ultimately work with these companies, which include:

- UUNET
- Level 3
- Verizon
- AT&T
- Qwest
- Sprint
- IBM

Then you have all the smaller ISPs. Many individual consumers and businesses subscribe to ISPs that aren't part of the Internet backbone. These ISPs negotiate with the upstream ISPs for Internet access. Cable and DSL companies are examples of smaller ISPs. Such companies are concerned with what the industry calls the **last mile** -- the distance between the end consumer and Internet connectivity.

Within the backbone are **Internet Exchange Points** (**IXPs**), which are physical connections between networks that allow data exchanges. For example, while Sprint, Verizon and AT&T provide part of the Internet backbone's infrastructure, the three networks aren't intertwined. They connect together at an IXP. Several companies and non-profit organizations administer IXPs.

The individual computer networks that make up the Internet can have owners. Every ISP has its own network. Several nations' governments oversee computer networks. Many companies have **local area networks** (**LANs**) that link to the Internet. Each of these networks is both a part of the Internet and its own separate entity. Depending on local laws, the owners of these networks can control the level of access users have to the Internet.

You might consider yourself to be an owner of the Internet. Do you own a device that you use to connect to the Internet? If so, that means the device you own becomes part of the enormous inter-networked system. You are the proud owner of part of the Internet -- it's just a very small part.

If no one owns the Internet, who is responsible for making sure everything works? Find out in the next section.

In the beginning, there was ARPANET

ARPANET was a network of computers housed in various universities, government agencies and research facilities. The people who built ARPANET designed many of the protocols that the Internet uses today. ARPANET connected to several other computer networks and the Internet was born. The agency responsible for ARPANET was the Defense Advanced Research Projects Agency (DARPA), a branch of the United States Department of Defense (DoD). Since ARPANET began as a U.S. government-sponsored project, you could argue that at one time, the U.S. government owned the Internet.

3. As mentioned earlier, the Internet works because of a system of rules called **protocols**. By following these protocols, computers can send information across the network to other computers. If there were no protocols, then there'd be no guarantee that the information sent from one computer could be understood by another, or that it'd even reach the right destination.

As the Internet evolves, these protocols must also change. That means someone has to be in charge of the rules. There are several organizations that oversee the Internet's infrastructure and protocols. They are:

- **The Internet Society**: A nonprofit organization that develops Internet standards, policies and education.
- **The Internet Engineering Task Force** (**IETF**): An international organization with an open membership policy that has several **working groups**. Each working group concentrates on a specific topic, such as Internet security. Collectively, these working groups try to maintain the Internet's architecture and stability.
- **The Internet Architecture Board** (**IAB**): An IETF committee, the IAB's mission is to oversee the design of Internet protocols and standards.
- **The Internet Corporation for Assigned Names and Numbers** (**ICANN**): A private nonprofit corporation, ICANN manages the Internet's **Domain Name System** (**DNS**). ICANN is responsible for making sure that every domain name links to the correct **IP address**.

The Internet Society and IETF are open membership organizations. Both welcome the participation and input of Internet experts. They shape the way the Internet works and evolves.

ICANN, on the other hand, is a private organization. The exclusive nature of ICANN concerns some people. They argue that ICANN holds a lot of power over anyone who wants to register a domain name. ICANN makes money by accrediting vendors called **registrars**. These registrars then sell domain names to consumers and businesses. If you want to register a specific domain name, ultimately ICANN decides if you can have it.

While none of these organizations own the Internet, they each influence how the Internet works. The Internet has no central owner. While its structure remains carefully designed and maintained, the actual content on the Internet continues to be the untamed cyberspace we all know and love.

ARPANET

Still, for the first few years of its existence, ARPANET was largely unknown outside of the relatively esoteric group of technologists that was developing it. That changed in 1972, Robert Kahn of Bolt Beranek and Newman (BBN), one of the chief figures in the development of the ARPANET architecture, organized a conference at the International Computer Communication Conference (ICCC) where ARPANET was first demonstrated publicly. That same year, the first major Internet application, called electronic mail, or e-mail, was introduced. Over the next decade, e-mail was the most widely used network application in existence.

The early years of ARPANET saw the network grow slowly, as nodes were gradually added and the vast array of computers plugged into it demanded software and interface hardware so as to adequately interact with ARPANET. As ARPANET expanded into what is now referred to as the Internet, it was grounded on what is known as an open architecture network. In such an environment, other networks could connect to and interact with the Internet and all other networks to which it is connected, but the technology used to build each network could be decided by that network's provider and needn't be dictated by any particular architecture. Packet switching, pioneered by Kleinrock, allowed for such architectural freedom to connect networks on a peer, rather than hierarchical, basis. In fact, open-architecture networking was originally referred to as "Internetting" when it was introduced to DARPA in 1972.

While this greatly expanded the uses of the Internet in its limited environment of the day, enabling network designers to tailor their architectures to the specific needs of their users while still linking it to the overall Internet, it resulted in the lack of a common user interface on the Internet. In fact, most of the early networks connected to the Internet were designed for a closed community of researchers and scholars, so the issue of cross-network capacity was a very low priority. For academics, military officials, and scientists, this was satisfactory on the whole as the Internet was geared toward very specialized users. It limited the overall availability of the Internet, however, in a manner that wouldn't be remedied until the 1990s and the introduction of the World Wide Web.

For several years, the bulk of the research involving Internet communications, including work on the various networking and transmission logistical concerns, was funded primarily by the United States Department of Defense, and thus was primarily designed around and translated into military concerns. For instance, the first demonstration of an Internet transmission linking three different kinds of gateways, including a mobile packet radio in California, the Atlantic Packet Satellite Network (SATNET), and several ground-level ARPANET systems through the eastern United States and Europe, were designed to mimic military scenarios the depended on linking mobile units to central command stations across an intercontinental network.

Network Control Protocol, however, proved limited in an open-architecture environment since it was dependent on the ARPANET network design for endto-end reliability, and any transmission packets that were compromised could bring the protocol to an abrupt stop. To get multiple packet networks to communicate with each other regardless of the underlying networking technology, a common communication protocol was needed. The first efforts toward this end were the work on the Transmission Control Protocol (TCP) by Vinton Cerf at the Stanford Research Institute and Robert Kahn at BBN. TCP was designed specifically to sidestep any centralized global control at the level of internetworking operations using the communications protocol. The design called for gateways, or routers, to connect networks to the Internet without calling for any network reconfiguration. After several years of research and design, the first TCP specification was published in December 1974. Just a few months later, DARPA transferred ARPANET as a fully operational Internet to the Defense Communications Agency (later renamed the Defense Information Systems Agency).

By the late 1970s, the U.S. military became interested in Internet technology not just as an experimental and theoretical tool, but as an actually existing military communications system. As a result, the military began to use Internet communications protocols in packet radio systems and various ground-satellite stations in Europe. The transfer of voice messages highlighted

complications in these radio-based networks and led to the development of a complementary Internet Protocol (IP), which was combined with TCP to produce the TCP/IP protocol suite. TCP/IP quickly emerged as the standard for all military Internet systems, and, by extension, the Internet itself.

Through the early 1980s, Internet products consolidated into the TCP/IP protocol, setting the stage for the opening of commercial applications. Sure enough, according to Vinton Cerf, in the mid-1980s a substantial market for Internet-based products began to flower. In large part this was due to the NSFNet initiative. This program, which was born of a network designed to link supercomputers together based on software designed by David Mills of the University of Delaware, and which was led by Dennis Jennings at the National Science Foundation (NSF), quickly generated supporting software and systems by IBM, MCI, and Merit to accommodate the quickly escalating networking demand. Thanks to the outgrowth of technologies stemming from NSFNet, the number of computers connected to the Internet jumped from only several hundred in 1983 to over 1.3 million in 1993, while the number of networks leapt from a tiny handful to over 10,000. By 1990, the NSFNet, in fact, had generated such a profound transformation in the Internet's backbone and reach that ARPANET itself was decommissioned. Soon commercial e-mail carriers, already devising systems and software for use in intranets, began exploiting the possibilities of Internet-based e-mail; commercial Internet service providers came along in their wake, sprouting up from the original handful of networks brought to life under NSFNet. For several years, however, these services were still primarily geared toward researchers and businesses-those few groups that already had a need for and access to the Internet. The Internet as a household resource was still largely unheard of.

The rapid expansion of the Internet in the 1980s necessitated new methods of management such as the Domain Name System (DNS). In its earliest incarnations, users had to memorize numerical addresses to access the fairly limited number of host networks, but that became unfeasible as the number of connected networks took off. With the proliferation of local area networks (LANs), Internet managers designed the DNS to create easily identifiable hierarchies of hosts to facilitate easy Internet navigation.

In the late 1980s and early 1990s, a series of policy initiatives, including a forum at the Harvard Kennedy School of Government on "The Commercialization and Privatization of the Internet" and a National Research Council committee report titled "Towards a National Research Network," paved the way for the next steps of Internet evolution, including the sponsorship by the U.S. government of high-speed computer networks that would serve as the backbone for the explosion of the information super-highway and e-commerce in the 1990s.

THE WORLD WIDE WEB

Perhaps the invention that most facilitated the growth of the Internet as a global information-sharing system is the World Wide Web. Unlike the Internet, however, the early design and development of the World Wide Web was primarily the doing of just one person: Tim Berners-Lee. Working as a contract programmer at the Geneva, Switzerland-based Centre Europen de Recherche Nucleaire (European Laboratory for Particle Physics, or CERN), Berners-Lee repeatedly proposed to develop a global interactive interface for use on the Internet so as to turn

the fragmented and relatively exclusive Internet into a popular and seamless whole. After several rejections, Berners-Lee simply developed a prototype using the laboratory's phone-book entries in 1989. Called Enquire Within Upon Everything, the prototype was designed to link and connect elements much in the way that the brain makes random connections and associations. Unlike the average database system, according to Berners-Lee, the Web was to be designed to make random associations between arbitrary objects in the files.

Just as the Internet evolved to ensure the greatest possible flexibility and interoperability, so the Web's original architectural design specifically minimized the degree of specification so as to minimize constraints on the user. In this way, the design could be modified and updated while leaving the basic architecture undisturbed. Thus, for instance, users could enter the existing File Transfer Protocol (FTP) in the address space and it would be as workable as the new Hypertext Transfer Protocol (HTTP). HTTP was the communications protocol that allowed the Web to transfer data to and from any computer connected to the Internet, and was designed as an improvement on the FTP standard in that it took advantage of the Web's capacity to read and translate intricate features. The intermixing of these protocols and file formats was the key, for Berners-Lee, to ensuring not only the widest proliferation but also the greatest durability of his creation. Not only would the Web in this way be able to evolve with changing systems and protocols, but the early adoption would be made smoother in that users could adopt the Web from whatever systems they were currently using as a parallel or supplementary system. Shortly after the successful demonstration of the phonebook prototype, the Internet community, still relatively esoteric, began experimenting with browser platforms for viewing the Web. One of the early successes was the Mosaic program written by Marc Andreessen, later the founder of Netscape.

Taking advantage of the Internet's gateways and bypassing centralized registries, Berners-Lee devised the universal resource locators (URLs) that are the basis for Web addresses under the DNS. URLs were built to highlight the central power of the Web: that any link can connect to any other document or resource anywhere on the Internet, or in the "universe of information," as Berners-Lee puts it. URLs are structured to identify the kind of space that is being accessed (for instance, by the prefixes "http:" or "ftp:") followed by the specific address within that information space.

The last piece of the WWW puzzle was the medium's lingua franca: Hypertext Markup Language (HTML), a language of codes, built on hypermedia principles dating back to the 1940s, that informs the browser how to interpret the files for the Web. By 1991, all the elements were in place, and the World Wide Web was released from Berners-Lee's laboratory to the public free of any charge.

Perhaps the biggest story in the development of the Web through the early and mid-1990s was the fight to stave off the fragmentation of Web standards that could potentially undermine the ability of the Web to fulfill its original function-namely, to create a seamless universe of information. The World Wide Web Consortium (W3C), of which Berners-Lee was the founder, was born in 1994 just as the Web was beginning to hit critical mass. The organization, though not a governing body, was founded to guide and oversee the Web's development and minimize proprietary battles over standards and protocols in an effort to keep the Web nonproprietary and freely accessible. Based at MIT, the W3C is a neutral organization that brings together technicians, researchers, policy

advocates, software vendors, and business interests to compromise on technical standards and specifications to ensure that the Web remains undivided.

ANATOMY OF THE INTERNET

The Internet is a vast collection of computers linked by cable and satellites, not controlled by any one authority, but all operating under common network protocols. The term 'Internet' includes both the hardware (satellites, cable, routing devices and computers) and the software (programs and network protocols) that enable computers to communicate with each other.

When information is sent across the Internet, the Transmission Control Protocol (TCP: the networking-language computers use when communicating over the Internet) first breaks the information up into packets of data. The client computer sends those packets to the local network, Internet service provider (ISP), or online service. From here, the packets travel through many levels of networks, computers, and communications lines until they reach their final destinations. Many types of hardware help the packets on their way. These are:

Hubs, which link groups of computers together and let them intercommunicate through multiple ports.
Bridges, which link local area networks (LANs) with each another.
Gateways, which act like bridges, but also convey data between dissimilar networks.
Repeaters, which amplify the data at intervals so that the signal doesn't weaken.
Routers, which ensure packets of data arrive at their proper destination across different technologies, media, and frame formats.
Servers, which deliver web pages and other services as requested.
Client computers, which make the initial request for Internet services, and run applications to handle those services.
Cables and/or satellite communications, which make the hardware connections.

All hardware units need common operating methods, basic instructions called protocols that specify to all parties how the data will be handled.

Internet Connections

Physical Internet connections are effected with:

1. Twisted wire: two insulated copper wires twisted into pairs for ordinary telephone communications, and 4 pairs of copper cabling for Internet networks. Transmission speeds range from 2 Mbps to 100 Mbps. (Transmission speed or bandwidth is measured in bits per second, where K a thousand, M a million, and G is a thousand million.)

2. Coaxial cables: copper or aluminum wire wrapped with an insulating and flexible material: widely used for cable television systems, office buildings, and for local area networks generally. Transmission speeds range from 200 Gbps to over 500 Gbps.

3. Optical fiber cable: one or more filaments of glass fiber wrapped in protective layers: not affected by electromagnetic radiation. Transmission speeds may exceed 1000 Gbps.

Satellite or Wireless connections are made with:

1. Terrestrial microwave transmitters and receivers placed on 'line of sight' locations on tops of buildings and elevated ground, usually assisted by relay stations spaced approximately 30 miles apart.

2. Communications satellites using microwave radio as their telecommunications medium, which is not deflected by the Earth's atmosphere. Such earth-orbiting systems can receive and relay voice, data, and TV signals.

3. Cellular and PCS systems using radio communications technologies, which are often specific to individual countries. Each area or cell employs a low-power transmitter or radio relay antenna device to relay calls from one cell to the next.

4. Wireless LANs using both high- and low-frequency technologies to enable communication between several devices in a limited area (e.g. Wi-Fi, BlueTooth, WiMax, UWB and ZigBee).

Networks are commonly designated as LAN (local area network) WAN (wide area network), MAN (metropolitan area network), PAN (personal area network), VPN (virtual private network), CAN (campus area network) and SAN (storage area network).

Wireless communication spans the electromagnetic spectrum from 9 kHz to 300 GHz. Satellite signals travel at the speed of light, but the distances involved induce a time-delay called 'latency'. A 71,000 km separation of transmitter and receiver, for example, will induce a latency of 473 ms, often noticeable on international calls.

It is often convenient to recognize four levels of Internet connection:

1. The 'backbones' are the main "trunk" connections of the Internet, carrying data at high speeds by fiber-optic cables and satellite links across the countries, continents and oceans of the world. Bandwidth is a measure of data that can be transferred per unit time, and in the US these backbones have bandwidths of 155 Mbps to 2.5 Gbps. Backbones are owned and operated by Network Service Providers, major companies like AT&T, Verizon, and AOL. Built into this network is redundancy, transmission surplus to demand but kept in reserve should there be traffic peaks, or breaks in the network.

2. Backbones 'step down' to regional and local networks at hubs, once called Network Access Points or Metropolitan Area Exchanges but now Internet Exchange Points (IXPs), which are again under the ownership and control of NSPs (Network Service Providers).

3. High-speed switching computers make the connection to the local networks, here leased by NSPs to government departments, campus area networks, large companies and ISPs (Internet Service Providers).

4. ISPs, the most familiar to the public, are retail providers, covering the 'last mile' to offer Internet access to client computers, i.e. those in homes and small businesses. ISPs include telecom giants but are generally national or local companies.

Routers

Routers ensure that all data gets sent to its intended destination by the most efficient route. They open the IP packets of data to read the destination address, calculate the best route, either to its final destination, or to another router closer to that destination, repeating this until the destination is reached. To find the optimal route, routers employ an internal database called a routing table. There are two types. A static table specifies unchanging paths for packets to use. A dynamic table allows a packet to have multiple routes. Sometimes the packets are sent to a router's input port faster than the port can process them, when they pile up in an input queue. If packets overflow that queue, then the TCP protocol has the packets sent again. Routers are a key element of the Internet, and today's models provide great flexibility, security and control over company networks. The one network can link all company employees, even those on out-of-office hotel and conference rooms. Many built-in technologies such as voice, wireless, and advanced security systems can be optimized by the IT management team, and proper measures taken against security lapses and malicious code attacks.

Servers

Equally important is the server, a powerful computer (or often groups of computers) that handle requests for web pages, email data, and an increasing variety of services. The computers will use the Unix, Windows, Linux, or Macintosh operating systems, which have the TCP/IP protocols built in, but run different types of software, depending on the service offered: http servers, network servers, ftp servers or database servers. Simplest are the http (Hypertext Transfer Protocol) servers, which comply with requests from website visitors, sending the data back to the client computer for the browser software to assemble as familiar web pages. Generally, however, servers will also employ scripts (Perl, Common Gateway Interface scripts, .NET and others) to engage with external mini-programs like database lookup or interactive forms processing. A Yahoo search for information on telecommunications, for example, will appear like http://search.yahoo.com/bin/search?p=telecommunications, where the 'bin' indicates where the scripts are located and the 'search?p=telecommunication' instructs the script to search the associated databases for the term 'telecommunications'.

Repeaters

Repeaters maintain the signal strength and use t

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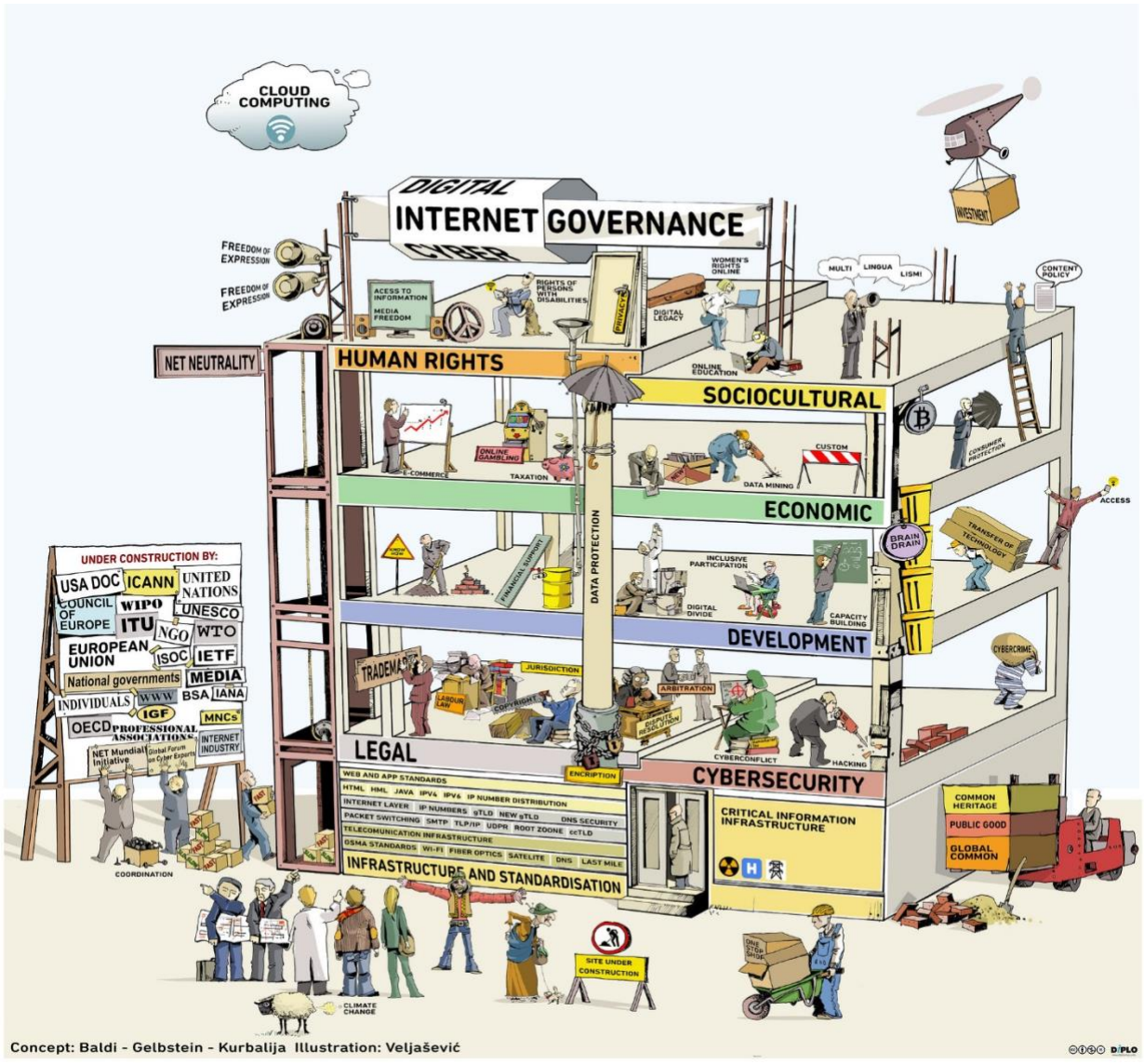

IG Building: What are the issues of Internet governance?

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echnologies appropriate to the transmission medium. Even backbone fiber-optical cables may carry optical amplifier repeaters in the form of erbium-doped amplifiers spaced several tens of kilometers apart.

Hubs

Transmission step-downs at Internet Exchange Points are achieved by the use of hubs, an electronic device with multiple ports. Transmission rates vary considerably across these hubs: as this Wikipedia listing indicates.

Gateways

Technically, a gateway is a network node designed to interface with another network that uses a different protocol. Not only must the gateway contain protocols translators, but also impedance matching devices, rate converters, fault isolators, and/or signal translators. Mutually acceptable administrative procedures have also to be agreed between the two networks.

Bridges

A bridge connects numerous local area networks for the purpose of collaboration and/or exchange of information. All networks have to be using the same network protocols.

Client Computers

Client computers are those used by the general public, on which they run applications, or make requests for Internet services.

BASIC INTERNET TERMINOLOGIES

1. Internet

One of the most important and **basic internet terminologies** is the Internet itself. The Internet is a worldwide network of computers, which provides a wide array of information that follows a standard communication protocol. This communication protocol is what we call as TCP (Transmission Control Protocol) or IP (Internet Protocol).

In 1969, the internet was known as ARPANET. It is coined by the Advanced Research Projects Agency of the United States of America. During that time, the Department of Defense was only using four computers to connect with each other. Today ARPANET is widely termed as the Internet.

2. World Wide Web

Another one of the **basic Internet terminologies** is the World Wide Web. World Wide Web or www is a collection of data stored and shared in the digital space. This collection of information form and connect into websites and divides into web pages. Tim Bernes-Lee in the CERN laboratory invented it in 1989.

The World Wide Web is accessible anywhere as long as there's an internet connection. You can use a wireless router, Wi-Fi or Ethernet cable to access www through the internet.

3. Host (Network)

A Network Host is usually a computer or any device that connects to a computer network. It provides information and facilities to other computers and their users. In addition, you can use the term host when there's two or more computer system that connects through a modem or other internet connection channels.

4. Domain Name

This is a friendly naming system for giving addresses to web pages and servers. It is a description of a computer's location on the Internet. Usually, a dot separates a domain name, for example, www.google.com or www.slashdigit.com.

In addition, Domain Names are part of the DNS (Domain Name System, a database of domain names and their corresponding IP addresses). Also, a domain name follows certain rules and algorithms in the DNS.

5. Web Browser

A web browser or browser is a software program that can access websites. Popular web browsers include Google Chrome, Apple's Safari, Internet Explorer and Mozilla Firefox. Each web browser has its own settings and works separately from each other. However, they have the same function and that is to serve as portals to the World Wide Web.

Moreover, web browsers allow you to surf, search any information from various websites on the internet. You also have a choice to pick your own web browser preference. If you like Chrome, you can stick with chrome or if you're an Apple user, Safari is the best browser for you.

6. IP Address

An IP (Internet Protocol) address is a unique set of numbers assigned to a computing device that uses the internet protocol. Also, IP address identifies a device on the Internet communication network. Furthermore, it allows a system to be acknowledged by other systems.

7. Homepage

A Homepage is the main page of a particular website. Usually, this is the first page you see when you open a website. Additionally, a home page can have one of several different filenames.

8. URL

URL or short for "Universal Resource Locator." From the name itself, it provides a way of locating a resource on the web. It also serves as a method of retrieving location on a computer network.

9. Search Engine

Search Engine is a software system that works to search information on the World Wide Web. Common examples of online search engines are Google, Yahoo, and Bing. These programs allow you to search keywords and phrases to locate information on the Internet.

APPLICATIONS OF INTERNET

1) On-line communication:

Computer users around the world use the E-mail services to communicate with each other extensively.

2) Feedback about products:

Commercial organizations are also using the internet to gather information about the satisfaction of existing products and market opportunities of new products.

This is usually accomplished by putting up an interactive survey application by the organization on a WWW site on the Internet.

3) Product promotion:

Several commercial organizations are effectively using the internet services for promoting their products by the use of different social networks.

4) Customer Support Service:

Many organizations are also using the internet to provide timely customer support.

5) On-line shopping:

The Internet has also facilitated the introduction of a new market concept, which consists of virtual shops. These shops remain open 24 hrs all the year round and are accessible to make purchase all around the world.

6) On-line journals and magazines:

There are many WWW sites on the internet, which consists of an electronic version of many journals and magazines.

7) Real-time updates:

It helps to provide news and other happenings that may be on-going in different parts of the word but with the use of the internet, we come to know about the real-time updates in every field be it in business, sports, finance, politics, entertainment and others very easily.

Many time the decisions are taken on the real-time updates that are happening in the various parts of the world and for this, the internet is very essential and helpful.

8) Research:

In order to do research, we need to go through hundreds of books as well as the references and that was one of the most difficult jobs to do earlier.

Since, the internet came into life, everything is available in just a click. The user just has to search for the concerned topic and will get hundreds of references that may be beneficial for the research and since, the internet is here to make research activity easy and hence, public user can take a large amount benefit from the research work that have been done.

9) Education:

Education is one of the best things that the internet can provide. There are a number of books, reference books, online help centers, expert`s views and other study oriented material on the internet that can make the learning process very easier as well as a fun to learn.

10) Financial Transaction:

It is a term which is used when there is an exchange of money. With the use of internet in the financial transaction, the work has become a lot easier. Payments, Funds transfer, banking transactions can be done through on-line banking service.

11) Entertainment:

The Internet is also used for entertainment. Such as chatting with friends, sharing videos, watching movies, listening music, live telecast of sports and other events, playing games, etc.

12) Job Search:

Using internet, searching job has become an easier task. There are an endless amount of websites on the internet that provided news about a vacancy in various post as required.

13) Blogging:

There are many people who are very much interested in writing blogs and for them the internet is the best place. They can not only write blogs as per their wish but can also publicize their work so that their work reaches to most of the people and they get appreciated.

INTERNET COMMERCE

Internet Commerce is the use of the Internet for all phases of creating and completing business transactions. Various surveys suggest that the amount of business conducted online will increase ten-fold over the next few years, from around $500 million in 1996 to over $6 billion in 2000. However, this still represents less than 10 per cent of the business conducted by mail order.

In our view too much focus of electronic commerce to date has been put on carrying out the final transactional phases - the ordering and payment. While such a perspective is all right when there are established supply chains for regular and routine purposes, this overlooks the wider perspective. It is often said, that the formal placement of an order is preceded by as many as 30 previous information exchanges. Thus, in its broadest sense we view Internet Commerce as also including:

- **The full sales and marketing cycle** - for example, by analysing online feedback to ascertain customer's needs
- **Identifying new markets** - through exposure to a global audience through the World Wide Web
- **Developing ongoing customer relationships** - achieving loyalty through ongoing email interaction
- **Assisting potential customers with their purchasing decision** - for example by guiding them through product choices in an intelligent way
- **Providing round-the-clock points of sale** - making it easy for buyers to order online, irrespective of location
- **Supply Chain Management** - supporting those in the supply chain, such as dealers and distributors, through online interaction
- **Ongoing Customer Support** - providing extensive after-sales support to customers by online methods; thus increasing satisfaction, deepening the customer relationship and closing the selling loop through repeat and onging purchases.

This wider perspective of Internet Commerce - as an ongoing iterative relationship that uses email, discussion lists, and other Internet facilities as well as the World Wide Web - is the strategy of most successful 'Netrepreneurs'. As in other marketing, the main categories of Internet Commerce are business-to-business and business-to-consumer.

Evolution and Status Today

Over 80 per cent of large companies have their own Web sites and make use of electronic mail. Our analysis suggests that companies evolve their Internet Commerce activities through six stages:

1. The World-Wide Web as an online product catalogue - this has the advantage (or should!) of being up-to-date and readily accessible. The best have guided interaction (e.g. http://www.xerox.com/products.html)
2. Pre-sales support through electronic mail - providing prompt and informed repsonse to the queries of potential buyers (this means going beyond simply emailing the Webmaster, but having the active involvement of many staff)
3. Full transaction processing for placing orders - ideally through a 'secure server'
4. Delivery of product or product update information - some products (e.g. software, documents) can be delivered online. For others, customers can be kept informed of new developments
5. Collecting details of prospective customers' interests - typically through forms. This stage is more fully developed when these are handled in a database and targetted offers can be sent to those registered *Note: those sites that demand that users complete lengthy registration forms **before** you can enter them do not fulfil this criteria*
6. Provision of interactive discussion facilities for customers with shared interest - developing online 'communities' will be a key way of engendering ongoing loyalty.

Our analysis shows that certain products and markets have characteristics that lend themselves more readily to Internet commerce. These include:

- Information-intensive products
- Medium to high value
- Global in applicability
- May require sourcing or delivering at a distance
- Often highly specialised
- Dispersed potential customer base
- Are attractive to Internet early adopters

Hence the markets that have actively used Internet Commerce since its inceptions have included been - computers, software, specialist cars, flowers, books, music, travel

Opportunities and Benefits

Those who trade via the Internet cite the following benefits:

- **Timeliness** - Your Web site is accessible round the clock. Email queries can be handled more expeditiously and completely than is often possible by mail or phone.
- **Reduced Marketing Costs** - Online catalogues are cheapre to produce and maintain that paper catalogues.
- **Better Targetting** - Internet communities are self selecting. People with particular interests tend to visit particaulr places in Cyberspace. Customers find you, rather than vice versa.
- **Greater Market Reach** - Distance is no object. Sending information or exchanging messages costs virtually the same as someone locally. You don't need to pay expensive courier bills.
- **Reduced communications costs** - With electronic networking it cost virtually the same to send a message to 100 people as to one.
- **Improved After Sales Service** - By providing online support, customers can serve themselves for many of the common post-sales information needs.

There are particular opportunities for those who have specialised markets, or wish to expand their market base without the cost of opening new offices. There are also opportunities created by the medium itself - for example for Internet intermediaries (directory and trading services), and novel ways of providing access e.g. kiosks in public areas.

Enabling Mechanisms

Several mechanisms are needed for there to be an effective electronic marketplace for a particular product or service. In particular prospective buyers must be able to find your site. Although traditional directories like Yahoo! have a role to play, trade directories (such as TradenetUK) or shopping malls may fit the bill, but many are too general or localised to be effective. There is a role and opportunity for specialised intermediaries. Or simply becoming the best known in your field (c.f. Amazon.com for books).

Additionally, an individual supplier will need:

- World Wide Web site - with appropriate transaction and database software
- Payment facilities - to accept credit card information or online electronic cash
- Secure interfaces - to prevent unauthorised access to critical systems
- Redesigned Business Processes - to accomodate online interaction via email and online transactions.

Above all they will need to develop the appropriate skills and strategies to adapt their marketing and business to the new medium.

Successful Strategies

Many commentators have focussed on ways of "making money on the Web". Their models include advertising, subscription services, site sponsorship etc. Unless your business is advertising, information services or Internet related, this should **not** be your strategic focus. Your focus should be

"How can the Internet enhance my existing key market process cycles?"

Key processes to consider are:

- **New product-to-market** - e.g. by wider use of testers across the world; use of interactive test panels
- **Market awareness-to-buying decision** - e.g. by better provision of information and access to expertise
- **Sales order-to-fulfilment** - e.g. by simplifying the order process

Challenges

Those who have focussed on electronic transactions cite a number of issues. Some challenges and potential solutions are:

- **Bandwidth** - There is concern that as usage of the Internet grows exponentially, that there will be insufficent bandwidth and it will grind to a halt. However, various analysts have shown that, in general, market forces will enable capacity to keep up with demand, though it may be patchy in places. *Solutions: Some suppliers are talking of multi-tiered services with premium pricing guanteeing faster levels of service.*

- **Authentification** - When orders are placed over a network the buyer needs reassurance that it was an authorized transaction and actually comes from who it purports. *Solutions: Electronic signatures, trusted third party validation* .

- **Security** - Both parties want assurance that their confidential transaction details have not been intercepted. *Solutions: Encryption, secure servers*.

- **Legislation Harmonisation** - Under which jurisdiction does a transaction take place- the location of buyer, seller or server? Issues like these are the subject of policy debate.

- **Payment** - How can someone set up simple, reliable and risk free mechanisms for payment, in multiple currencies and without hefty bank charges? *Solutions: Electronic cash mechanisms, new Internet protocols such as SET (Secure Electronic Transactions), virtual banks*.

In our own experience, even without new mechanisms such as SET it is probably no less secure sending your credit card number over the Internet than by phone or fax. In any case, solutions to most of these challenges are in sight. If one takes the wider view of Internet Comerce the main challegnes is that of **attitude and skills**. Conducting business and trading online has different expectations, patterns of work and needs new skills for customer dialogue and interaction. Long-term success in Internet Commerce does not come through mass merchandising techniques. It requires the nurturing and developing of customer relationships through a new interactive medium, using automatation in the bast way. Most suppliers have yet to develop these skills.

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IMPACT OF INTERNET ON SOCIETY

The internet is the guiding technology of the IT Age just as the electrical engine was of the Industrial Age. The internet is a global network of inter-linked networks that mainly provide wireless interactive communication. Though the internet was first deployed in 1969, it was only in the 1990s that it became available to the public.

From there onwards, its use has diffused rapidly throughout the world with there being around 7 billion users of wireless devices currently that employ internet technology. With about 7.7 billion people in this world and with limited use among those under 5 years of age, it's almost safe to say that the entire humanity is now connected to the internet! There are however variations in the bandwidths available, the efficiency and cost of its use.

It's been postulated that about 95% of all information available has been digitized and made accessible via the internet. The internet has also led to a complete transformation in communication, availability of knowledge as well as social interaction. However, as with all major technological changes, there are positive and negative effects of the internet on the society too.

The positive impacts of the internet include the following:

- It provides effective communication using emailing and instant messaging services to any part of the world.
- It improves business interactions and transactions, saving on vital time.
- Banking and shopping online have made life less complicated.
- You can access the latest news from any part of the world without depending on the TV or newspaper.
- Education has received a huge boost as uncountable books and journals are available online from libraries across the world. This has made research easier. Students can now opt for online courses using the internet.
- Application for jobs has also become easier as most vacancies are advertised online with online applications becoming the norm.
- Professionals can now exchange information and materials online, thus enhancing research.

The negative impacts of the internet on society include:

- Easy availability of illegal or inappropriate materials online that isn't age-suitable.
- Addiction to social networks can disrupt an individual's life, both personally and professionally.
- Some miscreants use the internet to hack into people's accounts for spurious activities including stealing data or banking information.
- Yet others have been known to misuse the internet for spreading hate and terrorism, two dangerously catastrophic scenarios.

However, those indulging in misusing the internet are few and far in-between. On a global scale, the internet has been the best thing to have happened to human society in recent years!

CRIME ON/ THROUGH THE INTERNET

The Internet can be a scary place, full of scammers, thieves, and saboteurs. If you think that sounds like an exaggeration, consider this statistic: According to the Norton Cyber Security Insights Report, over 143 million Americans have been affected by **computer crimes** in the last year, with 80% of those surveyed reporting they or someone they knew had been victimized.

With the ubiquity of smartphones and social media reporting our every move, it's no surprise that cyber-crime is on the rise. From theft to fraud to solicitation, here are nine common Internet crimes that are impacting users today.

1. Phishing

Phishing is when criminals send fraudulent emails pretending to be from legitimate businesses, in an attempt to collect sensitive, personal information. Often, any links in the email will redirect to a website owned by the scammer, so always be careful about what information you give out on the Internet.

2. Harassment

Cyberstalkers use electronic communication, such as email, social media, or websites to stalk and harass people. Forms of online harassment include slander, libel, false accusations, threats, or any other behavior that demeans or embarrasses someone. Sentences for cyberstalking can include jail time and hefty fines.

3. Ransomware

Cyber criminals can install malicious software on your system that will essentially hold your important information hostage until you meet their demands. A common ransomware attack will shut down a victim's computer or encrypt their files, agreeing to release them only if the victim pays a ransom. All too often, however, the files are never recovered.

4. Prostitution

Many escorts will advertise their services in online classifieds, social media forums, or their own personal websites, making it easy and discreet for people to find them. But since prostitution is illegal in the vast majority of the United States, both the escort and the client are committing a crime.

5. Child Pornography & Solicitation

The National Center for Missing and Exploited Children received over 10 million reports of suspected child sexual exploitation in the last year alone. Perpetrators will use the Internet to gain access to sexually explicit images of children, and sometimes even arrange for a face-to-face meeting.

6. Intellectual Property Theft

More commonly known as piracy, the Internet abounds with books, music, movies, and more that have been illegally obtained and made available for free download. Despite what some people say, piracy is not a victimless crime. Not only do artists and creators lose out, but many illegal downloads also contain hidden malware that can destroy your computer.

7. Account Hacking

We all know how important it is to guard our passwords – think about the damage someone could do if they gained access to your email account containing all your most personal information. If someone logs into your email, social media, or computer without authorization, they could potentially face jail time.

8. Drug Trafficking

With the rise of cryptocurrency, the online drug trade has increased significantly over the past few years. Illegal drugs such as marijuana, cocaine, meth, ecstasy, and heroin are all just a few clicks away – and according to research by the Rand Corporation, over 35% of worldwide revenues from online drug trafficking are based in the United States.

9. Credit Card Fraud

Half of all credit card fraud begins with spyware, malicious software unknowingly installed on a victim's computer or handheld device. Spyware runs in the background, collecting your data and sending it back to the criminal, who then uses your card to make fraudulent purchases.