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Fact Sheet

A Brief History of NSF and the Internet

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Early Years: 1960s-1994. The Internet that many of us take for granted today arose from a series of government-funded computer networking efforts. In 1969, the precursor to the Internet began with the U.S. Defense Department's ARPAnet. ARPA-funded researchers developed many of the protocols still used for most Internet communication. Several other agencies also developed networks so their researchers could communicate and share data. In 1981, for example, the National Science Foundation (NSF) provided a grant to establish the Computer Science Network (CSNET) to provide networking services to all university computer scientists.

In 1985, NSF considered how it could provide greater access to the high-end computing resources at its recently established supercomputer centers. Because NSF intended the supercomputers to be shared by scientists and engineers around the country, any viable solution had to link many research universities to the centers.

NSFNET went online in 1986 and connected the supercomputer centers at 56,000 bits per second—the speed of a typical computer modem today. In a short time, the network became congested and, by 1988, its links were upgraded to 1.5 megabits per second. A variety of regional research and education networks, supported in part by NSF, were connected to the NSFNET backbone, thus extending the Internet's reach throughout the United States.

Creation of NSFNET was an intellectual leap. It was the first large-scale implementation of Internet technologies in a complex environment of many independently operated networks. NSFNET forced the Internet community to iron out technical issues arising from the rapidly increasing number of computers and address many practical details of operations, management and conformance.

Throughout its existence, NSFNET carried, at no cost to institutions, any U.S. research and education traffic that could reach it. At the same time, the number of Internet-connected computers grew from 2,000 in 1985 to more than 2 million in 1993. To handle the increasing data traffic, the NSFNET backbone became the first national 45-megabits-per-second Internet network in 1991.

The history of NSFNET and NSF's supercomputing centers also overlapped with the rise of personal computers and the launch of the World Wide Web in 1991 by Tim Berners-Lee and colleagues at CERN, the European Organisation for Nuclear Research, in Geneva, Switzerland. The NSF centers developed many tools for organizing, locating and navigating through information, including one of the first widely used Web server applications. But perhaps the most spectacular success was Mosaic, the first freely available Web browser to allow Web pages to include both graphics and text, which was developed in 1993 by students and staff working at the NSF-supported National Center for Supercomputing Applications (NCSA) at the University of Illinois, Urbana-Champaign. In less than 18 months, NCSA Mosaic became the Web "browser of choice" for more than a million users and set off an exponential growth in the number of Web servers as well as Web surfers. Mosaic was the progenitor of modern browsers such as Microsoft Internet Explorer and Netscape Navigator.

Privatization: 1993-1998. Commercial firms noted the popularity and effectiveness of the growing Internet and built their own networks. The proliferation of private suppliers led to an NSF solicitation in 1993 that outlined a new Internet architecture that largely remains in place today.

From that solicitation, NSF awarded contracts in 1995 for three network access points, to provide connection points between commercial networks, and one routing arbiter, to ensure an orderly exchange of traffic across the Internet. In addition, NSF signed a cooperative agreement to establish the next-generation very-high-performance Backbone Network Service. A more prominent milestone was the decommissioning of the NSFNET backbone in April 1995.

In the years following NSFNET, NSF helped navigate the road to a self-governing and commercially viable Internet during a period of remarkable growth. The most visible, and most contentious, component of the Internet transition was the registration of domain names. Domain name registration associates a human-readable character string (such as "nsf.gov") with Internet Protocol (IP) addresses, which computers use to locate one another.

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The Department of Defense funded early registration efforts because most registrants were military users and awardees. By the early 1990s, academic institutions comprised the majority of new registrations, so the Federal Networking Council (a group of government agencies involved in networking) asked NSF to assume responsibility for non-military Internet registration. When NSF awarded a five-year agreement for this service to Network Solutions, Inc. (NSI), in 1993, there were 7,500 domain names.

In September 1995, as the demand for Internet registration became largely commercial (97 percent) and grew by orders of magnitude, the NSF authorized NSI to charge a fee for domain name registration. Previously, NSF had subsidized the cost of registering all domain names. At that time, there were 120,000 registered domain names. In September 1998, when NSF's agreement with NSI expired, the number of registered domain names had passed 2 million.

The year 1998 marked the end of NSF's direct role in the Internet. That year, the network access points and routing arbiter functions were transferred to the commercial sector. And after much debate, the Department of Commerce's National Telecommunications and Information Administration formalized an agreement with the non-profit Internet Corporation for Assigned Numbers and Names (ICANN) for oversight of domain name registration. Today, anyone can register a domain name through a number of ICANN-accredited registrars.

NSF after NSFNET. The decommissioning of NSFNET and privatization of the Internet did not mark the end of NSF's involvement in networking. NSF continues to support many research projects to develop new networking tools, educational uses of the Internet and network-based applications.

Through its programs, NSF helps research and education institutions—including those serving underrepresented minorities, rural areas, and Native American reservations—make and enhance their connections to the Internet. NSF has also been instrumental in providing international connections services that have bridged the U.S. network infrastructure with countries and regions including Europe, Mongolia, Africa, Latin America, Russia and the Pacific Rim. In addition, NSF has continued to extend the reach of the highest-performance U.S. research and education networks by supporting connectivity and collaborations with their counterparts in Canada, Europe and Asia.

NSF Internet Experts
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Larry Landweber, CISE senior advisor on networking, proposed the CSNET concept in 1979 and organized the workshops that led to its creation in 1981. He was an advisor to NSF during the development of NSFNET and helped establish the first Internet gateways between the United States and countries in Europe, Asia and Latin America. llandweb@nsf.gov (mailto:llandweb@nsf.gov), 703-292-8900.

George Strawn, currently NSF's Chief Information Officer, was the NSFNET program director from 1991 to 1993. From 1993 to 1995, he was involved with defining and deploying the privatized Internet architecture, and from 1995 to 1998 as networking division director, he led NSF's efforts in the Next Generation Internet Initiative. gstrawn@nsf.gov (mailto:gstrawn@nsf.gov), 703-292-8102.

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