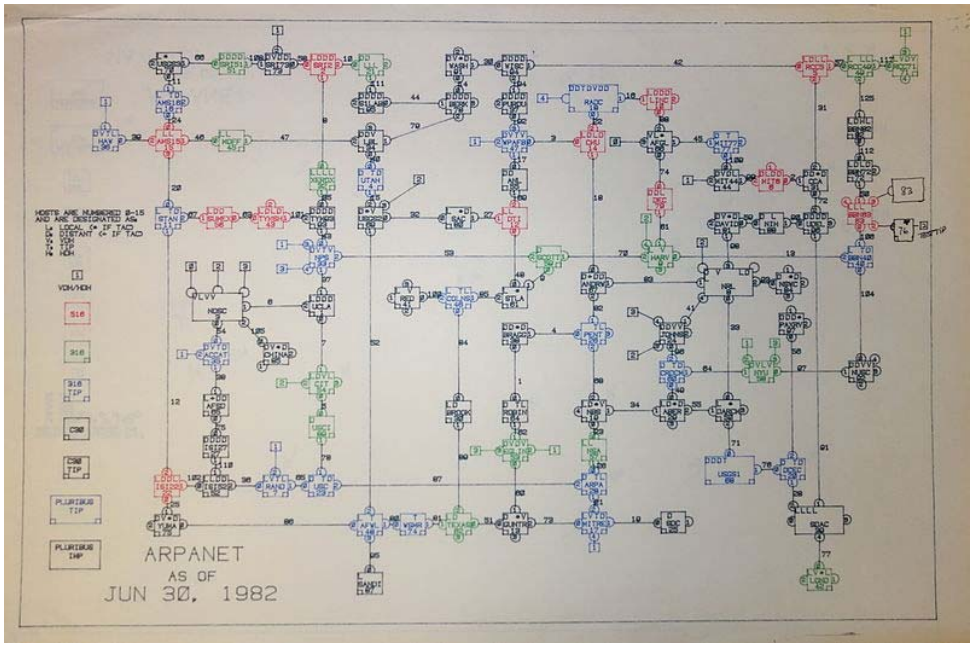
The Origins of the Internet



All of the men were nervous as they waited. But Len Kleinrock was the most nervous. The year was 1969, and just over 20 people were crowded into the room. A group of pale men in their 20s and 30s, the computer scientists stood beside executives from big telephone companies. The men tapped their feet impatiently. They waited.

The computer itself loomed along the wall, 15 feet wide and 35 feet long. A long grey cable snaked from the computer to a smaller machine, the router or "switch," in the corner. The two machines were important, but the real reason the men had gathered was the activity happening in that long grey cable. They were about to see whether information could successfully flow between a computer and router, for the first time in history.

At the center of the group was Len Kleinrock, the 35-year-old star of computer networking. Kleinrock was a professor at UCLA and was the one who had engineered this system. "Everybody was ready to point the finger if it didn't work," said Kleinrock. "Happily, the bits began to flow from the host to router. I like to refer to that day as when the Internet took its first breath of life, first connected to the real world. It's like when a baby is born and has its first experience of the outside world."

For Kleinrock, that moment had been almost a decade in the making. He originally became interested in the problem of network connection while working on the East Coast. He

recalled, "I looked around at MIT and Lincoln Laboratories [*sic*]: I was surrounded by computers and recognized that one day they're going to have to talk to each other. And it was clear that there was no adequate technology to allow that."

At the same time that Kleinrock was growing absorbed in the problems of network connection, the United States government was ramping up its investment in science and technology research. The Soviet Union's famous launch of a satellite called Sputnik had been an embarrassment for the United States—the United States thought that it should be the leader of space travel. Eisenhower created a branch within the Department of Defense to ensure that the scientific leadership of America wouldn't be eclipsed again in the future. This new organization, the Advanced Research Projects Agency (ARPA), became one of the major engines of technological innovation throughout the 1960s and 1970s.

In 1962, while Kleinrock was finishing up graduate school, ARPA created a new department devoted to computer science. The head of this division was J.C.R. Licklider, a fellow scientist at MIT who also worked on network structures.

"He was one of those visionaries who foresaw the advantages of combining humans with computer," said Kleinrock of his former colleague and boss. "He created a concept called man-computer symbiosis, recognizing that if you put the two together, you could get very significant results." Licklider ran into political problems at ARPA and ultimately left to return to MIT, but not until he had planted the idea of networking as a concept worthy of funding.

Bob Taylor took over ARPA's computer science division in 1966 and reinvigorated the project. Taylor had been funding different projects in computer science departments at universities across the country and realized it was growing too costly to give each department the machines and resources to do every task. What he needed was a way for geographically far-flung research centers to somehow share each other's computing resources. Taylor needed to create a network. The man he brought in to build it, Larry Roberts, happened to be Kleinrock's old officemate at MIT.

"We were all intimately familiar with each other's work, so when they asked, Roberts said, 'Look, I know exactly what this technology should be, and I know it can work. Len Kleinrock has already proven it,'" recalled Kleinrock. "And bang, the project came to life. After a number of years, it came to action."

And so it was that all of the men were crowded into the room watching a long grey cable. An air conditioner hummed in the background, fighting against both the heat outside

and the heat generated by the massive machine in the room. Cheers broke out when they saw that the information was flowing, but the real test was to come a few weeks later.

The first message between two computers was sent on October 29, 1969. This time the room was empty, except for Kleinrock and one other engineer. They didn't know that it was such an important milestone, so there was no camera or tape recorder. The two men were trying to log onto a computer at the Stanford Research Institute and successfully got through two letters of the message "login" before the system crashed.

"It was not until this thing called the Internet hit the consumer world that we recognized this network was really important. At that point we looked back and said, 'What was the first message ever sent on the Internet?'" Kleinrock remembered. "Samuel Morse sent, 'What hath God wrought?' Alexander Graham Bell said, 'Come here Watson I need you.' Neil Armstrong had his giant leap. These guys were smart and they understood media. We had no such concept, but the message we created, 'lo,' [short for 'login'] that's the most prophetic, succinct, powerful message we could have come up with by accident."