

-----  
Casting the Net  
-----

-----  
Caplan, Priscilla. "Will the Real Internet Please Stand Up?" The Public-Access Computer Systems Review 8, no. 2 (1997): 18-21.  
-----

It seems like only yesterday you could talk about the Internet and everyone knew what you meant. Now suddenly there seem to be more Internets than you can shake a stick at. People talk about Internet2, or the Next Generation Internet, or the Commodity Internet, but nobody talks about the plain old Internet anymore. What's going on?

Well, the plain old Internet was privatized in 1995, when NSF (National Science Foundation) discontinued direct funding for and direct access to the NSFNET backbone. Most Internet traffic is now carried on the backbones of independent Internet Service Providers (ISPs) like MCI, AT&T, and Sprint. In 1996, there were over 15 million hosts on the Internet, up from 6.5 million in 1995, with dot-com the fastest growing domain. So the Internet has become the "commercial Internet," or even the "commodity Internet." When you have more choice of ISPs than of car dealerships in your area, Internet access is indeed a commodity.

To most of us, it still looks pretty much like the same plain-old-Internet, except that suddenly there's a lot more on it. You can hardly find a newspaper or television ad that doesn't refer you to a Web site. And you're exchanging email with your whole family now, from Grandma to Uncle Max, not just your daughter at State College.

All this activity hasn't come without a price, of course, as anyone trying to do an FTP (file transfer) at 2:00 in the afternoon can attest. The network is so badly congested that we now have to think twice before subscribing to remote information services. Will response time be acceptable at all hours of the day? How many routers are there between campus and the service provider, and what happens if one goes down?

Which brings us to Internet2, which grew out of this problem but does not directly attempt to solve it. That is, if we're out of capacity for our emails and downloads, the solution is more capacity, not necessarily new technology. And you don't have to be a network engineer to know that as soon as bandwidth is added, demand will rise to clog it. So we can expect a repeating cycle of long periods of congestion interrupted by short periods of relief. It's the law of supply and be damned.

At the same time, universities have come to realize that research and instruction have sophisticated needs that cannot be satisfied by current technologies. Key applications, like virtual laboratories, distance learning, and digital libraries, will require key capabilities like visualization, sensory feedback and multi-site participation, which in turn require key network technologies, like streaming audio and video, multicast, and

synchronous communications. A network capable of supporting these applications needs more than bandwidth. It needs accounting, caching and directory services, security services, open standards for encoding audio and video, and mechanisms for requesting and guaranteeing various levels of service.

The Internet2 project, announced in October 1996, is intended to be a catalyst for collaboration and a testbed for advanced applications and the technologies that enable them. It is officially the project of roughly 100 member universities and their non-profit and corporate affiliates, and, as is often pointed out, its use will be restricted to members and intended for innovative high performance computing applications, not email for undergraduates. Member universities are expected to fund upgrades to their own campus infrastructures, support gigapops, and contribute to the project with annual dues. According to the February 1997 Project Description, "By promoting cooperation among [affiliate] organizations, government agencies and private industry, Internet2 will effectively leverage research funding, accelerate the development of campus networks, and create new standards and technologies urgently needed for advanced research, and eventually, by all Internet users."

The Next Generation Internet (NGI) is a little more nebulous than Internet2. People have been talking about the next generation Internet for some time, usually without capitals, and usually in relation to Internet Protocol version 6 (IPv6), the heir apparent to the current protocol, IPv4. (The IP problem is that the current standard can't accommodate the huge number of addresses needed on the network. If you think there are lots of hosts now, think about providing network service to private homes via cable, with 100 million households in the United States alone.)

+ Page 20 +

Most recently, however, we're hearing NGI refer to an initiative of the Clinton Administration announced in the President's 1997 State of the Union address. While the Advisory Committee on High-Performance Computing and Communications, Information Technology, and the Next Generation Internet scrambles to figure out exactly what Mr. Clinton had in mind, there is some consensus that the goals include connecting universities and national research laboratories at speeds "1000 times faster than today," promoting experimentation with the next generation of networking technologies like IPv6, and demonstrating new applications using these technologies. It sounds a lot like the goals of Internet2, with the added benefit of federal funding, a small amount of which will go to the I2 project itself.

Meanwhile, the NSF is still in the backbone business, despite having turned administration of the old backbone over to various network service providers. NSF now supports the vBNS (very high speed Backbone Network Service, actually provided by MCI) which connects supercomputer centers at gigabit speeds. Their goal is to provide a stable but leading edge network where technologies for the future like IPv6 can be built, tested, and moved to the commercial Internet. This is not exactly history repeating itself. While the original NSFNET became the commercial Internet, the new model is for coexisting networks, with technology transfer from the vBNS to the commercial Internet. But wait--the model for I2 is for eventual technology transfer to

the commercial Internet! And the model for the NGI is . . . Do I detect a pattern here?

In fact, this whole picture is starting to look more like a spin-off than a new show--Internet: The Next Generation. The Internet is and has been for some time the interconnection of a multiplicity of networks, some public and some private, some commercial and some educational, some stable and some experimental. Technology transfer has occurred, and partnerships between business, education and government have occurred, and it will all occur again. Speeds accelerate, hosts exponentiate, and we keep boldly going where we've never gone before. I'm looking forward to Internet3, Internet4, and Internet5. I hope it will be a long time before we hit The Final Frontier.

Since I always like buzzwords, we'll end with some vocabulary. Two terms you'll hear used over and over again in conjunction with all of these initiatives are "gigapops" and "quality of service." Gigapops are really fast regional network interconnect and aggregation points. Their basic function is to exchange traffic with specified bandwidth and other quality of service features.

+ Page 21 +

Quality of service (QoS) is the concept that network applications can specify and be guaranteed their requirements for certain services, such as communications speed, reliability, loss rate, or latency. Guaranteed bandwidth, an important component of QoS, can be reserved with the emerging reservation protocol, RSVP (Resource Reservation Protocol).

For more information on I2, see the project's home page at <URL:http://www.internet2.edu>. The concept paper for the NGI is at <URL:http://www.hpcc.gov/ngi-concept-08Apr97/>.

For advanced and high-performance networking see the NCRI (Networking and Communications Research and Infrastructure) home page at <URL:http://www.cise.nsf.gov/ncri> or the vBNS Web at <URL:http://www.vbns.net>. Finally, for a spiffy Internet time line to put things in perspective, see The History of the Internet at <URL:http://www.davesite.com/webstation/net-history.shtml>.

About the Author

Priscilla Caplan, Assistant Director for Library Systems, University of Chicago Library, 1100 E. 57th Street Chicago, IL 60637. Internet: p-caplan@uchicago.edu.

About the Journal

The World-Wide Web home page for The Public-Access Computer Systems Review provides detailed information about the journal and access to all article files:

<http://info.lib.uh.edu/pacsrev.html>

Copyright

This article is Copyright (C) 1997 by Priscilla Caplan. All

Rights Reserved.

The Public-Access Computer Systems Review is Copyright (C) 1997 by the University Libraries, University of Houston. All Rights Reserved.

Copying is permitted for noncommercial, educational use by academic computer centers, individual scholars, and libraries. This message must appear on all copied material. All commercial use requires permission.