

## Editorial

# Internet2: SUPER INTERNET?

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Coming soon to a high speed connection near you – "Internet2". Just as the Internet began in the early 1970s as a means for U.S. military contractors (both companies and universities) to communicate with the U.S. Department of Defense, the next generation of electronic communication, Internet2, has a similar origin. The original Internet, called ARPAnet for Advanced Research Projects Agency, later "merged" with NSFnet (U.S. National Science Foundation) and the basis was there to connect more and more local area and wide area networks (LAN's and WAN's) (NEWLAND, 1997). Internet2 is a collaborative project by over 120 U.S. research universities in partnership with industry leaders and U.S. federal agencies. The mission statement of Internet2 is to "facilitate and coordinate the development, deployment, operation and technology transfer of advanced, network-based applications and network services to further U.S. leadership in research and higher education and accelerate the availability of new services and applications on the Internet."

The need for Internet2 results from the extraordinary explosion of the current Internet, due primarily to the graphical-based World Wide Web (WWW), and the popularity of multimedia, both broadband width consumers. Today, speed and access to the Internet have become significant limiting factors. With this in mind, The National Science Foundation entered into a partnership with MCI (telecommunications company) to create the very high performance Backbone Network Service (vBNS). The vBNS, established in 1995, is an investment of about \$50 million (US) in a 5-year cooperative project. In October, 1996, President Clinton announced the Next Generation Internet (NGI) and pledged \$100 million to encourage partnerships between academia, industry and government for research and collaboration. The NGI related activities budget for 1998 is approximately \$10 million.

The vBNS network links five NSF supercomputer centers (National Center for Supercomputing Applications, San Diego SCC, Pittsburgh SCC, National Center Atmospheric Research, and Highway 1) in the U.S., and will eventually connect up to 100 research institutions. The network currently runs at 622 megabits per second and is expected to operate at 2,400 mbps by the year 2000. To put this into perspective, modern modems and telephone lines are currently limited to about 0.056 megabits per second (56 kbps). A T1 connection, which many businesses and universities have, operates at 1.54 mbps and a T3 line at about 45 mbps. While the T1 and T3 connections are very fast for those who have them, the limiting factor on the Internet is quite often a "bottleneck" (router, switchers, etc.) somewhere between the sender and the receiver. Internet2 will minimize those types of restrictions within its system.

The University Corporation for Advanced Internet Development (UCAID), a non-profit consortium led by university members working in partnership with corporate and affiliate members, provides leadership and direction for advanced networking development within the U.S. university community. Its activities include the

Internet2 project, as well as other programs devoted to network research, technology transfer, and collaborative activities in related fields such as distance learning and virtual education technology.

On April 14, 1998, U.S. Vice-President Al Gore initiated Abilene, an Internet Protocol (IP) network Abilene is being developed by the UCAID, through access to the nationwide Qwest fiber optic network. Hardware, software, and technology is provided by Cisco Systems and Nortel-Northern Telecom. With initial operation expected to begin before the end of 1998, and completion by the end of 1999, the Abilene project will initially operate at 2,400 megabits per second. Development of additional links running at 9,600 megabits per second will provide high speed networking capabilities to the member universities of UCAID. Project plans call for Abilene to interconnect with existing advanced research and education networks, such as vBNS, and play a role in the federal government's NGI initiative.

The need for increased speed and access becomes obvious to anyone who spends very much time on the Internet, and especially the WWW. Downloading data, or even just establishing a connection can be excruciatingly slow! Downloading large graphical files from environmental data bases (as is frequently necessary for environmental scientists utilizing satellite or Space Shuttle data) may require one to begin the download before going home in the evening - then hoping that no interruptions occur during the long process that would cause you to start over.

What will Internet2 do for the average Internet user? Well, as Douglas E. Van Houweling, President of UCAID, has said "To be truly successful, the technology developed to build Internet2 must migrate to commercial networks". (VAN HOUWELING, 1998) Corporate involvement in Internet2 is essential. In fact, AT&T (another telecommunications company) in May, 1998, committed to becoming a partner in the development of Internet2 – it is coming!

### WWW Sites related to Internet2

<http://www.internet2.edu/>  
<http://www.vbns.net/>  
<http://www.cise.nsf.gov/anir/hp-connections.html>  
<http://www.nlanr.net/>  
<http://www.cise.nsf.gov/anir/>  
<http://www.ucaid.edu/>

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 VAN HOUWELING, Douglas: Building the Internet's Future: Internet2, UCAID and NGI. *Educom Review* 33 (3):17-20. (1998).