



LEADING THE WAY TO TOMORROW'S INTERNET



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Quote of the Month

Vint Cerf, one of the founders of TCP/IP recently joked about the number of addresses available after the conversion to Internet Protocol Version 6 (IPv6) "while I can't guarantee that will be enough," he estimated that 28 bits falls "just short of being enough to house an address for every star in the Milky Way. After that, I'll be dead and somebody else can worry about it." In a Growth Forecast Cerf also said that the way things are going now, an "intergalactic Internet" is not out of sight.

CENIC News

Stanford's HighWire Press Celebrates Addition of 330,000th Free Article

HighWire Press recently welcomed the 100th scientific journal that provides free back issues online and uploaded the 330,000th free article. Those figures make HighWire -- a Stanford University Libraries program that hosts the online editions of leading scientific journals -- the world's largest database of free life science articles and second in size only to NASA among free scientific article databases.

"Not only is HighWire the largest archive of free literature in the life sciences, but it is perhaps the most important such archive for the researcher," said director John Sack. "Nearly half of the 200 most-frequently-cited journals in science and medicine are found here."

About 50 journals are planning with HighWire to load extensive archives of issues back to the 1980s; most of this content will be freely available online. To help researchers identify articles available to them without charge, HighWire has redesigned its main website. The redesign includes a new search engine that labels articles in a search result to show which full-text articles are freely available or available through the searcher's institutional affiliation. The new site also offers complete, one-step integrated searching of 13 million Medline abstracts and 600,000 HighWire-based full-text articles, with a total of 1,200,000 links to full-text content.

For details visit: <http://highwire.stanford.edu/lists/freeart.dtl> and <http://mywire.stanford.edu>

Source: Stanford University

Digital California Network Progress Report

By mid-month 62 of the 71 first round node sites have been certified as meeting all original node site requirements. Equipment for nine of the twelve backbone hub sites has been configured and installed, and twenty-four (24) first round DCP node sites are currently connected to the backbone. The installation schedule calls for an additional nine (9) node site installations this calendar year, mostly in November. This

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will bring the total of installed node sites by year's end to 33 out of 71, or 46% of the Round One node sites. For future reference, the DCP implementation schedule can be viewed online at the following URL: <http://www.cenic.org/nid/Nodes.html>.

Hub equipment has been configured and installed at the Bakersfield, Anaheim, Fresno, Stockton, Chico, Cal Poly SLO, WestEd, San Diego and Salinas PoPs. Various issues still need to be resolved at the three remaining DCP hub sites.

ISP services for the network were delivered as scheduled effective 10/31/01. Additional Internet drains for redundancy and robustness of the network are in the process of being installed.

Source: Edwin Smith, Network Implementation Project Manager

Pushing the Pyramid - CENIC's Network Development and Evolution is Now 3-D

CENIC's Optical Network Infrastructure (ONI) initiative is establishing a multi-tiered advanced networking services fabric to serve all research and education in California. This new fabric encompasses the three newly named entities - CalREN-XD - CENIC's experimental and developmental network; CalREN-HPR - CENIC's high performance research network; and CalREN-DC - CENIC's Digital California Network.

This new structure has been illustrated in a pyramid graphic which has been transformed into a 3-D pyramid that can be invaluable when explaining the ONI. If you would like to receive a pyramid for yourself or to distribute on your campus, please drop a note to editor@cenic.org. Include your mailing address and the number of pyramids you'd like.

National Networking News

Demonstrations of the TeraGrid

The research exhibit for the National Partnership for Advanced Computational Infrastructure (NPACI <http://www.npaci.edu>), at the SuperComputing 2001 exhibition in mid-November featured applications and technologies that will fuel future accomplishments in fields, ranging from astrophysics to proteomics. Partners demonstrated the latest NPACI innovations: personalized grid portals, extreme data storage software, large-scale interactive visualization tools, global network monitoring, and educational programs. The NPACI exhibit also housed a glimpse into the future of grid computing-a prototype data-intensive TeraGrid node.

The NPACI exhibit gave conference attendees their first chance to see the TeraGrid in action. The configuration on the exhibit floor included an IBM Linux cluster with 32 Intel IA64 processors and a 7-terabyte storage-area network anchored by a Sun Fire 6800 server from Sun Microsystems. NPACI demonstrations on the prototype TeraGrid included:

- **Biodiversity Prediction:** The WhyWhere application by David Stockwell of the San Diego Supercomputer Center (SDSC <http://www.sdsc.edu>), combines a massive database of environmental and satellite data, efficient image processing algorithms, and grid-based cluster computing into a search and mapping system that allows biodiversity researchers to answer the question, "Where is it and why?" for any species, anywhere on the globe.
- **Oil Reservoir Simulation:** Joel Saltz of Ohio State University and Alan Sussman from the University of Maryland conducted exploration and visualization of ensembles of oil reservoir simulations. This activity, a collaboration with the University of Texas Center for Subsurface Modeling (<http://www.ticam.utexas.edu/CSM/home.html>), provides an efficient and cost-effective means for accurate characterization of oil reservoirs, which has strategic, economic, and environmental benefits.
- **Protein Fragment Matching:** In a matter of hours, the parallel version of the Sequest code running on Linux clusters and demonstrated by SDSC's Amit Majumdar, matches peptide fragments to an existing protein database by comparing tandem mass spectrometry output to the appropriate protein or DNA database.

The National Partnership for Advanced Computational Infrastructure (NPACI) unites 48 universities and research institutions to build the computational environment for tomorrow's scientific discovery. Led by UC San Diego and the San Diego Supercomputer Center (SDSC), NPACI is funded by the National Science Foundation's Partnerships for Advanced Computational Infrastructure (PACI) program and receives additional support from the State and University of California, other government agencies, and partner institutions. The NSF PACI program also supports the National Computational Science Alliance. For additional information about NPACI, see <http://www.npaci.edu/>

Source: NPACI

First Uncompressed Real-time Gigabit HDTV Transmission Across Wide Area IP Network

Working in collaboration the University of Washington, the University of Southern California Information Sciences Institute (USC/ISI) and Level 3 Communications, Inc., and Tektronix, Inc. successfully demonstrated the first transmission of uncompressed real-time gigabit high-definition television (HDTV) signals over an Internet Protocol (IP) optical network. The demonstration was conducted as part of the SuperComputing 2001 conference in mid-November at the National Coordination Office for Information Technology Research and Development booth.

The HDTV transmission demonstration proved that Universal Network Access System (UNAS) technology has met the critical requirements to distribute challenging high-speed streaming data (which requires that the entire data stream be sent together), such as uncompressed HDTV signals, over IP networks. Although large amounts of data are sent over proprietary or ATM networks today, IP transmission is expected to be the preferred method of delivery as it becomes the most cost-effective method of rapidly sending information - including voice, video and data - over the Internet. The UNAS project is supported by the Defense Advanced Research Project Agency Information Technology Office's (DARPA/ITO) Next-Generation Internet (NGI) program.

Leading up to the demonstration, the key enabling technologies were tested and refined using the high-performance networks of the Pacific Northwest Gigapop and Mid-Atlantic Crossroads, as well as the Internet2 Abilene backbone network. During the demonstration, the digital video content was sent from UW's

laboratories in Seattle, Washington, to the receiver at the SuperComputing 2001 exhibition hall in Denver via Level 3's advanced IP fiber-optic network. The demonstration set a new standard for Internet performance by streaming digital video at 1.5 Gb/s-more than 25,000 times faster than a typical computer modem.

The ResearchChannel provided the streaming HD content via Pacific Northwest Gigapop's ultra-high performance 'Pacific Wave' exchange facilities, and along with the UW, the custom high performance multimedia server. Level 3 provided the network over which the transmission occurred. The Tektronix technology allowed video processed as data packets to be sent, received and compiled into play-out streams. Tektronix technology was used to compare packets at the input and output to determine if packets were lost or reordered during the transmission.

Source: Textronic, Inc.

New US Science Advisor Confirmed

The US Senate has confirmed President Bush's nomination of John H. Marburger, III as Science Advisor and Director of the Office of Science and Technology. He was most recently the Director of the U.S. Department of Energy's Brookhaven National Laboratory and President of Brookhaven Science Associates. He is presently on a leave of absence from the State University of New York at Stony Brook where he served as President and Professor from 1980 to 1994 and as a University Professor of Physics and Electrical Engineering from 1994 to 1997. Marburger served as the Dean of the College of Letters, Arts and Sciences at the University of Southern California from 1976 to 1980. He has been a member of numerous professional, civic and philanthropic organizations including the Universities Research Association, the Advisory Committee to the New York State Senate Committee on Higher Education and the Board of Directors of the Museums at Stony Brook. He is a graduate of Princeton University and received a Ph.D. in Applied Physics from Stanford University.

"I believe my professional career over the last three decades - as a Professor of physics and electrical engineering, as a university Dean and President, and as the Director of the Department of Energy's Brookhaven National Laboratory - has provided me with the knowledge and experience to meet the needs and expectations of this office," Marburger stated at his confirmation hearing. He promised to "seek the counsel and wisdom of the best minds in the science and engineering community," and to "ensure that our science and technology portfolio is responsive to Presidential and Congressional intent, that our cross-cutting programs are well-coordinated, and that our research and development funds are efficiently used."

Appropriations Bill Sent to the President for Signature

The House & Senate Conferees have sent to the President the appropriations bill which includes budget allocations the National Science Foundation for FY 2002. The bill includes \$3,598,340,000 for research and related activities. The conferees have included bill language which provides up to \$300,000,000 for polar research and operations support and \$75,000,000 for a comprehensive research initiative on plant genomes for economically significant crops.

The conference agreement provides specific funding levels for each of NSF's research activities includes \$ 515,800,000 for Computer and Information Science and Engineering. Up to \$10,000,000 of the appropriated level may be used for operational support of the two terascale facilities. Research funding was also provided for programs in Plant Genetics, Engineering, Geosciences, And Social Behavioral and Economic Sciences. \$922,190,000 was appropriated for Mathematical and Physical Sciences research. Of the appropriated amount, \$4,000,000 is provided for the Telescope Systems Instrumentation Program (TSIP) and \$5,000,000 has been provided for astronomical sciences to augment individual investigator support. The conferees expect NSF to continue its program of upgrading, on a priority basis, its astronomical facilities and equipment, including the Greenbank Observatory and Robert C. Byrd Telescope in West Virginia, and the Very Large Array radio telescope in New Mexico. The conferees have also placed a high priority on mathematics research within the amounts provided for this activity.

In presenting the Budget Estimates and Justification Materials for fiscal year 2003 and beyond, the conferees direct the Foundation to provide five-year plans for all multi-disciplinary programs which specify, among other details, the funding level and justification for each program or project.

Major research equipment and facilities construction appropriations included \$138,800,000 for major research equipment and facilities construction. The specific facilities funded \$16,900,000 for the Large Hadron Collider; \$24,400,000 for the Network for Earthquake Engineering Simulation; \$35,000,000 for continued development, production, and instrumentation of the High-Performance Instrumented Airborne Platform for Environmental Research (HIAPER); \$35,000,000 for Terascale Computing Systems; \$ 15,000,000 for start-up costs of the IceCube Neutrino Detection project; and \$12,500,000 for initial construction of the Atacama Large Millimeter Array (ALMA) radio telescope.

The conferees note that the amount provided for Terascale Computing Systems represents the initial segment of a three-year program expected to cost no less than the budget request of \$55,000,000. While the conferees remain committed to this program as outlined by the Foundation, it was determined that funding the program on an annual basis made it possible to provide adequate resources to other priority projects.

As part of the bill, Congress also appropriated \$5,000,000 for a new undergraduate workforce initiative, which is to include a new, merit-based, competitive grants program for colleges and universities for increasing the number of undergraduate degree recipients in science and engineering. In addition, \$ 105,500,000 has been provided to increase graduate level stipends for the research and teaching fellowship programs and the trainee program administered by the Foundation through its Graduate Education subactivity. Finally, \$2,600,000 above the budget request for the Human Resource Development subactivity has been provided to establish an initiative that will stimulate the competitive research capacity of Historically Black Colleges and Universities which offer doctoral degrees in science and engineering.

Source: <http://thomas.loc.gov>

Pew Studies People Participating in Online Groups

The Pew Internet & American Life Project (<http://www.pewinternet.org>) creates and funds original, academic-quality research that explores the impact of the Internet on children, families, communities, the work place, schools, health care and civic/political life. The Project aims to be an authoritative source for timely information on the Internet's growth and societal impact, through research that is scrupulously impartial.

In a recently released study, the Project revealed that more than 90 million people have participated in online groups. Many of these people use the Internet to connect with online communities that embrace their hobbies, their professions, their passions, and their beliefs. Of course, the Internet allows tens of millions of Americans to participate in a thriving social world where they enjoy serious and satisfying contact with online communities. Nearly 85% of Internet users have contacted an online group. That means that more Americans have used the Internet to contact a group than have gotten news online, or searched for health information, or bought a product.

Many of these online groups are far flung and allow Internet users to connect easily with others around the world who share their passions, beliefs, hobbies, and lifestyles. At the same time, 26% of online Americans use the Internet to intensify their connection to their local community by planning church meetings, organizing neighborhood gatherings, arranging local sports league operations, coordinating charity activities, and petitioning local politicians.

The Project believes these findings represent some hopeful news that the Internet can be a tool for vigorous social engagement, rather than a technology that spurs isolation and alienation among users.

Here are some interesting findings from the study report entitled, "Online Communities: Networks that nurture long-distance relationships and local ties":

- 50% of those who participate in online groups say the Internet has helped them get to know people they would not otherwise have met.
- More than a third (37%) of those who participate in online groups say the Internet has helped them meet others from different generations than their own.
- More than a quarter (27%) of those who participate in online groups say the Internet has helped them connect with people from different racial, ethnic, or economic backgrounds than their own.
- A surprisingly large number of those contacting online groups (56%) say they became active in a group -- even traditional, offline organizations -- after they began communicating with it over the Internet.

The Pew Internet & American Life Project is a non-profit initiative of the Pew Research Center for People and the Press. Andrew Kohut, the head of the Pew Research Center, will serve as an advisor to the Pew Internet & American Life Project and the chair of its board. Support for the project is provided by The Pew Charitable Trusts. The Tides Center in San Francisco administers the Project's grant from Pew.

Source: Pew Internet & American Life Project

Brain Imaging Research Data Will Be Shared In New Research Network

The National Center for Research Resources (NCRR), a component of the National Institutes of Health, has awarded more than \$20 million to a consortium of universities coordinated by the University of California, San Diego (UCSD) to build the first nationwide high-performance computer environment to study diseases of the brain. Researchers linked over a high-speed network will share high-resolution animal and human brain images to allow analysis and comparison at many different scales. These capabilities will be the means for cross-institutional integration of data and expertise that can advance research on such brain-related diseases as multiple sclerosis, schizophrenia, Alzheimer's disease, and Parkinson's disease. The Biomedical Informatics Research Network (BIRN), will be the nation's first test bed for sharing and mining data effectively in a site-independent manner for both basic and clinical research. BIRN will enable researchers to put into practice a multi-institutional, collaborative, technology-enabled approach that will be key to progress in neuroscience and medical science generally.

UCSD will establish the Coordinating Center for the national BIRN project with information technology contributions from the NSF-supported National Partnership for Advanced Computational Infrastructure (NPACI), the San Diego Supercomputer Center (SDSC), and the newly formed California Institute for Telecommunications and Information Technology [Cal-(IT)?]. BIRN is a major extension of a current grant to the NCRR's National Biomedical Computational Resource (NBCR), operated by UCSD (through CRBS). NBCR develops and deploys computational tools to benefit the biomedical community. CRBS will coordinate participation by the School of Medicine and campus researchers in biomedical areas.

The BIRN Coordinating Center at UCSD will work with Duke University, Massachusetts General Hospital, Brigham and Women's Hospital, Caltech, UCSD's School of Medicine, and UCLA to establish large-scale network connections and data-sharing facilities for the BIRN research projects. Advanced networking for BIRN will be developed using the Internet 2/Abilene high-speed infrastructure. Eventually, BIRN will use the large-scale distributed supercomputing resources of the TeraGrid, being established by NSF under the Partnerships for Advanced Computational Infrastructure (PACI) program.

TeraGrid, the most powerful computing environment ever proposed for scientific research, will facilitate the acquisition and correlation of the huge, complex datasets. "It's a tremendous computational challenge to perform comparisons on the vast amount of data that will be collected by the BIRN sites," said Fran Berman, director of SDSC, one of four TeraGrid sites. "BIRN will be an ideal test-bed for the national cyberinfrastructure, bringing together the hardware and software necessary for a scalable network of databases and computational resources."

Source: UCSD School of Medicine

Internet2 News & Events

Joint Techs Workshops scheduled for January, 2002

The next Joint Techs Workshop will be hosted by Arizona State University in Tempe, Arizona beginning with tutorial sessions on Sunday afternoon, January 27, 2002. The plenary will start Monday morning, and the Workshop will conclude on Wednesday, January 30. The Joint Techs Workshop will feature a variety of topics and BoFs, with a focus on technology and the application of videoconferencing. Further details, including hotel information and registration are on the web via the NCNE NLANR page <http://www.ncne.nlanr.net/training/techs/2002/0127/jt-info.html>.

Peer-to-Peer Workshop, January, 2002

"Collaborative Computing in Higher Education: Peer-to-Peer and Beyond" has been rescheduled for January 30-31, 2002 in Tempe, Arizona. The workshop will take place at the end of the Internet2/NLANR Joint Techs Workshop which will also be taking place in Tempe, Arizona. Details on accommodations and registration can be found at the Workshop website <http://www.internet2.edu/activities/html/p2pworkshop.html> . If you have any questions, please contact Linda Roos lroos@oar.net or Ana Preston apreston@utk.edu.

Internet2 Digital Video Initiative

As part of the Virtual Internet2 Member Meeting, the Internet2 Digital Video Steering Committee organized a virtual working group meeting via videoconference as did the Videoconferencing Subcommittee. The session used H.323 technology and the CIC MCU's (Multipoint Control Units), supported by Bob Dixon and his staff at Ohio State University. Also, on behalf of the I2DV Steering Committee, Doug Pearson organized several Internet2 Digital Video sessions at the TeleCon West Conference in Los Angeles, to present an overview of I2 digital video activities. Several members of the Steering Committee participated. For more information about the Internet2 Digital Video Initiative, please contact Joe Mambretti, j-mambretti@nwu.edu or <http://www.teleconexpos.com/> Internet2 Digital Video Initiative: <http://dv.internet2.edu/>

Directories

The MACE Dir Groups sub-group is developing an implementation document similar to the LDAP Recipe guide. A draft version will be available by the end of November and the final version will be completed by the end of January. Information about the Groups work is available at: <http://middleware.internet2.edu/dir/groups/>

HEPKI

The draft generic Certificate Policy (CP) for Higher Education, primarily the work of David Wasley, University of California Office of the President, with contributions from Internet2, EDUCAUSE and CREN representatives, has been completed and is now available for comment. Send comments to mw-cp-comments@internet2.edu . The document can be found at: <http://middleware.internet2.edu/certpolicies/>

Early Adopters

Early Adopters presented middleware implementation case studies in a pre-conference seminar at EDUCAUSE 2001. Discussion drafts of the sample Middleware Business Case and Writer's Guide were announced and distributed. The documents are now available on the website for comment. Send comments to mw-buscase-comments@internet2.edu. <http://middleware.internet2.edu/earlyadopters/>

NSF Middleware Initiative (NMI)

The NSF Middleware Initiative (NMI) Internet2/EDUCAUSE/SURA team is refining statements of work and work plans and drafting test bed plans and dissemination plans. The team also has weekly conference calls with NSF and GRIDs Center participants with the current focus on identifying a set of integrated objectives for the first year.

VidMid

The VidMid Videoconferencing (VC) working group is holding a meeting in November to discuss various architectural issues such as LDAP infrastructure for H.323, security models for videoconferencing, the draft workplan, development of a test bed and test plan with milestones, and evolution of the plans for SIP. The Video on Demand (VoD) working group is discussing ACLs and metadata. Information about VidMid activities is available at: <http://middleware.internet2.edu/video/>

End-to-End Performance Initiative (E2Epi) Call for Participation: Your Stories

E2Epi is issuing a Call for Participation (CFP) to its members, asking them to propose compelling best current practices to allow end users and support staff to resolve performance problems routinely and consistently. For further information and guidelines, please see the E2Epi Call for Participation: http://www.internet2.edu/e2epi/cfp_01.shtml

E2Epi Technical Advisory Group (TAG)

The E2Epi Technical Advisory Group (TAG) will now meet regularly via conference call every 2nd and 4th Wednesday of the month at 1pm ET/10am PT. The next meeting will be held November 14, 2001. A face-to-face meeting is still in the works for the Joint Techs Meeting at Arizona State University in January 2002. Please check the Web site for future announcements and updates regarding the TAG: http://www.internet2.edu/e2epi/tag_01.shtml

Source: Internet2 Update

About CENIC

CENIC is a not-for-profit corporation formed by the California Institute of Technology, the California State University, Stanford University, the University of California, and the University of Southern California to facilitate and coordinate the deployment, development, and operation of a set of seamless and robust advanced network services. The CENIC Associates program offers qualified companies the opportunity to collaborate with CENIC in pursuit of the goal of providing the most advanced network services for research and education. Cisco Systems, Nortel Networks, Pacific Bell, and the University and Community College System of Nevada are CENIC's Partner Associates.

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