

COMPUTER GURU

by Don Benjamin

Technology Lab Programs sponsored by: Princeton Core Center

The Internet Turns Fifty

Most of us use the internet every day with little thought of how it began. With October 2021 marking the internet's fiftieth anniversary, I figured it was a good time to explain how this amazing technology became our planet's ubiquitous information distribution network.

The internet began in the 1960s with the need for a robust data communications network that would allow research scientists around the country to remotely access the limited number of large, powerful research computers that were part of the Department of Defense's Advanced Research Projects Agency¹ (DARPA). At that time, researchers could only access those computers using separate, dedicated data terminals, each with its own set of operating instructions. Nor could those computers easily share information, other than perhaps by exchanging magnetic tape reels through the mail or by courier.

DARPA tasked two research scientists, [Ivan Sutherland](#) and [Bob Taylor](#), with developing a data network that would: 1. Interconnect the DARPA computers; 2. Allow research scientists to access that network remotely using a single terminal; and 3. Provide a way to exchange messages among the DARPA network users.

What resulted was DARPA NET, which went online in late 1969 (as ARPANET). The message exchange mechanism became today's email. (The first email was sent in 1971, and the first spam in 1978—an ad for digital computers.)

But it took more than simply connecting computers and scientists (users) with wires. The information had to be routed between a particular computer and a particular user or between computers. The telephone system, which could provide data communications, wasn't a practical solution because it's a "point-to-point" switched network (Dial. Ring. Answer. Talk. Hang up). And back then, the telephone network comprised electromechanical switches and copper wires that were far too slow for effective data exchange.

Packets

The solution was "packet switching," which the internet still uses. Here's how it works: An information stream from Computer A is divided into small, fixed-sized packets of "bits" along with the address of sending Computer A and the address of receiving Computer B. Then, other computers along the way shuffle the packets over the best available routes so that sequential packets may take different paths, depending on what other data transfers are taking place.

When the packets arrive at Computer B milliseconds later, they are reassembled in the correct order for processing. Today, internet packet switching is fast enough for 4k video streaming.

I'm still amazed at the speed and vastness of the internet. Whether we watch a documentary on Hulu, Zoom an Evergreen Forum class, or send an email to Aunt Sally in Bayonne, the internet handles our packets with ease. Pretty neat.

If you need technology help go to the PSRC website, click the Tech Resources webpage and fill out the Tech Request Form at princetonsenior.org/psrc-tech-resources/.



The ARPANET in December 1969

The first DARPA NET connected four research centers.

1 [DARPA](#) formulates and executes research and development projects to expand the frontiers of technology and science, often beyond immediate U.S. military requirements. (Wikipedia)