

Larry Roberts

Larry Roberts is sometimes called the "father of the ARPANET." He earned this nickname by directing the team of engineers that created the ARPANET. Roberts was also the principal architect of the ARPANET.



ARPA's Need for a Network

In 1966, Robert Taylor assumed the directorship of ARPA's Information Processing Techniques Office (IPTO), J.C.R. Licklider's old post. He noticed that IPTO research contractors were constantly requesting more computing resources. Most of them wanted their own computers—an expensive luxury. Taylor also noticed that there was a lot of duplication of research. This waste of resources also cost money. Building on the theoretical legacy of Licklider, Taylor decided that ARPA should link the existing computers at ARPA-funded research institutions together. This would allow everybody on the network to share computing resources and results. He got approval to go ahead with his plan.

With the go-ahead to build a network Taylor began looking for someone to manage the project. His first choice was a young computer scientist named Larry Roberts. Roberts was a shy man who was well-respected in his field. He was known for his good management skills and dedication to his work. Roberts was currently working on graphics at MIT's Lincoln Laboratory.

Roberts also had experience with network computing. In 1965, a psychologist named Tom Marill, who had studied under Licklider and been influenced by his interest in computers, approached ARPA and proposed a project to conduct an experiment linking Lincoln Lab's TX-2 computer to the SDC Q-32 computer in Santa Monica. ARPA officials thought it was a good idea, but suggested that Marill carry out his experiment under the sponsorship of the Lincoln Lab, which he did. Officials at the Lincoln Lab put Roberts in charge of the project. The experiment although much smaller in scope than the

Larry Roberts

ARAPNET would be was a success. Response times were slow and connection reliability was often poor, but Marill's project provided a solid first step.

Roberts, a respected computer scientist with good management skills who also had networking experience (which was a rare commodity in those days) was the ideal candidate to lead ARPA's networking project. The job would surely be good for Roberts career. Indeed, Taylor had said that the job would put Roberts in position to become IPTO Director when Taylor stepped down, but Roberts was happy where he was and did not want to leave. For nearly a year Taylor tied to persuade him to accept the position without any luck.

Taylor would not be dissuaded. He decided to use some strong-arm tactics. It happened that about half of Lincoln Lab's funding came from ARPA. Taylor went to ARPA's director, Charles Herzfeld, and asked him to persuade Lincoln Lab's director to talk Roberts into taking the position. Herzfeld agreed. Roberts later recalled, "Bob [Taylor] got Herzfeld to call up the head of Lincoln and say, 'Well, we have 51 percent of your money. Why don't you send Roberts down here as fast as you can?' And the head of Lincoln called me in and said, 'It'd probably be a nice thing for all of us if you'd consider this.'" (Roberts in Segaller, 47)

So, at age 29, Roberts accepted the position of manager and principal architect of the precursor to the Internet. In 1967, he attended a meeting for ARPA's Principal Investigators or PIs (scientists heading ARPA-funded research projects). The main topic was the new networking project. Roberts laid out his plans. He wanted to connect all ARPA-sponsored computers directly over dial-up telephone lines. Networking functions would be handled by "host" computers at each site. This idea was not well-received. Researchers did not want to relinquish valuable computing resources to administer this new network and did not see how they would benefit from sharing resources with other researchers. In 1989, Roberts recalled:

"Although they knew in the back of their mind that it was a good idea and were supportive on a philosophical front, from a practical point of view, they-Minsky and McCarthy [two prominent PIs], and everybody with their own machine-wanted [to continue having] their own machine. It was only a couple of years after they had gotten on [the ARPANET] that they started raving about how they could now share research, and jointly publish papers, and do other things that they could never do before." (Roberts in Abbate, 50)

Many also foresaw problems trying to facilitate communication between machine with many different incompatible operating systems and languages. All in all the reception to Roberts' plans was a cold one.

Toward the end of the meeting, A man named Wes Clark handed Roberts a note that read: "You've got the network inside out." (Hafner & Lyon, 73). After the meeting, Roberts talked with Clark. Clark suggested that Roberts employ small computers at each site to handle networking functions and leave the host computers alone. All of the small computers could speak the same language which would facilitate communication between them. Each host computer would only have to adapt its language once in communicating with it's small computer counterpart. Each host computer would be connected to the network via its small computer which would act as a sort of gateway. The small computers could also remain under more direct ARPA control than were the large host computers.

Roberts adopted Clark's idea. He called the small computers Interface Message Processors (IMPs). Roberts decided that the network should start out with four sites: UCLA, the Stanford Research Institute (SRI), the University of Utah, and UC Santa Barbara. This would be the core and the network could grow from there. (SRI had been chosen as one of the first sites partly because Doug Engelbart

Larry Roberts

was there. A few years earlier Bob Taylor had been at NASA and had funded Engelbart's invention of the first computer mouse.) By the middle of 1968, Roberts sent out a request for bids to build the IMPs to 140 companies. In late December, the bidding was over. Bolt Beranek and Newman, Licklider's old stomping ground, won.

In August 1969, they delivered the first IMP to UCLA. A month later, the second was delivered to SRI. The two were connected and the ARPANET was born.



Interface Message Processor (IMP)