

ARPANET – The First Internet

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> ARPANET, Internet

 [\(https://www.livinginternet.com/i/ii_arpanet.htm\)](https://www.livinginternet.com/i/ii_arpanet.htm)

I was in charge of the software, and we were naturally running a bit late. September 1 was Labor Day, so I knew I had a couple of extra days to debug the software. Moreover, I had heard BBN was having some timing troubles with the software, so I had some hope they'd miss the ship date. And I figured that first some Honeywell people would install the hardware — IMPs were built out of Honeywell 516s in those days — and then BBN people would come in a few days later to shake down the software. An easy couple of weeks of grace.

BBN fixed their timing trouble, air shipped the IMP, and it arrived on our loading dock on Saturday, August 30. They arrived with the IMP, wheeled it into our computer room, plugged it in and the software restarted from where it had been when the plug was pulled in Cambridge. Still Saturday, August 30. Panic time at UCLA.

– Stephen D. Crocker, The Request For Comments Reference Guide (<http://www.rfc-editor.org/rfc/rfc1000.txt>).

The ARPANET was the first wide area *packet switching* (https://www.livinginternet.com/i/iw_packet.htm) network, the “Eve” network of what has evolved into the *Internet* we know and love today.

The ARPANET was originally created by the *IPTO* (https://www.livinginternet.com/i/ii_ipto.htm) under the sponsorship of *DARPA* (https://www.livinginternet.com/i/ii_darpa.htm), and conceived and planned by *Lick Licklider* (https://www.livinginternet.com/i/ii_licklider.htm), *Lawrence Roberts* (https://www.livinginternet.com/i/ii_roberts.htm), and others as described earlier in this section.

The ARPANET, and so the internet, was born on August 30, 1969, when BBN (<http://www.bbn.com/>) delivered the first *Interface Message Processor* (https://www.livinginternet.com/i/ii_imp.htm) (IMP) to *Leonard Kleinrock* (https://www.livinginternet.com/i/ii_kleinrock.htm)’s Network Measurements Center at UCLA. This was long before commercial internet providers (<https://broadbandnow.com/All-Providers>) came onto the scene, however. The IMP was built from a Honeywell DDP 516 computer with 12K of memory, designed to handle the ARPANET network interface. In a famous piece of Internet lore, on the side of the crate, a hardware designer at BBN named Ben Barker had written “Do it to it, Truett”, in tribute to the BBN engineer Truett Thach who traveled with the computer to UCLA on the plane.

The UCLA team responsible for installing the IMP and creating the first ARPANET node included graduate students *Vinton Cerf* (https://www.livinginternet.com/i/ii_cerf.htm), *Steve Crocker* (https://www.livinginternet.com/i/ia_rfc_invent.htm), *Bill Naylor*, *Jon Postel* (https://www.livinginternet.com/i/iw_mgmt_jana.htm), and Mike Wingfield. Wingfield had built the hardware interface between the UCLA computer and the IMP, the machines were connected, and within a couple of days of delivery the IMP was communicating with the local NMC host, an SDS Sigma 7 computer running the SEX operating system. Messages were successfully exchanged, and the one computer ARPANET was born. A picture of Leonard Kleinrock with the first ARPANET IMP is shown below (click on the picture to link to a larger image on Kleinrock’s home site).



(<http://www.lk.cs.ucla.edu/LK/Inet/birth.html>)

– Leonard Kleinrock with first IMP

The first full ARPANET network connection was next, planned to be with *Douglas Engelbart* (https://www.livinginternet.com/w/wi_engelbart.htm)'s NLS system at the Stanford Research Institute (SRI (<http://www.sri.com/>)), running an SDS-940 computer with the Genie operating system and connected to another IMP. At about 10:30 PM on October 29th, 1969, the connection was established over a 50 kbps line provided by the AT&T (<https://broadbandnow.com/ATT>) telephone company, and a two node ARPANET was born. As is often the case, the first test didn't work flawlessly, as Kleinrock describes below:

At the UCLA end, they typed in the 'l' and asked SRI if they received it; 'got the l' came the voice reply. UCLA typed in the 'o', asked if they got it, and received 'got the o'. UCLA then typed in the 'g' and the darned system CRASHED! Quite a beginning. On the second attempt, it worked fine!

– Leonard Kleinrock, *The Birth of the Internet* (<http://www.lk.cs.ucla.edu/LK/lnet/birth.html>).

The Culler-Fried Interactive Mathematics centre (<http://www.cs.ucsb.edu/>) at the University of California at Santa Barbara was the third site added to the ARPANET, running on an IBM 360/75 computer using the OS/MVT operating system. The fourth ARPANET site was added in December 1969 at the University of Utah (<http://www.utah.edu/>) Graphics Department, running on a DEC PDP-10 computer using the Tenex operating system. These first four sites had been selected by Roberts to constitute the initial ARPANET because they were already DARPA sites, and he believed they had the technical capability required to develop the required custom interface to the IMP.

Over the next several years the ARPANET grew rapidly. In July, 1975, DARPA transferred management and operation of the ARPANET to the Defense Communications Agency, now DISA (<http://www.disa.mil/>). The *NSFNET* (https://www.livinginternet.com/i/ii_nsfnet.htm) then assumed management of the non-military side of the network during its first period of very rapid growth, including connection to networks like the *CSNET* (https://www.livinginternet.com/i/ii_csnet.htm) and *EUnet* (https://www.livinginternet.com/i/ii_eunet.htm), and the subsequent evolution into the internet we know today.

Milestones. Some of the milestones in the early history of the ARPANET are summarized below:

- East Coast. In March, 1970, the consulting company Bolt, Beranek & Newman joined the ARPANET, becoming the first ARPANET node on the US east coast.

- Remote Access. In September, 1971, the first Terminal Interface Processor (TIP) was deployed, enabling individual computer terminals to dial directly into the ARPANET, thereby greatly increasing the ease of network connections and leading to significant growth.
- 1972. By the end of 1972 there were 24 sites on the ARPANET, including the Department of Defense, the National Science Foundation, NASA, and the Federal Reserve Board.
- 1973. By the end of 1973 there were 37 sites on the ARPANET, including a satellite link from California to Hawaii. Also in 1973, the University College of London in England and the Royal Radar Establishment in Norway become the first international connections to the ARPANET. A logical map of the ARPANET from 1973 can be found *here* (https://www.livinginternet.com/i/ii_arpanet_1973.html).
- 1974. In June, 1974, there were 62 computers connected to the ARPANET.
- 1977. In March, 1977, there were 111 computers on the ARPANET. A logical map of the ARPANET from March 1977 can be found *here* (https://www.livinginternet.com/i/ii_arpanet_1977.html).
- 1983. In 1983, an unclassified military only network called MILNET split off from the ARPANET, remaining connected only at a small number of gateways for exchange of electronic mail that could be easily disconnected for security reasons if required. MILNET later become part of the DoD Defense Data Network, or DDN.
- 1985. By the middle of the 80's there were ARPANET gateways to external networks across North America, Europe, and in Australia, and the Internet was global in scope.
- 1990. The ARPANET was retired in 1990. Most university computers that were connected to it were moved to networks connected to the *NSFNET* (https://www.livinginternet.com/i/ii_nsfnet.htm), passing the torch from the old network to the new.

Resources. The following site provides more information about the ARPANET.

- Michael Hauben's History of the ARPANET (https://www.google.ca/search?q=Michael++++++Hauben%27s+History+of+the+ARPANET&gws_rd=cr,ssl&ei=EdDIVs7zBeK7jgSpq7jYDQ#q=%22Michael+Hauben%22+%22History+of+the+ARPANET%22)