The Future of Internet: A Review

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ABSTRACT: Like nothing else, the internet has revolutionized the computer and communication world. The telegraph, telephone, radio, and computer all set the stage for the unparalleled convergence of capabilities of the Internet. The Internet is at once a global broadcasting capability, an information dissemination system and a means of communication and interaction between people and their computers, irrespective of their geographical location. The Internet is also one of the most popular examples of continued investment in information technology and its contribution to research and development. The government, industry, and academia have been collaborators in developing and deploying this exciting new technology, beginning with early research into packet switching. Today, the Internet is a widespread infrastructure for information, the initial version of what is sometimes referred to as the National Information Infrastructure. Its history is complicated and covers many facets, including technology, organization and culture. And as we shift toward growing use of online resources to achieve electronic commerce, knowledge acquisition, and community operations, its impact reaches not just the technological fields of computer communications, but across society.

KEYWORDS: Commercialization, Documentation, File Transfer Protocol (FTP), Network Working Group (NWG), Request for Comments (RFC).

INTRODUCTION

A series of memos written in August 1962 by J.C.R. Licklider of MIT, describing his "Galactic Network" idea, was the first recorded explanation of the social connections that could be enabled through networking. Licklider envisaged a globally interconnected set of computers from which data and programmes from every place could be accessed easily by anyone. The idea, in spirit, was more like today's Internet. The first article on the theory of packet switching was published by Leonard Kleinrock of MIT in July 1961. Kleinrock persuaded Roberts, a significant move toward computer networking, of the potential viability of communication using packets rather than circuits [1]. The other key move was to make each other speak to the machines. Exploring this concept in 1965, Roberts linked the TX-2 computer in Massachusetts to the Q-32 in California via a low-speed dial-up telephone line while working with Thomas Merrill, establishing the first (though small) wide-area computer network ever. The outcome of this experiment: confirmation that time-sharing computers could work well together, running programmes and retrieving data on remote machines as required, but that the telephone device switched from the circuit was completely insufficient for the job. The conviction of Kleinrock for the need for packet switching was thus confirmed [2].

Roberts went to DARPA in late 1966 to establish the idea of the computer network and rapidly put together a proposal for the ARPANET, publishing it in 1967. The ARPANET switches (called IMPs) were built by Bolt, Beranek and Newman Corp. (BBN), under Frank Heart's leadership, with Robert Kahn responsible for overall system design. To optimize the topology and economics of the network, Howard Frank and his team at Network Analysis Corp. collaborated with Roberts. His Network Measurement Center at UCLA was chosen as the first node on the ARPANET due to Kleinrock's early implementation of the packet switching theory and his emphasis on research, design, and measurement. All this came together in September 1969, when the first switch was installed by BBN at UCLA and connected to the first host computer. The Network Working Group (NWG) under Steve Crocker completed the initial host-to-host ARPANET protocol, named the Network Control Protocol, in December 1970. During 1971-1972, as the ARPANET sites completed the introduction of NCP, network users could finally begin to build applications. A big, successful ARPANET demonstration took place in October 1972, the first public demonstration of this new network technology. Electronic mail, the original' hot' programme, was also launched in 1972. Ray Tomlinson of BBN wrote the simple email message send-and-read programme in March, inspired by the need for a quick coordination mechanism for ARPANET developers. From there, email took off as the most common application for the network and as a harbinger of the type of contact operation between people we see today on the World-Wide Web [3][4].

- ***Primary Internetting Concepts***

The initial ARPANET developed into the Internet, based on the idea that there will be several independent networks of somewhat arbitrary nature. It soon expanded to include packet satellite networks, ground-based packet radio networks, and other networks, starting with ARPANET as the pioneering packet-switching network [5]. A main fundamental technological concept is embodied in the Internet today: open-architecture networking. In this approach, the choice of any specific network infrastructure is not determined by a particular network architecture, but can be freely chosen by a provider and made through a meta-level "internetworking architecture" to communicate with other networks. It is possible to build each network to suit a particular environment and user requirements. Introduced by Kahn in late 1972, shortly after arriving at DARPA, the principle of open-architecture networking was driven by four main ground rules:

I. Any separate network had to stand on its own, and before being linked to the Internet, no internal improvements could be made of any such network.
II. On a best-effort basis, interactions will be It will be easily retransmitted from the source if a packet did not reach the final destination.
III. Black boxes will be used to link the networks (later called gateways and routers). No data about individual flows of packets passing through them will be maintained by the gateways, keeping them easy and preventing complicated adaptation and recovery from different failure modes.
IV. At organizational stage, there will be no global influence.

- ***The Internet Commercialization***

Internet commercialization has included not only the production of affordable, private network networks, but also the development of commercial Internet technology products. Dozens of vendors began integrating TCP/IP into their products in the early 1980s because they saw customers for that networking approach. Unfortunately, they lacked real evidence on how the technology was intended to work and how the solution was expected to be used by their clients. In 1985, in co-operation with the IAB, Daniel Lynch organized a three-day workshop for all vendors to learn how TCP/IP operated and what it still could not do well, acknowledging the lack of available knowledge and adequate training. The speakers were mainly from the research group of DARPA, where these protocols were developed and used in day-to-day work. 50 inventors and experimenters heard from approximately 250 vendor representatives. Interoperability among vendor products was demonstrated at the first Interop trade show in September 1988, attended by 50 companies and 5,000 engineers from potential customer organizations. Since then, Interop has expanded enormously, and today is an annual event with an audience of more than 250,000 who want to know which products function together with which other products and about the latest technologies in seven locations around the world.

We have seen a new wave of commercialization in the last few years. Initially, market efforts consisted largely of manufacturers supplying basic networking products and service providers providing access and basic Internet services. The Internet has now become almost a "commodity" service, and the use of this global information infrastructure as a support for other commercial services has gained a great deal of recent attention [6]. The widespread and rapid adoption of browsers and web technologies has intensified this practice, giving users easy access to linked information around the globe. Products for the discovery, transmission and retrieval of this information are available, and many of the latest technologies are aimed at delivering increasingly sophisticated information services on top of simple Internet data communications.

- ***The Key Role of Documentation***

Free and open access to basic documents, especially the specifications of protocols, has been a key to the rapid growth of the Internet. In the university research culture, the beginnings of ARPANET and the Internet fostered the scholarly tradition of free publication of ideas and findings. However, for the dynamic exchange of ideas required to build networks, the usual period of conventional academic publication was too structured and too sluggish. In 1969, S. took a crucial move. In setting up the request for comments (RFC) series of notes, Crocker (then at UCLA) intended to be an informal, fast means of dissemination for the sharing of ideas among network researchers [7]. The RFCs were initially printed on paper and circulated through postal mail. The RFCs were prepared as online files and accessed via FTP as the File Transfer Protocol (FTP) came into use. Now, on hundreds of sites around the world, RFCs are easily accessible through the Web. The online directories were held by SRI in its function as the Network Information Center. Jon Postel worked as RFC editor and as the centralized administration manager for the requisite number of protocol assignments, positions he continues to this day.

- ***History of the Future***

In the age of time-sharing, the Internet was conceived, but has survived into the era of personal computers, client/server and peer-to-peer computing, and network computers. It was planned to support LANs as well as more recent ATM and frame-switched services before LANs existed, but has evolved. It was intended to support a number of functions, from file sharing and remote login to sharing and collaboration with resources, and has spawned email and the Web more recently. But most importantly, it began as the development of a small band of committed researchers and, with billions of dollars invested annually, has grown to be a commercial success. It is not appropriate to assume that the Internet is complete. The Internet is a machine creature, not the telephone or television industries' conventional networks. It will, indeed, continue to evolve at the rate of the computer industry in order to remain relevant. The provision of new technologies such as real-time transport is now evolving, supporting audio and video streams, for example [8]. A new paradigm of nomadic computing and communications is made possible by the availability of ubiquitous networking, that is, the Internet itself, along with efficient, inexpensive computing and portable communications (e.g. laptop computers, two-way pagers, PDAs, cellular phones) [9][10].

This evolution will bring us new games, Internet telephone and Internet television, further out. It will also allow more advanced forms of pricing and cost recovery, a likely painful necessity in this world of commerce. It is evolving, from broadband residential connectivity to satellites, to accommodate yet another generation of underlying network technologies with different features and specifications. New access modes and new types of service will create new applications that will in turn push the net itself to develop further. For the future of the Internet, the most pressing issue is not how technology can evolve, but how to handle the process of change and development itself. Internet architecture has always been driven by a core group of designers, but as the number of outside parties involved has expanded, the form of that group has changed.

CONCLUSION

A multitude of stakeholders has arrived with the success of the Internet, now with an economic as well as intellectual interest in the network. We see, for example, a battle to find the next social framework to guide the Internet in the debates about domain namespace control and the shape of the next-generation IP addresses. However, given the vast number of stakeholders, the framework is harder to describe. The industry is also struggling to find the economic justification for the enormous investment required for future growth in order to boost residential access to more appropriate technology, for instance. It won't be because we lack technology, vision, or inspiration if the Internet stumbles, but because we can't set a course and March together into the future.

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