OT5.2 - Historical Perspectives

# Elementary

Who created it?

Advanced Research Projects Agency Network

When was it created?

It was established in 1969

Why was it created?

ARPANET was designed as a computer version of the nuclear bomb shelter.

It was made to protect the flow of information between military installations by creating a network of geographically separated computers that could exchange information via a newly developed protocol (rule for how computers interact) called NCP (Network Control Protocol).

How it actually works:

ARPANET was initially four computers running different operating systems connected together via phone lines. It ran using the protocols Telnet for remote login, FTP (File Transfer Protocol) for transferring files, and NCP (Network Control Program).

NCP was a symmetric host-host protocol. In simpler terms, this was the procedure for allowing computers to communicate within the network as well as adding more hosts to the network to make it bigger. The NCP also controlled the path and flow of data over ARPANET. It established the practice of using numeric host addresses for network communication and was a forerunner to today’s domain name servers (DNS).

# Basic + Sound

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| Date | Event |
| 1962 | At MIT, a wide variety of computer experiments are going on. Ivan Sutherland uses the TX-2 to write Sketchpad, the origin of graphical programs for computer-aided design.  J.C.R. Licklider writes memos about his Intergalactic Network concept, where everyone on the globe is interconnected and can access programs and data at any site from anywhere. |
| 1963 | A joint industry-government committee develops ASCII (American Standard Code for Information Interchange), the first universal standard for computers. It permits machines from different manufacturers to exchange data. 128 unique 7-bit strings stand for either a letter of the English alphabet, one of the Arabic numerals, one of an assortment of punctuation marks and symbols, or a special function, such as the carriage return. |
| 1964 | IBM’s new System 360 computers come onto the market and set the de facto worldwide standard of the 8-bit byte, making the 12-bit and 36-bit word machines almost instantly obsolete. The $5 billion investment by IBM into this family of six mutually compatible computers pays off, and within two years orders for the System 360 reach 1,000 per month. |
| 1965 | DEC unveils the PDP-8, the first commercially successful minicomputer. Small enough to sit on a desktop, it sells for $18,000 — one-fifth the cost of a low-end IBM/360 mainframe. The combination of speed, size, and cost enables the establishment of the minicomputer in thousands of manufacturing plants, offices, and scientific laboratories.  The ARPA-funded JOSS (Johnniac Open Shop System) at the RAND Corporation goes on line. The JOSS system permits online computational problem solving at a number of remote electric typewriter consoles. The standard IBM Model 868 electric typewriters are modified with a small box with indicator lights and activating switches. The user input appears in green, and JOSS responds with the output in black. |
| 1966 | Taylor succeeds Sutherland to become the third director of IPTO. In his own office, he has three different terminals, which he can connect by telephone to three different computer systems research sites around the nation. Why can’t they all talk together? His problem is a metaphor for that facing the ARPA computer research community.  Taylor meets with Charles Herzfeld, the head of ARPA, to outline his issues. Twenty-minutes later he has a million dollars to spend on networking. The idea is to link all the IPTO contractors. After several months of discussion, Taylor persuades Larry Roberts to leave MIT to start the ARPA network program. |
| 1967 | Larry Roberts convenes a conference in Ann Arbor, Michigan, to bring the ARPA researchers together. At the conclusion, Wesley Clark suggests that the network be managed by interconnected ‘Interface Message Processors’ in front of the major computers. Called IMPs, they evolve into today’s routers.  Roberts puts together his plan for the ARPANET. The separate strands of investigation begin to converge. Donald Davies, Paul Baran, and Larry Roberts become aware of each other’s work at an ACM conference where they all meet. From Davies, the word ‘packet’ is adopted and the proposed line speed in ARPANET is increased from 2.4 Kbps to 50 Kbps. |
| 1968 | Roberts and the ARPA team refine the overall structure and specifications for the ARPANET. They issue an RFQ for the development of the IMPs. |
| 1969 | Frank Heart puts a team together to write the software that will run the IMPs and to specify changes in the Honeywell DDP- 516 they have chosen. The team includes Ben Barker, Bernie Cosell, Will Crowther, Bob Kahn, Severo Ornstein, and Dave Walden.  After installation in September, handwritten logs from UCLA show the first host-to-host connection, from UCLA to SRI, is made on October 29, 1969. The first 'Log-In' crashes the SRI host, but the next attempt works! |
| 1970 | Bob Metcalfe builds a high-speed (100 Kbps) network interface between the MIT IMP and a PDP-6 to the ARPANET. It runs for 13 years without human intervention. Metcalfe goes on to build another ARPANET interface for Xerox PARC’s PDP-10 clone (MAXC). |
| 1971 | The Network Working Group completes the Telnet protocol and makes progress on the file transfer protocol (FTP) standard. At the end of the year, the ARPANET contains 19 nodes as planned.  Intel’s release of the 4004, the first ‘computer on a chip,’ ushers in the epoch of the microprocessor. The combination of memory and processor on a single chip reduces size and cost, and increases speed, continuing the evolution from vacuum tube to transistor to integrated circuit. |
| 1972 | At BBN, Ray Tomlinson writes a program to enable electronic mail to be sent over the ARPANET. It is Tomlinson who develops the ‘user@host’ convention, choosing the @ sign arbitrarily from the non-alphabetic symbols on the keyboard. Unbeknownst to him, @ is already in use as an escape character, prompt, or command indicator on many other systems. Other networks will choose other conventions, inaugurating a long period known as the e-mail ‘header wars.’ Not until the late 1980s will ‘@’ finally become a worldwide standard.  Xerox PARC develops a program called Smalltalk, and Bell Labs develops a language called ‘C.’Macintosh HD:Users:38559:Desktop:images.jpg |
| 1973 | The ICCC demonstrations prove packet-switching a viable technology, and ARPA (now DARPA, where the ‘D’ stands for ‘Defense’) looks for ways to extend its reach. Two new programs begin: Packet Radio sites are modeled on the ALOHA experiment at the University of Hawaii designed by Norm Abramson, connecting seven computers on four islands; and a satellite connection enables linking to two foreign sites in Norway and the UK.  Kahn and Cerf set about designing a net-to-net connection protocol. Cerf leads the newly formed International Network Working Group. In September 1973, the two give their first paper on the new Transmission Control Protocol (TCP) at an INWG meeting at the University of Sussex in England.Macintosh HD:Users:38559:Desktop:kahn_t.jpgMacintosh HD:Users:38559:Desktop:cerf_t.jpg |
| 1974 | Ethernet is demonstrated by networking Xerox PARC’s new Alto computers.  DARPA has fulfilled its initial mission. Discussions about divesting DARPA of operational responsibility for the network are held. Because it is DARPA-funded, BBN has no exclusive right to the source code for the IMPs. Telenet and other new networking enterprises want BBN to release the source code. BBN argues that it is always changing the code and that it has recently undergone a complete rewrite at the hands of John McQuillan.Macintosh HD:Users:38559:Desktop:alto_t.jpg |
| 1975 | NASA begins planning its own space physics network, SPAN. These networks have connections to the ARPANET so the newly developed TCP protocol begins to get a workout. Internally, however, the new networks use such a variety of protocols that true interoperability is still an issue.Macintosh HD:Users:38559:Desktop:1975_net_map_t.gif |
| 1976 | DARPA supports computer scientists at UC Berkeley who are revising a Unix system to incorporate TCP/IP protocols. Berkeley Unix also incorporates a second set of Bell Labs protocols, called UUCP, for systems to use dial-up connections.Macintosh HD:Users:38559:Desktop:cray-1_t.jpg |
| 1977 | Steve Wozniak and Steve Jobs announce the Apple II computer. Also introduced are the Tandy TRS-80 and the Commodore Pet. These three off-the-shelf machines create the consumer and small business markets for computers.Macintosh HD:Users:38559:Desktop:Apple_iigs.jpg |

## Internet Organizations

A few of the many organizations that contribute to the Internet are the IAB (Internet Architecture Board), ISoc (Internet Society), and W3C (World Wide Web Consortium). These organizations set the standard in which the computers interpret the information being retrieved via the Internet to display to the user. W3C especially manages the HTML side of things for browser inter-compatibility.

The World Wide Web Consortium (W3C) is the main international standards organization for the World Wide Web (abbreviated WWW or W3).

The purpose of ISoc is to promote Internet related standards, education, and policy.

The Internet Architecture Board (IAB) is the committee charged with oversight of the technical and engineering development of the Internet by the Internet Society (ISoc).

## Major Browsers

There are many Internet browsers today such as Google Chrome, Safari, Internet Explorer, Opera, and Firefox, but earlier when the Internet only just started to grow, there were very few browsers. The first GUI based browser was called the World Wide Web, but was later renamed to Nexus to avoid confusion. Then late in the 1990s came Netscape, which dominated the market space for Internet browsers and owned about 86% of the market share. At the time Microsoft’s Internet Explorer only just owned about 10% of the market share, until Microsoft started bundling it with its OS (Windows) and other OEMs. This caused the tables to turn for Netscape and caused Netscape to go down the drain and Internet Explorer to take the lead. In an effort to stay in existence, Netscape went open source and renamed to Mozilla. At first Mozilla struggled to attract developers but by 2002 it eventually evolved into a stable and powerful Internet suite. Also in 2002, a spinoff project that would eventually become popular named Firefox was released. In early 2005, Microsoft reversed its decision to release Internet Explorer as part of Windows, announcing that a standalone version of Internet Explorer was under development. Apple's Safari, the default browser on Mac OS X from version 10.3 onwards, has grown to dominate browsing on Mac OS X. Browsers such as Firefox, Camino, Google Chrome, and OmniWeb are alternative browsers for Mac systems.

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Replace the \* after wiki/ with the below for Wikipedia websites.

* ARPANET
* Internet\_organizations
* Internet\_Architecture\_Board
* Internet\_Society
* World\_Wide\_Web\_Consortium
* History\_of\_the\_web\_browser
* Tim\_Berners-Lee
* WorldWideWeb
* Web\_browser
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